

September, 1948

40 Cents

QST

devoted entirely to

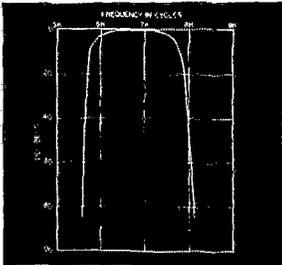
amateur radio



PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

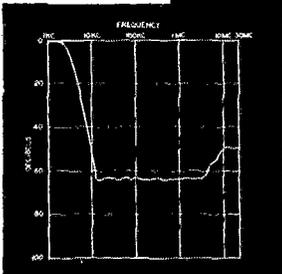
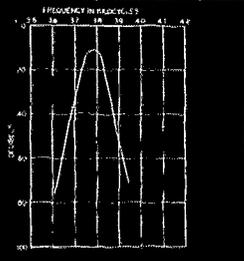
We illustrate the units below for the information they bring to engineers of "What can be done." A large part of UTC production, however, is on catalogued and special material of more standard nature. UTC quality has world-wide recognition on ALL types of transformer components.

FOR FILTERS



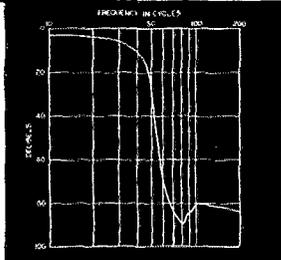
**BROAD BAND
SHARP CUTOFF
FILTER**

**NARROW BAND
SHARP CUTOFF
FILTER**

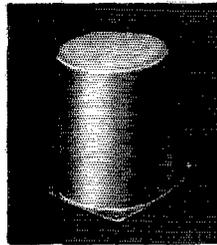


**ATTENUATES
10KC TO 30
MEGACYCLES**

**LOW FREQUENCY
— LOW PASS
FILTER**



FOR TRANSFORMERS



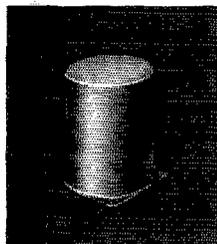
This high gain transformer is used in a 60 cycle chopper circuit for measuring small DC voltages—primary inductance 10 Hys. Ratio 250:1 — 100 DB of shielding.



This unit weighs but 1.3 oz. The rectifier in which it is employed delivers 2000 V DC with vibrator-battery input.



This input transformer was the perfect answer for an amplifier with a difficult hum problem. The locking universal joint mounting permits orientation to point of minimum hum level.



This pulse transformer has tight requirements. Frequency response is ± 3 DB from 80 KC to 4 MC.

Write for our Catalog PS-408

United Transformer Co.

150 VARICK STREET

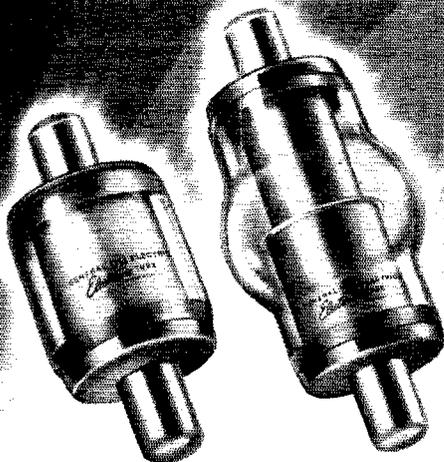
NEW YORK 13, N. Y.

EXPORT DIVISION: 13 EAST 40TH STREET, NEW YORK 16, N. Y.

CABLES: "ARLAB"

"BAND-HOPPING"

... it's easier with G-E vacuum capacitors!



GL-1L38
(50 mmfd, 9 kv)

GL-1L23
(50 mmfd, 20 kv)



G-E vacuum capacitors come in 5 capacitances (6, 12, 25, 50, and 100 mmfd), and in 2 peak voltages (9 kv and 20 kv ICAS). Shown above are the 50-mmfd types for both voltages. Their low prices, which your nearby G-E tube distributor will be glad to quote, make these capacitors real economy buys!

TIRED of working the same band, day-in and day-out? If your rig won't perform on one of the lower bands, try adding vacuum capacitors (the cost is very moderate). Chances are, this will enable you to reach the desired lower band at will.

Keep your present variable capacitor . . . no need to invest in a new, bulky, high-capacitance variable. Merely *add fixed capacitance* in the form of G-E vacuum capacitors—remembering that it's vital to have enough capacitance at the lower frequencies to maintain the proper Q!

Amateurs wanting to hold down final harmonics in this manner, will find guidance in G.E.'s *Ham News* for September-October (Technical Tidbits section). Moreover, the "do"s and "don't"s of applying vacuum capacitors are listed to an extent which makes this article fundamental ham read-

ing. See your G-E tube distributor for your free copy.

G-E vacuum capacitors are small, space-saving. You can rely on their performance at peak voltages—ratings are conservative. By reason of ultra-compact design, they add less inductance to your circuit, thus reducing parasitic oscillations. 10 types are available, as explained at the left, meeting every amateur need. Your G-E tube distributor will be happy to give you further facts, or write *Electronics Department, General Electric Company, Schenectady 5, New York.*

- Hams attending the A.R.R.L. National Convention at Milwaukee, Sept. 4 to 6, will find G.E.'s exhibit a high-spot for interest. Plenty to see and study, plus a warm welcome from Lighthouse Larry to his visiting friends!

Copyright 1948 by General Electric Company

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL  ELECTRIC

161-GA9-8850

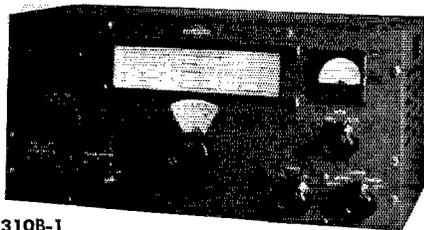
More contacts, more quickly, easily,

with a . . .

COLLINS PTO Exciter Unit

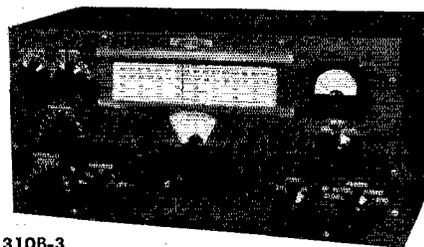
All these Collins exciters give you the flexibility of variable frequency, with the accuracy of calibration and remarkable stability inherent in the 70E-8A PTO around which they are engineered. The slide rule dials of both the 310B series and 310C series roughly indicate operating frequency, while their vernier dials read directly in kilocycles. See them at your Collins dealer's. If you don't know him write us for his name and address. And stop by our booth at the National ARRL Convention in Milwaukee, September 4, 5, and 6.

The 310B-1 is a versatile, bandswitching, self-powered unit with an input of 40 watts on all ham bands under 32 mc. Output coupling is by means of a link in the plate tank coil. The tube complement consists of 1—6SJ7 PTO, 3—6AG7 multipliers, 1—2E26 r-f amplifier, 1—6SL7GT sidetone oscillator, 1—5R4GY H. V. rectifier, 1—5Z4 L.V. rectifier, 1—6H6 bias rectifier, 1—VR105 voltage regulator, 1—VR150 voltage regulator. Price, \$190.00.

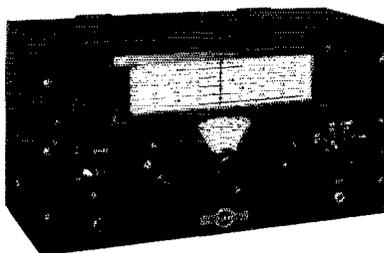


310B-1

The 310B-3 has a series-parallel tunable matching antenna network, of the universal type, which will match balanced or unbalanced antenna systems over a wide range of impedances. Otherwise it is identical with the 310B-1. It makes a fine standby transmitter, is excellent for spot frequency network and, because of its low power requirements, for emergency work. Also, it is unexcelled for the beginner. Later, when more power is called for, he has only to add the final amplifier stage. Price, \$215.00.



310B-3



310C-1 and 310C-2

The 310C-1 exciter is a straightforward unit consisting of a 70E-8A and a multiplier, with an r-f output of approximately 80 volts rms across 40,000 ohms. Its output frequency range is from 3.2 mc to 4.0 mc. The output of the 310C-1 can be plugged into the crystal socket, or applied to the grid of an 807 buffer stage, providing crystal accuracy and stability with greater versatility than a large number of crystals would afford. Price, \$85.00.

The 310C-2 is identical with the 310C-1, but with self-contained power supply. Price, \$100.00.

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, New York 18, New York

458 South Spring Street, Los Angeles 13, California

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

STAFF

Editorial

KENNETH B. WARNER, W1EH
(Managing Secretary, ARRL)
Editor

HAROLD M. MCKEAN, W1CEG
Assistant Editor

GEORGE GRAMMER, W1DF
(Technical Director, ARRL)
Technical Editor

DONALD H. MIX, W1TS
BYRON GOODMAN, W1DX
Assistant Technical Editors

EDWARD P. TILTON, W1HDO
V.H.F. Editor

RICHARD M. SMITH, W1FTX
C. VERNON CHAMBERS, W1JEQ
JOHN W. PADDON, VE3QV

Technical Assistants

ROD NEWKIRK, W9BRD
DX Editor

WALTER E. BRADLEY, W1FWH
Technical Information Service

Production

RALPH T. BEAUDIN, W1BAW
Superintendent

NANCY A. PRICE
Assistant

Advertising

F. CHEYNEY BEEKLEY, W1GS
LORENTZ A. MORROW, W1VG
EDGAR D. COLLINS

Circulation

DAVID H. HOUGHTON

Circulation Manager

RALPH T. BEAUDIN, W1BAW
Assistant Circulation Manager

OFFICES

38 La Salle Road

West Hartford 7, Connecticut

Subscription rate in United States and Possessions, \$4.00 per year, postpaid; \$4.50 in the Dominion of Canada, \$5.00 in all other countries. Single copies, 40 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.

Copyright 1948 by the American Radio Relay League, Inc. Title registered at U. S. Patent Office.

—CONTENTS—

"It Seems to Us..."	9
CU in Milwaukee!	10
Our Cover	10
In QST 25 Years Ago This Month	10
A Surplus-Parts Bandswitching Transmitter (Part I) C. Vernon Chambers, W1JEQ	11
A Peaked Audio Amplifier for Communication Receivers G. D. Hanchett, jr., W2YM	16
Antenna Matching with Line Segments John G. Marshall, W0ARL	18
The "Monitone" J. W. Paddon, VE3QV	22
WWV Schedule	24
Happenings of the Month	25
Accurate Frequency Measurement Louis A. Williams, W4JUI	28
Some Thoughts on 10-Meter Mobile R. V. Anderson, W3NL	33
"QRR . . . the Dike Is Broken!" Allen N. Davis, W7DIS	38
Hidden-Transmitter Hunts for Everyone A. E. Hudson, W2OMD	40
I.A.R.U. News	41
On the Air with Single Sideband	42
September V.H.F. QSO Party . . . F. E. Handy, W1BDI	43
A Novel Converter for 144 Mc. . R. S. Wenger, W3EWR	44
Coming ARRL Conventions	47
Hamfest Calendar	48
Silent Keys	48
"How's My Modulation?" J. L. Hollis, W0JET, ex-W8TMZ	49
Your QSL Manager	51
Correspondence from Members	52
Triple Conversion for the Communications Receiver William I. Orr, W6SAI	53
Hints and Kinks	56
How's DX?	58
The World Above 50 Mc.	60
Operating News	62
Station Activities	70

See the latest
hallicrafters
EQUIPMENT

on display in our booth at the

ARRL NATIONAL
CONVENTION

Milwaukee, September 4, 5, 6

73

Bice Halligan W9WZE
White Wist W9TDF
Fritz Franke
Charlie Merrill W9PTC

hallicrafters
RADIO

The **hallicrafters** *Co.*

4401 W. FIFTH AVE., CHICAGO 24, ILL.

Manufacturers of
PRECISION RADIO AND TELEVISION EQUIPMENT

Still Tops...

in Versatility and Coverage

SX-42 **\$295⁰⁰**
AM 540KC to 30 MC
FM 27MC to 108 MC



SX-43 **\$179⁵⁰**
AM 540KC to 55 MC
FM 44-55 and 88-108 MC

All Amateur Bands through 6 meters plus FM and Standard Broadcast. A radio man's dream of outstanding performance come to life. See either of these models at your local hallicrafters Dealer. Other receivers from \$47.50.

The **hallicrafters** Co.

4401 W. FIFTH AVENUE, CHICAGO 24, ILLINOIS

MANUFACTURERS OF *Precision* RADIO AND TELEVISION EQUIPMENT

Section Communications Managers of the ARRL Communications Department

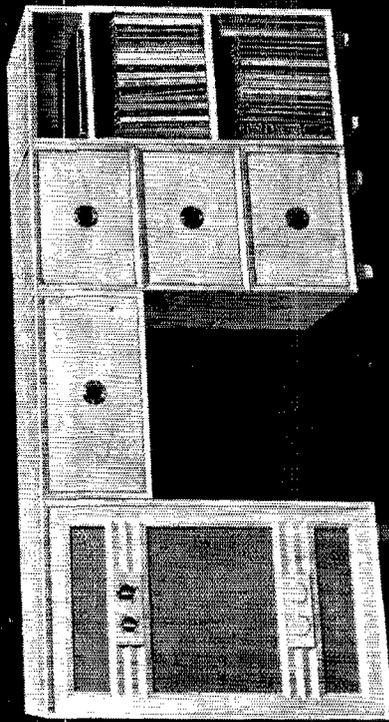
Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in QST. All ARRL Field Organization appointments are now available to League members. These include ORS, OES, OPS, OO, and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, *all amateurs* are invited to join the ARRL Emergency Corps (ask for Form 7).

ATLANTIC DIVISION			
Eastern Pennsylvania Maryland-Delaware-D.C. Southern New Jersey Western New York Western Pennsylvania	W3BES W3BWT W20XX W1PQT W3KWL	Jerry Mathis Eppa W. Darne G. W. (Bill) Tunnell Harding A. Clark Ernest J. Hlinsky	623 Crescent Ave. 132 Tennessee Ave., N.E. 253 Wyooming Ave. 753 Westmoreland Ave. 509 Beechwood Ave.
CENTRAL DIVISION			
Illinois Indiana Wisconsin	W9AND W9FSG W9RQM	Wesley E. Marriner Charles H. Conway Reno W. Goetsch	623 College Ave. 3335 College Ave. 929 S. 7th Ave.
DAKOTA DIVISION			
North Dakota South Dakota Minnesota	W0GZD W0NGM W0CWB	Paul M. Bossolotti J. S. Foasberg Walter G. Hasskamp	204 Polk St. 509 Idaho Ave., S.E. 116 3rd Ave., S.W.
DELTA DIVISION			
Arkansas Louisiana Mississippi Tennessee	W5JIC W5VT W5IGW W4QT	Marshall Riggs W. J. Wilkinson, jr. Harold Day Ward Buhrman	Room 313, Jefferson Hotel Route 2, Box 333 1000 Overlook Ave.
GREAT LAKES DIVISION			
Kentucky Michigan Ohio	W4CDA W8SCW W8PNQ	W. C. Alcock Joseph R. Beljan, jr. William D. Montgomery	155 St. Mildred's Court 13959 Tuller Ave. 1290 Coolidge Ave.
HUDSON DIVISION			
Eastern New York N. Y. C. & Long Island Northern New Jersey	W2HZL W2KDC W2IHN	Ernest E. George Charles Ham, jr. John J. Vitale	2044 Lexington Parkway 200 Harvard St. 87 Sayre St.
MIDWEST DIVISION			
Iowa Kansas Missouri Nebraska	W0PPP W0AWP W0ICD W0RQK	William G. Davis Alvin B. Unruh Ben H. Wendt William T. Gemmer	3rd St. 843 N. Terrace Drive RFD 10 1708 West 6th St.
NEW ENGLAND DIVISION			
Connecticut Maine Eastern Massachusetts Western Massachusetts New Hampshire Rhode Island Vermont	W1VB W1CKJ W1ALP W1AZW W1AOC W1HRC W1NLO	Walter L. Glover F. Norman Davis Frank L. Baker, jr. Prentiss M. Bailey Gilman K. Crowell Clayton C. Gordon Burtis W. Dean	Glover Ave. RFD 1 91 Atlantic St. 63 Dexter St. 15 Academy St. 70 Columbia Ave., Gaspee P. O. Box 81
NORTHWESTERN DIVISION			
Alaska Idaho Montana Oregon Washington	K17PO W71WU W7EEN W7HAZ W7ACF	August G. Hiebert Alan K. Ross Fred B. Tintinger Raleigh A. Minkres Clifford Cavanaugh	Box 879 1017 East Jefferson St. 328 Central Box 744 Route 1
PACIFIC DIVISION			
Hawaii Nevada Santa Clara Valley East Bay San Francisco Sacramento Valley Philippines*	KH6EL W7CX W6BPT W6T1 W6NL W6MGC KA1CB	John Souza N. Arthur Sowle Roy E. Pinkham Horace R. Greer Sammul C. Van Liew John R. Kinney Craig B. Kennedy	Box 2025 RFD 1 1061 Fremont St. 414 Fairmount Ave. 215 Knowles Ave. 5240 Jay St. 25 Roosevelt Road
San Joaquin Valley	W6FKL	Ted R. Souza	3515 Home Ave.
ROANOKE DIVISION			
North Carolina South Carolina Virginia West Virginia	W4CVB W4BOE/ANG W4KFC W8JM	W. J. Wortman Ted Ferguson Victor C. Clark Donald B. Morris	57 Duke Power Co. 3422 Rosewood Drive Box 73 303 Home St.
ROCKY MOUNTAIN DIVISION			
Colorado Utah-Wyoming	W0OYT W7NPU	Glen Bond Atvin M. Phillips	2550 Kendall RFD 2
SOUTHEASTERN DIVISION			
Alabama Eastern Florida Western Florida Georgia West Indies (Cuba-P.R.-V.I.) Canal Zone	W4GTW W4FWZ W4DAO W4DXI KP4KD	Dr. Arthur W. Woods John W. Hollister Luther M. Holt Clay Griffin Everett Mayer	411 Woodward Bldg. 3809 Springfield Blvd. 223 W. Romana St. 1557 Athens Ave., S.W. P. O. Box 1061
SOUTHWESTERN DIVISION			
Los Angeles Arizona San Diego	W61OX W7MLL W6GC	Vincent J. Haggerty Gladys C. Elliott Irvin L. Emig	1017 Indio Muerto St. 39 North Melwood 4852 Marlborough Drive
WEST GULF DIVISION			
Northern Texas Oklahoma Southern Texas New Mexico	W5DAS/MNL W5HNI W5HIF W5SMA	N. C. Settle Bert Weidner Ted Chastain Lawrence R. Walsh	5630 McCommas Box 14 3037 So. Staples St. P. O. Box 1663
MARITIME DIVISION			
Maritime (Nfld. & Labr. att.)	VE1DQ	A. M. Crowell	69 Dublin St.
ONTARIO DIVISION			
Ontario	VE3CP	Thomas Hunter, jr.	1774 Westcott Road
QUEBEC DIVISION			
Quebec	VE2GL	Gordon A. Lynn	c/o Radio Division, Montreal Airport
VALALTA DIVISION			
Alberta British Columbia Yukon	VE6MJ VE7WS VE8AK	Sydney T. Jones W. W. Storey W. R. Williamson	P. O. Box 373 3915 W. 32nd Ave. Radio Range Sta., D.O.T.
PRAIRIE DIVISION			
Manitoba Saskatchewan	VE4AM VE5CO	A. W. Morley Norman Thompson	26 Lennox Ave. 1120 7th Ave., N. W.
			Glenside Gardens Washington 2, D. C. Auburn Syracuse 10 Farrell Dixon Indianapolis 5 Wausau Grand Forks Huron Crosby Danville Shreveport Greenville Chattanooga Danville Detroit Cincinnati 30 Schenectady 8 Westbury Elizabeth 3 Mitchellville Wichita 6 North Kansas City North Platte Newtown Old Orchard Beach North Quincy 71 Pittsfield Concord Plateau, Providence 5 Burlington Anchorage Boise Whitefish Baker Auburn Wailuku, Maui Reno Santa Clara Oakland 11 Daly City Sacramento 16 San Francisco Del Monte Queson City, Rizal Fresno 4 Charlotte 1 Columbia 25 Annandale Fairmont Denver 14 Ogden, Utah Birmingham Jacksonville 8 Pensacola Atlanta San Juan 5, P. R.

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

Jensen Custommode

presents four basic units



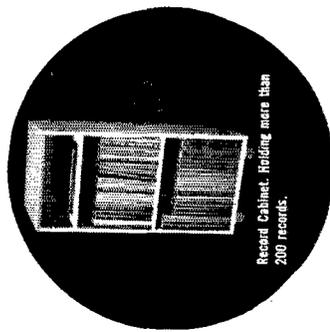
Assemble your own Entertainment Center with distinctive functional decorator-designed Custommode

Jensen Custommode was created to solve the custom-builder's problem—how to integrate fine sound reproducers and associated audio-video equipment into the space and decorative scheme of the home. Custommode's universal "building block" flexibility permits stacking in literally hundreds of different combinations insuring maximum utility for all layout arrangements. In blond or Cordovan mahogany.

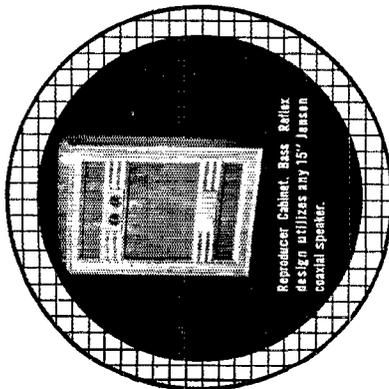
Write today for full information and scale cut-up illustrations



Medium Utility Cabinet. For large equipment, small television sets, amplifier racks, etc.



Record Cabinet. Hiding more than 200 records.



Reproducer Cabinet. Bass Reflex design utilizes any 15" Jensen central speaker.



Small Utility Cabinet. For tuner, amplifier, recorder, record changer, etc.

Jensen MANUFACTURING COMPANY

6601 S. Jeramie Ave.
Chickasha, Okla.

THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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



Past Presidents

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

Officers

President GEORGE W. BAILEY, W2KH
Washington, D. C.
Vice-President J. LINCOLN MCCARGAR, W6EY
Oakland, California
Secretary KENNETH B. WARNER, W1EH
West Hartford, Connecticut
Communications Manager FRANCIS E. HANDY, W1BDI
West Hartford, Connecticut
Treasurer DAVID H. HOUGHTON
West Hartford, Connecticut

General Counsel PAUL M. SEGAL
816 Connecticut Ave., Washington 6, D. C.

Assistant Secretaries ARTHUR L. BUDLONG, W1BUD
JOHN HUNTOON, W1LVQ, LEROY T. WAGGONER, W1PEK
West Hartford, Connecticut

DIRECTORS

President

GEORGE W. BAILEY W2KH
1 East 79th St., New York 21, N. Y.

Vice-President

J. LINCOLN McCARGAR W6EY
66 Hamilton Place, Oakland 12, Calif.

Canadian General Manager

ALEX REID VE2BE
240 Logan Ave., St. Lambert, P. Q.
Alternate: Leonard W. Mitchell VE3AZ
78 Raglan Ave., Toronto, Ont.

Atlantic Division

WALTER BRADLEY MARTIN W3QV
1033 Arbutha Rd., Abington, Pa.
Alternate: Henry W. Wickenhiser, Jr. W3KWA
1112 State Ave., Coraopolis, Pa.

Central Division

CLYDE C. RICHELIEU W9ARE
Marshfield, Wisconsin
Alternate: Harold H. Jansen W9DJG
3519 California Ave., Alton, Ill.

Dakota Division

GOODWIN L. DOSLAND W0TSN
Moorhead, Minnesota
Alternate: Robert A. Kimber W0BLK
Canyon Lake Rd., Rapid City, S. D.

Delta Division

VICTOR CANFIELD W5BSR
P. O. Box 965, Lake Charles, La.
Alternate: James W. Watkins W4FLS
220 N. Howell St., Chattanooga, Tenn.

Great Lakes Division

HAROLD C. BIRD W8DPE
114 Hickory Dr., Crescent Lake, Pontiac, Mich.
Alternate: John H. Brabb W8SPF
1321 Berishure Rd., Grosse Pointe Park 30, Mich.

Hudson Division

JOSEPH M. JOHNSTON W2SOX
Aron-by-the-Sea, N. J.
Alternate: Robert A. Kirkman W2DSY
1910 Oak Drive, West Belmar, N. J.

Midwest Division

LEONARD COLLETT W0DEA
Civil Aeronautics Administration
Box 776, Joplin, Mo.
Alternate: Alvin G. Keyes W0KTK
1201 Merchants Nat'l Bank Bldg., Cedar Rapids, Ia.

New England Division

PERCY C. NOBLE W1BYR
37 Broad St., Westfield, Mass.
Alternate:

Northwestern Division

HAROLD W. JOHNSTON W7DXF
2727 Belvidere Ave., Seattle 6, Wash.
Alternate: R. Rex Roberts W7CYP
110 W. Brennan St., Glendive, Mont.

Pacific Division

WILLIAM A. LADLEY W6RBQ
200 Naylor St., San Francisco 12, Calif.
Alternate: Kenneth E. Hughes W6CIS
810 W. Orange Ave., So. San Francisco, Calif.

Roanoke Division

H. L. CAVENESS W4DW
2607 Vanderbilt Ave., Raleigh, N. C.
Alternate: J. Frank Key W4Z A
Box 707, Buena Vista, Va.

Rocky Mountain Division

FRANKLIN K. MATEJKA W0DD
P. O. Box 212, Estes Park, Colo.
Alternate: P. Arthur Small W0KVD
529 No. Nevada Ave., Colorado Springs, Colo.

Southeastern Division

WILLIAM C. SHELLTON W4ASR
527 Revilo Blvd., Daytona Beach, Fla.
Alternate: William P. Sides W4AUP
Fleming Road, Montgomery, Ala.

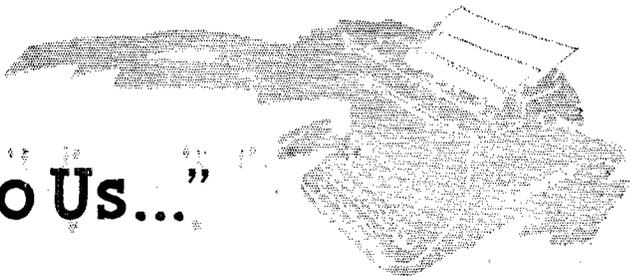
Southwestern Division

HANS R. JPPSEN W6KEI
6837 Ethel Ave., No. Hollywood, Calif.
Alternate: Arthur E. Schifferman, sr. W6CGI
1445 Raymond Ave., Glendale 1, Calif.

West Gulf Division

WAYLAND M. GROVES W5NW
P. O. Box 585, Odessa, Texas
W5NW at Humble Pipe Line Camp, Odessa
Alternate: Jack T. Moore W5ALA
4531 Fairway Ave., Dallas 4, Texas

"It Seems to Us..."



PREPAREDNESS PAYS OFF

No one who reads the thrilling story in this issue of the work of the amateurs in the Columbia River floods can fail to be proud of his fellow amateurs who, by their superlative work in that emergency, have contributed mightily to the prestige of our whole fraternity. Here, indeed, was amateur emergency work at its best, a magnificent testimonial to our ability to render vital assistance to our home communities in the face of sudden emergencies.

But the job around Portland, it seems to us, was more than a demonstration of the individual abilities, the individual brilliance and courage and devotion to duty of the amateurs concerned, or even of their ability to function smoothly as a group. Shining through the author's story is the fact that the excellence of the whole performance was to a large degree the result — we might almost say the inevitable result — of intelligent advance planning at the local level by an alert and civic-conscious ARRL Emergency Coördinator and a capable team of qualified and hard-working amateurs. It's the old, old story of preparedness paying off; it is because of such preparedness that we have a brilliant addition to the pages of our amateur history.

Well done, gang! And the thanks and gratitude of all the rest of us!

DON'T ASK F.C.C.

There's something that has bothered us for years and years, and finally we have decided to come right out in meeting and talk about it for the good of the craft. It's this business of individual amateurs, puzzled over some fine point of regulations and commendably wishing to keep in the clear, writing FCC and asking whether it is all right to do so-and-so.

The trouble is that such a letter is always answered by a lawyer and the set-up is such that all too often it invites an unfavorable answer. To a layman's viewpoint a lawyer who is asked a question of this sort seems almost instinctively to feel that there is something wrong about it or he wouldn't be asked. Whether he likes us or not, he almost seems to go looking for something to justify him in

saying no. And, in our observation, most of the time that is his answer.

Now heaven knows a bunch of hams can ask plenty of goofy questions, and there are some characters who would get away with the linoleum off the kitchen floor if it weren't glued down. A turn-down is the only right answer to such questions. But we are here thinking of border-line questions that require an exploration into just what we properly may and may not do. Frequently interpretations differ, particularly if the interpreter hasn't a thorough background in the broader aspects of the philosophy of amateur regulation which, developed over many years, grants us a remarkable freedom in our operating because it has proved in the national interest to give us those liberties. We also know of some cases where there hasn't been the slightest real FCC objection to a proposed practice but when the amateur got to splitting hairs and pushing for a ruling, some complicated legal fact got in the way and the only reply FCC could give was restrictive — perfectly unnecessary if the amateur hadn't asked but the only possible one when he did, a familiar phenomenon in administrative law.

We've even seen it happen that what the inquiring amateur proposed to do was something the rest of us already do and regard as all right. But consider what has happened when inquiry has been made and the answer is negative. At the least, the amateur who asked is now forbidden to do that thing, and that is true even though all the rest of us do it. And if enough of us make inquiry about that same topic, the law staff will think that it "requires clarification" in our regulations, which often is another term for a restrictive amendment. We've seen these things happen many times. We think we could say that, by and large over the years, we amateurs have lost many more little rights and privileges by asking out loud about them than we ever did through misconduct or because FCC itself first worried about the subject and thought it should be prohibited.

Can we do something about it? We think we know a solution. It is to ask the League, not

FCC. Our headquarters staff knows most of the answers, and if we're stuck we can always find out informally without creating a precedent or inviting a general restriction. It seems to us it's one of the services ARRL can give the gang. Let's ask ARRL and let the League stand between us and FCC. Hr suggested motto:

Never ask FCC anything about regulations
-- ask ARRL.

Adrian



SEPTEMBER, 1923, *QST* enthusiastically heralds the approach of the *Second National ARRL Convention*, scheduled to be held this month at the famous Edgewater Beach Hotel, Chicago, under the auspices of the Chicago Radio Traffic Assn. With amateurs from all U. S. and Canadian districts expected to attend, the convention committee has arranged a gala program, including talks by such notables as Dr. J. M. Miller of the Naval Research Laboratory, Frank Conrad of 8XK, Dr. E. F. W. Alexanderson of GE, M. B. West of Zenith, and Leroy M. Clausung of WJAZ. Prominent amateurs handling arrangements are W. E. Schweitzer, R. H. G. Mathews, Irving Herriott, M. W. McRae, J. A. Callanan, C. E. Wright, and W. F. Marquardt, jr. Something new in convention attractions is promised—a hidden-transmitter hunt!

So numerous and successful have been our recent operating activities that the *QST* staff is hard put to find space to record them all. ARRL Operator Don Mix, aboard the MacMillan Arctic Expedition *Bowdoin*, is holding down his berth in true amateur fashion. First reports from the expedition, now off the coast of Greenland, indicate that WNP has worked 1UJ, 1ZE, 2CQZ, 1ANA, 1CPI, 1FB, and Canadian 1AR. In the heard list are a pair of West Coasters, 6CMR and 6PL, and 4FT. "ARRL on the Yukon" tells of League-sponsored amateur activity on the Alaskan frontier too, thanks to the cooperation of 7FD, 7UU and Headquarters in helping the Rev. John W. Chapman procure equipment for a station at Anvik, on the Yukon River. Further recapitulation of the results of the recent Trans-Pacifics has disclosed that 6CGM, one of the stations getting down under to the Antipodes, used a single 5-watter, and that the signals of 6KA-6XBC were louder in New Zealand than Naval stations in Hawaii. From the Dominion, we have Ontario Division Manager Russell's comprehensive report of the record-breaking Canadian Transcons, which should spur American amateurs in their attempt at a *daylight* Transcon this fall.

Technical Editor Kruse dispenses sound advice on "Getting Away from 200 Meters." He argues, "... 100-meter signals fade much less than 200-meter ones; they travel almost as well in daylight as at night; they get into dead spots where the 200-meter stuff never arrives. . . ." Joining the amateur attack on the mysteries of the relatively-unknown short-waves, the Bureau of Standards announces continued WWV standard-wave transmissions.

(Continued on page 112)

CU in Milwaukee!

• Last call for the biggest and best amateur radio convention ever held, the ARRL National Convention in Milwaukee over the Labor Day week-end, September 4th-5th-6th. See the article and advertisement in our last month's issue and hurry up your plans. Entrain, fly, hitch-hike, hop a freight or jump on your bicycle, but be there! For reservations, accommodations or last-minute information, write or wire the general chairman, Jack Doyle, W9GPI, 4331 No. Wildwood Ave., Milwaukee 11, Wisconsin. We'll BCNU!

OUR COVER

This month's offering illustrates a typical "busman's holiday." Though Tom McMullen, W1QVF, senior operator at W1AW, spends most of his time working on the lower frequencies at the Hq. station, he is a microwave enthusiast at heart. In the cover picture he is demonstrating his latest development, "wireless Lecher Wires," a simple system for determining the frequency being radiated by microwave equipment.

The tube in use is a 723A/B, modified according to information given by W2RJM in *QST* for February, 1947, to get it in or near the amateur 10,000-Mc. band. A crystal diode, in this case a 1N34, is connected in series with a microammeter and mounted close to the antenna of the klystron oscillator. A potentiometer is used to vary the repeller voltage until a reading is obtained on the meter, indicating oscillation.

Then a metal plate, about three inches square, is moved with its flat side facing the probe until a flicker is noted in the meter reading. A mark is made at that point and the plate moved slowly until another flicker is noted and its position marked. Measure the distance between the marks, and substitute in the formula $f_{Mc.} = 5905/\text{length}$ (in inches).

Needless to say, there are many mechanical improvements possible, but even this arrangement gives accuracy sufficient for most purposes.

A Surplus-Parts Bandswitching Transmitter

Making Use of BC-375 Components in a 7-Band Rig—Part I

BY C. VERNON CHAMBERS,* WIJEQ

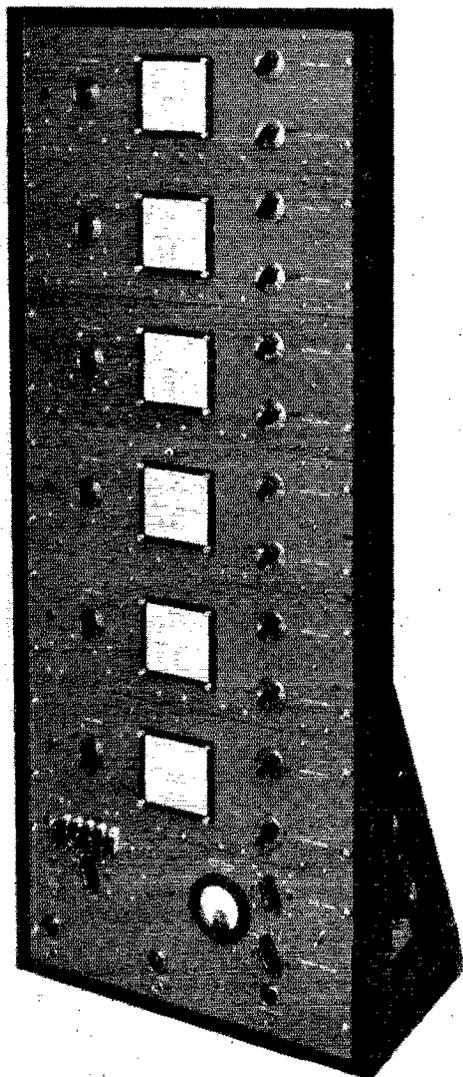
• Here is a bandswitching rig covering the seven most-popular ham bands built principally from parts salvaged from inexpensive BC-375-E tuning units. Since it is closely equivalent to separate transmitters for each band, it has several operating advantages not found in most conventional bandswitching transmitters. Many of those who are stumped trying to make a satisfactory job of conversion on the TU units will find this a welcome answer to their problems.

Essentially, the arrangement consists of a 3.5-Mc. crystal-oscillator unit followed by a series of separate units, each containing a driver, final amplifier and antenna tuner for one of the 6 main ham-band divisions from 3.5 to 50 Mc., 21 Mc. included. When any output stage is idle, its driver may serve as a frequency multiplier for succeeding higher-frequency stages. Capacitance coupling is used throughout and excitation connections between stages, with the exception of the

ON the surface, the BC-375 has appeared to be one of the best bargains in the surplus field. However, many hams, attracted by the low price, have bought these transmitters, or sets of the individual TU plug-in units, to find that as they stand the frequency stability does not meet present-day amateur requirements. Worse yet, the construction makes a satisfactory job of conversion extremely difficult, if not impossible. On the other hand, stripped down, the BC-375 units provide a gold mine of good-quality parts at ridiculously low cost. With a little thought and preliminary planning, these components can be used to good advantage in building transmitting gear along almost any line the constructor chooses. The 7-band 150-watt bandswitching transmitter shown in the photographs is an example of what can be done. In this instance, special effort has been made to limit the design, so far as possible, to the parts to be found in the tuning units of the BC-375-E. Only a few additional components are required and most of these, including the tubes, are available in surplus.

*Technical Assistant, QST.

◆
Front view of the complete surplus-parts transmitter. The 7 units are assembled in a rack approximately 4 ft. high.
◆



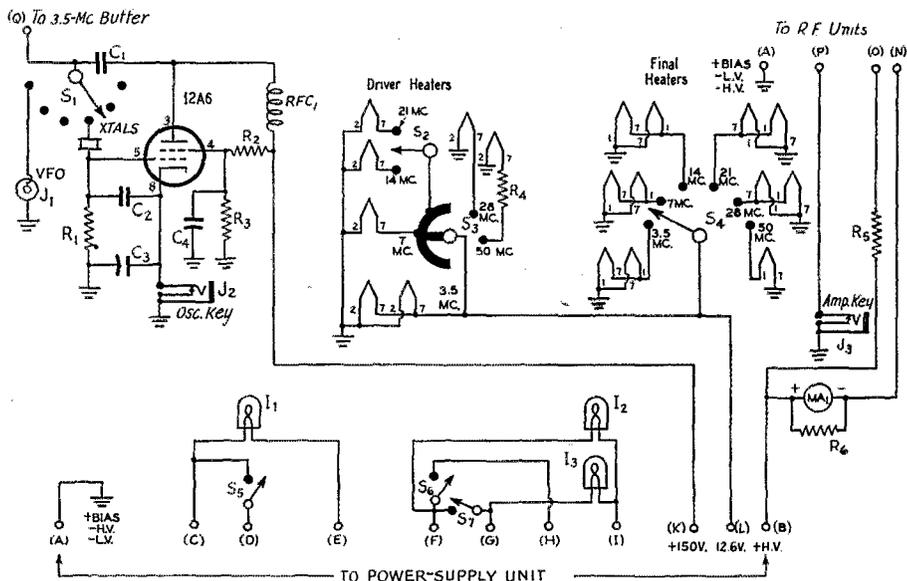


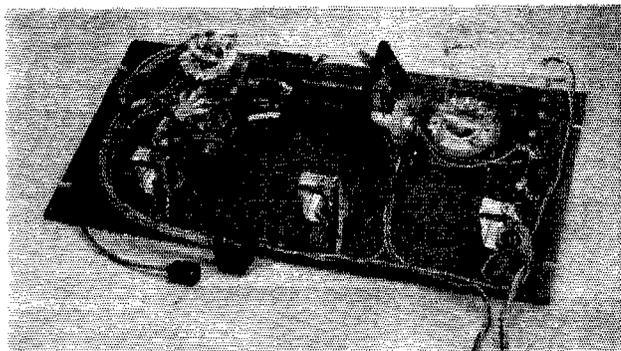
Fig. 1 — Wiring diagram of the oscillator and control unit.

- C₁ — 0.001- μ fd. mica.
- C₂ — 47- μ fd. mica.
- C₃, C₄ — 0.01- μ fd. 100-volt paper.
- R₁, R₂ — 47,000 ohms, $\frac{1}{2}$ watt.
- R₃ — 0.1 megohm, $\frac{1}{2}$ watt.
- R₄ — 10 ohms, 10 watts, adjustable (see text).
- R₅ — 40,000 ohms, 10 watts.
- R₆ — Meter shunt (see text).
- I₁, I₂, I₃ — 115-volt indicator lamp.
- J₁ — Coaxial connector (Jones S-101).

- J₂, J₃ — Closed-circuit jack.
- MA₁* — 500-ma. d.c. meter (see text).
- RFC₁* — 6-mh. r.f. choke (No. 2602).
- S₁*, S₄* — 6-position rotary switch (529 & 629 — ML-7762960-G1).
- S₂ — S.p.d.t. toggle switch.
- S₃* — 5-position progressive-shorting switch (502 — ML-7761605-G1).
- S₅, S₆, S₇ — S.p.s.t. toggle switch.
- * Found in BC-375-E.

one to the 50-Mc. unit, are permanent. Switching from band to band is reduced to a simple system which cuts off the filaments of the tubes not in use, making them inoperative. Since each output stage is called upon to operate in only one band, optimum circuit values can be chosen to suit each. Antenna switching also is simplified by the separate antenna tuners, preset and ready to go. Pilot lamps, used as r.f. indicators in the driver stages, and a plate milliammeter common to the six amplifiers provide an inexpensive means of

checking the operation of the entire transmitter. Each output stage, except the 50-Mc. unit, can handle up to 150 watts input c.w. or 120 watts plate-modulated 'phone. The 50-Mc. unit, limited to a single 1625 instead of two in parallel principally because of prohibitive tube capacitance, has a normal rating of half that of the others. The construction can, of course, be cut off at any particular stage the builder may desire. The entire transmitter operates from a dual power supply included in the construction.



Rear view of the oscillator and control panel. The 12A6 and associated oscillator components are assembled on a Millen 80009 tube bracket with the crystal switch, S₁, to the right and the milliammeter, MA₁, to the left. Grouped in the upper left-hand corner are the three filament-control switches, S₂, S₃ and S₄. Power-control switches and indicator lamps are along the bottom edge and the two key jacks along the right-hand edge. The panel is 8 $\frac{3}{4}$ inches high with a standard rack width of 19 inches. The cable plug in the foreground carrying the heater-switching connections was used as a laboratory convenience, but would not normally be required.

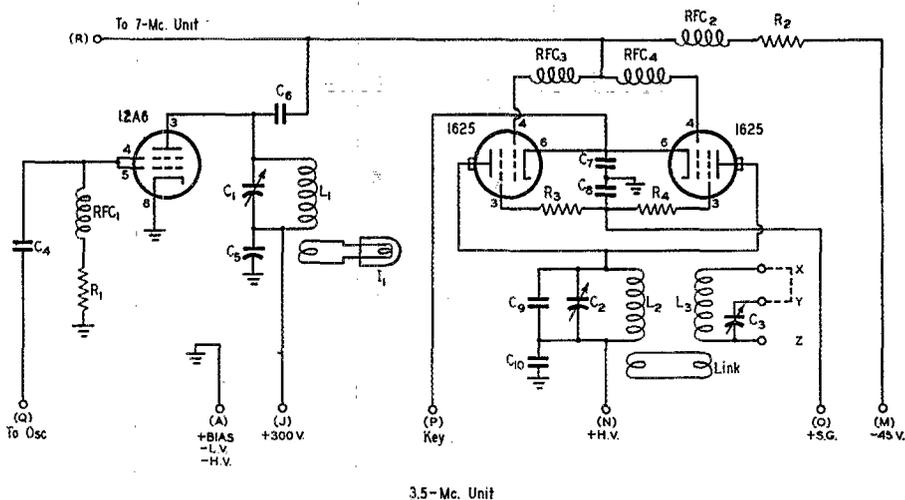


Fig. 2 — Circuit diagram of the 3.5-Mc. section.

- C₁ — 100- μ fd. variable (Hammarlund APC; surplus No. CV-188).
- C₂* — 156- μ fd. variable (527 — T7660443P6).
- C₃* — 116- μ fd. variable (627 — T7660443P1).
- C₄* — 100- μ fd. mica (503 — P7761662P3).
- C₅ — 0.01- μ fd. 400-volt paper.
- C₆* — 100- μ fd. mica (504 — P7761662P3).
- C₇* — C₁₀* — 0.005- μ fd. mica (2610 & 2615 — P7761663P4).

- C₈* — 400- μ fd. mica (2623 — P7761442-4).
 - C₉* — 90- μ fd. mica (523 — T7761442P15).
 - R₁ — 1000 ohms, 1 watt.
 - R₂ — 18,000 ohms, $\frac{1}{2}$ watt.
 - R₃, R₄ — 68 ohms, $\frac{1}{2}$ watt.
 - L₁, L₂, L₃ — See Table I.
 - I₁ — 2-volt 60-ma. dial lamp.
 - RFC₁*, RFC₂* — 2.9-mh. r.f. choke (508 & 511).
 - RFC₃, RFC₄ — 17 turns No. 20 d.c.c., $\frac{1}{4}$ -inch diam.
- * Found in BC-375-E.

Stripping the TU Units

Disassembling the BC-375-E tuning units is a project in itself and time will be saved if that is completed before construction is started, rather than to do it piecemeal. The units best suited for this job are the TU-26-B, TU-5-B, TU-6-B, TU-7-B and TU-8-B. The low-frequency unit, TU-26-B, provides some mica condensers and one r.f. choke. If this unit isn't available, the parts can be picked up from surplus stocks. TU-9-B will furnish two r.f. chokes and a chart frame, if you happen to have this unit on hand, but otherwise is not required.

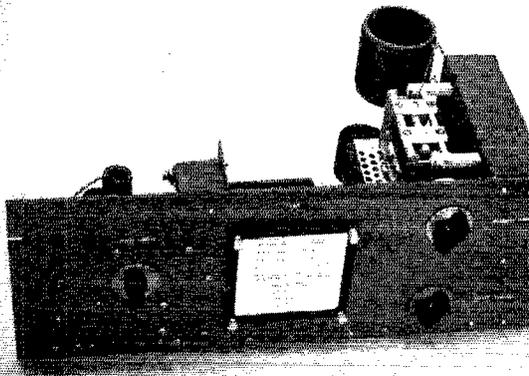
A copy of Army Air Forces Technical Order No. 08-10-139, *Instruction Book for Operation and Maintenance of Radio Transmitter BC-375-E* will be most helpful when it comes to identifying parts. If you don't already have one, you should attempt to beg, borrow or steal a copy before turning loose on the tuners. However, parts can be identified by referring to the accompanying lists which show the tuning-unit reference numbers as well as the drawing numbers. The first figure of the reference number identifies the

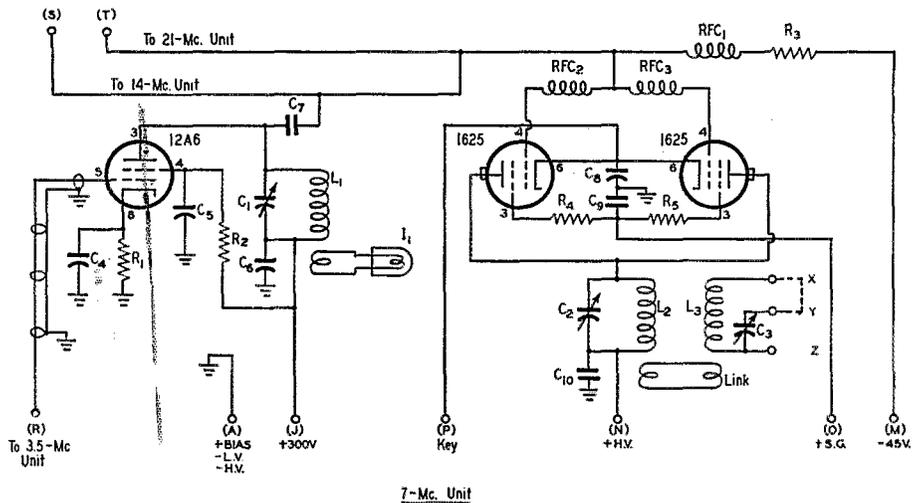
tuning unit in which the part will be found, while the drawing numbers are those stamped on the respective components.

The first difficulty that will be encountered in taking the units apart is that most joints are covered with Glyptal which hampers the loosening of nuts and screws. The Glyptal can be softened by treating with ethylhexanedoil (sometimes called 612 Insect Repellent) about 12 hours before starting the dismantling. Turpentine, applied just before an attempt is made to loosen screws and nuts, or a hot soldering iron can be used also. An Allen wrench measuring $\frac{1}{16}$ inch between parallel faces is needed for the setscrews. Since the chances are good that at least one will be broken before the job is finished, it is a good idea to buy three or four at the start.

Remember that most of the nuts, screws and ceramic-pillar insulators can be used. Don't re-

The panel layout shown here is used in all r.f. units. The driver tuning control is to the left, the output-stage control below to the right and the antenna tuning above. The panel is 7 inches high.





7-Mc. Unit

Fig. 3 — 7-Mc. diagram.

- C₁ — 100- μ fd. variable (Hammarlund APC; surplus CV-188).
- C₂* — 135- μ fd. variable (507 — P7761569P2).
- C₃* — 111- μ fd. variable (702 — P7761569P4).
- C₄, C₅, C₆ — 0.01- μ fd. 400-volt paper.
- C₇* — 100- μ fd. mica (505 — P7761662P3).
- C₈ — 0.01- μ fd. 600-volt paper.
- C₉* — 400- μ fd. mica (2609 — P7872594-6).
- C₁₀* — 0.004- μ fd. mica (2612 — P7761663P18).

- R₁ — 560 ohms, $\frac{1}{2}$ watt.
- R₂ — 22,000 ohms, 2 watts.
- R₃ — 18,000 ohms, $\frac{1}{2}$ watt.
- R₄, R₅ — 68 ohms, $\frac{1}{2}$ watt.
- L₁, L₂, L₃ — See Table I.
- I₁ — 2-volt 60-ma. dial lamp.
- RFC₁* — 0.72-mh. r.f. choke (608).
- RFC₂, RFC₃ — Same as RFC₁, Fig. 2.
- * Found in BC-375-E.

move the pillars from the mica and variable condensers, however, because they will be used in remounting these parts later on. The units contain a number of step-type selector switches which, when stripped down, furnish a supply of insulators that can be used as terminal posts. But don't tear down switch No. 502, drawing ML-7761605-G1, because this one is used for the heater switching of the multiplier tubes.

The Oscillator and Control Panel

To simplify construction, the transmitter has been built in the form of seven r.f. units and a power unit. A separate wiring diagram is shown for each. The front- and rear-view photographs show the complete transmitter with the units mounted in a homemade wood relay rack. The detail pictures of the 3.5- and 50-Mc. sections show the type of construction used for the individual multiplier-amplifier units, all of which are similar in principle and construction.

Fig. 1 is the circuit diagram of the first r.f. unit which includes the heater-switching system for band changing, and power controls, as well as a 3.5-Mc. crystal oscillator. In the latter, a 12A6 —

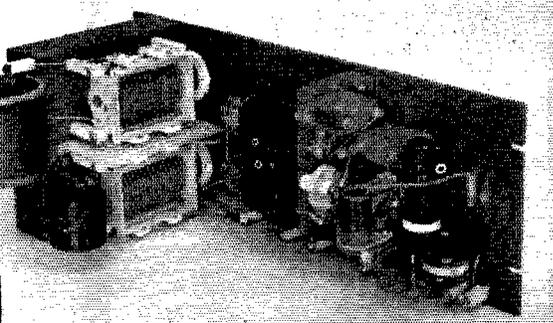
the 12-volt version of the 6V6 — is used in a Pierce circuit which involves no tuning adjustment. If oscillator keying for break-in is desired, J₂ is provided for that purpose. Power input to this stage is quite low, plate and screen voltages running 150 and 75 respectively. J₁, connected to one of the crystal-switch contacts, is for capacitively coupling an external VFO to the input of the second stage. The VFO should be capable of delivering at least as much power as the crystal oscillator at the grid of the 3.5-Mc. buffer.

Switches S₂, S₃ and S₄ control the band changing. By opening heater circuits, they disable the stages not in use for the selected band of operation. S₂ supplements S₃, taken from one of the TU units, because the latter is short one contact for handling the complete line-up of driver tubes. A fifth notch must be added to the detent of S₃ so that the wiper contact can be swung completely free of the fixed contacts when the switch is in the 3.5-Mc. position. R₄ is a voltage-dropping resistor for the heater of the 6L6 used as the 50-Mc. driver, and R₅ is the screen resistor for the output tubes. S₅ is the main filament switch, while S₆ and S₇ control the low- and high-



The type of construction shown in this rear view of the 3.5-Mc. unit is typical of that used in all r.f. sections. Most of the parts are included in three subassemblies as described in the text.

QST for



voltage plate supplies. The latter two are connected in series so that the high voltage cannot be applied before low voltage. Each power switch has a corresponding panel-indicator lamp. J_3 provides for amplifier keying which is preferable when break-in is not needed. The jack is in the cathode lead common to all output stages and therefore does not have to be switched. The single milliammeter, MA_1 , which reads output-stage plate current, happens in this case to be a surplus job requiring a multiplying shunt, R_6 , but the 500-ma. meter in the BC-375 is perfectly suited to the job and does not require the multiplier.

The rear-view photograph of this section shows the arrangement of parts on the panel which can be of either metal or Presdwood. As will be seen from the front view of the complete transmitter, the crystal and heater switches are placed so as to line up with the tuning-control knobs of the units above.

3.5-Mc. Unit

The wiring diagram of the buffer, power amplifier and antenna tuner for 80 is shown in Fig. 2. In this unit a 12A6 is connected as a high- μ triode in a conventional buffer circuit which drives a paralleled pair of 1625s — the 12-volt equivalents of 807s. The output of the driver also is coupled, through connection R , to the grid of the driver in the following 7-Mc. unit. A 60-ma. dial lamp, I_1 , loosely coupled to the driver plate coil, serves as a resonance indicator for this stage. Since the final tank condenser, C_2 , taken from the BC-375, doesn't have sufficient capacitance for a Q of 12 at 3.5 Mc., it is augmented by the mica padder, C_3 . RFC_3 , RFC_4 , R_3 and R_4 are v.h.f. parasitic suppressors.

The 1625s are biased by a combination of grid leak and a fixed voltage of 45 taken from the power-supply unit. The fixed bias limits the input to the final stage to a safe value when excitation is removed, thus permitting oscillator keying. The high- μ connection safeguards the 12A6, since it draws little current at zero bias.

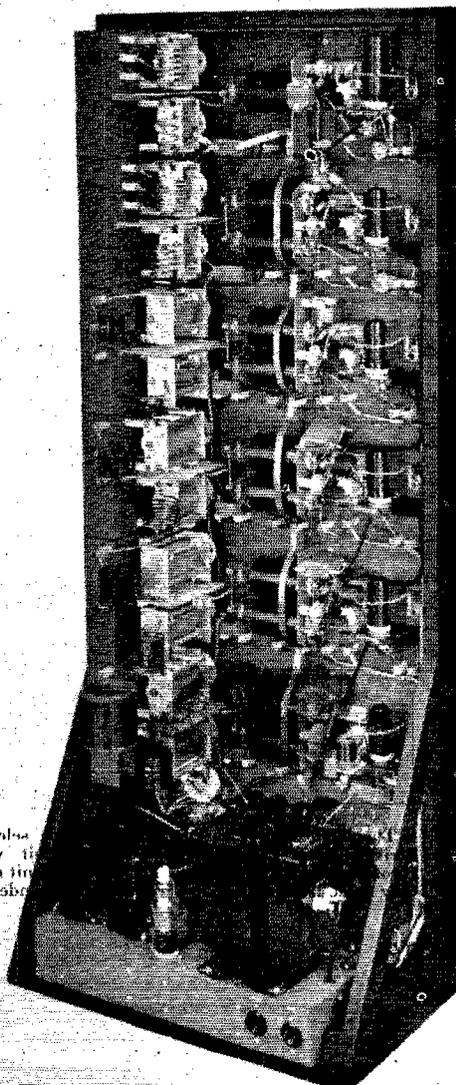
The antenna tuner, L_3C_3 , is link coupled to the amplifier. When the feeders are connected to X and Y , the system is series-tuned. For parallel tuning, X and Y are strapped together and the feeders connected to X and Z .

The unit, which is typical of the others in the transmitter, is made up of three subassemblies mounted on a 7-inch rack panel. The first, to the right in the rear view, consists of the buffer-circuit components mounted on and around a Millen 80009 tube bracket which has been fitted

with an octal socket. A simple strip-aluminum angle bracket supports the buffer tank condenser, C_1 , to the left of the tube, while the tank coil, L_1 , is mounted on a small aluminum tab extending from the rear of the tube bracket. The connection between the stator of C_1 and the plate terminal of the 12A6 runs through a small feed-through insulator set in the bracket near the front. RFC_1 is mounted underneath the bracket. The input and output coupling condensers, C_4 and C_6 , are fastened to the panel respectively below and above the subassembly. A single-turn loop coupled to L_1 is connected to the neighboring indicator lamp on the panel by a short length of twisted lead.

In the central subassembly, a standard 8-inch chassis bracket, cut down to a depth of 3 inches supports the two 1625s enclosed in Millen tube shields, and the associated screen by-pass con-

(Continued on page 132)



Rear view of the surplus-parts transmitter. With the power supply behind the oscillator and control panel at the bottom, the operating frequency of the units increases toward the top. The copper strap running up the center is the common ground bond.

A Peaked Audio Amplifier for Communication Receivers

BY G. D. HANCHETT, JR.,* W2YM

• One usually thinks of audio filters as devices with high-Q iron-cored chokes in them, and such components are expensive and the values critical. Here is a simple peaked amplifier that uses only resistors and condensers, and yet will give you all the audio selectivity you can use.

THE amateur bands are so crowded these days that a simple receiver without a narrow-band filter is no longer satisfactory for reliable c.w. amateur communication. Most modern receivers are equipped with crystal filters, but these are rather expensive and difficult to construct. For those amateurs who would like to obtain selectivity approaching that of a crystal-filter c.w. receiver, but at low cost, the peaked audio amplifier to be described is offered as a simple solution. When this amplifier is properly peaked, the bandwidth can be made as narrow as that obtained with the average crystal filter. The amplifier can be added to any type of receiver, regenerative or superheterodyne. The improvement is likely to be more marked following a regenerative receiver, although a great

*% Tube Department, Radio Corp. of America, Harrison, N. J.



This little audio amplifier has amazing selectivity, derived from a negative-feed-back circuit working through a twin-“T” network. The simple circuit requires only three triodes and a few resistors and condensers.

improvement can be made on a superheterodyne that has normal i.f. selectivity. The single-signal feature of high i.f. selectivity cannot be obtained with this audio filter (or any other), but it will still provide a marked improvement in reception.

The fundamental circuit upon which this amplifier is based is a simple twin-“T” resistance-capacitance bridge, as shown in Fig. 1-A. A bridge of this type has a null at a frequency $f_0 = 1/2\pi RC$. If the bridge is connected to an

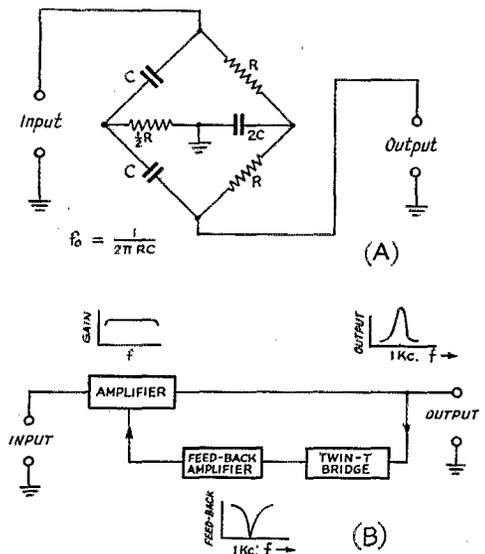


Fig. 1—A twin-“T” resistance-capacitance bridge is shown at A. No signal of frequency f_0 can pass from input to output when the components are properly matched.

A practical peaked amplifier can be built around the twin-“T” bridge by using the arrangement shown in B. The amplifier with a flat frequency characteristic will have a peaked characteristic centered on the null frequency of the twin-“T” bridge, because the amplifier is made highly degenerative at all other frequencies.

audio amplifier, as shown in the block diagram of Fig. 1-B, a negative feed-back takes place at all frequencies except the frequency to which the bridge is tuned. Under these conditions, the audio amplifier has practically no gain at frequencies other than the null frequency of the bridge. At the null frequency the gain of the amplifier is maximum. By controlling the amount

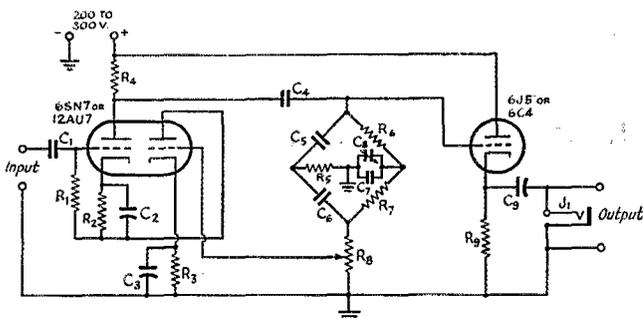


Fig. 2 — Wiring diagram of the selective audio amplifier.

- | | |
|--|--|
| C_1, C_4 — 0.01- μ fd. paper. | R_2, R_3 — 1500 ohms. |
| C_2, C_8 — 25- μ fd. 25-volt electrolytic. | R_4 — 56,000 ohms. |
| C_5, C_6 — 680- μ fd. mica. | R_5 — 0.1 megohm. |
| C_7 — 1000- μ fd. mica. | R_6, R_7 — 0.22 megohm. |
| C_8 — 600- to 1600- μ fd. adjustable mica trimmer. | R_8 — 2.0-megohm potentiometer. |
| C_9 — 0.1- μ fd. paper. | R_9 — 10,000 ohms, 1 watt. |
| R_1 — 1.0 megohm. | J_1 — Open-circuit jack. |
| | All resistors $\frac{1}{2}$ watt unless otherwise specified. |

of negative feed-back, varying degrees of selectivity can be obtained.

The schematic diagram of the amplifier is shown in Fig. 2. The first tube of the amplifier is a 6SN7 (or a 12AU7). One triode section of this is used as an audio amplifier, and the other half

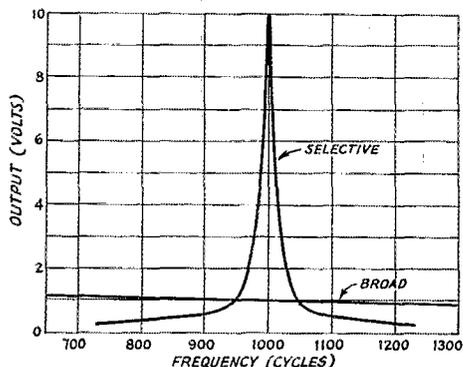


Fig. 3 — The output of the amplifier for a 0.4-volt input signal. The gain and selectivity of the amplifier increase markedly as the selectivity control is advanced.

is used to amplify the feed-back voltage. To isolate the headphones from the amplifier, a 6J5 (or 6C4) output stage is used. If this output stage were not included, the impedance reflections from the headphones would load the amplifier and affect its characteristics. Since most receivers already have sufficient gain in the audio system, no additional gain is required, and the 6J5 is connected as a cathode follower.

The capacitor C_7 is shunted by an adjustable mica trimmer, C_8 , that is used to adjust the bridge for the proper null condition. Mica condensers, or other condensers with good power

factors, are used in the bridge circuit because the ultimate selectivity depends upon the quality of these components.

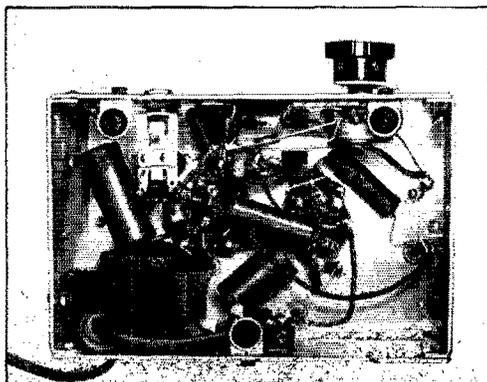
Construction

The amplifier can, of course, take practically any form. The unit built by the writer and shown in the photographs was mounted on a small metal chassis. A small heater-supply transformer was included, but the plate voltage was taken from the receiver. The plate drain of the unit is only a few milliamperes, and almost any receiver can stand this additional load without damage. The two tubes are mounted on the top of the chassis, and the selectivity (feed-back) control is brought out to the front of the chassis. The components given in Fig. 2 are

for a peak frequency of 1000 cycles, selected because most headphones have a resonant frequency in this range. Other peak frequencies could be obtained, of course, by using other values derived from the equation of Fig. 1-A.

After the unit is connected to the output of a receiver, the selectivity control, R_8 , should be adjusted for maximum feed-back (farthest from ground) and the amplifier peaked by adjusting C_8 for maximum "sharpness." Tune the receiver to a frequency on which there is no signal and increase the capacitance of C_8 until the amplifier tends to oscillate or "ring" from noise peaks. For the final setting, back off on C_8 until there is no tendency to oscillate. In the circuit shown, a slightly larger value for the combination of C_7 and C_8 is used than is theoretically indicated by the null-frequency formula. This increase makes

(Continued on page 102)



The under-chassis view of the peaked audio amplifier shows there is space for the heater transformer and all components, with plenty of room left over.

Antenna Matching with Line Segments

Design Formulas for Wide-Range Matching

BY JOHN G. MARSHALL,* WØARL

• Although design charts for determining the length and position of a matching stub have been available for some time, their use is restricted to the special case where the line and stub have the same characteristic impedance. This article treats the linear matching transformer from a more general standpoint, giving considerably more latitude in the choice of matching arrangements.

ANY methods of matching the antenna to the transmission line have been described, but with the exception of the Q-section transformer, very little design information has been published on those that employ a section of line as a transformer. Practically nothing has been published on the actual design of the series-balanced network. The same holds true for the shunt-balanced network, except for what has been written about the simplest form of the matching-stub system.

This article was prepared for the purpose of making available simple formulas for designing all types of networks that employ a section of line as a transformer, whether series- or shunt-balanced, including those in which the transformer section and/or the stub, if used, have values of characteristic impedance different from that of the transmission line.

Early design of the matching-stub network consisted of connecting a $\lambda/4$ section of line to the antenna and attaching the transmission line at the point that minimized the standing waves. In many cases, depending upon the ratio of antenna driving-point impedance to transmission-line characteristic impedance, this procedure did not sufficiently reduce the standing-wave ratio. More recently, graphical solutions, which require the transmission line, transformer section and the stub itself to have the same value of characteristic impedance, have appeared.¹

As will be seen, the formulas included here are not restricted in the above manner; and, if desired, each element of the network may have a different value of characteristic impedance.

Since these networks employ the transformer action of a segment of line terminated by an impedance not equal to the characteristic imped-

ance, a brief review of line segments having lengths up to $\lambda/4$ is in order.¹ Line segments possess many interesting and valuable properties and those important to these networks are to follow.

When a section of line like that in Fig. 1 is terminated by a purely resistive impedance, Z_L , not equal to the characteristic impedance, Z_T , the sending-end impedance, Z_S , contains a reactance component, X_S , as well as a resistance component, R_S , at all lengths, θ , except exact multiples of $\lambda/4$. Z_S is actually the effective value of Z_L as seen through the section of line.

Input Reactance of Segment

Except when $Z_L = Z_T$, gradually increasing θ from zero causes the reactance, X_S , that appears at the sending end to rise gradually from zero to a maximum and then fall back to zero as θ reaches $\lambda/4$. X_S is zero when θ is zero or $\lambda/4$, and is maximum when θ is one certain intermediate value. This maximum becomes smaller as Z_L and Z_T approach equality, to the point where X_S is zero at any value of θ when Z_L becomes equal to Z_T . The actual value of this maximum, or the value of θ that causes it, is unimportant here. At lengths less than $\lambda/4$, X_S is inductive when $Z_L < Z_T$; and when $Z_L > Z_T$, X_S is capacitive.

Input Resistance of Segment

When $Z_L < Z_T$, gradually increasing θ from zero causes the resistance, R_S , appearing at the sending end to rise gradually from a minimum

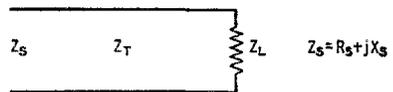


Fig. 1 — Simple line segment.

to a maximum, as θ reaches $\lambda/4$. The minimum value, which is equal to Z_L , occurs when θ is zero, while the maximum value, which is equal to Z_T^2/Z_L , occurs when θ is $\lambda/4$. The greater the ratio Z_T/Z_L and the nearer θ is to $\lambda/4$, the greater is the step-up transformer ratio.

When $Z_L > Z_T$, gradually increasing θ from zero causes R_S to drop gradually from a maximum to a minimum, as θ reaches $\lambda/4$. This maximum, which is equal to Z_L , occurs when θ is zero, while the minimum, which is equal to Z_T^2/Z_L , occurs when θ is $\lambda/4$. The greater the ratio Z_L/Z_T and the nearer θ is to $\lambda/4$, the greater is the step-down transformer ratio.

* Box 6023, Kansas City 4, Mo.

¹ *Radio Amateur's Handbook*, antenna chapter.

A graphical representation of these effects is given in Fig. 2. Fig. 2-A shows how the resistance and reactance vary along a piece of 600-ohm line terminated in 300 ohms, and Fig. 2-B shows the variation along a 600-ohm line with a 1200-ohm termination. The shapes of the curves would be the same for any similar ratios of Z_L and Z_T — only the "Ohms" scale would change.

Irrespective of whether the transformer ratio is step-up or step-down, as Z_L and Z_T approach equality the smaller this ratio becomes. This may be carried to the point where Z_L , Z_T , maximum R_S and minimum X_S all are equal. When this happens there are no standing waves, no X_S , and consequently, a transformer ratio of 1 to 1 at any value of θ .

From the above, it is seen that a variety of transformer ratios is available by selecting various combinations of θ and Z_T .

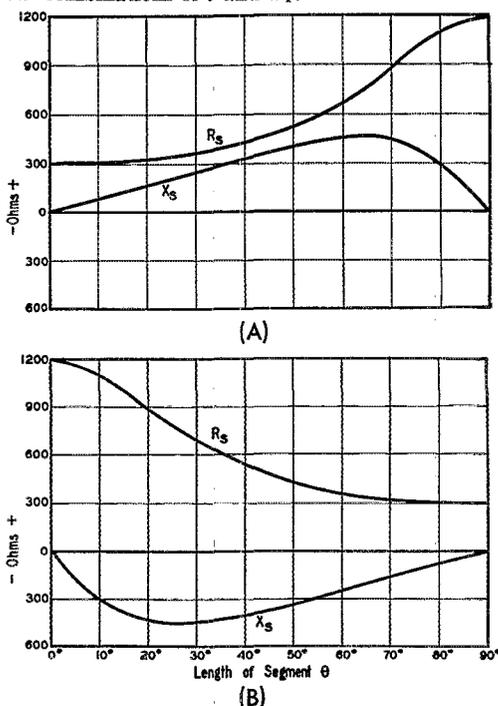


Fig. 2 — Values of input resistance, R_S , and input reactance, X_S , at various segment lengths. At (A) is shown a typical case where $Z_L < Z_T$ ($Z_L = 300$, $Z_T = 600$), and in (B) $Z_L > Z_T$ ($Z_L = 1200$, $Z_T = 600$). These curves are obtained from the relations

$$R_S = Z_T \frac{Z_L (1 + \tan^2 \theta)}{1 + \left(\frac{Z_L}{Z_T}\right)^2 \tan^2 \theta} \text{ ohms}$$

and

$$X_S = Z_T \frac{\tan \theta \left[1 - \left(\frac{Z_L}{Z_T}\right)^2\right]}{1 + \left(\frac{Z_L}{Z_T}\right)^2 \tan^2 \theta} \text{ ohms.}$$

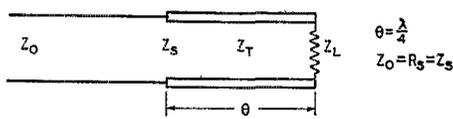


Fig. 3 — Q-section transformer.

Since R_S , not X_S , handles the power, the transformer ratio between Z_L and R_S is the heart of all antenna-matching systems that employ the transformer action of a section of line. But in order to use this transformer action θ must be fixed at some odd multiple of $\lambda/4$, unless some other means is provided to balance out X_S .

Three general methods of treating the above reactive condition are illustrated in Figs. 3, 4 and 5.

Q-Section Transformer

Fig. 3 shows the popular Q-match, which is covered in all the handbooks. It is briefly described here merely to show its behavior and relationship to the other networks employing the linear transformer.

In this system, a $\lambda/4$ segment is selected having a value of Z_T that produces a Z_S containing an R_S equal to the characteristic impedance, Z_0 , of the transmission line. Since θ is an exact multiple of $\lambda/4$, Z_S is purely resistive and there is no X_S to balance out.

With given values of Z_L and Z_0 ,

$$Z_T = \sqrt{Z_0 Z_L} \text{ ohms.}$$

Since Z_T is the only variable and there are limits to the useful range of characteristic impedances, the Q-match can be used to accommodate only part of the many combinations of Z_L and Z_0 encountered.² As will be seen, the other networks employing the linear transformer are not limited in this respect.

Series-Balanced Network

In the series-balanced network of Fig. 4, a segment is selected which has a convenient value of Z_T (usually equal to Z_0) and of such length, θ , that Z_S contains an R_S equal to Z_0 . In other

² There is another consideration important to the Q as well as to all other networks employing the transformer action of a segment of line. When Z_L and Z_0 differ greatly, the standing-wave ratio is high and the use of solid-dielectric cable in this section may result in considerable power loss or possibly breakdown. Cables are rated under flat-line conditions and the maximum rated r.m.s. voltage is \sqrt{WZ} , where W is the rated power and Z is the characteristic impedance. The voltage at the antenna end of the transformer section in any of these networks is $E_L = \sqrt{W_0 Z_L}$. The voltage at the sending end of the Q section and the shunt-balanced network is $\sqrt{W_0 Z_0}$. In the series-balanced network it is $\sqrt{E_L \cos \theta + I_L Z_T \sin \theta}$, where I_L is the current

at the antenna and equal to $\sqrt{\frac{W_0}{Z_L}}$. When $Z_L < Z_0$, maximum

voltage is at the sending end in any of these networks, while when $Z_L > Z_0$, maximum voltage is found at the antenna end.

words, the segment becomes a transformer having the proper ratio to make Z_L appear equal to Z_0 . This condition is fully accomplished by balancing out the reactance component, X_S , by a series reactance, X_{BS} , of equal ohmic value but of opposite sign. Then the line looks into an impedance equal to its own Z_0 .

With a suitable type of line selected for the transformer section,² the correct length, θ , and the total X_{BS} necessary to bring about the above conditions, may be found from³

$$\tan \theta = \sqrt{\frac{1 - \frac{Z_L}{Z_0}}{\frac{Z_L}{Z_0} - \left(\frac{Z_L}{Z_T}\right)^2}} \quad (1)$$

and

$$X_{BS} = Z_T \frac{\tan \theta \left[\left(\frac{Z_L}{Z_T}\right)^2 - 1 \right]}{1 + \left(\frac{Z_L}{Z_T}\right)^2 \tan^2 \theta} \text{ ohms.} \quad (2)$$

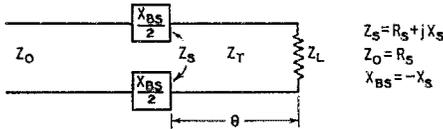


Fig. 1 — Series-balanced network.

When the same material is selected for the transformer section as for the transmission line — which is most common and usually permissible — Z_T will equal Z_0 , and simpler formulas may be used.² In these cases, formulas (1) and (2) reduce considerably, and values of θ and total X_{BS} may be found from

$$\tan \theta = \sqrt{\frac{Z_0}{Z_L}} \quad (3)$$

and

$$X_{BS} = \tan \theta (Z_L - Z_0) \text{ ohms.} \quad (4)$$

In the series-balanced network, the total X_{BS} should be equally divided between the two legs of the circuit. It is important to note that when a capacitive balancing reactance is used each individual reactor must contain twice the total capacity in order to contain half the total reactance.

The unmodulated peak voltage across each individual balancing reactor is

$$E_S = X_{BS} \sqrt{\frac{W_O}{2Z_0}} \text{ volts.}$$

³ A negative quantity appearing under the radical in formulas (1) and (5) indicates that the value of Z_T selected does not permit sufficient transformer ratio, even if θ is made the full $\lambda/4$, so another selection must be made. To be workable, Z_T must be greater than $\sqrt{Z_0 Z_L}$ when $Z_L < Z_0$, and Z_T must be less than $\sqrt{Z_0 Z_L}$ when $Z_L > Z_0$.

NOMENCLATURE

Z_0	— Characteristic impedance of transmission line
Z_T	— Characteristic impedance of transformer section
θ	— Length of transformer section
Z_C	— Characteristic impedance of stub
β	— Length of stub
Z_L	— Impedance of antenna driving point (must be nonreactive)
Z_S	— Sending-end impedance of transformer section
R_S	— Resistance component of Z_S
X_S	— Reactance component of Z_S
X_{BS}	— Series balancing reactance
Z_P	— Parallel equivalent of Z_S
R_P	— Resistance component of Z_P
X_P	— Reactance component of Z_P
X_{BP}	— Parallel balancing reactance
E_S	— Voltage across series balancing reactor
E_P	— Voltage across parallel balancing reactor
W_O	— Power output of transmitter
V	— Velocity factor

Shunt-Balanced Network

In the shunt-balanced network of Fig. 5, a segment is selected which has values of Z_T and θ that render a Z_S whose equivalent parallel impedance, Z_P , contains a parallel resistance component, R_P , equal to Z_0 . The parallel reactance component, X_P , is balanced out by a parallel reactance, X_{BP} , of equal ohmic value but of opposite sign. Then the line looks into a pure resistance equal to its own Z_0 .

With a suitable type of line selected for the transformer section,^{2,3} the correct values of segment length, θ , and parallel balancing reactance X_{BP} , necessary to bring about the above conditions may be found from

$$\tan \theta = \sqrt{\frac{\frac{Z_0}{Z_L} - 1}{\left(\frac{Z_T}{Z_L}\right)^2 - \frac{Z_0}{Z_L}}} \quad (5)$$

and

$$X_{BP} = Z_T \frac{1 + \left(\frac{Z_T}{Z_L}\right)^2 \tan^2 \theta}{\tan \theta \left[1 - \left(\frac{Z_T}{Z_L}\right)^2 \right]} \text{ ohms.} \quad (6)$$

As in the series-balanced network, if the same material is selected for the transformer section as for the transmission line, Z_T will equal Z_0 and simpler formulas may be used.² In these cases, formulas (5) and (6) reduce considerably,

TABLE I
Proper Formulas for Finding Length of Transformer Section and Value of Balancing Reactance

	Series-Balanced Network (Fig. 4)	Shunt-Balanced Network (Fig. 5)	Matching-Stub Network	
$Z_T = Z_0$	(3) and (4)	(7) and (8) *	$Z_L < Z_0$	$Z_L > Z_0$
$Z_T \neq Z_0$	(1) and (2)	(5) and (6) *	(7) and (11) with open stub	(7) and (12) with closed stub

* When a stub is desired at X_{BP} , β is found from (9) or (10).

and values of θ and X_{BP} may be found from

$$\tan \theta = \sqrt{\frac{Z_L}{Z_0}} \quad (7)$$

and

$$X_{BP} = \frac{Z_0 Z_L}{\tan \theta (Z_L - Z_0)} \text{ ohms.} \quad (8)$$

The unmodulated peak voltage across X_{BP} is

$$E_P = \sqrt{2W_0 Z_0} \text{ volts.}$$

Linear Shunt Reactors

The shunt-balanced network is especially suited to the use of a linear balancing reactor, such as that made of a segment of open or closed line. It is quite convenient that any practical value of characteristic impedance, Z_C , may be selected for the linear reactor or stub.

After selecting a value for Z_C , the necessary length, β , to give the required value of X_{BP} , may be found from

$$\tan \beta = -\frac{Z_C}{X_{BP}} \quad (9)$$

and

$$\tan \beta = \frac{X_{BP}}{Z_C} \quad (10)$$

for the open and closed stub, respectively.

The *Handbook*¹ shows that when β is less than $\lambda/4$, an open stub is a capacitive reactance while a closed stub is an inductive reactance. Formulas (9) and (10) bear this out.

Matching-Stub Network

In the matching-stub network, which is a special form of the shunt-balanced network, it is convenient and most common practice (although not essential) to construct the transformer section, transmission line and balancing reactor from the same material.² When this is done Z_T , Z_0 and Z_C are equal, and design formulas become quite simple. Once a line of known Z_0 has been selected, it is necessary to find only θ and β .

Since this system is of the shunt-balanced type and $Z_T = Z_0$, $\tan \theta$ is found from formula (7).

When $Z_L < Z_0$, an open stub is used and formulas (8) and (9) combine into one operation. Then β may be found from

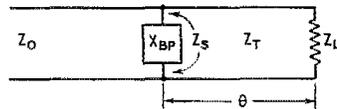
$$\tan \beta = \frac{\tan \theta (Z_0 - Z_L)}{Z_L} \quad (11)$$

When $Z_L > Z_0$, a closed stub is used and formulas (8) and (10) combine into one operation. Then β may be found from

$$\tan \beta = \frac{Z_L}{\tan \theta (Z_L - Z_0)} \quad (12)$$

Examples

Table I will aid in selecting the proper formulas to use in working any example using any of these networks.



$$\begin{aligned} Z_S &= R_S + jX_S \\ \frac{1}{Z_S} &= \frac{1}{R_S} - j\frac{1}{X_S} \\ Z_0 &= R_P \\ X_{BP} &= -X_P \end{aligned}$$

Fig. 5 — Shunt-balanced network.

In working an example, it is necessary to convert degrees to feet. A useful formula, requiring a minimum of effort, is

$$\text{feet} = \text{degrees} \times \frac{2.731V}{f_{Mc.}} \quad (13)$$

where V is the velocity factor of the line.

Example 1 —

Given: A matching-stub network with $Z_L = 70$ ohms, $Z_0 = 600$ ohms, and $V = 0.975$, operating on 7 Mc.

Solution: Needed are θ and β . According to Table I, an open stub with formulas (7) and (11) is used. Then,

$$\tan \theta = \sqrt{\frac{70}{600}} = 0.342$$

and

$$\tan \beta = \frac{(0.342)(600-70)}{70} = 2.59.$$

From trig tables, $\theta = 18.9^\circ$ and $\beta = 68.9^\circ$. Converting to feet via formula (13), $\theta = 7.19$ feet

(Continued on page 102)

The "Monitone"

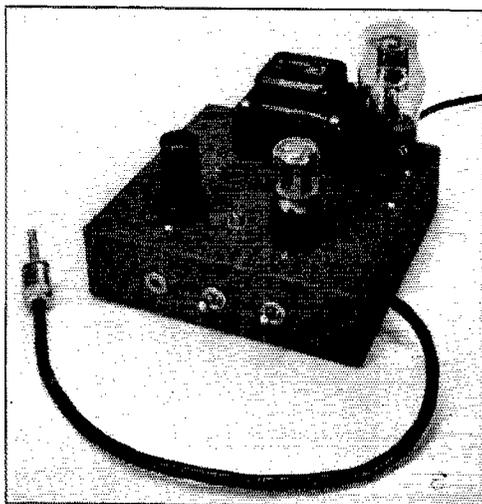
Simplified Monitoring for C.W. Break-In

BY J. W. PADDON, * VE3QV

SOME fortunate c.w. operators can send excellent code without listening to their own keying. The rest of us struggle along copying the transformer grunt, the relay clatter, the key rattle or else we juggle the receiver to hear our own signal. Some remarkable fellows even copy blinker from their 866s!

Another method is to key an audio oscillator along with the transmitter to provide sidetone. The weakness of this system is that the audio oscillator goes on cheerfully keying after the transmitter has blown up.

We need a sidetone generator operated by the transmitter's r.f. output. A separate receiver-monitor is one solution. Its use is handicapped by



A top view of the "Monitone." The shaft of the screwdriver-adjusted potentiometer controlling tone and volume is located between the 6J5 and 6SL7 tubes. The right-hand switch controls the a.c., and the center switch cuts the tone oscillator in and out.

the fact that it must be retuned every time we QSY. There is also a fatigue factor. Prolonged listening to a single pure tone is far more fatiguing than listening to a complex tone. A subconscious acceptance of this fact can be seen in the average operator's continual retuning of his receiver or monitor during a long transmission.

The Monitone does two jobs. It is a sort of electronic traffic cop. When the key is up it allows the signals from the receiver to pass

* Technical Assistant, QST.

• If you like to monitor your sending but neglect to do so because it isn't convenient in your particular station arrangement, here is the "Monitone" to solve your problem. Just plug it into your receiver, steal a few milliwatts from the transmitter output, and then settle back and enjoy some mighty convenient c.w. operation.

through it into the headphones. When the key is down it blanks the receiver output completely and allows a sidetone to appear in the headphones. The switching is purely electronic. There are no relays to clatter. The sidetone is keyed by the r.f. output of the rig regardless of the transmitter frequency setting.

The Monitone does its job in a peaceful fashion. There are no impact noises caused by making or breaking contacts. Sharp receiver noises caused by the keying of the transmitter are blanked. The thing presents us with either the received signal or the sidetone. The transition is smooth and effortless. This consideration for our ears (and hence nerves) enables us to end a long operating session far less fatigued and irritable than is usually the case.

The Circuit

Let's examine the circuit diagram shown in Fig. 1. The left-hand section of the 6SL7 accepts the output from the headphone jack on the receiver via the plug and line terminating in the resistor network R_1R_2 . It will be clear that the values of the two resistors were chosen to set up a fixed potentiometer with the grid of the 6SL7 tapped well down. The values shown were chosen to suit the particular receivers on which the Monitone was tested. Some experiment may be needed on the part of the individual constructor to choose a ratio best suited to his own receiver. The criterion is to find a setting where there is ample headphone volume coming from the Monitone with the receiver controls at their usual setting. Fellows who are fond of fiddling can fit variable potentiometers.

Cathode resistors R_3 and R_4 are not by-passed because gain isn't important. In this special case the 6SL7 is not called upon to function as an amplifier but combines its job as a traffic cop with that of a low-gain coupling and mixing stage. C_1 is a coupling condenser isolating the 6SL7 grid

Fig. 1 — Circuit diagram of the "Monitone."

C_1 — 0.005- μ fd. 400-volt paper or mica.

C_2 — 0.1- μ fd. 600-volt paper.

C_3 — 100- μ fd. mica.

C_4 — 0.001- μ fd. paper or mica.

C_5 — 250- μ fd. paper or mica.

C_6, C_7 — 8- μ fd. 450-volt electrolytic.

R_1 — 6800 ohms.

R_2 — 1000 ohms.

R_3, R_4 — 1200 ohms.

R_5 — 0.56 megohm.

R_6 — 1 megohm.

R_7 — 68,000 ohms.

R_8 — 4.7 megohms.

R_9 — 2.2 megohms.

R_{10} — 25,000 ohms, 5 watts.

R_{11} — 1-megohm volume control.

R_{12} — 22,000 ohms, 1 watt.

All resistors $\frac{1}{2}$ -watt unless otherwise specified.

L_1 — 40-ma. filter choke (Thorndarson 13C26).

J_1 — Coaxial-connector jack.

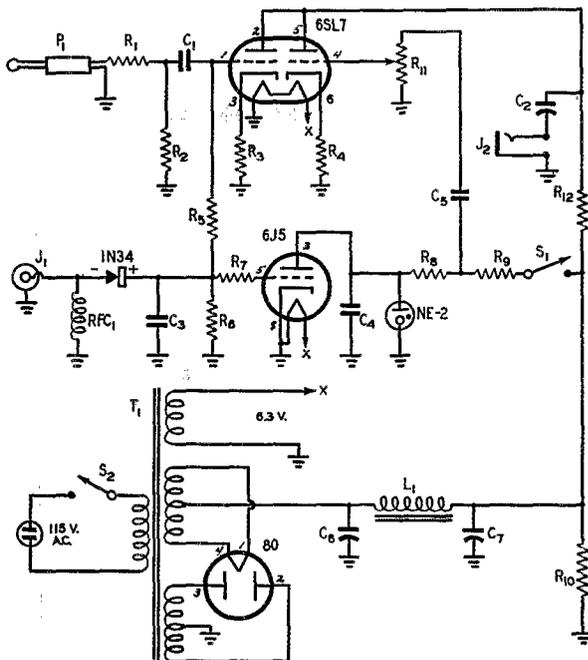
J_2 — Open-circuit jack.

P_1 — Phone plug.

RFC_1 — 2.5-mh. r.f. choke.

S_1, S_2 — S.p.s.t. toggle.

T_1 — Small b.c. replacement transformer (Stancor P.6297).



from the receiver. R_5 carries the cut-off bias from the r.f. network and will be discussed later. R_{12} is a load resistor in the plate circuit of both halves of the 6SL7. The audio voltage across it is passed to the headphones through coupling condenser C_2 . The headphones could, of course, simply be placed in series with the paralleled plates, but the slight added cost and trouble of the method used seemed more than offset by the advantage of having "cold" headphones.

The network RFC_1 , 1N34 and C_3 accepts a small amount of r.f. "stolen" from the transmitter by a small pick-up antenna (a foot or so of wire near the final or feeders) and fed into the Monitone either direct or through a length of coaxial cable. The 1N34 rectifies the r.f. and produces a voltage drop across R_6 . The voltage so produced does two jobs. It is passed to the grid of one 6SL7 half through R_5 and biases it far beyond cut-off, thereby blanking off the signals from the receiver. This is the first traffic-cop operation.

Now let's look at the circuit in the plate of the 6J5. The combination of C_4 , R_8 , R_9 and the neon tube will produce a neon-tube oscillator¹ if there is sufficient voltage across the neon tube. The tone is determined by the time constant of C_4 , R_8 and R_9 . Juggling of these values allows the operator to select the tone most pleasing to him. Since the neon-tube oscillator produces a highly-complex waveform we sidestep the fatigue produced by a single pure tone.

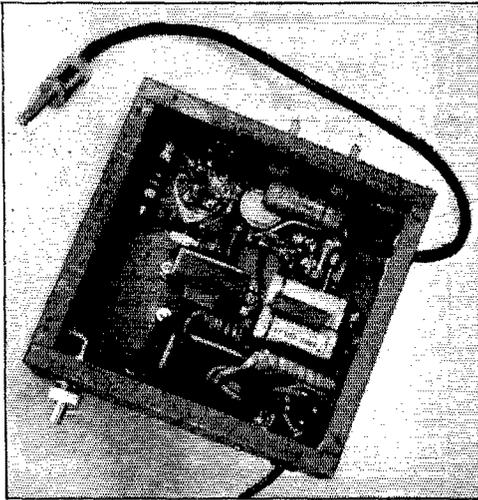
When the key is up the 6J5 draws normal plate current. The voltage drop across R_8 and R_9 subtracts enough from the supply voltage so that the neon tube will not "fire." When the key is down, bias is applied from the r.f. network and the 6J5 plate current is cut off. The voltage across C_4 shoots up, the neon tube fires and the circuit oscillates to provide sidetone. Thus the receiver is blanked the sidetone is waved on through. S_1 is placed in the plate circuit of the 6J5 to enable us to check the blanking on the 6SL7. With S_1 open and the key down we should hear large quantities of silence in the headphones.

R_7 is an isolating resistor preventing interaction between the 6J5 and the 6SL7. R_8 and R_9 are used in series instead of a single resistor to tap off a suitable voltage to be fed to the 6SL7 via the coupling condenser C_5 . R_{11} is a screwdriver-adjusted potentiometer enabling the operator to select the tone volume he likes the best. Neon bulb NE-2 is rated at $\frac{1}{2}$ watt. It does not have a base and is mounted on its own leads. The one used was taken from across the secondary winding of a BC-453 output transformer.

The power supply is built-in and made of standard parts. The total d.c. drain of the Monitone is very small and could equally well be taken from the receiver power supply.

The physical layout can be seen in the photographs. The placement of parts is not in the least critical although the r.f. network (RFC_1 , 1N34 and C_3) should be separated from the 6SL7.

¹ I. O. Ebert, "An Automatic Keying Monitor," April, 1948, QST.



Bottom view of the "Monitone," showing the small neon lamp supported on its own leads and located directly above the center of the 6J5 socket. The r.f. feeder terminates on the tie-point that carries the 1N34.

Installation & Use

Installation of the device consists of plugging the input lead into the headphone jack on the station receiver, the headphones into the jack on the Monitone and the power plug into the a.c. outlet.

The final step is to couple the right amount of r.f. into the Monitone. A short piece of wire can be connected to the coaxial fitting on the back of the Monitone if the operating table is near the transmitter. If they are widely separated a piece of RG-59/U or simple shielded wire can be run from the coaxial fitting to a point near the final amplifier (CAUTION — high voltage!) or feeders. The length of the pick-up wire, either directly from the Monitone or extending beyond the shielding of the coaxial line, will depend on the transmitter power being used. Only a foot or two will be needed.

Close the key and move the pick-up wire nearer or farther from the transmitter or feeder until the neon in the Monitone glows. We want to find a point where a little less coupling will extinguish the neon — in other words we want the loosest coupling which will cause vigorous and sustained oscillation of the neon circuit. If only the final is keyed care must be taken not to put the pick-up wire in the r.f. field of the driver stages — otherwise the oscillator will run continuously whenever the transmitter is switched on.

The Monitone is a simple and inexpensive aid to convenient operating that is worth much more than the few dollars and hours of work required to build it.

WWV Schedule

STANDARD-FREQUENCY transmissions are made continuously, day and night, as a public service by the National Bureau of Standards over its standard-frequency station, WWV, on the following frequencies:

Mf.	Power (kw.)	Audio Freq. (cycles)
2.5	0.7	1 and 440
5.0	8.0	1 and 440
10.0	9.0	1, 440 and 4000
15.0	9.0	1, 440 and 4000
20.0	8.5	1, 440 and 4000
25.0	0.1	1, 440 and 4000
30.0	0.1	1 and 440
35.0	0.1	1

A 0.005-second pulse may be heard as a faint tick every second, except the 59th second of each minute. These pulses may be used for accurate time signals, and their one-second spacing provides an accurate time interval for physical measurements.

The audio frequencies are interrupted at precisely one minute *before* each hour and each five minutes thereafter (59th minute; 4 minutes past hour, 9 minutes past hour, etc.), resuming after an interval of precisely one minute. This one-minute interval is provided to give Eastern Standard Time in telegraphic code and to afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. Ionospheric-disturbance warnings applicable to the North Atlantic path are given at 19 and 49 minutes past each hour. If a disturbance is in progress or is anticipated within 12 hours, the time announcement is followed by 6 Ws; if conditions are quiet or normal, the time announcement is followed by 8 Ns.

The accuracy of all the frequencies, radio and audio, as transmitted, is now better than a part in 50,000,000. Transmission effects in the medium may result in slight fluctuations in the audio frequencies as received at a particular place; the average frequency received, however, is as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.000001 second. The beginnings of the periods when the audio frequencies are resumed are synchronized with the basic time service of the U. S. Naval Observatory.

Strays

While working a W9 on ten recently, W1KEC was troubled with a persistent case of auto-ignition noise. He told the W9 about it, signed, and threw the switches in disgust. The next day brought Larry a most astounding explanation of the QRM. His neighboring TV looker-in informed him, most apologetically, that he had heard Larry working the W9 in the background of his TV receiver, and that the motor noise which he couldn't account for had come from the midget-auto races being viewed on the screen!



Happenings of the Month

WE GET OUR NEW MOBILE REGS

Those of the gang interested in using mobile on the lower frequencies who heeded our last month's hint to keep an ear cocked for WIAW cashed in on July 15th when the Headquarters station began transmitting an official bulletin announcing the good news: we have our new mobile regs! Domestic amateur mobile work can now be carried on in any amateur band.

The new rules, involving wholesale amendment of old § 12.91, deletion of § 12.92 and creation of a new § 12.94 — and the subject of innumerable confabs between League and FCC personnel — are printed in full below but some explanatory comment will help clarify their provisions.

The heart of the matter — the privilege of engaging in domestic mobile operation on any amateur frequency — is contained in § 12.91(a), which also reaffirms our previous right to domestic portable work on any amateur frequency. But don't overlook that § 12.91(a) also revises the procedure for notifications to the proper FCC office for portable and mobile work. Now, for both portable and mobile, we are relieved of the need to send notification when the over-all period of such operation is, or is likely to be, less than 48 hours away from the fixed-station location specified in the license; notification (to the Engineer-in-Charge of the radio inspection district where the contemplated operation is intended) is required only when the over-all period is to be more than 48 hours. A lot of portable operation that in the old days required all the tedious business of notification won't require it in future.

Notice one slight difference, though, between the requirement for portable and that for mobile. In the case of portable, the notification is required if the over-all period of such operation is more than 48 hours even if the station may be operated part of this time at the fixed location. What this means is that if you decide to go portable at your summer camp for a week or two you can't escape the requirement for notification just because you may be planning to sneak back home every day or so to do a little operation at the home location. On the other hand, when it comes to mobile operation, notification is required only when the mobile work is to be for 48 hours before a return to the home location. This difference isn't accidental; it's something we worked out with the Commission people so that those of the gang who work mobile to and from their daily jobs, etc., won't have to wear themselves out with a steady flow of notifications.

If you work mobile, but never more than 48 hours before you come back home, you never need to notify.

There's one more place where there's a difference: As in the past, it is still required that for portable you have to renotify monthly if you stay away from home more than a month, and further that you can't continue such renotifications for more than four consecutive months at the same location — the FCC still thinks if you're going to be at another location longer than that you should modify. But for mobile work, while you have to send in a notice each month you're away, you can keep it up indefinitely.

All these provisions relate solely to operations within the continental limits of the United States, its territories and possessions; they became effective July 14th. For such operation outside the continental limits of the U. S., its territories and possessions, turn to § 12.91(b). The principal feature of this section is that such work may now be carried on only in the band 28.0–29.7 Mc.; that's the only band, except for some of the microwave assignments, where there is a worldwide uniformity of assignment. This section went into effect August 20th. As of that date, also, old § 12.92 was deleted in its entirety.

Last is the new § 12.94, applicable only when ham mobile stations are operated aboard ships or aircraft; its provisions are self-explanatory.

Amateurs engaging in mobile operation should also be familiar with the provisions of §§ 12.81 and 12.82 dealing with the calling and signing procedure for portable and mobile operation, including special procedures for stations aboard marine craft and aircraft.

Text of the new sections follows:

§ 12.91 Requirements for portable and mobile operation:

(a) Within the continental limits of the United States, its territories, or possessions, an amateur station may be operated as either a portable or a mobile station on any frequency authorized and available for the amateur radio service. Whenever portable operation is, or is likely to be, for an over-all period in excess of 48 hours away from the fixed transmitter location designated in the station license, the licensee shall give prior written notice to the Engineer in Charge of the radio inspection district in which such portable operation is intended. This notice is required even though the station is, or is likely to be, operated during any part of this over-all period at the fixed transmitter location. Whenever mobile operation is, or is likely to be, for a period in excess of 48 hours without return to the fixed transmitter location designated in the station license, the licensee shall give prior written notice to the Engineer in Charge of the radio inspection district in which such mobile operation is intended. The notice required for either portable or mobile operation shall state the station call, the name of the licensee, the date or dates of proposed operation and the contemplated portable station locations or mobile station itinerary as specified, as possible, by amateur

station operated under the provisions of this section shall not be operated during any period exceeding one month away from the fixed station location designated in the station license without giving additional notice to the Engineer in Charge of the radio inspection district in which the station is intended to be further operated, nor for more than four consecutive periods of one month each as portable at the same location. Mobile operation without return to the fixed transmitter location may be continued beyond the four consecutive periods of one month each provided that the above mentioned notice of mobile operation is given each month.

(b) Outside the continental limits of the United States, its territories, or possessions, an amateur station may be operated as portable or mobile only in the amateur band 28.0 to 29.7 Mc. Within areas under the jurisdiction of a foreign government, operation is also limited to this band and then only with the permission of that government. Whenever such portable or mobile operation is, or is likely to be, for a period in excess of 48 hours away from the continental limits of the United States, its territories, or possessions, the licensee shall give prior written notice to the Engineer in Charge of the radio inspection district in which the fixed transmitter site designated in the station license is located. Only one such notice shall be required during any continued absence from the continental limits of the United States, its territories, or possessions.

§ 12.94 *Special provisions for mobile stations aboard ships or aircraft.*—In addition to complying with all other applicable rules, an amateur mobile station operated on board a ship or aircraft must comply with all of the following special conditions: (1) The installation and operation of the amateur mobile station shall be approved by the master of the ship or captain of the aircraft; (2) The amateur mobile station shall be separate from and independent of all other radio equipment, if any, installed on board the same ship or aircraft; (3) The electrical installation of the amateur mobile station shall be in accord with the rules applicable to ships or aircraft as promulgated by the appropriate government agency; (4) The operation of the amateur mobile station shall not interfere with the efficient operation of any other radio equipment installed on board the same ship or aircraft; and (5) The amateur mobile station and its associated equipment, either in itself or in its method of operation, shall not constitute a hazard to the safety of life or property.

CANADIANS GET MOBILE TOO

Just as we go to press, Canadian General Manager Reid wires us the good news that, effective immediately, Canadian amateurs have also been granted mobile and portable operating rights on all bands under the same conditions as in the United States. We have not yet seen the text of the new regulation but suggest that if VEs have any questions they can get full information from the nearest RI.

N.F.M. EXTENDED

N.f.m. 'phone operation may be continued.

Except for parts of our bands above 27 Mc. open even to wide-band f.m., the right to engage in narrow-band frequency- or phase-modulated telephony has been a temporary one, authorized only for a trial period of one year expiring August 1, 1948. ARRL considers that the experience has been sufficiently satisfactory to warrant continuation of n.f.m. and so recommended to FCC. The Commission has extended the present authorizations one additional year. This was accomplished by an order amending § 12.114(b) of our rules to change the expiration date for this

facility from August 1, 1948, to July 31, 1949.

As a matter of fact, ARRL has asked that the authorizations be made permanent but this is tied in with some of the other requests of our Board of Directors, including the one to widen the 75-meter 'phone authorization. When that matter is determined, it is expected that the n.f.m. authorizations will be made permanent in their final locations.

F.C.C. NOTES

Beginning early in July, FCC began issuing amateur tickets on a new form which has all the essential station and operation information on one side of the card. Speeds up their ticket-issuing processes and also means we don't have to reserve a two-sided window in our billfold just for our precious ham license, so everybody seems to gain. . . . Benjamin E. ("Benny") Wolf, engineer-in-charge of FCC's Grand Island key monitoring station since its inception eighteen years ago, retired this summer after over forty years in Government service, immersed in the good wishes of his friends in every branch of radio. Now he will have time to ham. . . . Landon C. Herndon, well known to amateurs of the Baltimore and Seattle areas where he served as inspector-in-charge, and more lately FCC regional manager for the Central States at Chicago, has been appointed assistant chief of the Field Engineering & Monitoring Division at Washington. . . . If you hear anything about FCC engineering conferences and hearings on harmonics and spurious emissions, know also that ARRL is in there participating for the amateur service. . . . No news yet on FCC's reception to the ARRL Board's requests for changes in the ham regs, what with a heavy calendar of duties and vacation absences there.

U.R.S.I.-I.R.E. MEETING

A second joint meeting of the American Section, International Scientific Radio Union, and the Institute of Radio Engineers will be held in Washington on Thursday, Friday and Saturday, October 7th, 8th and 9th. The morning session on Thursday will be held jointly with District 2, AIEE. The program, as usual, will be devoted to the more fundamental and scientific aspects of radio and electronics. A listing of titles and abstracts of papers will be available in booklet form for distribution before the meeting. For any further information, address Dr. Newbern Smith, Secretary, American Section, URSI, National Bureau of Standards, Washington 25, D. C.

C.A.A. ALASKA JOBS

The Civil Aeronautics Administration has a need for aircraft communicators to man approximately 45 communications stations along Alaskan airways. They want men who have had 18 months of military or commercial aeronautical communications experience (or two years of other radio communications experience), single

(because of shortage of family housing facilities), in good physical condition, who can handle c.w. at 30 w.p.m. and touch-type at 35. Starting salary is approximately \$3718 per year and a good opportunity exists for properly-qualified communicators to advance to \$4659 per year after six months' service. New employees are given several weeks' orientation training at Oklahoma City before travel to Alaska. Complete details and application forms may be obtained by addressing the Director, CAA Aeronautical Center, Box 1082, Oklahoma City 1, Oklahoma.

ELECTION NOTICE

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

You are hereby notified that, in accordance with the Constitution, an election is about to be held in each of the above-mentioned divisions to elect both a member of the ARRL Board of Directors and an alternate thereto for the 1949-1950 term. Your attention is invited to § 1 of Article IV of the Constitution, providing for the government of ARRL by a board of directors; § 2 of Article IV, and By-Law 12, defining their eligibility; and By-Laws 13 to 24, providing for the nomination and election of division directors and their alternates. Copy of the Constitution & By-Laws will be mailed to any member upon request.

As a special case in these elections: There being a vacancy in the office of alternate director in the New England Division, and it being desirable and required that the office be filled as quickly as possible, every nomination for alternate director from the New England Division will be deemed to be not only a nomination for the 1949-1950 term but also for the unexpired remainder of the present term; and the candidate chosen will take office immediately upon his selection.

Voting will take place between October 1 and November 20, 1948, on ballots that will be mailed from the headquarters office during the first week of October. The ballots for each election will list, in one column, the names of all eligible candidates nominated for the office of director by Full Members of ARRL residing in that division; and, in another column, all those similarly named for the office of alternate. Each Full Member will indicate his choice for each office.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for both offices. Inasmuch as all the powers of the director are transferred to the alternate in the event of the director's death or inability to perform his duties, *it is of as great importance to name a candidate for alternate as it is for director.* The following form for nomination is suggested:

Executive Committee

The American Radio Relay League
West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the..... Division, hereby nominate..... of..... as a candidate for director; and we also nominate..... of..... as a candidate for alternate director; from this division for the 1949-1950 term.

(Signatures and addresses)

The signers must be Full Members in good standing. The nominee must be a Full Member and must have been both

a member of the League and a licensed radio amateur operator for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination, except that a lapse of not to exceed ninety days in the renewal of the operator's license and a lapse of not to exceed thirty days in the renewal of membership in the League, at any expiration of either during the four-year period, will not disqualify the candidate; provided that if a candidate's membership was interrupted by reason of service in the armed forces of the United States or Canada between September 1, 1939, and May 3, 1947, he shall not be deemed to be disqualified so far as concerns continuity of membership if within those dates he resumed his League membership within the 90 days following his release from active military duty. He must be without commercial radio connections; he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or part, for consumption by licensed radio amateurs. Further details concerning eligibility are given in By-Law 12. His complete name and address should be stated. The same requirements obtain for alternate as for director. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EDST of the 20th day of September, 1948. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of alternate. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are frequently found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for alternate but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Present directors and alternates for these divisions are as follows: Central Division: director, Clyde C. Richelieu, W9ARE; alternate, Harold H. Jansen, W9DJG. Hudson Division: director, Joseph M. Johnston, W2SOX; alternate, Robert A. Kirkman, W2DSY. New England Division: director, Percy C. Noble, W1BVR; alternate, none. Northwestern Division: director, Harold W. Johnston, W7DXF; alternate, R. Rex Roberts, W7CPY. Roanoke Division: director, Hugh L. Caveness, W4DW; alternate, J. Frank Key, W3ZA. Rocky Mountain Division: director, Franklin K. Matejka, W8DD; alternate, P. Arthur Smoll, W8KVD. Southwestern Division: director, Hans R. Jepsen, W6KEI; alternate, Arthur E. Schiffman, sr., W6CGI. West Gulf Division: director, Wayland M. Groves, W5NW; alternate, Jack T. Moore, W5ALA.

These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. Full Members are urged to take the initiative and to file nomination petitions immediately.

For the Board of Directors:

K. B. WARNER,
Secretary

July 1, 1948

SWITCH
TO SAFETY!



Accurate Frequency Measurement

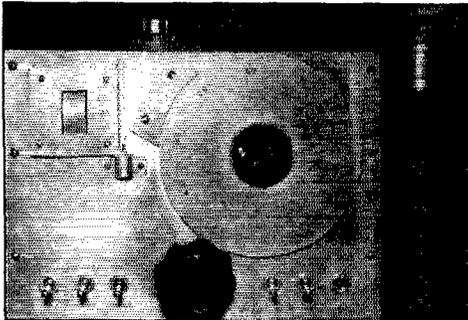
Combining Frequency Standard and Interpolating Oscillator

BY LOUIS A. WILLIAMS,* W4JUI

IN view of the availability of good frequency meters — as well as simple crystal standards that mark the band edges with high accuracy — a frequency meter of the type to be described may seem unduly elaborate. On the other hand, some of us like to be able to measure frequencies anywhere in the bands to within a smaller number of cycles than is possible with the simpler types of equipment. That — together with a healthy respect for the FCC Monitoring Service — is what inspired the writer to design and construct the instrument discussed here.

As is often the case with amateur gear, the circuits do not involve anything that could not have been obtained from the regular sources of information. However, the combination of methods incorporated in the instrument results in a much higher order of accuracy in frequency measurement than is ordinarily achieved in amateur apparatus.

A glance at Fig. 1 will show that the unit



Panel view of the frequency meter, showing the home-made dial mechanism. The thermometer is mounted alongside the drum dial escutcheon at the right. The knob projecting from the top controls the band-selector switch, S_7 . The control switches and the frequency corrector are along the bottom.

includes a good low-drift 100-ke. crystal oscillator, a 10-ke. multivibrator, an amplifier-mixer for boosting harmonic output, and a double-range interpolating oscillator of good stability. The 100-ke. oscillator and interpolation-oscillator circuits are temperature-controlled. By using a tuning dial that can be read to one-tenth division in each of its 5000 divisions, a high order of precision in calibration is attained.

Since the circuits used will, in general, already

* R. R. 2, Box 43, Anchorage, Ky.

• The equipment and technique described here are capable of measurements to within 1 part in 100,000 in the hands of a capable operator. With precision condensers absurdly cheap in surplus, the cost of such a unit is within the reach of practically any amateur.

be familiar to those interested in precise frequency measurement, the discussion to follow will be confined to those constructional features that help contribute to making the stability and accuracy of the instrument high.

The Crystal

The heart of the unit is an accurate crystal. Obtain a good low-temperature-coefficient crystal; if possible, allow it to "age" for a few weeks before calibration. Aging is done with the crystal oscillating. Crystals drift more the first few weeks and need the tuning retouched oftener than thereafter. This does not mean you must wait to calibrate your meter should you build one; but simply that the crystal frequency-adjusting condenser, C_3 , will have to be touched up oftener while calibrating.

The crystal used by the author came with a rated accuracy of 0.005% over a temperature range from 0 to 50 degrees Centigrade. Aging and temperature control improved it to 0.0009%. It sits for days on zero beat with WWV's 5-Mc. signal without more than 3 cycles variation. The crystal frequency can, of course, be checked at any time by tuning in WWV on 5 Mc. on the regular receiver and adjusting C_3 so that the crystal's 50th harmonic zero-beats with the standard-frequency transmission. By zero beat is meant just that; use the receiver's tuning meter for an accurate indication, or count the "swooshes" in background noise as the harmonic comes closer to actual zero beat.

In this unit, C_3 is controlled by the large knob in the center of the row of switches near the bottom of the front panel, as shown in the front-view photograph. The oscillator plate voltage can be turned on or off by means of S_3 .

Multivibrator & Harmonic Amplifier

The 10-ke. multivibrator, using a 6SC7 double triode, is locked on its 10th harmonic by the 100-ke. output of the crystal. It can be turned on and off by S_4 , which opens the cathode circuit. The

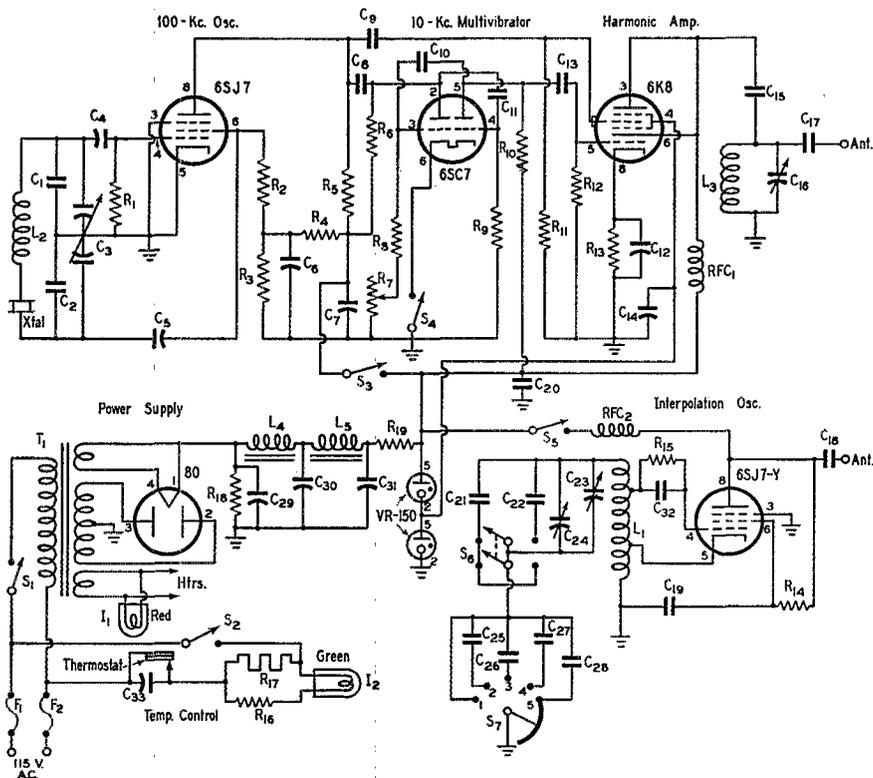


Fig. 1 — Circuit diagram of the frequency meter.

- C₁, C₂ — 50- μ fd. silver mica.
 C₃ — 140- μ fd. per-section variable.
 C₄, C₅ — 0.01- μ fd. paper, 400 volts.
 C₆, C₇, C₁₂, C₂₀ — 0.1- μ fd. paper, 400 volts.
 C₈, C₁₃ — 10- μ fd. silver mica.
 C₉ — 50- μ fd. silver mica.
 C₁₀, C₁₁ — 0.001- μ fd. mica.
 C₁₄ — 8- μ fd. electrolytic, 450 volts.
 C₁₅, C₁₉ — 0.002- μ fd. mica.
 C₁₆ — 50- μ fd. midget variable.
 C₁₇ — 100- μ fd. mica.
 C₁₈ — 50- μ fd. mica.
 C₂₁ — 590- μ fd. silver mica.
 C₂₂ — 125- μ fd. silver mica.
 C₂₃ — 220- μ fd. variable.
 C₂₄ — Midget variable, approx. 1 μ fd.
 C₂₅, C₂₆, C₂₇ — 15- μ fd. silver mica.
 C₂₈ — 280- μ fd. silver mica.
 C₂₉, C₃₀, C₃₁ — 10- μ fd. electrolytic, 450 volts.
 R₁, R₁₁ — 1 megohm, $\frac{1}{2}$ watt.
 R₂, R₅ — 0.5 megohm, $\frac{1}{2}$ watt.
 R₃ — 0.1 megohm, $\frac{1}{2}$ watt.
 R₄ — 0.14 megohm, $\frac{1}{2}$ watt.
 R₆, R₁₀ — 50,000 ohms, 1 watt.

- R₇ — 15,000-ohm variable, wire-wound.
 R₈, R₉ — 20,000 ohms, 1 watt.
 R₁₂ — 0.3 megohm, $\frac{1}{2}$ watt.
 R₁₃ — 800 ohms, 1 watt.
 R₁₄ — 50,000 ohms, 2 watts.
 R₁₅ — 0.15 megohm, 1 watt.
 R₁₆ — 800 ohms, 10 watts (for 6-volt 0.15-amp. bulb).
 R₁₇ — 60-watt 115-volt lamp.
 R₁₈ — 50,000 ohms, 10 watts.
 R₁₉ — 1000 ohms, 10 watts.
 L₁ — 8 $\frac{1}{2}$ turns No. 12 bare, diameter 1 $\frac{3}{4}$ inches, length 3 inches. Tapped at 2 $\frac{1}{2}$ and 4 $\frac{1}{2}$ turns.
 L₂ — Furnished with crystal (20-mh. r.f. choke).
 L₃ — 30 turns No. 30 on $\frac{1}{4}$ -inch form (see text).
 L₄, L₅ — 10 henrys, 50 ma.
 F₁, F₂ — 2-amp. fuse.
 I₁, I₂ — 6.3-volt pilot lamp.
 RFC₁, RFC₂ — 2.5-mh. r.f. choke.
 S₁—S₅, inc. — S.p.s.t. toggle.
 S₆ — S.p.d.t. toggle.
 S₇ — Single-gang ceramic, 5-position, progressive short.
 T₁ — 600 v. c.t. 50 ma., 6.3 v. 3 amp.
 Thermostat — See text.
 Xtal — 100-kc. low-drift (Biley FM6-S).

frequency is adjusted by R_7 which, once the proper setting is found, need not be touched again. The frequency is checked by first tuning in two adjacent 100-kc. signals from the oscillator alone, noting the receiver dial settings at which they occur. R_7 is then adjusted so that, with S_4 closed, nine additional signals occur between the two 100-kc. signals. R_7 is a screwdriver adjustment.

In the 6K8 the 100-kc. and 10-kc. signals are fed to separate control grids while the oscillator plate and converter plate are connected together and to the output tank, L_3C_{16} . Since the multivibrator output is rich in harmonics, the 10-kc. signals are always stronger than the harmonics from the 100-kc. oscillator alone.

A plug-in coil for each band could be used at L_3 . However, it was found that crystal harmonics

as high as the 100th were strong enough for use, so in the interests of simplicity it was decided to tune the output circuit to 14.2 Mc. and install a permanent coil at L_3 . C_{14} , an 8- μ fd. electrolytic, is used to prevent any tendency toward audio oscillation. In units made since, it has been found that C_{14} could be left out if the triode plate of the 6K8 (socket terminal No. 6) was left disconnected from the other plate.

Interpolation Oscillator

The interpolation oscillator uses the familiar electron-coupled circuit, with a 6SJ7-Y in preference to the ordinary 6SJ7 so that drift will be minimized. Its tuning unit is built around a variable condenser of the type used in the BC-221 frequency meter — a 220- μ fd. precision unit built to very close mechanical tolerances and having a 100-to-1 gear ratio. These condensers sell for around two or three dollars in surplus. If you are fortunate, your condenser may come with the drum dial, flat dial and knob. The writer had to manufacture his, along with the shaft, bearing, and mounting for the drum.

A 360-degree vernier dial numbered 0 to 100 may be purchased but will prove to be tiresome to tune because of the large over-all reduction ratio. A homemade 6-inch diameter "flywheel" dial, cut from $\frac{1}{8}$ -inch aluminum, was found to be large enough for fine settings and gave much faster tuning. With the tuning ratio used there is no trouble in setting to zero beat even on 10 meters. Parallax is avoided by placing the dial indicator to the left as shown in the front-view photograph, the instrument being placed to the left of the receiver on the operating desk.

Since the condenser gear ratio is 100 to 1, 50 complete revolutions of the dial are required to turn the condenser through 180 degrees. The drum has 50 divisions, one for each complete revolution of the tuning dial. Since the latter has 100 divisions, the scale is divided into 5000 parts. A vernier on the dial index makes it possi-

ble to read to $\frac{1}{10}$ of a division — in other words, effectively 50,000 divisions. Such a spread-out scale permits high precision in calibrating and reading, but obviously requires that a gear drive without back-lash be used.

Several tuning ranges are provided in the interests of increased accuracy at the higher frequencies. With S_7 in Position 1 there are two fundamental ranges in the 3500-ke. region; with S_6 thrown to the right-hand position shown in the diagram the range is from 3485 to 3765 kc., and with S_6 in the left-hand position the range is 3740 to 4100 kc. The harmonics of the first range cover the 7-, 14-, 21- and 28-Mc. bands and permit readings to less than 100 cycles at 28 Mc. The second range covers the upper half of the 3.5-4 Mc. band. On these ranges each $\frac{1}{10}$ dial division represents a frequency change of 3 to 16 cycles at the fundamental frequency.

For comparable precision of reading at the higher frequencies, four additional ranges in the 7-Mc. fundamental region have been included. These are found on the remaining positions of S_7 and are as follows:

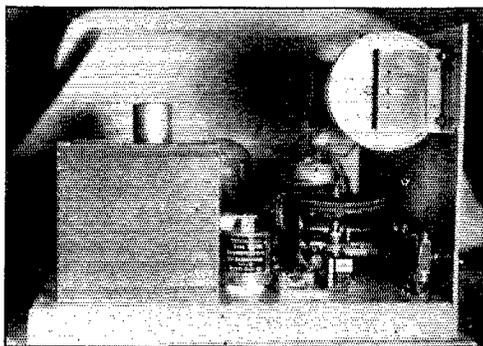
- Position 2 — 6900 to 7115 kc.
- " 3 — 7100 to 7217 kc.
- " 4 — 7205 to 7320 kc.
- " 5 — 7300 to 7430 kc.

With these ranges the bandsread is such that each $\frac{1}{10}$ dial division corresponds to 1 to 5 cycles on 7 Mc., 2 to 11 cycles on 14 Mc., 7 to 16 cycles on 21 Mc., and 4 to 22 cycles on 28 Mc. S_6 is in the right-hand position for all ranges except 3740 to 4100 kc. For all practical purposes, this eliminates the dial as a source of error in measurement.

Solid construction definitely will improve stability. If a grooved coil form is not available for L_1 , cement the turns on. Do not use a plastic form, and avoid any extra insulation, even to make a neater job, if it means more plastic in the critical circuits. All tuned circuits should use either mica- or ceramic-insulated air condensers.

C_{24} is a midget condenser cut down to two plates to act as a "corrector." The tuning shaft of C_{24} was brought out the top for screwdriver adjustment, but in several months of use very little "correction" has been required — other than that made necessary by hitting the shaft with the lid when showing off the "works" to a visitor. In any case, to reset the calibration it is only necessary to consult a calibration chart (made as described later) for any 10-ke. logging point on any band. Check the crystal with WWV, set the receiver to the same 10-ke. point, and zero-beat the interpolating oscillator by touching up C_{24} , with the dial of the interpolating oscillator at its calibration setting. An improvement would be to bring the control out to a knob on the front panel, especially when using the second method described later under frequency checking.

The interpolating oscillator in the writer's



Looking inside from the left, showing the crystal unit and thermostat. The large cased unit at the left is the power transformer.

unit will vary plus or minus 175 cycles in 24 hours on 7 Mc. It appears to be as stable as a crystal for the short periods while interpolating, but may vary 20 to 30 cycles in ten minutes if one is that slow in taking the readings.

Temperature Control

The chassis and cabinet are divided into two sections, with the rear half containing the power transformer, filter chokes, filter condensers, rectifier and two VR tubes. This section is ventilated to permit normal cooling of the power-supply components.

The other tubes, crystal, and a 60-watt bulb heat source are in the front section, which is heat-insulated and is operated at a temperature of 107 degrees F. Temperature control has been well worth while, since it was found that temperature variations had a greater effect on the circuit stability than did the voltage variations normally encountered. Up to a certain point, advantage is taken of the tube and circuit heat; the heat source has to add only a few extra degrees to assure constant temperature.

The complete enclosure is not shown in the photographs, but surrounds the parts shown in the front section in the side views. Removable pieces of half-inch-thick Celotex are used for the sides of the enclosure, with three layers of asbestos paper pasted on the inside surfaces. No insulation is used on the front panel.

The thermostat is an ether-filled wafer type made for chicken incubators, and sells for 75 cents at most country hardware stores. The thermometer is from the same source. The scale of the thermometer was removed and duplicated on the front panel. The thermostat operates a normally-closed microswitch and holds the temperature to within one-half degree F. The heat source should not be located too close to the thermostat, but if the two have to be mounted side by side they should be isolated from each other by an asbestos wall to prevent erratic temperature fluctuations caused by direct heat radiation. The chassis is homemade from sheet aluminum and measures 11 by 12 by 1½ inches. The cabinet dimensions are 11 by 12 by 7½ inches.

Calibration

Assuming that the oven is up to temperature and the circuits have had a fifteen-minute warm-up run, connect the output post to the receiver antenna post through a shielded line. The unit is then ready for making calibration charts.

Set the receiver so that the 100-kc. points fall on the proper 100-kc. spots of the band to be calibrated. Now turn on S_4 and adjust R_7 so that you have a signal every 10 kc. Then close S_5 and swing the interpolating oscillator to zero beat with the harmonic on, say, 3490 kc. Write down the interpolating-oscillator dial reading, move the receiver to 3500 kc., and then swing the

TABLE I
Sample Calibration Chart

Freq.	Dial	<i>Cycles/Div.</i> <i>this</i> 10 Kc.	Freq.	Dial	<i>Cycles/Div.</i> <i>this</i> 10 Kc.
	7.0			7.1	
13990	137.3	105.4	14200	146.4	112.3
14000	242.7	103.0	14210	259.7	103.3
14010	345.7	100.0	14220	363.0	98.9
14020	445.7	98.8	14230	461.9	99.5
14030	544.5	99.9	14240	561.4	103.6
14040	644.4	106.0	14250	675.0	106.0
14050	750.4	111.2	14260	781.0	109.0
14060	861.6	116.6	14270	890.0	122.4
14070	978.2	127.5	14280	1012.4	132.6
14080	1105.7	135.3	14290	1145.0	144.8
14090	1241.0	142.0	14300	1389.8	160.2
14100	1383.0	160.3	14310	1450.0	169.3
14110	1543.3	181.9	14320	1619.3	183.7
14120	1725.2	195.1	14330	1803.0	201.6
14130	1920.3	208.7	14340	2004.6	218.0
14140	2129.0	241.7	14350	2222.6	238.7
14150	2370.7	256.6	14360	2461.3	272.9
14160	2626.3	270.7	14370	2734.2	301.0
14170	2897.0	321.8	14380	3035.2	357.4
14180	3218.8	369.5	14390	3392.6	417.9
14190	3588.3	440.7	14400	3810.5	496.8
14200	4029.0	523.4	14410	4307.3	
14210	4552.4				

interpolating oscillator to zero beat again. Continue at 10-kc. intervals until the oscillator is calibrated for each band.

Now subtract the 3490-kc. dial reading from the 3500-kc. reading, thus obtaining the number of divisions for that 10-kc. interval. Make another column headed "Divisions per this 10 kc." and enter this number on an imaginary line drawn between the first and second dial readings. Continue until all such differences have been calculated and listed. This "difference" helps to speed up calculations when making a measurement. Table I is a sample chart.

A receiver dial that is readable to 10 kc. will help in determining the 10-kc. interval in which you are interpolating. However, once the interpolating oscillator is calibrated it can be used much better than the receiver.



The interpolation-oscillator tank coil is at the lower left in this view, with the precision tuning condenser just above it. Two of the heat-insulating partitions are shown in place.

Checking a Frequency

There are several methods by which an unknown frequency can be measured. The accuracy of each is in proportion to the effort one uses.

The most accurate method of measurement — and the most time-consuming one — requires using the 10-kc. crystal points on each side of the unknown signal, zero-beating both 10-kc. points and the unknown signal with the interpolating oscillator. If possible, use a visual zero-beat indicator such as the receiver S-meter or a 6E5 “eye.”

Assuming that the unit is up to oven and circuit temperature, use the following procedure:

1) Zero-beat the crystal to one of WWV's frequencies with S_4 and S_5 open so only the 100-kc. signals will be heard.

2) Set the receiver so that the 100-kc. signals fall on the correct dial points — for example, 7.0, 7.1, 7.2, 7.3, etc.

3) Turn on S_4 ; the 10-kc. signals will fall on their respective places.

4) With the receiver, tune in the signal to be measured (a 7-Mc. signal is assumed in this case). The b.f.o. should be off.

5) Turn off S_3 and turn on S_5 , after first making sure S_6 and S_7 are in the correct band positions.

6) Zero-beat the interpolating oscillator to the unknown signal. Let's say it is at 1157.3 on the dial of the oscillator.

7) Now zero-beat the interpolating oscillator to the 10-kc. crystal signals on each side of the unknown signal. Let's say the lower 10-kc. point reads 1221.7 on the interpolating-oscillator dial. The difference between the readings at the two 10-kc. points is 130.2.

The interpolating formula is:

$$F_x = F_1 + \frac{D_x - D_1}{D_2 - D_1} \times 10$$

Where F_x = unknown frequency

F_1 = frequency of 10-kc. point below the unknown

D_x = dial setting for F_x

D_1 = dial setting for F_1

D_2 = dial setting for 10-kc. point above the unknown

All frequencies are in kilocycles. F_1 may be obtained either from the receiver dial or the previously-calibrated interpolating-oscillator dial chart.

For example, if F_1 is 7110 kc., substituting in the formula gives:

$$F_x = 7110 + \frac{1157.3 - 1091.5}{1221.7 - 1091.5} \times 10$$

$$7110 + \frac{65.8}{130.2} \times 10 = 7115.50$$

The last figure is uncertain, but with care in measurement as well as care in setting the crystal frequency and in zero-beating with the 10-kc. points and the unknown frequency, it is safe to say that the accuracy will be within 0.001%. Consequently, the actual frequency may be between 7115.43 and 7115.57, since 0.001% of 7100 kc. is approximately 0.07 kc.

This method works fine for checking a local signal or one in the shack, but to give a distant fellow ham a frequency check requires his signal to be reasonably free from interference.

The second method — and the author's favorite — is to have the interpolating oscillator previously calibrated as in the tabulated example. Check the crystal against WWV. See if the interpolating-oscillator dial readings check with the chart on the 10-kc. points. If so, you are ready to check the unknown frequency. If not, set the interpolating oscillator on a 10-kc. point read from the chart and then zero-beat it at that 10-kc. point by use of the corrector, C_{24} . Proceed to interpolate as before for an accuracy in the neighborhood of 0.001%.

For a third method, use the 10-kc. points to calibrate your interpolating-oscillator dial; draw a graph showing dial readings vs. frequency and read the unknown frequency direct from the graph. This method is by far the simplest, and with a large graph may be read to within 100 cycles. The accuracy will not be as close unless the graph is checked against the standard, as described above, just before the reading is taken. Do not neglect the warm-up period if the instrument has been turned off. An alternative method is to calibrate the interpolating oscillator in a typed column style for every 100 cycles and read it off the page directly to the nearest figure.

There is nothing complicated about the building, adjustment, calibration or operation of the meter. The operating cost at the local power rate is around 50 cents per month when the oven is left on continuously and the power circuits are used for average operating periods.

Some Thoughts on 10-Meter Mobile

Practical Ideas from Members of the Washington Mobile Radio Club

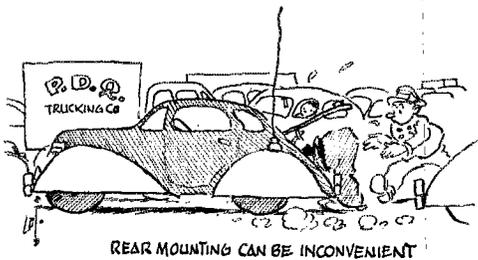
BY R. V. ANDERSON,* W3NL

ACTIVE mobile operators continually receive requests for information relative to the practical considerations in this field of amateur operation. The fellow who has never tried mobile work often has little or no idea of the best ways of getting started, and if his experiences are anything like those of the members of the Washington Mobile Radio Club, he may spend many hours finding out how to do it by a laborious and possibly expensive process of trial-and-error. Certainly the problems confronting the mobile enthusiast are vastly different from those involved in home-station work.

Here, for what they may be worth in smoothing the way for the man who is just entering the fascinating field of mobile operation, are numerous practical suggestions compiled from the experiences of members of our club. It is realized that each mobile installation is an individual problem, and that no one routine solution will satisfy everyone's requirements, but if even a few useful ideas are suggested, and a few hours of effort are saved, this paper will have served its purpose.

Location of Equipment

If at all possible, put the transmitter under the dash where it will be accessible from the driver's position. This provides several very desirable features. Long cables are eliminated; the antenna



may be mounted up front, high on the car, and leads to it kept short; heater leads are much shorter, reducing the likelihood of excessive voltage drop; and you will not be confronted with the problem of concealing cables which run the length of the car. Tuning and frequency shifting can be accomplished without moving out of the driver's seat, a feature that can be best appreci-

•The perennial housing shortage, and the resultant ultrachoosey attitude of landlords in the matter of certain rooftop structures, make mobile operation more than ordinarily popular with amateurs in the vicinity of Washington, D. C. Because many of them are wholly dependent on their car rigs for their hamming, the members of the Washington Mobile Radio Club have gone to considerable trouble to assure maximum performance from their mobile stations. Here is a cross-section of the experiences of the club representing many operator-years, compiled by the club president and originally presented by him in a talk at the 1948 Atlantic Division ARRL Convention.

ated by the fellow who has had to do some tuning operations on a rear-compartment job in the rain, or in heavy traffic! In single-seat coupé models the shelf in back of the seat may be employed as a second choice.

Placing the converter or receiver offers almost no alternative to steering-post or dash mounting, unless one cares to go in for complicated remote-control devices.

Under the hood is generally the best place for the dynamotor or vibrator supply. Most present-day cars have their batteries alongside the engine; if the power supply and its associated relays are mounted on the engine side of the fire wall, or elsewhere in the considerable amount of vacant space available under the hood, the battery leads (which must be of very heavy wire or cable) can be short and direct. Some cars have a shelf, in the form of the portion of the fender which extends under the hood, which may be used to good advantage. With large installations it is occasionally desirable to separate the modulator from the r.f. portion of the transmitter, and mount the former under the hood, particularly if space under the dash is at a premium.

Power — How Much To Run and How To Get It

The uninitiated often have misconceptions about the power required for satisfactory mobile work. With most home stations running upwards of 100 watts, some fellows think that a lot of

* 2818 Que St., S.E., Washington, D. C.

power must be used in the mobile station, but 12 watts is only one S-unit below 50 watts, and the 10-watt mobile job¹ will almost invariably work anything that 50 will. One of our gang uses about 8 watts input, and has literally "worked the world." Average power of our stations is about 20 watts, but several use 10 watts or less, and they've worked the same distances the 50-watters have.



For inputs up to 15 or 20 watts it is possible to get along with the original car battery and generator, provided you do a reasonable amount of daytime driving. Unless you cover a lot of ground regularly do not expect to use a PE-103 at maximum rating without some auxiliary power system — special generator, extra battery, separate charger, etc. Even then you will probably have a tendency to idle the engine fast — a most uneconomical method of supplying power. Some of our fellows use an extra generator and a separate battery, completely apart from the regular system. Others use a separate battery which can be removed for basement charging; or, if there is a.c. available in your garage, night charging in the car is feasible. With the two-battery systems a switch is generally provided to permit use of either battery separately, or both in parallel.

About three-quarters of the Washington Mobile Radio Club gang use the PE-103; other dynamotors 15 per cent and vibrator supplies 10 per cent. Most shied away from vibrators because the hash may be hard to handle. We've even had two instances where receiver vibrator hash got into the transmitter audio!

Nearly all removed the PE-103¹ from its box (there's a lot of stuff in the box you'll never use anyway) and have mounted the dynamotor directly to the car frame. If you use the unit "as is" there is a constant 15-ma. drain caused by the safety relay, 3E7, which protects the unit if 12 volts is applied with the switch in the 6-volt position. To eliminate this drain, find the point on the bakelite board, just over the 2- μ f. condenser, where two wires come out to a common lug. Cut off the smaller of the two wires and tape it.

Take out the 12-volt brushes — they are on the side with the high-voltage brushes. If your car

has a negative ground you can reverse the polarity of the PE-103 by transposing the high-voltage leads which go to the brushes. Most of our fellows do not use the control relay as is — it takes a lot of current. Instead they use the 12-volt solenoid with a weakened spring, or employ some other type of relay, some of which draw as little as 150 ma.

The PE-103 requires 5 to 7 amperes just to turn itself over. It is rated at 21 amp., and this, plus heater drain, may bring the total load on the battery up to about 30 amp., for which you can get an input to the final of 35 to 45 watts. Most of us use only about 20 watts or so, however, with correspondingly lower drain and less battery trouble. About 2 μ f. will filter the dynamotor nicely. The PE-103 may be used for low-power operation by putting 6 volts on the 12-volt winding. About 250 volts at 125 ma. will be available with this connection — enough for a good low-powered rig.

Transmitter Considerations

It is highly recommended that crystal control be used, even though quick QSY is desirable. The use of a VFO is almost impossible, because of vibration and extra-drain considerations, but a choice of two or three crystals, separated by 10 to 20 kc. in the 10-meter band, can accomplish the desired result. Pick the approximate spot you want to operate in; then select your crystals so that you can use the middle one, moving "up ten" or "down ten" as may be needed to avoid QRM which may develop on the original operating frequency.

Push-button control is handiest, or the standard point switch may be used. There are several stepping switches available (some on the surplus market, at low cost) which provide up to six positions. They present the problem of indication of the frequency in use, however, and may require going through a lot of steps to get to the position "just before" the one presently in use. A pilot light may be wired to operate on one position, and all others can be oriented from this one by counting steps. Telephone switches are available, though usually somewhat large. Crystal-switching units, one housing 10 crystals, another 3, are commercially available.

Don't try to do too much in a single stage. It is often more practical to use two stages with small tubes for getting to 28 Mc. with 7-Mc. crystals than it is to use a larger tube and quadruple in the oscillator. The 6G6G, for instance, has a heater drain of only 0.15 ampere, yet it is an excellent oscillator-doubler or harmonic amplifier, and two of them will give plenty of drive for most final stages, multiplying down from 7-Mc. rocks. This procedure is recommended, as 7-Mc. crystals are cheap and plentiful, and they are much easier to use than the more critical and expensive harmonic types.

¹ For more ideas on the PE-103 see information from W3GKP in the "Surplus Corner," August, 1948, *QST*, page 81.

If, in the interest of low drain and small size, it appears necessary to double in the final, it is quite permissible to do so. One of our most popular low-power combinations (7F7-7C5) does this with excellent results. Of course the efficiency of the doubler-final is not comparable to the stage that works straight-through, but don't make the mistake of using the wrong comparison factors and thinking in home-station terms. Efficiency in the home rig is not normally considered from the angle of watts-on-the-power-meter to soup-in-the-antenna, but in the mobile job we are primarily concerned with the relation between amperes-from-the-battery and power-output. A 6L6-807 combination, for instance, may operate more satisfactorily in the mobile set-up with both stages doubling, than if we quadruple in the oscillator and work straight-through in the final.

Be sure to incorporate facilities for use of the 11-meter band in both transmitter and receiver. A lot of good mobile work is being done on that band, particularly when 10 is overcrowded.

How About the Modulator?

Be sure to have a reserve of modulator power, and be certain that the transmitter is capable of being modulated well. Remember that your signal is not going to compare with the higher-powered home stations in most instances, as far as carrier level is concerned, so be sure that the modulation is right "up there" both in quality and quantity. In our transmitters you will find Class A (Heising), Class AB, and Class B modulators. The first has the advantage of drawing a steady current, though it does take more drain for a given amount of output. Class B imposes the problem of a varying load, though with good efficiency in the matter of over-all drain for a given amount of audio. The Class AB compromise between these two extremes is most popular in our group, and a reasonable suggestion would be to use it in most installations. The Class A modulator is used principally with less-than-10-watt rigs, and Class B is good for higher-powered jobs, particularly if a separate supply is available for the modulator.

Use a speech amplifier of some sort. You can always turn down the gain if you have too much, but shouting to overcome audio deficiencies is tiresome. Nearly all of our fellows use carbon microphones. The man who suggested using crystal jobs for mobile work has never tried one in a closed car in Washington's summer climate. A crystal microphone will melt the first hot day you leave the car in the sun for a few hours with the windows closed. Velocity microphones are too bulky, and when you have dropped a dynamic once you're ready to go back to the old reliable single-button carbon!

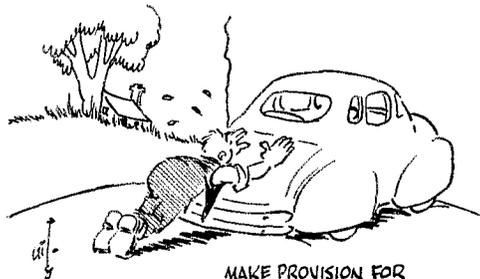
If you use one of those T-17 jobs now available on the surplus market, change the push button

to a slide or snap switch, to avoid thumb fatigue. You can use the storage battery for microphone current, either directly, or through an isolating network of 100 to 500 ohms and a high-capacitance condenser. The microphone current can be supplied from a cathode resistor, if desired, but there seems to be little point in it in mobile service, except when vibrator hash is a problem.

For the present, do not consider the use of n.f.m. While it is true that good contacts are occasionally made by mobile stations using n.f.m., our experience has shown conclusively that it cannot begin to compare with good a.m. for consistent results under the conditions peculiar to mobile operation. It is singularly ineffective in work with other mobiles — the high noise levels inherent in mobile reception make even an S9 n.f.m. signal difficult to copy on a mobile receiver. On one of our numerous week-end excursions, several of our 10-watt a.m. jobs worked out well over the two-day period, while a 30-watt n.f.m. job was not once able to "get off the mountain." Until use of n.f.m. adapters at home stations becomes more general, the use of this type of modulation in the mobile job just will not pay off.

Choosing the Tube Line-Up

It is well to consider all the factors carefully before building a rig employing quick-heating tubes. They are expensive and not always readily obtainable; and there may not be as much advantage in their use as appears on the surface. The saving in battery drain is appreciable only if you contemplate leaving the heaters (in the case of indirectly-heated cathode-type tubes) on over long periods of time, as the filament-type tubes



impose more drain on the battery than do heater types of about the same power level. The chief advantages of the quick heaters actually turn out to be that, if you use a push-to-talk system, you cannot accidentally leave the filaments on when you park the car, and the set is always ready to go, at an instant's notice, without any warm-up period. Under the section entitled "Control Circuits" there is outlined a system whereby the first of these features can be included in the rig having heater-type tubes.

Here are some representative line-ups, all assuming the use of 7-Mc. crystals, doubling in the oscillator stage:

For the PE-103, cathode-type tubes, 20 to 30 watts — 6G6G oscillator-doubler, 6G6G or 7C5 doubler, 807 or 2E26 final. Modulator — two 7C5s with 6G6G (triode-connected) speech amplifier. Heater drain 2.1 amp.

Same power level, but with quick heaters — 2E30, 2E30, 2E24 or 5516, modulated by 2E25s with 2E30 speech amplifier. Drain 4.2 amp.

For the 300-volt 100-ma. supply, cathode-type tubes — 6G6G, 6G6G, 7C5. Modulator — two 6G6Gs Class A with 6G6G speech. Drain 1.2 amp.

For the same power level with quick heaters, use 2E30s all the way through. Drain 3.25 amp.

Tetrode tubes are recommended for the final stage in each case because of their low-drive requirements. It takes very little plate current in the oscillator and doubler stages to provide enough drive for any of the tubes recommended above. The 6AG7 and 832 are two tubes of unquestioned performance, but most of us look askance at their 0.65- and 1.6-ampere drains.

Some of us are not completely sold on miniature tubes for mobile use. Many of them are counterparts of other standard types, and nothing is gained in performance or economy. Even in the matter of size there is seldom any great saving. Condensers or resistors must be placed alongside the miniature socket, whereas they may be laid across the larger types. The lock-in types are popular; they work well in high-frequency service, and they stay in the sockets!

Receiver and Noise Problems

Quite a few of our group use commercial converters working into their car broadcast receivers. It is not difficult to build a good mobile converter, however, and even the single 6J6 mixer-oscillator combination does very well. One of the 274-N "Command" sets can be converted to 28 Mc. without much trouble, and this is a particularly good deal for the fellow who has no car radio. Broad-band converters are out for use with mobile broadcast receivers that do not have sufficient tuning range to allow coverage of the entire 10-meter band.

It is not necessary to have an extremely hot receiver for the mobile station, since noise is almost always the limiting factor, rather than receiver sensitivity. Even if you have your own car noise suppressed completely, the racket from other cars can give you plenty of trouble. A simple and effective noise limiter is shown in Fig. 1. It works only with diode tubes; don't try a crystal diode — it won't work. Use a 6H6 in preference to the 6AL5. Avoid the use of a limiter which requires a knob adjustment. The one shown is the automatic-level type, and it does a nice job.

When you first hook up your mobile receiver and turn it on to listen to the ignition level, you will probably be a candidate for death by heart failure, but if you tackle your noise problem on the basis of a comparison of noise to signal strength it will not be too difficult to lick. An appreciable amount of noise can be tolerated, since your own car may not be the principal source. Even with a moderate amount of noise suppression, you soon find that cars alongside make more noise than your own, and often there may be an appreciable noise pick-up noticeable from power and telephone lines near the highway.

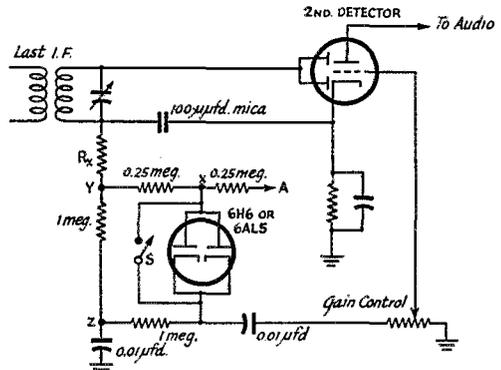


Fig. 1 — Schematic diagram of a simple diode noise limiter for use in a car radio receiver. If the a.v.c. voltage comes from the plate of the last i.f. tube, ignore the a.v.c. connection. If it comes from the second detector and does not use the same diode for both detection and a.v.c., change the circuit so it does. Try connecting the a.v.c. to points X, Y, and Z, in that order. Try connecting point A to cathode, or ground, whichever gives best results. Use a 6H6 as first choice, in preference to a 6AL5. Do not use a crystal diode. Resistor R_k appears only in some receivers and may be left in the circuit.

It is significant that most of our members have done nothing further than to install spark suppressors and a generator filter, plus a good noise limiter in the receiver, the latter being of major importance. Put good suppressors on your spark plugs. These may be wire-wound or carbon, but get good ones — no bargain stuff! You may or may not need one on the distributor. Good suppressors will not ordinarily affect the operation of your engine, or cut down your gas mileage. Make sure that all ignition wiring makes good contact; fittings are initially installed by pressing them on, and noise-producing gaps are quite common.

Install a 10-meter wavetrap in the generator lead, using No. 8 or 10 wire and a small air padder. About 10 turns, 1 inch in diameter, and a 50-µfd. padder. Set the trap to about 29.2 Mc. with the home rig, and mark the setting so it can be reset after installation.

Beyond the noise limiter, spark-plug suppressors, and generator ripple elimination, the problem becomes individual. For such items as wheel

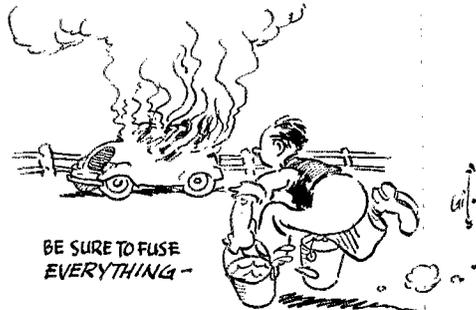
static, voltage-regulator interference, etc., we refer you to May 1947 *QST*.² Don't, however, let this article scare you into thinking that you have to do everything mentioned before you can operate.

Control Circuits

When you push the transmit button there are a lot of things you will want to have happen. Two are absolute "musts" — the antenna must be switched and the dynamotor must start — but don't stop there! You will have two undesirable conditions, the first of which is a mess of feed-back when the rig comes on, unless you use your third hand to turn down the receiver volume control. Put in a relay to cut off the receiver when the transmitter comes on — but add a switch to make it optional — there may be times when you'll want to monitor your own signal. Then there's the "hangover" attributable to the filters in the transmitter, which will block your receiver until the dynamotor has quit rotating and the filter has given up its last gasp. Put in a relay to douse the transmitter instantly, facilitating fast-break work. One good system is to open the oscillator screen lead.

Of course you don't have to use separate relays for everything; use multicontact relays wherever possible. There are many good types on the surplus market, and if you can't find a 6-volt job, rewind some of the other types. Try No. 30 enameled wire for the type which has a coil about $\frac{3}{4}$ -inch diameter and 1 inch long.

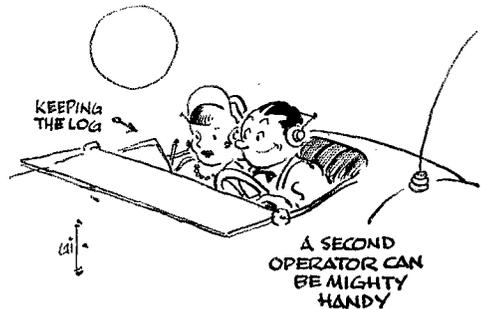
For the expenditure of a fraction of an ampere while the engine is running you might consider a relay operated by the ignition switch, which



will break the "A" lead to the transmitter when the ignition is turned off. It will then be impossible to run the battery down by leaving heaters on for long periods accidentally. If you don't have something of this nature, by all means provide a good bright pilot lamp, to tell you when anything is left on.

One parting thought on relays — don't connect them so that they are dependent on the operation of the dynamotor relay. The voltage

across the dynamotor drops very low until it gets up speed, and this drop may cause delay in the closing of the other relays. This is advantageous in the case of quick-heating tubes, wherein the filaments reach operating temperature in about the same time as is required for the dynamotor to reach full speed, but with heater-type tubes (and quick break-in) it will be troublesome.



The use of an antenna relay was listed as a "must" item, a point which some may not understand. It should be remembered that any mobile antenna system is directional, and the field patterns of antennas mounted at different points on the car are sure to be different. The only way to be certain that you transmit and receive with a uniform antenna pattern is to use the same whip for both purposes. And your nonham passengers will agree that one antenna is superior to two for other reasons!

Miscellaneous Hints

Be sure to fuse *everything*. Many state laws require it, and for good reason. A solid short to ground across a 6-volt battery can cause a lot of trouble — quick!

Make a monitor out of a crystal diode, a 10-meter tank circuit, a pair of cans, and a few feet of wire. It will tell you a lot about your signal. A similar arrangement, with a sensitive microammeter, is useful in checking antenna performance. An absorption-type wavemeter with a 60-ma. pilot lamp is handy. If your antenna is mounted up front you can even poke this gadget out the window to check r.f. output and modulation from the driver's position.

If you plan to operate regularly with some home station, equip that station with a vertical antenna. Matching polarization makes a world of difference in your effective "local" working radius.

Before you start operating mobile, by all means get a copy of the FCC regulations governing this type of work. There have been many changes recently, and almost everyone does it wrong! You hear a lot about "portable-mobile" — yet there's no such animal. It is not correct to say "WIABC mobile three" — to satisfy FCC

(Continued on page 104)

² "Eliminating Car Noise in 28-Mc. Mobile Reception," Price, May, 1947, *QST*, page 37.

"QRR . . . the Dike Is Broken!"

Over 10,000 Emergency Messages Handled by Hams During Columbia River Flood

BY ALLEN N. DAVIS,* W7DIS

"QRR QRR QRR W7WJ FROM W7DHX — THE DIKE IS BROKEN AND WATER IS POURING INTO VANPORT! SEND ALL AVAILABLE HELP. PLEASE ACKNOWLEDGE."

IN those words the world received its first news of the breach in the dike which protected Vanport, Wash. — "the world's largest housing project" — from the raging waters of the flood-swollen Columbia River.

Don A. Smith, W7DHX, had been asked by the sheriff of Vanport to investigate a rumor that the dike was about to give way. As he arrived on the scene he was just in time to see a wall of sixty feet of railroad fill topple inward, unleashing a fifteen-foot wall of water which tossed curious sightseers, piling and railroad tracks about like toothpicks.

While awaiting verification of receipt of his disaster flash, and before he could swing his car around preparatory to fleeing the raging waters, the running boards were awash and Don became just another of Vanport's 25,000 occupants fleeing for their lives. At that instant another section of the dike, this one more than 600 feet long, yawned open to seal the doom of Vanport within the next few minutes. It is difficult to report all that happened in the fleeting moments which followed, but we recount all we can definitely establish.

As W7DHX's flash went out on the frequency of the mobile AEC net, W7ASF was just entering Vanport's eastern outskirts on the opposite side of the area from the dike breaks, and, after W7WJ's QSL of W7DHX's message, he transmitted the information that he was proceeding westward through Vanport to assist wherever possible. At the same time the district dike

*ARRL Emergency Coördinator, Portland, Oregon.

• Here is the report on a portion of the fine job done by amateur radio during the Columbia River flood (May-June, 1948). We regret that space limitations have made it impossible to publish Coördinator Davis' report in its entirety. However, we have selected a few of the high points to give you a picture of a task well handled. As in all reports of this nature, some fellows who contributed heavily to the success of this accomplishment may not have been mentioned. This we regret, but to all, "Well done!!"

superintendent, who was riding with mobile W7AEF and who was directing dike operations north of Vanport with a portable p.a. system, exclaimed "Let's go!" as soon as he heard W7DHX's announcement. W7ASF and W7AEF met in the center of Vanport and proceeded, bumper-to-bumper, seeking to determine the extent of the break-through. Suddenly the superintendent saw the approaching wall of water and shouted, "Quick, turn around! There'll be fifteen feet of water here in nothing flat!" Fortunately all concerned were able to make their way to a high point from which the superintendent was able to direct operations with the active assistance of W7AEF and W7ASF.

The timely rescue by W7HVX of blind W7DCJ, his family, and a blind dinner guest in water up to their knees was swiftly executed. Had it not been for the thoughtful and speedy action of W7HVX, W7DCJ and his family might easily have been among the many who never left the area alive.

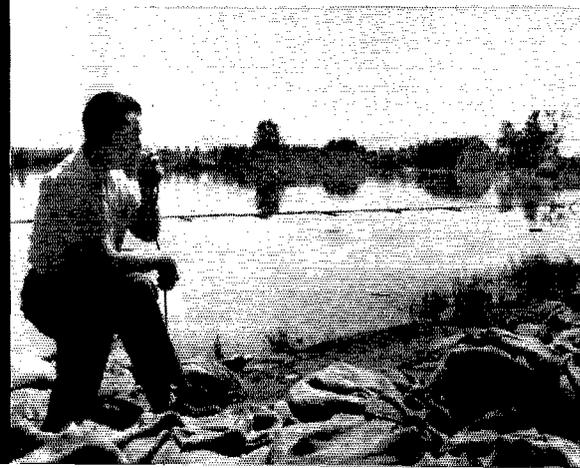
— — — — —

Coincidence? No! The episodes above are but another proof that advance planning can produce apparent miracles in time of disaster. It all began on May 20th, ten days before the tragic Vanport break-through, when Emergency Coördinator W7DIS, acting on information received from Portland officials, alerted the local ARRL Emergency Corps members and briefed them on what



W7AEF, ten-meter mobile supervisor, moves out to a vantage point on a dike to relay information requested by disaster headquarters.

QST for



EC W7DIS scans the listings on the IBM Personnel File, in search of more operating personnel, while W7EXQ, Mrs. W7BQD and Larry Grace scan call books and telephone books for operator listings. W7ICA is at the microphone of the 144-Mc. intercom rig advising headquarters of the relief operators scheduled for the next day.



their jobs would be "in case." On May 27th the Portland Red Cross Disaster Committee met with the AEC planning committee and representatives of the local clubs in order to perfect plans.

Disaster plans were discussed, laid, and action started on relief work in the Portland area, with the ARRL Emergency Corps being provided a radio room in the Red Cross Disaster Headquarters Building. An HT-9 transmitter and suitable receivers, antennas, etc., were quickly installed to establish a net control station for the 28-Mc. mobile group using the call W7WJ/7. The mobile net later provided the Red Cross relief-survey parties with direct communication with their headquarters through W7WJ from remote points in the flood area. It was this station, also, that relayed W7DHX's "alarm" to the world. The mobiles also served the Army Engineers and other relief officials with speedy communication direct to disaster headquarters concerning food, supplies and personnel.

Point-to-point service on 144 Mc. was established between many strategic points on the premise that telephone facilities would either be jammed or wiped out completely if any areas became inundated. This premise proved its validity within a short time since nearly all telephone lines were wiped out between Portland proper and the critical Vanport area.

At the same time the gang on 3941 kc. were lined up to serve the Coast Guard, Army Engineers and any other groups which might call for service along the Columbia from Pendleton through Astoria and Clifton Beach. This group included W7FU, W7GM, W7CSC, W7DNP, W7WQ, W7HVX, W7GCZ, W7LAX, W7AQJ, W7AIA, W7KR, W7AKC, W7HA, W7JWD, W7FFE, W7APD, W7BVO, W7FNF, W7FON, W7IFV, W7HQL, W7GOO, W7FKZ, W7HJU, W7IHA and W7MEY. For stand-by, skip relay and policing there were W7KL, W7HPS, W7GPZ, W7HRV, W7IRJ, W6GHS and W6NPH.

On 3540 kc., W7VT was requested to become master control for Portland-area c.w. operations, handling bulletins, traffic routing, etc., and was assisted by W7JMZ, W7ECI and W7IIV. Established traffic nets in Oregon, Washington and California were served through this channel, with representatives from each net calling in on

3540 kc. at frequent intervals, reporting traffic, and moving to an alternate frequency with one of the Portland traffic men to clear traffic as directed by W7VT. In this way the emergency channel, 3540 kc., was kept cleared for traffic of the highest priority. Constant contact with W6OT at the Oakland (Calif.) Red Cross chapter was maintained, while the bulk of the East-West and California traffic was handled through W6FDR in Oakland. W7ZU, W7CKT and W7RAO of Seattle, and W7JCT of Yakima provided excellent tie-in with the Washington Traffic Net, while W7FNZ and W7LBV afforded the much-needed link with the Oregon Traffic Net.

By 8:00 p.m. on May 29th the waters of the Willamette River, a tributary of the Columbia, had risen sufficiently high so that one of the main bridges linking portions of Portland was put out of commission. Other bridges were jammed with traffic moving at a snail's pace and low-lying arterial routes were completely inundated. Portland began to feel the pinch of its first honest-to-goodness flood in 50 years. Pumps, hose and flooded basements all added their part to the scene of general discomfort. Cocksure business executives who only a few hours before had said "It can't happen here" were found laboring beside their employees in hip-deep water, trying to save precious stocks. Yes, Portland was in for it!

Sunday morning, May 30th, dawned -- Memorial Day! In Vanport, just across the Columbia River from Portland, telephone exchanges were jammed with the calls of anxious residents trying to make arrangements for friends or trucking firms to move their belongings out of the area . . . just in case. In spite of printed reassurances by the governing authorities which had been delivered to every home in Vanport that very morning, many of Vanport's citizens knew that the swollen waters of the Columbia were at that moment fifteen feet above the elevation of the highest point in Vanport!

It was under these conditions that W7DHX first drove his mobile into the threatened community itself to offer his services to the authorities. The "Red Cross Disaster Car" card, which had been issued to all of the mobile amateurs,

(Continued on page 104)

Hidden-Transmitter Hunts for Everyone

A New Stunt for Conventions and Hamfests

BY A. E. HUDSON, * W2OMD

EVERY about-to-be or just-was ham reads about hidden-transmitter hunts, and thinks how much fun they must be. However, when he finally attends a hamfest or convention, he gets to see just what a hidden-transmitter hunt is like. At a large convention with 500 delegates, perhaps only a dozen hams have mobile outfits. This small group may spend a couple of hours wandering around the countryside, having their own good time, but the majority of those hams attending have no part in the proceedings.

After being left out in this manner several times, the author decided that a restricted-area transmitter hunt, requiring very little equipment, might be a desirable thing to dream up. The result of this dreaming was the discovery of a practical means for holding a hidden-transmitter hunt in which practically everyone can participate. The complete receiving outfit is shown in Fig. 1 — a pair of headphones and a crystal diode! It has no antenna and requires no power, but it is a complete microwave receiver.

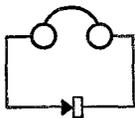


Fig. 1 — This wiring diagram of the 2400-Mc. receiver shouldn't prove too complicated! The crystal can be a 1N34 germanium diode or any of the surplus silicon-capsule crystals. The headphones can be anything on hand.

The original idea was born by recalling the old-timers talking of spark transmitters and their crystal sets, and then recalling early radar techniques using the same thing in modern dress. Inasmuch as the FCC regulations do not require stable oscillators or filtered power supplies on frequencies above 1250 Mc., the author found it was possible to do some microwave experimentation without benefit of plumbing or magnetrons.

A doorbell buzzer was set up with a "J" antenna for 12 cm. (2400 Mc.) placed across the spark gap. This formed a nice little spark transmitter. A headset placed across a silicon crystal made a receiver, and I was in business on the microwaves. A check on the broadcast band showed that I was committing a nuisance, and I was quickly out of business with that particular

• You don't need to have a complicated direction-finding station in your car to engage in *this* type of hidden-transmitter hunt. It should be a natural for harassed convention and hamfest chairmen who are looking for something new in the line of stunts and contests.

set-up. The loan of a 6L2C40 microwave oscillator gave me a legal 2400-Mc. transmitter. With the headphones across the crystal for a receiver, I had my complete system the way I wanted it.

While much experimentation may yet be done to refine this system and to learn how it may be used for maximum enjoyment, this is the way it may work. Use an oscillator on 2400 Mc. as a transmitter. No filter on the power supply will furnish 120-cycle modulation, or a higher tone can be applied through a normal modulator. Procure any sort of crystal, either silicon or germanium, and connect a pair of headphones across it. The signal from the transmitter will be heard if the crystal is good and you are close enough to the transmitter. The maximum range is open to question, but it is possible to hear a signal any place in an ordinary house, and by the same token it should be possible to hear a signal anywhere in a large hall.

If the crystal is held in one hand, the other hand can be used as either a reflector or an absorbing medium. The latter stunt has proved to be more successful. As the free hand is moved back and forth between the transmitter and the crystal, a null point will be found when the free hand is directly in line with the signal source. When the hand is moist it acts as a better absorbing medium. The type of crystal does not seem to be important nor does the length of pigtail — if any. Finding the transmitter seems to be something of an art. It may be akin to the art of listening to that DX signal under the kilowatt boys that can still be copied by those with know-how. At any rate, both skill and luck are involved.

If you plan to hold a hunt of this sort, give your contestants plenty of notice so that they may bring a crystal and a pair of headphones (or make arrangements for borrowing or purchasing these at the meeting). Be sure to comply with FCC regulations by signing the station call at least once every 10 minutes. Disguise your trans-

(Continued on page 110)

* 10 Pierce Street, Albany 5, N. Y.

I.A.R.U. News



JUNE CALENDAR

The June issue of the I.A.R.U. Calendar, the constitutional medium for effecting international agreements between member-societies concerning the affairs of the Union, reports that George W. Bailey, W2KH, and J. Lincoln McCargar, W6EY, having been reelected president and vice-president, respectively, of A.R.R.L., continue to hold similar posts as officers of the Union under the terms of the I.A.R.U. Constitution. On behalf of the Union, President Bailey signed a one-year extension of the agreement between United Nations and I.A.R.U. Also reported is the establishment of United Nations amateur station K2UN at Lake Success, New York.

It is further chronicled that the *Burma Amateur Radio Society* has been returned to the active membership roster of the Union and that the *Izlenkir Radio Amatorar* was admitted, without dissenting vote, to membership in the Union. The Headquarters was pleased to express, on behalf of members of the Union, sentiments of congratulations and hearty good wishes to these two member-societies.

The June Calendar promulgates proposals by the Headquarters to admit to Union membership the following societies: *Club de Radio Aficionados de Guatemala*, *Hong Kong Amateur Radio Transmitting Society*, *Philippine Amateur Radio Association*, and the *Radio Club Peruano*. Member-societies were also informed that the *Liga Panamena de Radio Aficionados* has applied for Union membership, which application is expected, by the Headquarters, to be presented in the December Calendar.

Also reported in the Calendar was news concerning post-Atlantic City developments in the allocations picture. It listed, for example, many countries in which amateurs are presently permitted, either as an advance authorization or as a special and often temporary privilege, to operate in the 50-Mc. region. It was set forth informally that the original target date of September 1, 1949, as the effective date of the Atlantic City allocations below 27.5 Mc., probably will not be realized and that we may continue to operate longer than expected under the Cairo allocations; that, as examples, we shall not suffer the loss of the top 50 kc. on 14 Mc. as soon as expected, nor shall we gain the new 21-Mc. band as soon as expected, nor will broadcasting get a larger portion of the 7-Mc. band outside the Americas as soon as expected.

The magnificent contribution to Atlantic City efforts by the *Radio Society of Great Britain* in sending two of its officers to the conference for several months as representatives of the Union was further acknowledged.

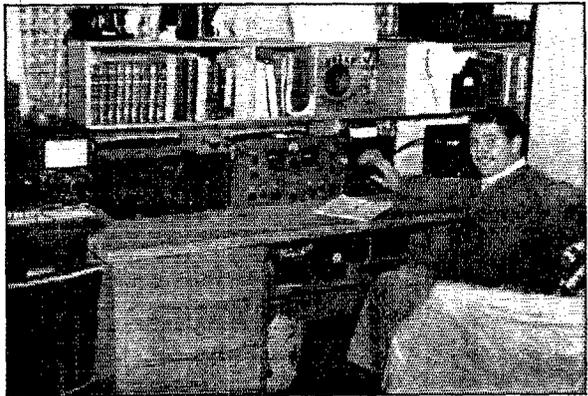
Cessation of the issuance of 28-Mc. endorsements for WAC certificates was reported as well as the reasons for the action.

Progress in the program of the *Radio Society of Great Britain*, in active cooperation with other European member-societies, in devising an acceptable and workable arrangement for the division of amateur bands in Europe as between 'phone and c.w. use was reported. The May decisions of the Board of Directors of A.R.R.L. in respect of the international amateur bands were discussed and the plea of A.R.R.L. that 14-Mc.

(Continued on page 110)

◆
Vernon Scott, of Quito, Ecuador, believes in comfort, as evidenced by this peck into his shack. The genial gentleman with the cheerful grin is the operator behind those signals heard from HC1KP. Equipment includes a Meck T-60 transmitter, a Super-Pro and a BC-348 with a converter ahead of each. At his present location, Scott could use toothpicks for antenna masts and still have his antenna 9300 feet high!

◆



On the Air *with* **SINGLE SIDEBAND**



One of the questions asked most frequently about the s.s.s.c. stations is, "When are they on the air? I want to hear what the stuff sounds like." This column will report schedules and operating times of active s.s.s.c. stations, describe operating experiences and sometimes the gear in use, and possibly discuss some of the practical operating problems and suggested solutions. Contributions from active s.s.s.c. stations will be welcomed.

SUMMER STUFF such as good flying weather has put a crimp in the 14-Mc. s.s.s.c. activities of W2KUJ (Schenectady), but he is happy about the good reports he has been getting on reception of his s.s.s.c. signal through QRM. Not that enough fellows turn on their b.f.o.s so that they can receive the stuff, but those that do (or get talked into listening while Don has the carrier running) report good results through QRM. Best DX was a 45-minute QSO with VP9F.

Among summer visitors at Hq. was Mike Villard of W6YX. Mike has a new single-sideband *unsuppressed-carrier* system he has been developing, and the 28-Mc. mobile rig in his car uses it, under the call W6QYT/anyplace. The thing isn't *simon-pure* s.s.s.c., of course, because the carrier is present, but it does take up less room in a band, and the receivers with frozen b.f.o. switches receive it just like old-fashioned a.m. While it affords no relief from heterodyne QRM, it is a slick trick and one we may be hearing more about. Mike had been driving around the country too long to have any "hot" dope on the latest activities at W6YX.

Ward of WØTLE (St. Paul) has a new filter in his 29.2-Mc. rig, and holds forth nightly from 9 to midnight. He received some excellent newspaper publicity for s.s.s.c. and amateur radio when he demonstrated his rig before 600 at the Gopher Hamfest in Minneapolis. He has also increased his percentage of QSOs by sneaking in a bit of carrier until he raises a station and explains the tuning routine, after which he carries on in the true fashion. It looks as though that carrier-sneak play is going to become standard practice for the s.s.s.c. boys for some time to come.

In Harrisburg, W3ASW says the gang is beginning to accept the "parasitic" at the low end of 75, which is his self-deprecating way of telling that some of the regulars now know how to tune him in. Dick says that one night W3SFK reported W3ASW/s.s.s.c. the only station on the band that was readable through the QRN, which speaks loads for the stuff's punching power. A "first" claimed is the "first amateur traffic

handled by s.s.s.c.," when he QSPed a message on c.w. (from an a.m. station that couldn't get through) and passed it along on s.s.s.c. Biggest difficulty seems to be with the stations using receivers with weak beat-frequency oscillators.

W2KUJ and W1DX are slated to talk on s.s.s.c. at the National Convention in Milwaukee, where some of the techniques will be described and demonstrated.

Tuning In S. S. S. C. Signals

An s.s.s.c. signal can be identified in the 'phone bands by the fact that it is practically unintelligible and, with each syllable, it will kick the S-meter up, returning to the QRM level between syllables. If you don't know how to tune in s.s.s.c., and you run across a signal with the above symptoms, peak it in your receiver and then switch off the a.v.c. Take your hand away from the tuning dial—you won't be using that control again. Reduce the i.f. gain with the manual control, and run up the audio gain to maximum. Then switch on the b.f.o. and tune *very carefully* with the b.f.o. control *only*. If you have an s.s.s.c. signal (and not something else that is acting up), you will find a spot on the b.f.o. tuning where the speech is low-pitched, goes through "normal" and then is high-pitched. The high- and low-pitched conditions will be somewhat understandable but nothing resembling high fidelity. On the nose, s.s.s.c. sounds just like any other voice signal. The r.f. gain must be held down to a minimum, to avoid overloading of the i.f. amplifier in the receiver, since there is no a.v.c. working to do the job for you. If distortion is always present and you can't clean up the signal by tuning, it is either overloading in the receiver or lack of sufficient b.f.o. voltage, or both. In any case, the immediate cure is to reduce further the i.f. gain.

Experience indicates that c.w. men catch on to the tuning procedure a little faster than 'phone men, undoubtedly because the former are used to nursing their receivers along very carefully when trying to pull a signal out from under the QRM. When you realize that your receiver has to be tuned to within 20 or 30 cycles of a certain setting, you can readily see that it takes a little finesse.

The other method is to use a "freqmeter" (BC-221, VFO harmonic, or the like) and inject it into the front end of the receiver. The receiver can be left as for regular a.m. reception and centered on the suspected s.s.s.c. signal. Then, by very careful tuning of the auxiliary oscillator (freqmeter) to within the necessary 20 or 30 cycles, the speech will clear up. The signal injected from the oscillator has to exceed the peak amplitude of the incoming signal, or you will have an overmodulation effect in the receiver, because the sideband peaks are exceeding the "carrier" level.—B. G.

September V.H.F. QSO Party

September 25th-26th—ARRL Section Leaders To Receive Certificate Awards

BY F. E. HANDY,* WIBDI

WITH September the start of a new radio season, ARRL is pleased to announce its third special v.h.f. activity for the year. Like the successful January and May tests, this is an invitation to all amateurs who can work any or all v.h.f. bands (any 50 Mc. or above) to use 'phone, m.c.w. or c.w. between 2 P.M. local standard time (EST, CST, MST, PST) Saturday, September 25th, and midnight local standard time Sunday, September 26th, to see what stations can be worked and what v.h.f. DX is possible. States for WAS, a test for new antennas and gear, and a renewal of friendships in the v.h.f. circle are all made possible in the same event. Mark the dates on your calendar now and don't miss this funfest.

Exchanges, Scoring and General Call

Participants will exchange the names of their ARRL sections. Page 6 of this issue is a register of the League field-organization set-up, and will serve as a convenient section check-off list. You



compete only with amateurs in your own ARRL section for the certificate award. ARRL staff members are not eligible for awards.

Count 1 point for successfully-confirmed two-way exchanges of section information on 2 or 6 meters. A one-way exchange, confirmed, does not count.

When two-way exchanges are accomplished with your transmitter on the 220-, 420-, 1215-Mc. or higher band, you may record 5 points per QSO. Use "CQ contest" to advise other contestants of your participation. Exchanging signal-

*Communications Manager, ARRL.

strength and readability reports is suggested but not required.

Multiplier

The sum of station points earned is multiplied by a section multiplier. Each time a new section is worked two-way it adds one to the multiplier. *The multiplier grows by one if you rework this same section on another band.* This scoring differs from other kinds of League competitions in order to encourage everyone to make use of as many v.h.f. bands as possible. See page 55 of May, 1948, *QST*, for the form in which to report your summary of contacts.

Rules

- 1) Name-of-section exchanges must be acknowledged by both operators before either may claim the point (s).
- 2) All claimed contacts must fall in the contest period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation.
- 3) Contest score must represent points earned from operation exclusively within a given ARRL section.
- 4) Fixed-, portable- or mobile-station operation under one call and by one operator is permitted.
- 5) The band your transmitter is on determines whether a QSO counts 1 or 5 points. Cross-band work shall not count.
- 6) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.
- 7) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 5 points for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked, i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted.
- 8) A contact per band may be counted for each different station worked. Example: W1AQE (E. Mass.) works W1XYZ (R.I.) on 50, 144 and 220 Mc. for complete exchanges. This gives W1AQE 7 points (1 + 1 + 5 = 7) and also 3 section-multiplier credits. (If more R.I. stations are subsequently contacted on these bands they do not add to the multiplier but they do pay off in additional contact points.)
- 9) Each section multiplier requires actual completed exchanges with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.
- 10) Award Committee decisions shall be accepted as final.
- 11) All reports must be postmarked no later than Oct. 4, 1948, to be entered for awards. See p. 55 of May, 1948, *QST*, for form.

Reporting

Submit contest logs to Headquarters immediately, even if your score is small, to help in cross-checking the claims of others. ARRL will supply convenient reporting forms upon request.

A Novel Converter for 144 Mc.

High Gain with Good Stability at 2 Meters

BY R. S. WENGER,* W3EWR

OCUPANCY of the 2-meter band has progressed to the point where something pretty good in the way of a receiver is needed, if one is to do outstanding work on the band. Though it is now possible to buy converters that will cover 144 Mc., this is one field where it is still advantageous for the experimentally-inclined amateur to build his own. The converter described herein is presented for the consideration of that type of worker — the fellow who is willing to use a little time and ingenuity to make something himself which will be better and far less expensive than anything of a similar category which could be bought ready-made.

A high degree of stability and good sensitivity were the primary objectives in this design. These requirements were satisfied by some simple circuit features, and by the use of specially-constructed by-pass condensers which keep inter-stage coupling at a minimum.

The entire converter unit is made plug-in. In this way additional converters (of completely different design, if need be) may be employed to tune whatever other frequency ranges are required. Experience has shown that bandswitching or plug-in coils, while quite OK for lower frequencies, are almost certain to be unsatisfactory for 2-meter operation. By use of the plug-in feature the converter may be designed for maximum efficiency on one band, and no compromises need be made for other frequencies.

Circuit Features

In most converter designs the plate circuit of the r.f. stage is tuned in an indirect manner, by overcoupling it to the mixer-grid tuned circuit. In this unit both the grid and plate circuits of the r.f. stage are tuned directly, and the plate circuit is critically coupled to the mixer grid circuit. High gain is the natural result, but great care must be taken with by-passing and circuit isolation, or instability will result. The special by-pass condensers to be described later were incorporated with these problems in mind.

*Garden Hill, R. D. 2, Lancaster, Penna.

• Here is a 2-meter converter design that departs from the customary technique of purchasing a collection of commercially-available components and arranging them on a chassis in the accepted manner. Through effective by-passing with specially-constructed condensers, and by arranging components in a rather unconventional manner, W3EWR achieves both high gain and good stability — a rare combination in v.h.f. receiver design.

Pulling of the oscillator frequency and detuning of the mixer grid circuit, common troubles in v.h.f. converter design, are reduced through the use of a push-pull mixer circuit, in which the oscillator injection voltage is fed into the cathode of the mixer, while the signal voltage is applied to the grids. Particular attention was given to shielding and by-passing, in order to minimize unwanted coupling between circuits. Care was taken to keep power wiring out of the tuned-circuit compartments as far as possible, and wherever power leads enter these compartments efficient by-pass capacitors were employed.

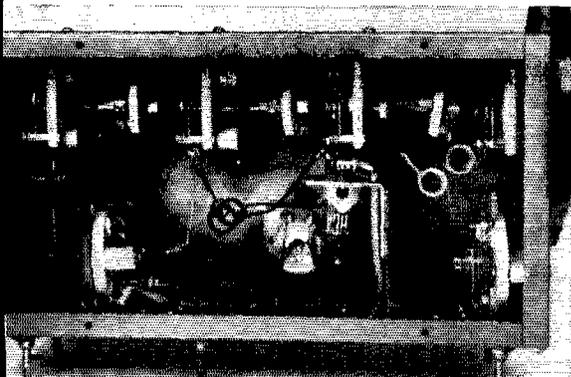
Parallel trimmer capacitors were not used to facilitate tracking, because they would have lowered the L/C ratio of the circuits. Besides, they are not necessary with the tuning method and alignment procedure used. Copper strap was used where r.f. leads were needed, reducing lead inductance and making possible larger coils in the tuned circuits. The circuit design eliminated the need for r.f. chokes at any point.

Mechanical Details

The converter is built inside a standard $5 \times 9\frac{1}{2} \times 3$ -inch chassis, with the $3 \times 9\frac{1}{2}$ -inch sides serving as top and bottom. The chassis is divided into three compartments by two sheet-copper partitions which have $\frac{3}{8}$ -inch edges folded over to bolt to the top and bottom edges of the chassis. The four tuning condensers are mounted near the top of the unit, with their shafts in line to facilitate coupling for single-dial control. The three compartments, starting at the right in the main photograph, are the oscillator, mixer, and r.f. stages. When the unit is completed a cover-plate 5 by $9\frac{1}{2}$ inches in size is attached to the

◆
Side view of the 2-meter converter described by W3EWR.

QST for



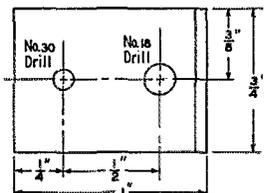


Fig. 2 — Construction details of by-pass capacitors C_{14} through C_{18} .

less critical as to placement of the coils. The plate coil of the r.f. stage, L_3 , is inductively coupled to the mixer by placing it in between the sections of the mixer input coil, L_4 .

The mixer is operated in push-pull and output at the i.f. is taken off by means of a two-turn link at the middle of the mixer plate coil, L_7 . This link is connected by two insulated feed-throughs to banana plugs in the base of the converter. Connection to the receiver is made by means of a length of 75-ohm Twin-Lead. If trouble is experienced with pick-up of signals on the i.f., a coaxial line may be substituted.

The Special By-Pass Capacitors

Handmade by-pass capacitors are used to keep r.f. out of the power leads, and thus one of the most common sources of instability in high-frequency equipment is minimized. As may be seen from Fig. 2, each capacitor consists of a piece of sheet copper separated from the chassis by a polystyrene ribbon 0.003 inch thick.

To explain the operation of these capacitors let us take the example of the plate-supply by-pass, C_{17} , in the oscillator section. Referring to Fig. 3A (p. 112), if E is not at the node of the winding, or if the conductor between points E and F is in a strong r.f. field, a radio-frequency voltage will be present at point F . If this voltage is allowed to reach point H it will be radiated or conducted into other circuits common to the power supply. The conventional method of dealing with this condition is shown in Fig. 3A, in which a mica or tubular by-pass is used. Because the reactance of such a capacitor (assuming 100 $\mu\text{mfd.}$) is 10 ohms or more at 150 Mc., the resistance to r.f. voltage between points F and G is substantially greater than between F and H . In addition, because there is a strong r.f. field in the oscillator compartment, the path from G to H through C_{17} may act

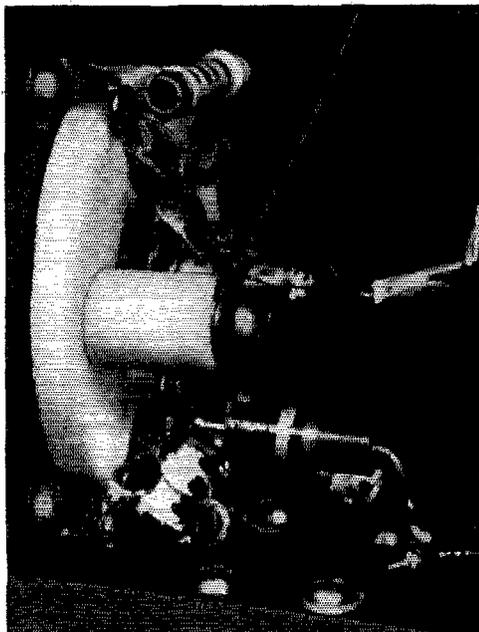
as a pick-up loop, extracting r.f. energy from the compartment, particularly if C_{17} is mounted away from the chassis surface.

The special capacitors are, however, physically flat, and are separated from the chassis by only 0.003 inch, reducing the possibility of their acting as pick-up loops. In Fig. 3B, if any r.f. energy is to reach point H it must flow along the top plate of C_{17} , where it is by-passed to the chassis surface, G . The very low inductance involved in such an arrangement makes it an effective capacitor. The function of R_7 is to break up the r.f. pick-up action of the lead between L_3 and C_{17} . A check for the presence of r.f. energy at point H may be made by touching a small mica capacitor between point H and the chassis. If a click is heard each time such a connection is made, r.f. is present. The initial click is, of course, attributable to d.c. charging.

Power requirements for the converter are 6.3 volts a.c. at 0.75 ampere, and 150 volts d.c. at about 15 ma. To avoid oscillator instability with line-voltage fluctuations the use of a regulated power supply is recommended. Connection to the circuits is made by the use of banana plugs mounted in the base of the converter unit.

Choice of the intermediate frequency to be used should be based on individual requirements. In the writer's case the receiver was an NC-101X, which tunes only the amateur bands, so the i.f. had to be set at a point just outside one of these.

(Continued on page 112)



Close-up view of the r.f. stage, showing the built-in by-pass capacitors.

Coming ARRL Conventions

Delta Division

Biloxi, Miss., Sept. 17th-19th

So successful was the convention staged jointly last year by the Delta and West Gulf Divisions at Texarkana, that Director Canfield felt a Delta meeting should be sponsored by the Gulf Coast Radio Club this year at Biloxi, Miss. — "Riviera of the South." Scores of hams are planning to combine the convention and a vacation trip with the XYL to this famous resort community. The Buena Vista Hotel, accustomed to one or more conventions every week, provides an ideal setting for a 100% affair.

Highlighting the program is a half-day "open house" at the Air Force's big radar school, Keesler AFB, where Keesler Field Radio Club members will show and explain early warning and search radar, 30- and 60-Mc. i.f. strips, gun-laying and plane-tracking 10-cm. equipment, *variable* wave guides on 3-cm., such antennas as collinear, beaver-tail, truncated-parabola and cosecant-square, and electronic computers for offset bombing.

Activities will start at noon on Friday, Sept. 17th, with the afternoon session including talks on emergency communications and better network operation, meetings of SCMs, SECs, ECs and several nets. Saturday morning will find the conventioners at Keesler AFB, followed in the afternoon by technical and operational addresses by nationally-known speakers. The program will be continued during a three-hour session on Sunday morning, with the convention banquet at 1 P.M.

Registration is \$6.00 (including banquet) for amateurs, servicemen, engineers, etc., and \$4.00 (including banquet) for wives and YLs. To those who can come in for one day only, \$2.50 for Saturday, Sept. 18th, or \$4.50 for Sunday, Sept. 19th (including banquet). Check or money order should be made out to Gulf Coast Radio Club and mailed to P.O. Box 283, Biloxi, Miss.

New Hampshire State

(New England Division)

Concord, N. H., September 19th

It just wouldn't be a normal autumn in New England without a New Hampshire State Convention, which this year is being sponsored by the Concord Brasspounders in the Masonic Temple of that city on Sunday, September 19th. WIAOQ, SCM, is convention chairman and promises a bang-up program starting promptly at 11 A.M. with a treasure hunt and code-proficiency

contest, thence proceeding to emergency-planning and ARRL activities meetings, technical talks and discussions, and the banquet in midafternoon. All this — and the autumn splendor of New Hampshire, too! Get your \$3.75 registration promptly to the Concord Brasspounders, P. O. Box 312, Concord, N. H.

Hudson Division

Albany, N. Y., October 2nd-3rd

The Ten Eyck Hotel in Albany will be the scene of the 1948 Hudson Division Convention, October 2nd-3rd, sponsored by the Schenectady Amateur Radio Association and other clubs in near-by cities. "Come early for an informal rag-chew session Friday, October 1st," says the committee, and "prepare for a big day Saturday." There will be a lecture and demonstration of s.s.s.c. technique by Don Norgaard, W2KUJ, plus talks and demonstrations on reflected-power communication, microwaves, power reduction and others; also a DX forum. "Bring headphones and xtals to participate in the hidden transmitter hunt," the committee urges, "as it's going to be lots of fun." Saturday's events culminate in the grand banquet with the finest food the hotel has to offer, while Sunday is reserved for informal trips and more rag-chews.

Registration is \$5.65 in advance, \$6.00 after September 26th. Send yours to Treasurer, Hudson Division Convention Committee, Box 247, Albany, N. Y.

Southwestern Division

Los Angeles, Calif., Oct. 2nd-3rd

"The greatest ham convention ever held on the west coast" is promised by the Council of Radio Clubs of the Southwestern Division at Los Angeles' Alexandria Hotel on October 2nd and 3rd. Technical talks and demonstrations are highlighted by the fact that these dates coincide with the IRE convention and joint activities are planned. There will be contests, open house at the radio stores, open forum, grand ball, Hollywood entertainment, an eight-course banquet, Wouff-Hong ceremony, special meetings for DX, v.h.f., traffic and old-timers groups. ARRL President Bailey, W2KHI, and Vice-President McCargar, W6EY, are two of the many notables who will be present. The YL Club of Los Angeles has a full program lined up for the gals — tours of Hollywood and broadcast studios, fashion show, luncheons; YLs may write Evelyn Scott, W6NZP, for advance details and arrangements.

Southwestern's is the only divisional conven-

tion scheduled for the west coast this year. Make your plans now! Send reservations, \$5.50 per person, to Larry Lakes, W6RMV, 3006 Wilshire Blvd., Santa Monica, Calif.

Eastern Canada

(Maritime-Quebec-Ontario Divisions)

Montreal, P.Q., October 8th-9th

All roads in eastern Canada will lead to Montreal the week-end of October 8th and 9th for a combined convention of the Maritime, Quebec and Ontario Divisions sponsored by the Montreal Amateur Radio Club and scheduled for the Mount Royal Hotel of that city. A full program will include all the trimmings: technical talks and films, contests, v.h.f. and DX clinics, Wouff-Hong initiation, banquet, dancing, equipment exhibit, women's program.

The words "convention in Montreal" are all that is needed to get Canadian amateurs to put a red circle around the dates of October 8th and 9th. To you Ws within striking distance of Montreal who have never enjoyed the warmth and friendship of Canadian hospitality, we suggest a red circle on those dates on your calendar, too.

Registration is \$5.50, and \$3.50 for wives and youngsters. Send yours to the Convention Committee, Montreal Amateur Radio Club, Box 1, Station D, Montreal, Que., Canada.

HAMFEST CALENDAR

CALIFORNIA — Northern California and southern Oregon amateurs are invited to the 2nd Annual Hamfest of the Mt. Shasta Amateur Radio Club, to be held in Mt. Shasta this year on Saturday and Sunday, September 11th and 12th. An excellent program has been arranged by the committee in charge, with interesting activities scheduled for the entertainment of every member of the family. Last-minute particulars may be obtained from Arthur R. Dragoo, W6CAT, 300 Orem, Mt. Shasta, Calif.

KENTUCKY — The Central Kentucky Amateur Radio Club will hold an all-day Picnic and Ham Reunion on Sunday, September 12th, at Pandora Dock Camp on Herrington Lake. All radio amateurs are invited to attend, and should bring their own picnic lunch, fishing tackle, etc.; also unwanted but usable ham gear for the auction. A special invitation is extended to YLs and XYLs.

OHIO — Promised to be the greatest get-together in its history, the Greater Cincinnati Amateur Radio Assn. announces its coming "Stag" Hamfest, to be held on Sunday, September 12th, at Ash Grove on Winton Road. The Committee has extended an invitation to area nets and clubs to participate, with special booths and tables being available for their use. Prominent speakers, competitions, entertainment and good eats are billed. Advance reservations may be made through Sec. Jack Hohman, 3159 Harrison Ave., Cincinnati 11, Ohio.

OHIO — The Annual Hamfest & Picnic of the Findlay Radio Club is scheduled for Sunday, September 12th, at Riverside Park, Findlay. Director Hal Bird, W8DPE, will be in attendance and a good program is assured. As usual — no registration fee!

SOUTH CAROLINA — Radio amateurs from South Carolina and adjoining states are invited to the Annual Hamfest of the Charleston Amateur Radio Club, to be staged again this year on the Sunday before Labor Day, September 5th. Plan to be among the 200 who will attend!

Further details available from T. Hunter Wood, W4ANK, Secy.-Treas., Charleston Amateur Radio Club, Route 6, Box 526A, Naval Base, S. C.

— — — —

MANITOBA — With the many compliments concerning last year's Hamfest still ringing in their ears, members of the Winnipeg Amateur Radio Club are planning on going all-out to make this year's "do" one that will go down in the history of Manitoba amateur radio as "the best ever." Sunday, September 12th, is the big day, the St. Vital Fair Grounds the place. Included on the program, which starts at 11 A.M., are special features for YLs, XYLs and children, exhibits, sports, equipment judging, and special prizes for out-of-town visitors with a special award going to the ham coming from the farthest distance. Contact VE4s DY, GW, KW or FJ for additional information.

ONTARIO — The North Shore Radio Club is staging another of its popular Hamfests on Sunday, August 29th, at Oshawa's Lakeview Park. This year's affair is coupled with a V.H.F. Test on the 28th, including a prize for the 2- or 6-meter mobile rig that works the Hamfest station from the greatest distance. There will be a gala time for everyone — 60 years down to 60 days. Bring a picnic lunch and join the fun!

Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

Ex-W1ELK, John D. Burdett, Springfield, Mass.

W1KYN, Thomas H. Schlagel, Newburyport, Mass.

W1MCO, Irving E. Sweet, Stowe, Vt.

W2MWR, Capt. Henry E. Spencer (retired), N.Y.N.G., N. Y. C.

W3EWZ, Frank Cannon, Philadelphia, Penna.

W4CWB, Frank H. Miller, Montgomery, Ala.

W5DS, P. E. Bohannon, Port Arthur, Texas

W5FDE, ex-5IT, Graham D. Kendall, Tulsa, Okla.

W5OBB, H. O. Bailey, Jackson, Miss.

W6GJL, Charles F. Hess, Sonora, Calif.

W6TTF, ex-W2GOQ, Raymond W. Newby, Hollywood, Calif.

W7CG, Leslie W. Johnson, Weiser, Idaho

W8VR, Capt. William B. Michael (retired), USA, Caldwell, Ohio

W8ZKC, Hugh A. Alsup, Dearborn, Mich.

W9FIH, Ralph E. Peck, Clinton, Ind.

W9HXF, Mathieu S. Levy, University City, Mo.

W9CCA, ex-W9CCA, Warren L. Lungstrom, Denver, Colo.

G5QV, F. L. Stollery, Felixtowe, Suffolk

G2WG, W. G. Goult

KL7EU, Wallace P. Macdonald, Anchorage

VE1GZ, Thomas Neil, Glace Bay, N. S.

VK2HM, Alex Marshall, Bondi, N. S. W.

YR3VI, Victor Rotlender, Constanta

"How's My Modulation?"

A Built-In Monitor 'Scope for Any 'Phone Transmitter

BY J. L. HOLLIS,* WØJET, EX-W8TMZ

• With surplus oscilloscope tubes selling for only a few dollars these days, the only thing standing in the way of your owning a monitor 'scope is the power supply. But your transmitter has a power supply, and WØJET tells how you can use that power to run a monitor 'scope and get your own — and correct! — answer to the perennial question that is also the title of this article.

THE often-heard query, "How does my modulation level sound to you?" and the just-as-often-heard reply, "Your carrier is very strong but your modulation seems low" are as unnecessary as drip pans for grid leaks. In these days of inexpensive surplus 'scope tubes there is no reason why there shouldn't be one in every transmitter.

The oscilloscope is a natural for a modulation indicator. There are several ways in which it can be applied, but the one to be described here is so simple that all of the parts can be recovered from the junk box in most ham shacks. The very fact that a simple and easily-installed 'scope can provide the answer to that ever-present question about modulation is sufficient reason for one in every transmitter.

Aside from the tube itself, and a few small resistors, potentiometers and condensers, the only thing required is a source of d.c. and a.c. voltages. *These are present in every transmitter.* A 2-inch 'scope tube, Type 2A1, or the older 902, will produce a pattern that is large enough for most modulation monitoring, and yet the tube is so

* 1915 C Ave., N. E., Cedar Rapids, Iowa.

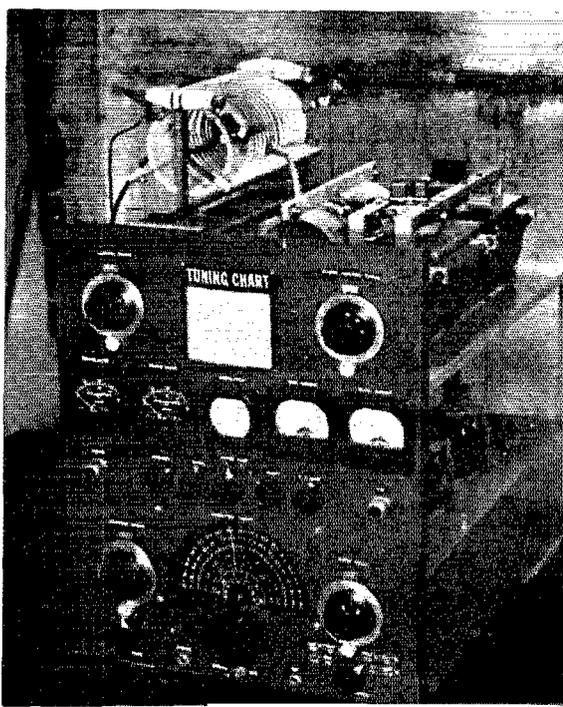
¹ A very neat front-panel bezel that resembles a 2-inch square meter is available from the James Millen Company and possibly others.

² See "Parallel Standing Waves" by John W. Paddon, January, 1948, *QST*, for further details.

◆
In this front view of the WØJET transmitter, the 'scope-tube face can be found just under the tuning chart. A small bezel resembling a meter dresses up the installation.
◆

small that it can be mounted conveniently within the transmitter or even the exciter.¹ The d.c. supply voltage of from 300 to 600 can be obtained from the low-voltage supply of the transmitter or even from the exciter supply, while the 6.3 volts a.c. for the heater can be taken from the filament transformer for one of the stages. A 60-cycle horizontal sweep is perhaps the most simple time base that can be provided. This will be adequate for all the modulation monitoring necessary in the average shack. This 60-cycle sweep voltage can be very easily obtained from the secondary of the same plate transformer that supplies the previously-mentioned d.c. voltage. Add three potentiometers for focus, intensity and sweep amplitude, and you have a modulation indicator that is second-to-none and will not tell a lie. The vertical deflection is obtained from the r.f. in the tank or antenna coupling circuit, by means of a simple shielded single-turn pick-up coil which will be described.

Fig. 1 is the circuit of the monitoring 'scope. The d.c. supply and the a.c. voltage sources are shown dotted, since it is assumed that they will be obtained from some place in the transmitter. The circuit is self-explanatory, with the possible exception of the pick-up coil. This is made from a length of shielded wire — single-conductor microphone cable or still better a length of small-diameter coaxial cable.² A loop is formed in one end of this cable about the diameter of the tank



coil to which it is to be coupled. Fig. 1 also shows how this coil is made. This coil can either be provided with a support that will allow it to be moved easily in and out of the field of the tank coil, or it can simply be pushed between turns of the coil and adjusted to provide about one inch of vertical deflection on the 'scope tube. Since this link is not tuned, it will have to be coupled quite closely to the tank, so a little experimenting may be necessary to find the right place for it. It is

wise to remember that this coil must be insulated to withstand the tank voltage to ground if it is to come in contact with the coil.

A few words on how to use this simple 'scope and some of the possible troubles that might be encountered, and you will be off on your own never again needing to ask about your modulation. With the pick-up link uncoupled from the tank and the horizontal-sweep potentiometer turned to minimum, the focus and intensity controls are adjusted to provide a brilliant and well-defined pin-point spot of light. Right here is where your first troubles may show up. First, the 'scope tube itself is very sensitive to magnetic fields, and their presence will be indicated if you find it impossible to obtain a spot but instead get only a short brilliant line. If the horizontal-sweep potentiometer is turned up a slight amount at this time, the pattern will become a circle, ellipse, or possibly a distorted figure "8." In addition, the spot might not be well centered on the face of the tube. If these troubles show up, the tube should

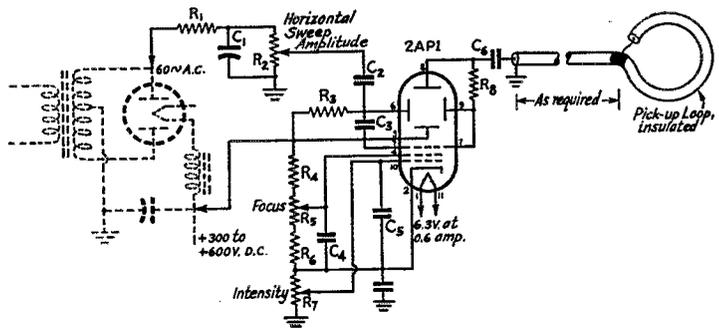


Fig. 1 — Circuit diagram of the monitor 'scope.

- | | |
|--|---|
| C_1 — 0.1- μ fd. 600-volt paper. | C_6 — 47- μ fd. mica or ceramic. |
| C_2 — 0.05- μ fd. 600-volt paper. | R_1, R_6 — 47,000 ohms, 1 watt. |
| C_3, C_4, C_5 — 0.001- μ fd. mica or paper. | R_2 — 1-megohm potentiometer. |
| (Note: Unlabeled capacitor from cathode to ground is also 0.001 μ fd.) | R_3, R_8 — 2 megohms, $\frac{1}{2}$ watt. |
| | R_4 — 0.2 megohm, 1 watt. |
| | R_5, R_7 — 50,000-ohm potentiometer. |

either be moved to a different place in the equipment, away from power and filament transformers, or it should be magnetically shielded. This shield can be provided by either a silicon-steel sleeve or a short length of iron pipe fitted over the tube, to cover all except the face and possibly the rear inch or so of the tube. It is a wise precaution to install this shield at the very beginning.

Assuming now that the pin-point spot can be obtained, the next step is to turn up the horizontal deflection until it draws a horizontal line the full width of the tube. The pick-up link can now be coupled to the tank circuit to produce about an inch of vertical deflection. If everything is perfect at this stage, the pattern will be rectangular, the full width of the tube and about an inch high. It will be uniformly illuminated in the horizontal direction. It will have well-defined top and bottom edges that are slightly brighter than the center. Here again several discrepancies may appear. If some of the r.f. is getting mixed up with the 60 cycles on the horizontal sweep, the pattern will appear to be tipped to the right or left instead of being rectangular. This can be remedied by better by-passing between horizontal plates directly at the tube socket. If the top and bottom of the pattern appear to have flattened

The monitor 'scope can be seen sandwiched in below the top deck of the W6JET transmitter.

QST for

circles on them or if one side is higher than the other, either your transmitter is being affected by some 60-cycle modulation or a 60-cycle voltage is being induced into your pick-up circuit. This latter can be prevented by using a very small coupling condenser from the vertical plates to the pick-up link. This coupling condenser as well as the one-megohm resistor should be mounted directly on the tube socket. If the pattern is not uniformly illuminated in the vertical direction but has a brightly illuminated top half with a darker lower half or vice versa, some of the r.f. is modulating the control grid of the 'scope. Better by-passing from grid (Pin 10) to cathode should eliminate this trouble.

Now assuming that none of the above-mentioned troubles is present, there is still one more thing to be checked. If the pattern shows a number of bright horizontal lines at various levels, it is an indication that the r.f. voltage is full of harmonics. The pick-up coil should be tried at several different places in the tank coil to see if a better point can be found. If no improvement can be affected by pick-up location, it is an indication that the tank Q is too low and the LC ratio should be readjusted to operate with higher capacity, unless of course you like to receive harmonic notices from the FCC.

If these bright lines are vertical instead of horizontal, it is an indication that the 60-cycle sweep voltage is not sufficiently free of harmonics. The resistance-capacitance filter shown between the plate transformer and the horizontal sweep control is intended to eliminate this trouble. Either the resistor, the condenser, or both, should be increased if these vertical stripes appear.

After all of these points are checked and any troubles remedied, you are ready for modulation. Proper 100% modulation will just double the vertical deflection on peaks and at the same time will show valleys that just meet at the center of the 'scope. Overmodulation will be indicated by white streaks at the center where the valleys meet and actually overshoot for a short time. By carefully whistling into the microphone or, better still, using an audio oscillator, a stationary pattern can be produced and studied for distortion. Insufficient upward modulation will be evidenced by a failure of the pattern to just double in height at the same time that the valleys just meet in the center.

Although this description may seem a bit long and elementary to some, it is hoped that by being thus forewarned some of the possible pitfalls can be avoided in the initial construction and that everything will work properly from the moment the last wire is soldered in place. This is really simpler to do than it is to describe. There is no excuse for any transmitter intended for 'phone operation to be on the air without a modulation monitor to answer once and for all the ever-present question, "How's my modulation?"

Your QSL Manager

ON May 19, 1920, the 8th-grade teacher at Oakland School in Oakland, California, counted noses and discovered that young Horace R. Greer was absent. Had she been teaching school in Maine or Indiana, probably she would have chalked his absence up to the advent of spring. However, in the land of perpetual spring, no such reason could be ascribed for his having played hooky. The truth of the matter was that Horace left home that morning with his books under his arm, ostensibly on his way to school. Instead his steps led him to the Government examining office where he passed the amateur license examination and received his first ticket.



Horace R. Greer, W6TI, would like to answer personally each of the many letters and cards he has received voicing appreciation of his services but, if he did, he would soon be swamped with DX QSLs. As the next best course, he takes this opportunity to say, "Thanks a lot, fellows."

That same night, he was on the air with a half-kw. spark transmitter, the same rig used through 1921. In early 1922, he changed over to the then-new c.w. and was on the air with a pair of 5-watters. A little later that year, he graduated to a Cunningham 50-watter with which he pumped 4 "amps" into the antenna. Horace was one of the first American amateurs to be heard in New Zealand in January, 1922, and was heard frequently during the May transpacific tests that year. Some of his success with the "big DX" probably was contributed by the 85-foot vertical antenna with a half acre or so of counterpoise.

His earlier rigs have been replaced by a thoroughly modern station running 750 watts on c.w.; somewhat less on 'phone. In addition to postwar DXCC certificate No. 77, Horace holds WAC, WAS and WBE certificates. Since the war, W6TI has confirmed contacts with 130 countries. A member of the Old Timers Club, he also holds Code Proficiency, OBS, ORS and

(Continued on page 114)



Correspondence From Members -

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

BOARD ACTIONS

1118 W. John St., Champaign, Ill.

Editor, *QST*:

I write this letter as a sincere amateur who is disappointed with the recent policies of the organization he helps support. I feel qualified in writing this letter not only by my continued yearly support, but by my ardent love for my hobby and the frantic dread that it is being sold down the river.

Here, in the graduate department of psychology, University of Illinois, we learn never to underestimate your fellow man; to respect his opinions and to listen to his voice; to provide him with the unbiased and objective facts of any controversial issue is one of our major doctrines. Psychologically speaking then, it is obvious that you and the League do not meet the above criteria in fact, and perhaps not even in theory.

Per my recent discussion with your representative, it was told to me that the ARRL is not bound to the voice of the average "ham," but is supposedly directed in its policy by the Board members we elect. Why then, is it possible for the Board as a legislative body to make proposals to the FCC without first consulting the group this Board theoretically evolves from? Where is the democracy in the ARRL? Are you so imbued with the righteousness of your convictions that neither you nor the Board you advise need consult your constituents?

May I remind you that your recent poll was also a sign-post of your disregard for the amateur's voice. The action taken by you and the Board leaves me, a twenty-meter c.w. DX man, completely dissatisfied. If I am to sacrifice my DX to the betterment of the hobby for the majority of amateurs, then surely this would be a most worthwhile sacrifice. . . .

— Myron Unger, W3YIN

743 S. Highland Ave., Oak Park, Ill.

Editor, *QST*:

. . . I believe that the officers at the ARRL are too smart and sure of themselves. It's about time that you either wake up and correct your corrupt policies or have a new live-wire organization come in and represent our views in Washington and all other important places regarding amateur activities.

I do not believe that an increase in membership dues is necessary even with increased costs of the present day. Your ad rates in *QST* are quite high, and I think the present increased membership dues should remain at the same rate. Why not try economizing amongst yourselves at Headquarters instead of placing the burden on the members? The quality of the articles in *QST* hasn't been very interesting recently. I remember when the articles were of great interest, but it seems all you can print now is articles about 220 Mc. and higher.

So, let's have some improvement in the League and show us that it can be a true democratic organization.

— W. J. Gago, W9FVU

633 South Dodge St., Iowa City, Iowa

Editor, *QST*:

It is with extreme reticence that I submit my answers to your most recent poll. Judging from past actions of the League officers in putting the will of the majority into play, it would appear that the questionnaire sent out was one of the type sent out merely to give the average member the

idea that his opinions, as stated collectively, had a large part in shaping the policy of the League, particularly in highly-controversial issues. A recent discussion with our Midwest director concerning the most recent Board meeting has confirmed an old suspicion that such is not the case. Mr. Collett conducted an extremely comprehensive poll of his constituents and, despite his personal opinion on the 'phone-c.w. division, presented his poll to the Board exactly as tabulated. The reception it got is past history, but the statement made by a director to the effect that polls meant very little shows only too well that the higher decisions on policy are made far too much on personal opinions as effected by political cliques, small pressure groups and the like, and not nearly enough on the will of the amateur. My personal opinion as to the division of the 14-Mc. band is that it should be left as it is at the present, and in fact I recent very strongly the efforts of so many to have the 'phone division increased. This is true because I work about an equal amount of 'phone and c.w. and enjoy working DX. The effect of the increased 'phone allocation upon foreign amateurs and their opinion of the United States cannot be overlooked. However, in spite of this viewpoint, the fact remains that the majority of the amateurs have decided that it is to our advantage to increase the 'phone allocation, and since we live under a democratic system their will should prevail in spite of what you and I think. The fact that it did not shows only too clearly that the amateur is not getting truly representative administration from the League. I recognize the fact that in many cases the officers and directors of the League are better qualified to make decisions than are the members of the League. This is true because the former have access to information which makes them more able to make better decisions. However, when such is the case the officers who vote against the expressed will of the majority should inform the members of their reasons for voting as they do, and if in the light of this new knowledge, the members still feel that the officer voted wrong, he should change to conform with the will of the majority. . . .

It is my hopeful desire that our League may soon be functioning in a truly democratic manner so that it may contribute to the highest degree to the continued enjoyment of our fine hobby, amateur radio.

— K. L. Klippel, W8SQO

Arkansas

Editor, *QST*:

ARRL is not authorized to represent the undersigned. Am opposed to proceedings of Bulletin 138 [concerning Board actions].

W6

[EDITOR'S NOTE: Hq. subsequently received the following letter from the same amateur.]

Editor, *QST*:

The card that I sent to you recently was because of the comments in *QST* about making it necessary to pass a code exam of 16 w.p.m. and to limit 'phone on 10, 20 and 75 to Class A only. I am sure that you received other cards about the same time. [Yes, two others. — Ed.] I would like to explain that the reason that I sent the card was because one of my best friends asked me to and "stood alongside" till I did. The reason he is so concerned is the fact that he took the Class B exam 4 times before receiving a ticket and I feel sure the RI must have had a weak moment when he graded his code exam. He has never had a c.w. contact as

(Continued on page 100)

Triple Conversion for the Communications Receiver

A Compact 85-Kc. I.F. Channel

BY WILLIAM I. ORR,* W6SAI

• Here you can read how one ham realized the advantages of a "Q5-er" without building an auxiliary power supply or spoiling the appearance of his receiver by draping a BC-453 over it. The unit described is for a Collins 75A, but it should be readily applicable to many other types of receivers.

ONE of the most revolting experiences to a DX man — or to any ham, for that matter — is to call a station and then to be unable to tell whether the station came back or not because of blanketing QRM. The situation reached a climax the other evening at W6SAI when FQ3AT/FE replied to my thirty-third call but was buried beneath several hundred eager-beavers all within five kilocycles of him and all calling him madly. I didn't know that he had answered me until a well-meaning friend (with a more selective receiver) thoughtfully called me on the telephone a few hours later and passed the welcome (?) information along.

That did it! I had read By Goodman's article about the "Lazy Man's Q5-er" in January *QST* with mild interest, and then immediately turned to "How's DX?" to see what I had lost out on

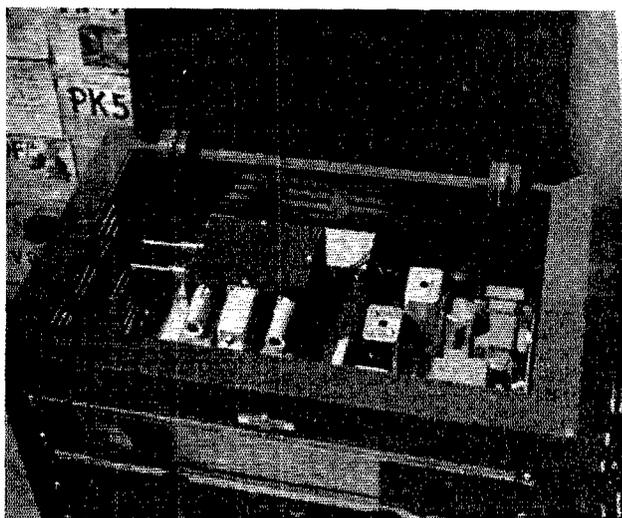
*1426 Camden, Los Angeles 25, Calif.

during the past month. Obviously I had missed the boat!

A trip was made to "Surplus Sam's" and a well-used BC-453-A was obtained. The January copy of *QST* was pulled from the bookcase. Reading the article I noticed By said, "All you need is 25 volts a.c. ["From where?" I asked myself] at 0.45 ampere, and 250 volts d.c. at about 40 ma." Well, I had the choice of haywiring a d.c. supply and trying to dig up a 25-volt transformer, or of trying to steal the voltages from my Collins 75A. I finally decided upon the latter plan, and therefore rewired the BC-453-A for 6.3 volts and changed its tubes accordingly. The 250 volts was obtained from the relay terminal strip at the rear of the 75A, and the antenna post of the BC-453-A was wired to the 6H6 second detector of the 75A. To put it mildly, the results were astounding. The selectivity was what I had dreamed of during many hours of digging through pile-ups for the elusive FQ. At last! the world was mine.

However, after several days of use, the BC-453-A's rosy appearance began to fade, and several serious defects were found that were not noticed in the first rush to get the BC-453-A working. First of all, my beloved 75A ran hot as the proverbial two-bit pistol with the added load on the power supply. Secondly, the grimy, battered

◆
The auxiliary 85-kc. i.f. amplifier mounted inside a Collins 75A receiver. Two control shafts extend out to the left-hand side of the receiver and sneak through the louvre holes.



BC-453-A did not add to the appearance of the 75A. In addition, the BC-453-A added sufficient background noise and hum to mask out some of the weakest signals. Also, it had a nasty habit of overloading on strong local signals (and believe me, they are strong in the Los Angeles area!). Finally, the audio quality on 'phone signals was not as good as that of the 75A. All of these factors, plus the fact that it took six extra tubes to do the job, pointed to another solution to the selectivity problem: the construction of a small low-drain frequency conversion unit that would fit inside the Collins 75A receiver and do the work of the BC-453-A. Since the 75A has excellent stability, the unit should have comparable stability. It should contribute no appreciable noise to the receiver and, above all, it should not be necessary to tear into the Collins to connect the unit. After all, the finance company wouldn't like that! A large order, but the unit described herewith fulfills the requirements. With little or no change it could be used in other receivers.

Circuit Details

The converter unit consists of a 6BE6 pentagrid converter with an untuned input and a 585-kc. cathode-oscillator coil. The plate circuit is coupled to two capacity-coupled 85-kc. transformers from the BC-453-A. A single 6BJ6 is used as a low-gain 85-kc. i.f. amplifier and a third 85-kc. transformer couples the 6BJ6 to a 1N34

second (really a fourth) detector. Another 1N34 is used as a noise limiter to replace the one in the 75A. The two 1N34s replace electrically the 6H6 second detector in the 75A that is removed and not used. The converter unit couples to, and receives filament power from, the 75A by means of a cable and octal plug which terminate in the empty 6H6 socket. The plate voltage to operate the unit is obtained by running a wire to the relay terminal strip on the rear of the receiver.

The adapter draws 6.3 volts at 0.45 ampere and 240 volts at 16 ma. Since the 6H6 is removed from the receiver, the net additional filament drain is only 0.15 ampere. This small power consumption causes no noticeable heating of the power-supply components in the 75A.

A double-pole double-throw rotary switch is used to cut the adapter in and out of the receiver circuits, but the filament and plate voltages are applied to the unit at all times.

Since the BC-453-A employed a 12K8 triode-hexode mixer and the only miniature mixer, the 6BE6, is a pentagrid converter, a new oscillator coil had to be obtained in place of the original coil. This coil is slug-tuned and padded to 585 kc. with a 50- μ fd. zero-drift ceramic condenser. It is adjustable by means of a midget 20- μ fd. condenser that may be used to compensate for the very slight warm-up drift that may be encountered in a cold room.

The use of three 85-kc. i.f. transformers gives a

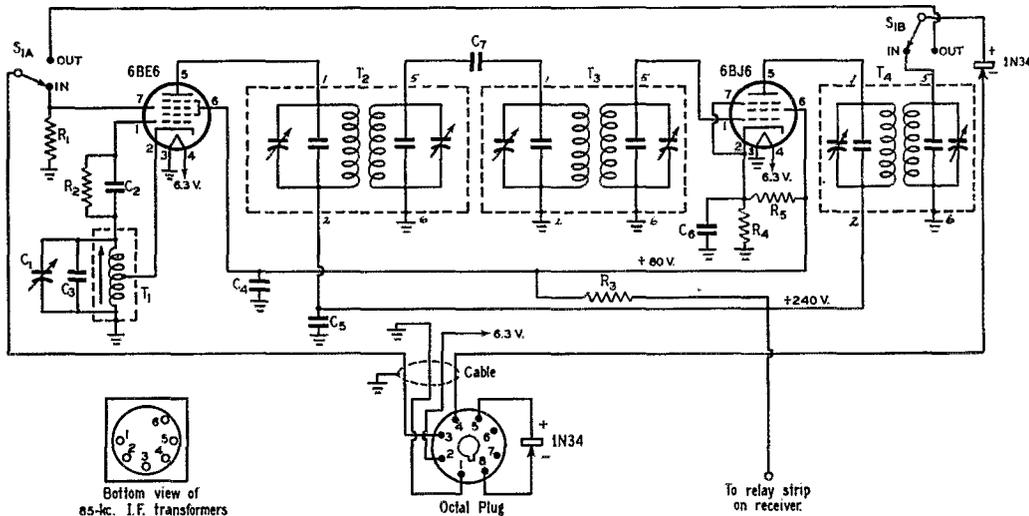


Fig. 1—Wiring diagram of the 85-kc. i.f. amplifier.

- C₁ — 20- μ fd. variable midget condenser.
- C₂ — 100- μ fd. zero-drift ceramic condenser.
- C₃ — 50- μ fd. zero-drift ceramic condenser.
- C₄, C₅, C₆ — 0.05- μ fd. 300-volt-working paper.
- C₇ — 15- μ fd. ceramic zero-drift capacitor.
- R₁ — 0.1 megohm, $\frac{1}{4}$ watt.
- R₂ — 20,000 ohms, $\frac{1}{4}$ watt.
- R₃ — 10,000 ohms, 2 watts.
- R₄ — 5000 ohms, $\frac{1}{2}$ watt.

- R₅ — 47,000 ohms, $\frac{1}{2}$ watt.
- S_{1A}, S_{1B} — Double-pole double-throw "tone-control" switch (Centralab No. 1462).
- T₁ — Low-frequency oscillator coil (Miller X-321-M, manufactured by J. W. Miller Coil Co., 5917 S. Main St., Los Angeles, Calif.)
- T₂ — BC-453A i.f. transformer (No. 4698; coded red).
- T₃ — BC-453A i.f. transformer (No. 7267; coded yellow).
- T₄ — BC-453A i.f. transformer (No. 4677; coded blue).

sharp i.f. response with a broad-enough nose for excellent 'phone reception. The gain of two i.f. tubes was not needed, so two of the 85-kc. transformers were capacity-coupled, obviating the need for an extra tube. The 6BJ6 i.f. tube is biased so the gain with the adapter in use is about 6 db. above the gain of the receiver alone. Any additional gain beyond this is unnecessary and may introduce additional noise.

A choice of using the b.f.o. in the receiver or adding one to the adapter was available, but after trying both methods, the b.f.o. in the receiver was chosen. It is adjustable from the front panel and an extra power-consuming tube is not needed. Furthermore, the BC-453-A b.f.o. does not tune over enough range to permit flexible operation.

Two 1N34s are used as detector and noise limiter to conserve filament power. They perform equally as well as the 6H6. The 1N34 noise limiter is mounted directly in the octal plug, to permit short leads.

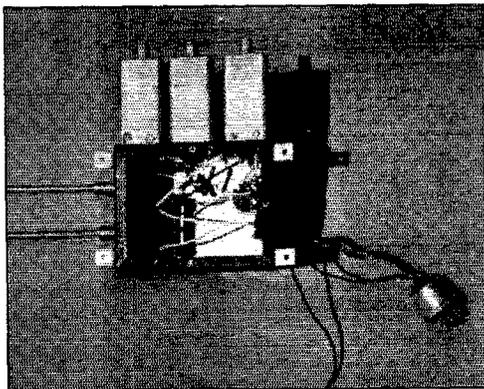
Construction

The next step was to cram all these components plus the necessary resistors, condensers and what-not into a small box that could be mounted atop the r.f. dust cover in the receiver. Since there is only $4\frac{1}{4}$ inches clearance to the lid, the tubes and coils are mounted horizontally on a small black-crackle box measuring $5 \times 4 \times 3$ inches. The 6BE6 and 6BJ6 are mounted in the two top front corners of the 5×3 side, and the 585-kc. oscillator coil is mounted between the tubes. The three 85-kc. i.f. transformers are mounted in a horizontal line below the tubes. The mounting plates are removed from the transformers and may be used for drilling templates.

A six-terminal lug strip is bolted to the right inside box wall to terminate the power cable, and to hold the 1N34 detector. A triple-section 0.05- μ fd. 300-volt condenser is mounted to the lid. This is a surplus item, and if unavailable may be replaced by three separate 0.05- μ fd. 300-volt paper tubular condensers.

A double-pole double-throw rotary "tone-control" type switch is mounted on the left inside box wall. This is operated from outside the receiver by passing an extension shaft through one of the cabinet ventilation louvres. Directly in front of it is the oscillator trimming condenser also brought out by means of an extension shaft.

The adapter wiring is conventional and simple. The usual attempt to make all leads short and direct should be observed. The power cable has the audio, filament and ground leads laced, but the 500-kc. i.f. lead is left unlaced to reduce the capacity to the other leads. None of the leads need be shielded. The B+ wire is separate from the cable and terminates in a lug to be slipped over one of the bolts on the relay terminal strip on the receiver.



The bottom view of the 85-kc. amplifier. The octal plug goes to the detector socket of the communications receiver.

Operation

When the unit is completed and the wiring checked, it may be attached to the receiver. The double-pole double-throw switch should be set to the "out" position. The receiver is next turned on and plate, screen and filament voltages of the adapter should be measured. They should be 240, 80 and 6.3 volts respectively. Next, the family BCL midget set should be borrowed and placed atop the Collins and tuned to approximately 585 kc. The slug-tuned oscillator coil in the adapter should now be adjusted until the oscillator can be heard in the BCL set. Now the adapter may be cut into the circuit, and the oscillator padding condenser adjusted for maximum audio output on a received signal. The 85-kc. transformers are then aligned and left in the uncoupled position — plungers up.

This little unit has been worth its weight in DXCC certificates. It should work as well with other receivers having different i.f. frequencies, since the specified oscillator coil will work over a range of 400 to 1500 kc. by changing the value of the fixed padding condenser.

After trying this unit on several Collins 75As it was noticed that when the adapter was in use, the b.f.o. level of the 75A was a little too high. This caused an annoying hiss in the 'phones that might easily wipe out that S1 AC4. This hiss may easily be eliminated by placing a 50,000-ohm 1-watt resistor from screen to ground on the 6SJ7 b.f.o. socket of the 75A.

Because of the sharp bandpass, the perennial power leak at W6SAI is shaved down about one S-unit. This, alone, is well worth the cost and construction time of the gadget. So — stand aside! When MF8J in Upper Bulltravia comes back with "W6SAI GE OM UR RST 599 HR — HW NW? AR K," ol' SAI will be right there — with his 85-kc. adapter unit to nurse him right out from under all those other eager-beavers.



Hints and Kinks

For the Experimenter



DIODE PEAK CLIPPER WITHOUT BIAS BATTERIES

IN the course of trying several noise limiters, we attempted to use a pair of selenium rectifiers in place of the 1N34 germanium diodes called for in the *Handbook* circuit. We found that instead of clipping at the 3-volt level that was supposed to be established by the bias batteries, the unit clipped at 8 volts peak-to-peak. Apparently the 5-volt drop that is encountered in the selenium rectifiers holds even at low current levels.

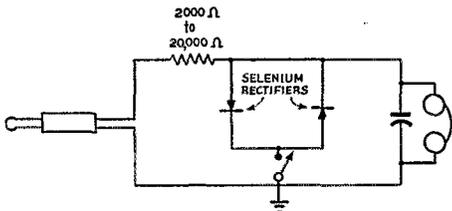


Fig. 1 — A diode peak clipper that requires no bias batteries. Two selenium rectifiers are used instead of the usual germanium crystals.

The batteries were eliminated therefore, resulting in the circuit shown in Fig. 1. The limiter clips at 5 volts peak-to-peak, which has worked out well for high-impedance 'phones.

The great advantage of the selenium rectifiers in this unit is the elimination of the need for batteries. Any battery will wear out after a relatively short time, while the rectifiers used in this gadget will probably outlive your receiver. — *Floyd Gardner, W9BQJ*

IMPROVED 144-MC. RECEPTION

OWNERS of the SCR-522 can make a substantial improvement in receiver performance by the use of the regular station communications receiver in the same manner that the "Q5-er" is used on the lower-frequency bands.

The communications receiver is used as an additional i.f. amplifier and audio channel. It is loosely coupled to the last i.f. transformer of the 522 by twisting a wire once or twice around the lead that runs from the last i.f. transformer of the 522 to the 12C8 detector tube. The other end of the wire is connected to the antenna post of the communications receiver. The communications set is then tuned to about 12 Mc., the i.f. frequency of the 522.

Rough tuning is accomplished with the dials of the 522 in the usual manner. Then the band-

spread dial of the communications receiver is used for peak reception.

This system of reception offers all the conveniences of low-frequency operation: stable easy-to-read signals, bandsread tuning, S-meter, b.f.o., noise-limiter action, and a better audio system. Most important, however, is the improvement in signal-to-noise ratio obtained because of the narrower passband of the system. Unstable or badly-drifting signals can be received as usual on the 522 alone by turning the audio gain of the 522 up, while reducing it on the low-frequency set. — *Francis H. Stites, W1MUX*

MORE ON SCREEN PROTECTION FOR THE 807

THE circuit shown in Fig. 2 is not new, but is an adaptation to use with the 807 or similar circuits that have been described for larger tetrodes. The purpose of the 6V6 is to reduce the screen voltage on the 807 during key-up conditions, thus permitting oscillator or driver keying ahead of the 807 without requiring any fixed bias at all.

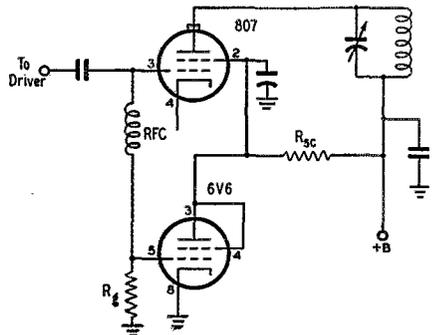


Fig. 2 — The screen-protective tube as adapted for use with the 807. Circuit constants are the usual values required for the 807, and the only extra parts needed are the 6V6 and its socket.

R_{sc} — Usual screen resistor, 30,000 ohms, 20 watts for 450-volt supplies, or 50,000 ohms, 20 watts for 600-volt supplies.

R_g — Normal grid leak for the 807, 12,800 ohms, 1 watt.

The 6V6 is operated as a triode, with screen and plate tied together. With the constants shown, and at screen potential of about 250 volts, approximately 40 volts negative is required to cut off plate current in the 6V6. This corresponds nicely with the usual bias requirements of the 807, so that with a grid leak of 12,800 ohms, proper bias is obtained when 3.5 ma. grid

drive is present. When excitation stops, the 6V6 conducts through the screen resistor, reducing screen potential to about 75 volts. Even though zero-biased under these conditions, plate current in the 807 is held to 30 to 35 ma., which is well within the plate-dissipation rating of the tube.

Thus, the need for cumbersome bias supplies or batteries is eliminated, at the small cost of a single 6V6 tube and its socket. — *Wade C. Kingery, W9JGZ*

SOCKET-PIN PROTECTOR

WHEN you are stripping some gear and want to be able to use the parts again in another rig, damage to the fragile socket pins can be avoided easily by plugging an old tube in the socket while you unsolder the connections. The pressure of the tube pins against the socket terminals keeps them straight, and prevents bending and loosening. — *David O. Finnell, W5LCL*

A GADGETLESS BREAK-IN SYSTEM

SHOWN in Fig. 3 is a smooth-working break-in system that requires only a short length of wire and a s.p.d.t. toggle switch, plus a few minutes to hook it up. In operation it provides all the features of more complex systems, and makes working BK a pleasure. It is adaptable to any rig that contains an unkeyed self-biased stage.

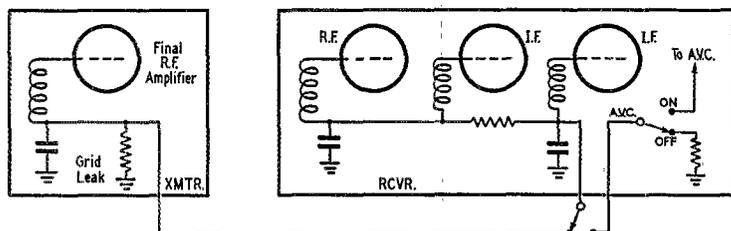


Fig. 3 — Simplified schematic diagram of a gadgetless break-in system that is adaptable to many rigs with almost no effort.

A wire is run from the bias end of the grid leak to the a.v.c. line in the receiver. Thus, when excitation is present, the bias voltage developed across the grid leak is applied to the a.v.c.-controlled tubes in the receiver, reducing their gain to the point where the signal from your own rig comes out about S4. Should the other station wish to break you, he merely sends BK a couple of times, and you hear him at his normal signal strength because the receiver returns to full sensitivity between keyed characters.

At W3HLK, this system has been used successfully with a BC-459-A, which develops about 60 volts negative bias across the grid leak of the amplifier stage, and an SX-24 receiver. It should work satisfactorily with any similar set-up. It isn't necessary to worry about whether the time constant of the a.v.c. system is fast enough to

follow a bug, or if there will be too much r.f. in your receiver at low power. — *Walter H. Packer, W3HLK*

MORE ON WEATHERPROOFING TWIN-LEAD

SHOWN in Fig. 4 is the scheme used by W5CXS, W6PNO and XE1KE to avoid the detuning effects often encountered in wet weather with Twin-Lead feedlines. Slots are cut in the dielectric



Fig. 4 — Method of "weatherproofing" feedlines made of Twin-Lead. Some of the dielectric is removed, leaving only enough to maintain line spacing.

between wires, leaving just enough to serve as normal feeder spreaders and to provide enough mechanical strength to hold the spacing rigid. W5CXS suggests that the slots be cut about 1½ inches long. — *W. W. Basden, W5CXS; Roy G. Walters, jr., W6PNO; B. J. Kroger, XE1KE*

PANEL MARKING MADE EASY

THERE are many stencils and "decals" on the market for ham use, but all of them lack one thing or another. Either they are not the right color, not the desired type style, or not the right inscription to do the whole job. You can make your own very simply with a typewriter and a mimeograph stencil.

Type the desired wording on the stencil, and then cut it into small strips. Place the strip on the panel, hold it firmly against the surface, and rub some thick paint over it with your finger. Rub only in one direction, and be sure that the paint is the approximate consistency of vaseline. The results are well worth the effort. — *C. Harvey Haas, W6EAH*

INEXPENSIVE MOUNTING FEET

A SHORT LENGTH of ½-inch rubber tubing, available in almost any hardware store, may be used to provide cheap mounting feet for the usual steel chassis used in ham construction. Cut the tubing into four pieces, and then slit each piece lengthwise. Slip one piece on each corner of the chassis. The feet will prevent the chassis from scratching the furniture, and if you're afraid of scratching the chassis when you have it on the bench for testing or repair, a set of "feet" can be kept handy to be slipped on until the chassis is returned to the rack. — *Jack C. Nelson, W2FW*



How's DX?



CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Jeeves reports hearing quite a bit of extreme QSL-proselytism agoing on in the ranks of the Sleepless of late. This wouldn't be exactly unnatural, what with the inflated value of a juicy DX confirmation on the present booming DXCC (and other awards) market. However, we think it would be much more on the sincere side if the boys would reserve their cartons of fags and surplus spare parts for the uncommonly rare lads who come through first with an immediate, unprocrastinated QSL from that new country. Horrors and gadzooks if it ever comes to the day when one must run a mail-order house to make DXCC! We're all in favor of helping to share some of our W radio wealth with less fortunate fellows overseas, but let's keep it clean, eh?

So, Jeeves, uncrate that refrigerator we were going to ship to the KC4 you worked last night and produce with the mailbag. . . .

What:

Eighty: We stepped into a big bear trap when we brought up this 3.5-Mc. WAC subject. While W9BMV and W4BRB were hashing out their claims, W5KC barged in with the evidence. A letter from J3AAD shows that Vince was worked a half hour previous to W4BRB and W9BMV was a little later than that. All of the three had the rest of the continents when they trained their guns on poor J3AAD, so they'll have to settle for

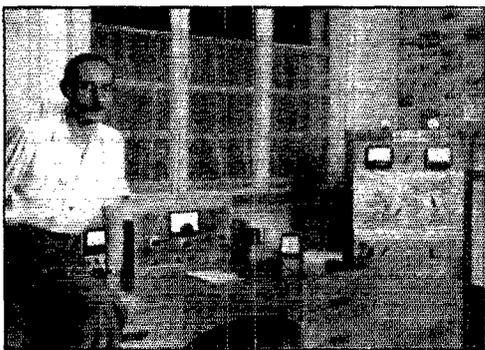
* DX Editor, QST; 1517 Fargo Ave., Chicago 26, Ill.

the first three spots respectively. J3AAD's 3.5-Mc. appearance undoubtedly grayed the wool of many DXers. Well, summer conditions are nerve-racking but W4BRB is still in there under the QRN. Gene chalked up CX1DB (3502), KG6DI (3510), LU3EL (3510) and VP4TO (3525) to reach No. 49 on eighty. . . . Among other noteworthy performances last season was that of G8VB (ex-ON4HS). G8VB worked 278 Ws on 75-meter 'phone and a complete WAS! W1AAH aided in the feat by acting as NCS for the State-side end of activities when the going got rough. G8VB needs cards from a few more states to make it official. . . . ZC6AA, with 150 watts, is on the lookout for Ws around 3500 kc.

Forty: W2RDK puts on his specs, checks his card file and finds he needs just *four* more confirmations for his 7-Mc. DXCC. . . . Conditions are pretty crummy, in general, but W1RBK scraped up ZS1EQ (7030), FA8BG (7024), PAØBK (7025), F9GC (7020), HK5CR (7080), KH6RP (7035) and assorted KZ5s, KP4s and CMs. . . . Folding a dipole, W4MPF caught up with TI2EXO, TI6TA, HB9HQ, PY2QW and some G-men. . . . An indoor wire at W3CJS warmed up the walls for KP4FH, KZ5AH, KH6MO (7060) and VE8OS (7060). . . . W1HV's 807 soaked up KL7IJ/KL7, HB9DD, ON4AU, F8EO, PAØYW, VK2AHB, T12WR, ZLs 1FE, 2GL and 2RS.

Twenty: Don't fall over, but there is probably going to be some postwar FY8 activity pronto if not already. Cards for FY8A should be sent to W2PIN. . . . W4JFE has some nice ones in TA1AA (13,998 t8), YU7RC (14,108 t9), EA5MP (14,092 t7), MB9BA (14,112 t9), LX1HW (14,001 t7), CR7MB (14,022 t9), CR6AQ (14,060 t9), OE7PK (14,002 t8), OE4FR (14,040 t8), UF6KAB (14,072 t8) and UD6AH (14,017 t7). Frank had a recent 74-minute WAC thanks to UD6AH, VK3LG, CR7MB, CE3DZ, G2SO and a WØ. . . . W5ACL kept occupied with HL1AE (14,100), ZK2AA (14,150), J9ACS (14,110), ZC1CL (14,075), YN1AA (14,015), AC2MA (14,005) and MD3AB (14,120). . . . Tampa's W4EFK tampered with AR1WW (14,105), TA3FAS (14,110), UQ2AH (14,060), YU7AF (14,120), SL5AB (14,060 t9c), ZA2AA (14,090) and EA5BE (14,000). . . . W3KTW was the early bird for MD4TH (14,065 QRH). . . . A new rhombic at W8KPL fixed Bill up with FT4AG (14,005), ET3AH (14,020), ZK1AE (14,080), ZE1JI (14,160) and VQ8AD (14,020). . . . A product of the modern trend is SM8UM/A, a Scandinavian Airlines DC6.





We're all sorry to hear that George R. Cliffe has closed down his Eritrean station, MI3ZJ, after giving the boys a lot of enjoyment on 14 and 28 Mc. since early 1947. MI3ZJ used an elaborate homebuilt superhet receiver and the transmitter ended with a pair of DET-12s in push-pull at 100 watts input. The skywires were high dipoles. MI3ZJ worked 123 countries but George is still in need of a few more confirmations for DXCC. We thought only Ws had that trouble!

W6SAI reports his QRG as 14,075-kc. c.w. and 14,360-kc. 'phone. QSL via SSA. W2QHH's QRP efforts have reached 130 post-war, including VQ5GHE (14,115), ZC6SM (14,016), ZK1AJ (14,033) and VP2GE (14,064). The boys are having a field day with FI8ZZ and W6ODD/FI8 providing the first Indo-China activity in many moons. The Chagos Isles are now being ably represented by VQ8CB (VQ8AB) who is splurging on both A1 and A3, according to W1FH. C.w. QRG: 14,070 t9c. W1KUF battered the stone wall for OH3NA (14,090), OH2QF (14,070), OH3OM (14,070), HA4EA (14,130), HA5EX (14,040), YR5I (14,150), EL5B (14,110), YI2AM (14,115) and a herd of U people. Victims at W5JPC include J9ACB (14,110), J2COM (14,045), VP4TAU (14,070), KG6DE (14,085), TI2ES (14,050) and VO2G (14,095). HLI1AU received his 100th W6 card and claims he is tired of hearing only W6s answer his CQs. "Do I get a special award for 1000 W6 confirmations?" No, but he should get a medal for not resorting to CQ NO W6! W4IYT, an ex-W9, traded squeaks with LX1AW (14,090), ZD1LQ (14,070), EL7A (14,045), HH2JD (14,120), FE8AB (14,030), ZD2RGY (14,030), UF6KAC (14,100), UC2CB (14,100), UQ2AH (14,103) and J9KCA (14,040) while using 500 watts to a vertical Zepp. While awaiting a card from CPIAT, W8WWU killed time with J3KBE (14,125), UC2AD (14,100), UQ2KAA (14,100), UB5BG (14,105), I1MV (14,395), I1BCB (14,015) and CT1JS (14,050), the Italians being in Trieste. Another vacation from Harvard tempted W9TKV to chew with UR2AA (14,000), YU7AA (14,015), UG6WD (14,040) and VP1AA (14,047). W4FVI/KX6 and KX6AF are providing a heap

of contacts during the early morning nowadays. At last reports, both boys were getting plenty fed up with the Hawg market, too. A large 'phone report from XE1AC says that the high end of the band is clogged with VS7GR, VS7PW, AR8AB, CT3MN, PK4PQ, ZD1BD, ZD3A, ZS8A, VS2AL, VS6AE, VR2AZ/VR1, EA9AI, EA8AO, MF2AA, VQ8AE, HLI1AC and VR2AP.

Ten: Somebody has put the whammy on 28 Mc. or else nobody likes the band any more. But we do hear that ZP1X (28,300) is a motorship plying South America routes with W7LUK at the key. On eleven, W9AND collided with HR1MB for a new country that he couldn't find on twenty.

Where:

Darn it. The latest *Call Book* came out and cramped our "Where" style. But we managed to dig up a few that W9TRD hasn't put the snatch on — yet. Notes: Many EA stations are now using Box 12354, Madrid, while Trieste stations can be reached % ARAT, Box 301, Trieste.

C8YCW	Box 73, Lanchow, Kansu, China
CN8EK	Navy 214, Box H, FPO, N. Y. C.
CN8EM	Navy 214, FPO, N. Y. C.
EA5BE	Box 12354, Madrid, Spain
EA5MP	Box 98, Cartagena, Spain
EA8AO	Apartado 22, Villa Cisneros, Rio de Oro, West Africa
EQ1AY	"Box 21, Redol, Persia 2"
HPILT	P.O. Box 528, Panama City, Republic of Panama
HSISS	Don J. King, Rush City, Minnesota
J2GUY	Box 87, APO 328, % PM, San Francisco, Calif.
KX6AF	AACS, Navy 935, FPO, San Francisco, Calif.
MD4TH	P.O. Box 436, Mogadiscio, Somalia, East Africa
MD7AF	(via R5GB)
OE1AD	(via PA0BK)
OY8LA	P.O. Box 35, Thorshavn, Faroe Isles
P6XTX	(via ARRL)
PK4PQ	(via VERON)
PK6XA	Bert Krygsman, % NNGPM, Sorong, New Guinea, N. E. I. (via SSA)
SL5AB	(via SSA)
VQ4SGC	Box 777, Nairobi, Kenya
VR6AB	Gilbert Long, Swan Hotel, Horsham, Sussex, England
W1IPR/KL7	AP0 942, Seattle, Wash.
W4FVI/KX6	Bill Reid, AACS, Navy 824, FPO, San Francisco, Calif.
W6RET/KG6	Navy 939, FPO, San Francisco, Calif.
XALF	P.O. Box 3024, Mombasa, Kenya
YU7AF	(via YU bureau)

A great big salaam to W1s NWO, PEK, QMI, QMM; W2s CJX, HMJ, HZY, KIR; W3s KTW, MLW; W4EFK; W5JPC; W6s OJW, UZX; W7GPP; W8TAJ; W9AND; KH6PM; VE7EO; XE1AC.

Tidbits:

A recent disastrous fire in the shack of G2BJY totally destroyed 95 cards earned toward DXCC and 42 for WAS. Since all this work was accomplished with less than 30 watts input, G2BJY feels

(Continued on page 116)



The World Above 50 Mc.

CONDUCTED BY E. P. TILTON,* WIHQ

ANOTHER 50-Mc. WAS! For some time he had been lacking only Oklahoma and Vermont for WAS on 6, but a new job, which required that he be on the road continually from Monday through Friday, seemed to have him out of the running. His performances in years past (he was the first operator in the country to work all call areas on 56 Mc., completing his WACA on that band in the summer of 1939, and he was one of the leaders in the V.H.F. Marathon each year) had demonstrated that he had what it takes, but how would he make out, with only week-ends to work the band? But week-ends were enough. On the evening of July 18th tropospheric bending was excellent, and he worked W5HLD, Enid, Oklahoma, for Number 47 — a 260-mile hop to the southwest. One week later the band was open to the northeast, and the first signal heard was W1CGX, Brattleboro, Vermont, who was promptly raised, for Number 48. Need anyone be told his name or call — who else would it be but Vince Dawson, WØZJB, Gashland, Missouri?

Aside from this item, the 50-Mc. news is somewhat disappointing. Continuing the trend it had shown in May and June, the 6-meter band was still holding out on its staunchest supporters.

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

Contacts up to 1400 miles or so were frequent, but those slam-bang double-hop sessions just haven't showed up. For the first time since the middle '30s, July 27th has been passed without a single first-class opening for transcontinental work across the northern half of the country.

On 144 Mc., the summer bending was providing extended ranges in almost all sections of the country. The old idea that only the coastal areas were particularly favored in this respect has long since gone by the boards, and many inland stations were covering distances equal to the best that could be claimed for either coast.

Last Call for Milwaukee!

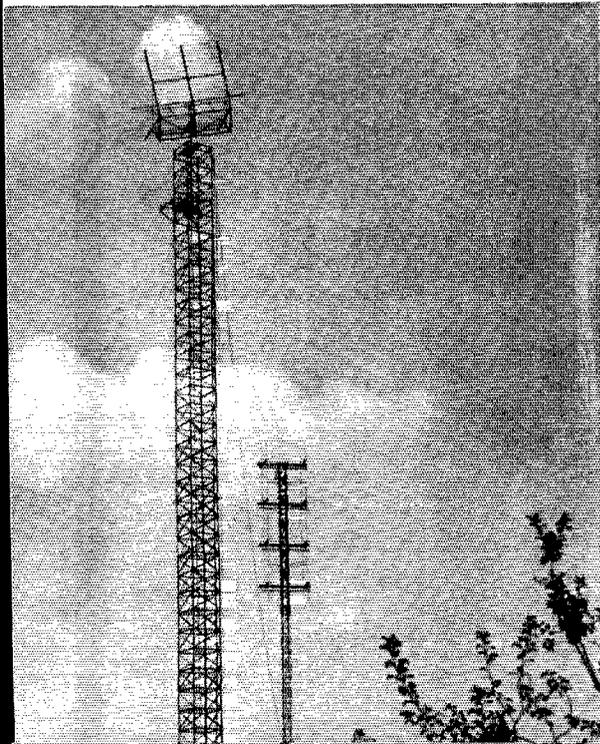
This issue of *QST* will be reaching you just about in time for a last reminder regarding the big v.h.f. doings at the National ARRL Convention at Milwaukee, Wisconsin, September 4th, 5th and 6th. As far as v.h.f. men are concerned, this will be no ordinary convention. No effort is being spared to cater to the v.h.f. gang, and several hours of program time are being set aside for v.h.f. events.

There will be a three-hour period allotted to a gigantic v.h.f. get-together Saturday evening, in Plankinton Hall, which has a seating capacity in excess of 1100 people. Sunday morning will feature hidden-transmitter hunts on 2, 6 and 10 meters, beginning at 9:30. Also on Sunday morning will be a judging competition, with splendid prizes offered for the best ham-built gear in each of three classes: v.h.f. exciters, v.h.f. converters, and microwave transmitters. Bring along your brain-children, and show them off. They don't have to be beautiful or complex; rather, they will be judged on the basis of good design, novel ideas in construction. Your gear if built by yourself, may win you a valuable award. Bring it with you!

There will be a microwave demonstration at 11:15 A.M. conducted by George Floyd, W2RYT,



This impressive array is partly responsible for the splendid 144-Mc. coverage enjoyed by W8WJC, Everett, Ohio. His location is also the highest spot in the county, and his power is up over 500 watts, neither of which probably does him any harm. The big array uses two halfwaves in phase, with a square-corner reflector. The smaller is a 16-element vertical. W8WJC has 14 states and 6 call areas worked on 144 Mc!



QST for

whose work on the u.h.f. and s.h.f. bands is well known to QST readers. Late developments in gear for the citizens' band will be demonstrated by Al Gross, W8PAL. You may not be interested in the citizens' band, but you'll find Al's midget portables crammed with ideas for 420 Mc.

There will be v.h.f. notables from far and wide — never before such an opportunity to meet and talk with the fellows you've been working and reading about from other sections of the country and the world! Carroll Busby, OA4AE, co-winner with W4IUIJ of the Milwaukee Cup for the first two-way 50-Mc. contact between this country and another continent; Vince Dawson, W8ZJB; and hundreds of others you'll want to meet. Many surprises not appearing in the printed program — you just can't afford to miss it. See you there!

Here and There on 6, 2 and 1¼

Doylestown, Penna. — The Atlantic 6-Meter Net, consisting of 10 stations at present, in New Jersey, Pennsylvania and Maryland, operates on 50.4 Mc. each Thursday night at 8 p.m. Net control is W3MFY, Philadelphia, and active stations include W2PWP, Delanco, N. J., W3MQU, Doylestown, W3OAS, W3KKO, W3NTD and W3NSI, Philadelphia, W2QVH, Bernardsville, N. J., W3GGR, Pleasant Hill, Md., and W3MUQ, Washington, D. C.

San Antonio, Texas — W4JLY reports working TG9CH, Guatemala City, for country Number 9 on 50 Mc. Earl turns in one of the best states-worked totals for 1948, listing 30 states worked in the first six months. He also reports that 2-meter stations in the San Antonio area are checking the 144-Mc. band between 6 and 7 A.M. daily, as well as watching it closely at other times.

Houston, Texas — Guatemala has been added to the countries-worked list at W5FSC, with TG9CH and TG9JW worked in June. Bud also heard a VP9 on 50 Mc., but static level was high and the modulation was difficult to read. Does anyone have any dope on VP9 activity on 50 Mc.? W5FSC, and many other Texas stations, question whether there are any W1s on 6 these days. They report no sign of the New England states on 6 this year. To which your conductor adds that certain W1s have been wondering about the southern portions of W5 this year, too!

Fontainebleau, France — The 58.5- to 60-Mc. band will be withdrawn from amateur use, effective Jan. 1, 1949, according to word received from F3L.G. Beginning July 1st, French amateurs may use 72-72.8 Mc. and 144-146 Mc. Transmitters of the self-controlled oscillator type are not allowed in the 72-Mc. band.

Clacon, Essex, England — Most of Europe settled down on 5 meters for the summer DX season, according to G6DH, though there was crossband work going on between 10, 6 and 5, to complicate matters. On June 5th, Denis was working

SM5VL, crossband 28-50 Mc., when QRM developed on the SM from OH2PK, who was worked shortly after for the first G-OH v.h.f. QSO. OH2NY, also on 50 Mc., was worked the same day. The big rush, not only in G-land but in other European countries, is to get going on 144 Mc. With 5 meters being removed from the European amateur picture, and 6-meter permits being issued only on a temporary basis in some countries, Gs, PAos, ØNs, Fs, and others are moving to 144 Mc. as the only v.h.f. band available to all. A 500-mile working radius can cover a lot of countries in Europe, and it may be expected that some European 144-Mc. stations may soon be counting countries in numbers equaling our states-worked totals.

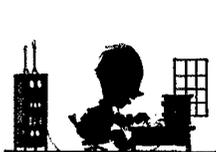
South Devonshire, England — It may be the last gasp on 5 meters, but European activity on that band is at an all-time high, reports G5BY, who added three new countries, Austria, Germany and Norway, during July, bringing his total worked on 58.5 to 15! His 5-meter signals were reported heard by YR5VV, Bucharest, Roumania, on June 27th. On this date ionization was so intense that there was sharp-angle rebound in evidence, and G5BY was hearing G5MQ, Liverpool, 228 miles to the north, only when both stations were aiming east.

Mexico City — An automatic band-scanner, made out of parts from a B-29 computer, is running at XE1KE daily from 8 A.M. to 5 P.M. CST. After that, BJ scans the band by hand at home nightly. Frequent contacts with W5s and occasional other call areas within the single-hop range were all that this continuous monitoring produced during the first half of July.

Shepherdsville, Ky. — Operating portable in Glasgow, Ky., W4FBJ worked some nice DX on 144 Mc. in early July. Contacts beyond 300 miles included W3RUE, Pittsburgh, nearly 400 miles, W0KYF, University City, Mo., 330 miles (believed to be the first Mo.-Ky. 144-Mc. contact), W8WXV, Shiloh, Ohio, 320 miles, W8WJC, Everett, Ohio, 350 miles, and W9s ZHB, PK, JIL, EHx, MDB, FKI, OGE, MLX and BBU, at distances between 300 and 400 miles. All contacts were made with a 4-element array in a horizontal position. No signals were heard on vertical. Since his return to the home location, W4FBJ has worked W9ESE, Fort Washington, Wis., more than 400 miles distant.

Malvern, Australia — The ability of 144-Mc. signals to reach out to surprising distances is not the exclusive property of those emanating from W stations. On June 6th, the occasion of the first 144-Mc. Field Day, VK3ABA and VK3CI worked a distance of 122 miles over a mountainous path, according to news received from Bill Hartley, v.h.f. monitor in VK3 for WIA. On this same date, the signals of VK2VW were heard by VK4FN, 450 miles up the coast in Brisbane.

(Continued on page 124)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
J. A. MOSKEY, WIJMY, Asst. Comm. Mgr.
ALBERT HAYES, WIIN, Natl. Emerg. Coördinator

GEORGE HART, WINJM, Communications Asst.
A. F. HILL, JR., WIQMI, Communications Asst.
LILLIAN M. SALTER, Communications Asst.

September. This month traditionally marks the start of the new operating season. Plans for all usual major activities have been completed, the first after you return from the National Convention being the Frequency Measuring Test. All members are cordially invited to get in on the opportunity afforded by this test (September 17th) to measure WIAW frequencies and possibly win a prize. (See full announcement elsewhere in these pages.) Constantly increasing interest in the v.h.f.s should make the September 25th-26th V.H.F. Party the biggest yet. Traffic interest is greatly on the increase. This year section-net and trunk-line activity resumes at the full stature attained last spring. Both slow-speed and high-speed nets and trunk lines are open to your participation. All amateurs who have not done so are cordially invited to get into network activities and also to seek appropriate appointments for which they are qualified in the field organization. There are both voice and c.w. nets and appointments. Don't sit back and let the amateur world slip by. Get into appointments and activities and enjoy them. Contact your RM, PAM or EC and help him to run local tests and activities. Emergency organization should be accorded proper importance and every amateur ought to sign up in the AEC. Ask for a "supporting membership" if time permits you only limited participation in Emergency Corps activities. Copies of the newly-prepared publication, *Emergency Communications*, will be distributed through emergency coördinators to new members of the Corps.

Coming—Simulated Emergency Test. In October we shall supplement the equipment-testing opportunity provided in the Field Day by holding the annual roll call of AEC members combined with the annual Simulated Emergency Test. Emergency coördinators are the leaders who work this out. Instead of *QST* notice, meetings, telephone directions and the like are used to mobilize and activate community drills. One participant, staggered by the individual radiogram side of the last test, which taxed the capabilities of his regional network, said, "It's great, even bigger than the SS!" Be that as it may, the mid-October emergency doings stress *organization and operating*, both v.h.f. and h.f., to implement the plans that are entirely those of ECs. If you "want in" on the Simulated Emergency Test take a tip

from us and get an AEC blank off to your EC or SCM (for routing to EC) today. *Wanted!* Qualified amateurs to accept EC appointment in every city or town of over 20,000 population where no such appointee is functioning actively. SCMs seek both full-time ECs and temporary leaders for the AEC registration and October Simulated Test. Every community should be represented by amateur radio emergency-communication coverage! (Clubs are urged to recommend appropriate leaders to SCMs to serve as emergency coördinators where none has been appointed in their community.)

Mobile Work Permitted on All Bands. Full text of the FCC regulations authorizing portable and mobile work in all amateur frequency ranges for the continental United States and territories (and, with additional restrictions, on 23-29.7 Mc. for maritime-mobile and aircraft-mobile work) appears on another page of this *QST*. This is a most welcome development, and was sought by the ARRL Board. From an operating standpoint it seems to us that this is bound to act as a powerful incentive for amateurs to engage in more portable and mobile operation. This will add to an already enjoyable side of amateur radio and it should insure more *real* emergency rigs, as contrasted to the conversion of home-station equipment to go afield. The larger the number of installations that can work together or be sent to designated key points in a communications emergency, the greater the number of cities and towns in which we can supply practical communications when the unexpected emergency arrives — as it always invariably does! It also follows that communities that now have emergency amateur facilities will have improved and extended amateur facilities.

The radio amateur best justifies his existence by the service he can render his community when other means of summoning assistance is lacking. The privilege to pursue normally his hobby includes accepting an obligation to be fully prepared to be of service when disaster strikes. Every operator of portable and mobile amateur equipment is welcomed most heartily to the ranks of our ARRL Emergency Corps. The extension of our mobile privileges should extend our communicating abilities and add substantially to the ranks of the Amateur Emergency Corps.

"FD" Goes over Top. Preliminary Field Day claims which indicate the success of that June activity are reported this month. To the leaders in competitive activity, our congratulations — and to those who tested new and practical emergency gear with enough QSOs to prove communicating ability, our approbation and applause likewise. One club's FD chairman writes, "We plan next year to make 'less elaborate' plans and instead encourage small groups to get together with one transmitter each and see what they can do. We must stimulate the use of more battery-powered equipment as the emergencies here connected with flood-control work will require more units and only low-powered equipment. After several years of operating higher-powered equipment on gas-engine power we know where to get this when needed, but we know less on the battery-equipment front." In that connection let us add that the July field-organization bulletin contained FD comments from various sources and included the suggestion (from W3EIS) that a real "flea-powered class" be considered in addition to the other power levels for next year. Any comments for or against an added classification? It has been said that a 3-watt-or-less class will not change the competitive effort in the popular and practical 30-watt range but will extend opportunity in a new direction.

Phone-Band Conditions. A W1 amateur, in commenting on "FD" conditions, reported that the 75- and 20-meter bands sounded much more inviting than ever before. "W0s on 30 watts were in the clear. . . . It was really nice. . . . The signals were spread out better and were more readable and working with higher communicating efficiency than at any other time. . . . Perhaps there are operating lessons to be learned from this. What conclusions are possible?"

Information from one FD may be too general to make it possible to draw any conclusions. The major factors (unless there were unusual propagation conditions between W1 and the rest of the nation) would seem to be based on (1) scarcity of high-power 3.9-Mc. 'phone stations on the air during the period, because of the presence of many of the amateurs concerned afield; (2) power levels down to 30 watts for the majority of the stations on the air, just a few home stations and others using as much as 100 watts, thereby

cutting down heterodyne interference; and (3) objectivity in every FD QSO. How to produce a continuation of such inviting and desirable conditions?

Club Safety-Inspection Committees. An early-1948 field-organization bulletin reported the near death from electrocution of some amateurs in Columbus, Ohio. W8MGQ, who read this, returned some useful suggestions on circuit design as related to safety; also the suggestion that each club ought to have a safety-inspection committee. As we see it, committees should implement their own programs, arranging reports or talks before their groups during the year and emphasizing both the *personal-safety code* and the need for station inspections. Committees could issue certificates or stickers to "inspected" stations that meet the standards established by the committee. We believe the committee representatives should visit every club member's shack and make similar visits available to other amateurs on request to look over physical arrangements and practical installations. Committees may find it advantageous to use check lists to note compliance or noncompliance with points of good practice and the individuals might be given a written list of every safety hazard, either to life or property, that can be spotted in the entire set-up. A letter on this subject has been sent all affiliated radio clubs.

DX Ethics. W6DTY sends a list of 27 calls of DX-minded amateurs that he logged in about an hour spread over two weeks' time, all operating *off-frequency*. He writes, "Frankly, gents, I have been amazed and horrified. Some of this off-frequency work may be due to plain carelessness and some is plainly intentional. Some of the better-known DX men deliberately step outside the band to grab a rare one and are heard pulling the 'come-hither' gag. They go out to about 13,995 and call the DX and when QSO slowly creep back inside the band pulling the DX along with them. I imagine the FCC must surely be sending these characters notices of violations. . . . and I suggest that a scheme be cooked up that would deny any DXCC certification to such station." How about a code of operating practices for DX amateurs that would ostracize W/VE stations engaging in such practices? — F. E. H.

Famous for their traditional rivalry on the athletic field, Colgate and Syracuse University students extend their competition to chess via amateur radio. Here are Colgate Chess Club members awaiting a report on moves of the Syracuse team in what is believed to be the first intercollegiate chess match ever played by radio. Ed Hillert, W8VJG, wearing earphones, operated WIQYA/2 on c.w. Syracuse communications were handled by Hoyt Wilcox, W2VIQ.



TRAFFIC TOPICS

The 1948-49 operating season is starting. Let us strive to increase our accuracy in the transmission and reception of traffic. This past season there were many nondeliveries because of poor or incomplete addresses, scrambling of addressee's name and address, or improper handling along the line. If in doubt concerning any word or portion of a message, request repeats or confirmations to insure the intended meaning of the originator. The best insurance for correct handling is to use standard ARRL procedure and message forms.

It's time to enlist new members of your net to give more complete coverage for the area you serve. Attempt to have at least one station and alternate station for each city, county or area through which your net passes.

The ARRL Trunk-Line System will resume activity on October 1st. For fast accurate movement of traffic in an east-west or north-south direction make use of this system. New members and alternate members are needed for many of the trunk lines, old and new. All ORSs who may be interested in trunk-line work are invited to drop a postal or letter to Hq. for possible assignment to a line.

RMs and net organizers are invited to register their nets with Hq. so that a complete and accurate directory may be published at the earliest possible date.

Are you ready for the October Simulated Emergency Test?

The Md.-Del.-D.C. Section Net will resume full schedules on September 15th. This net operates on 3650 kc. at 7:30 P.M. EST, Monday, Wednesday and Friday.

Traffic Outlet Net will resume a full operating schedule on September 1st. Members and those who check in from other nets are urged to note this change of schedule — "TO" meets at 9:00 P.M. on 3705 kc.

The Pine Apple Net is in operation on 3725 kc at 7:45 P.M. HST, Monday through Friday. Connections to the Mainland are maintained through the Hit and Bounce and Pioneer Nets. The Pine Apple Net is in need of outlets on the Island of Hawaii. Interested amateurs in the Hilo area are cordially invited to check into the net or contact KH6BW.

A 40-meter net has been organized in the Western Florida Section. Traffic-minded amateurs in this section are urged to contact W4DLO for details.

The Washington Section Net has changed its time of meeting to 8:00 P.M. PDST. The net meets on 3695 kc., Monday through Friday, and is still in need of outlets in eastern Washington. Interested stations in that area contact W7RAO or check into the net.

The Transcontinental Net is now in operation on 7100 kc. nightly between 8:30 P.M. and 2:30 A.M. EST. This net clears traffic for all parts of the United States and possessions.

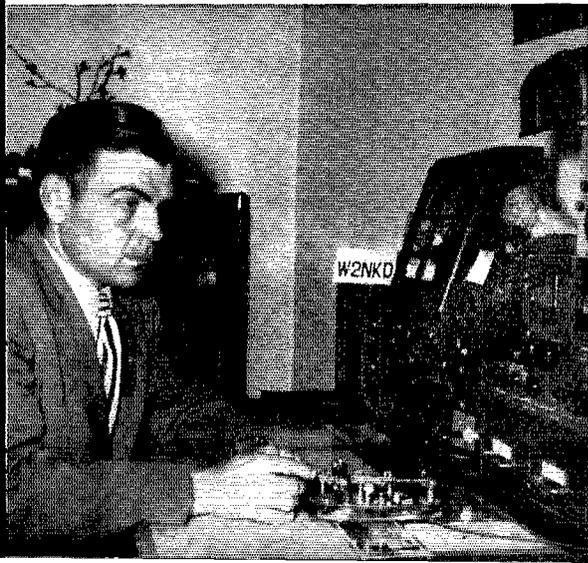
Effective September 26th, the Swing-Shift Net will change operating times to 12:30 P.M. EST for the daytime shift and 7:00 P.M. EST for the night shift. This net covers the Atlantic Seaboard with connections into the Canal Zone.

An amateur station was set up during the Fairport Harbor (Ohio) Mardi Gras celebration, handling 170 messages during the period July 1st-5th. A greater part of the traffic was placed on the Eastern Shuttle Net. Operation was accomplished despite bad QRN from the various gasoline-driven "rides" located nearby. A great job was done by the two operators, W8BBA and W8CFX.

A "QN" signal list, suitable for posting at your operating position, is available from Hq. We'll send you a copy gratis upon receipt of your request.

Meet Tom Ryan, W2NKD, of Elizabeth, N. J., operator of a top-notch traffic station. He's holder of ORS and OBS appointments, a member of the A-1 Operator Club, and RM for Union County in his section. W2NKD is an NCS of the Northern New Jersey Net and a nightly visitor to Trunk Line "C" and NTL. Transmitting gear consists of a Meissner Signal Shifter, 829-B buffer and a pair of VT-127As running 500 watts input; reception is provided by an NC-101X and an SX-24.

QST for



BRASS POUNDERS LEAGUE

Call	(June Traffic)			Extr. Del. Credit	Total
	Orig.	Del.	Rel.		
W6REB	22	14	2004	8	2048
W6FDR	43	1164	146	143	1496
W7CKT	5	35	1162	34	1236
W8HMM	1	30	546	27	604
W5MN	2	86	370	85	543
W8YOS	18	30	466	21	535

The following make the BPL with over 100 "deliveries plus extra delivery credits":

W8QXO 167 W7RAO 142 W3NHI 136

A message total of 500 or more or 10C "deliveries plus extra delivery credits" will put you in line for a place in the BPL. The Brass Pounders League listing is open to all operators who qualify for this monthly "honor roll."

WSZA CONTINUES

In recognition of the pioneer contributions to amateur radio of the late Louis Falconi, FCC in a special action waived its rules and assigned his call, W5ZA, to his widow, Mrs. Eunice P. Falconi, so that she may perpetuate the call as a memorial to Louis.

5ZA was one of the most famous calls in amateur annals. Louis Falconi was an early amateur, beginning in 1912, and his location in Roswell, N. M., was a strategic point in the days of 200-meter relaying. Given the special privileges of a "Z" license in the early days after World War I, his was a key station in the early ARRL transcontinental relay routes. In the famous "Transcon Tests" of the League which established a record of 6½ minutes elapsed time for a relayed message from East Coast to West and the returning of the answer through half a dozen relays, Falconi was the link between Southern California and Chicago which made the deed possible. Vast quantities of transcontinental message traffic passed through his station until the development of high frequencies extended every amateur's range. During the four years that Herbert Hoover served as Secretary of Commerce, he awarded a cup annually — the Hoover Cup — to the best all-around American amateur station the major portion of which was home-built. For the first year of its presentation, 1921, it went to Falconi, the unanimous choice of the judges.

Constantly active until his death earlier this year, Louis Falconi was a shining example of a good amateur, one whom we all shall miss. W5ZA is indeed a famous call.

BRIEF

From a net bulletin:

The ham worth while
Is the ham who can smile
As he copies signals vile
Buried deep in the pile.

MEET THE SCMs

Alabama's SCM, Dr. Arthur W. Woods, W4GJW, was licensed in 1934 under the call W9TFH, which he held until 1939 when he received his present call, W4GJW.

Since his introduction to amateur radio in 1924, Woods has maintained a keen interest in most of its phases. In addition to being ORS and OBS, which appointments he also held before the war, he is a member of the Birmingham Amateur Radio Club. He was a charter member of the Tri-Town Radio Club of Harvey, Ill., and was c.w. runner-up in the 1940 Sweepstakes. Woods was issued a 25-w.p.m. Code Proficiency Certificate in 1940 and possesses

a Public Service Certificate for his work as 7-Mc. relay station during the 1937 Ohio River Flood. At the time of the Florida hurricane he acted as 3.85-Mc. 'phone and 7-Mc. c.w. relay station. In 1942, while a Naval medical officer, he originated and operated radio communication between Lambert Field, Mo., and an auxiliary airport until a radio operator could be secured. Borrowed ham gear was converted for the job until official apparatus became available.

An insulated attic shack is used to house W4GJW's rig, which includes a Meissner 150-B transmitter modified for 14- and 28-Mc. operation; receiver is an HRO-5. Antennas are doublets fed with RG-8/U. SCR-274N equipment powered from a 6-volt storage battery is on hand for emergency use. Operation is mostly on 3.5- and 7-Mc. c.w., and 3.85-Mc. 'phone.

Doc received his education at the University of Chicago, Knox College at Galesburg, Ill., and Loyola University College of Medicine, Chicago, and earned B.S. and M.D. degrees. He served his country in the Navy, entering as a Lt. (jg) and advancing to the rank of Lt.-Comdr., and also was in the 22nd Marines, F.M.F.

Satisfying the obligations of his practice (he specializes in diseases of infants and children), fulfilling his SCM duties, keeping abreast of progress in his profession by constant reading, completing a course in radio via correspondence under the G.I. Bill of Rights, doing a little ham operating, and keeping his family happy, to say nothing of attending meetings of various professional, fraternal and civic organizations of which he is a member, require about eighteen hours daily of Doc's time. It is little wonder, then, that his other hobbies are catching up on sleep and vacationing.



HIGH CLAIMED SCORES — 1948 FIELD DAY

The following are high claimed scores reported for the Twelfth Annual ARRL Field Day, June 12th-13th. These are subject to checking and grouping according to number of transmitters used at each station. Complete FD results will be presented in a later issue.

CLUB GROUPS

(Listing shows club name, call used in FD, claimed score, and number of simultaneously-operated transmitters.)

Society of Amateur Radio Operators, Inc.....	W6AEX/6	17,152-7
Metropolitan Radio Club of Los Angeles.....	W6AMT/6	15,529-7
Tri-County Radio Assn.....	W2OM/2	15,250-8
Amateur Radio Club of Hollywood	W6UYR/6	15,093-6
Mid-Cities Amateur Radio Club...	W6GAL/6	14,378-10
Los Angeles Fire Department Amateur Radio Club.....	W6QV/6	13,770-5
Mike and Key Club of Santa Monica.....	W6VB/6	13,689-7
United Radio Amateurs Club.....	W6ME/6	13,150-7
Mid-Island Radio Club.....	W2KTF/2	12,897-4
Northwest Amateur Radio Club...	W9IT/9	12,479-8
Palomar Radio Club.....	W6NWG/6	11,563-10
Jersey Shore Amateur Radio Assn.....	W2GSA/2	10,962-7
Inglewood Amateur Radio Club...	W6CFZ/6	10,658-8
Four Lakes Amateur Radio Club...	W9SWQ/9	10,652-5
San Fernando Valley Radio Club...	W6SD/6	9998-7
North Suburban Radio Club.....	W9TO/9	9204-6
Dayton Amateur Radio Assn.....	W8TQ/8	8802-3
Central Jersey Radio Club.....	W2AI/2	8640-6
Monmouth County Amateur Radio Assn., Inc.....	W2AF/2	8375-6
West Side Radio Club.....	VE3JJ	7992-5
Royal Order of Sods Club.....	W6CG/6	7812-6
North Bay Amateur Radio Assn...	W6EUL/6	7641-9
Crescenta Valley Radio Club.....	W6RFR/6	7464-4
Egyptian Radio Club, Inc.....	W9AIU/9	7281-6
Westchester Amateur Radio Assn.	W2AD/2	7155-6
K.B.T. Radio Club.....	W2EWT/2	6873-3
Ventura County Amateur Radio Club.....	W6NE/6	6845-5
Raritan Valley Radio Club.....	W2QW/2	6579-6
Union County Amateur Radio Assn.....	W2GIZ/2	6510-8
Milwaukee Radio Amateurs Club...	W9SO/9	6413-5
Electric City Radio Club.....	W3SM/3	6373-3
Nassau Radio Club.....	K2AC/2	6345-5
Potomac Valley Radio Club.....	W4KFC/4	6205-2
Radio Assn. of Western New York.....	W2UJR/2	6197-3
Somerset Hills Radio Club.....	W2HXM/2	6156-6
Lake County Amateur Radio Club	W9JZA/9	5985-4
Cleveland Brasspounders Assn....	W8BWA/8	5931-3
Lakeland Amateur Radio Assn., Inc.....	W2VDJ/2	5895-6
Wisconsin Valley Radio Assn.....	W9RQM/9	5859-2
Bartlesville Amateur Radio Club...	W5EST/5	5889-3
Yonkers Amateur Radio Club.....	W2NY/2	5622-6
Concord Brasspounders.....	W1OC/1	5526-2
Frankford Radio Club.....	W3FRY/2	5427-3
Frontier Radio Assn.....	VE3CP	5373-6
Amateur Transmitters Assn. of Western Pa.....	W3KSP/3	5126-4
Ream Field Amateur Radio Club...	W6ZSC/6	5067-4
Steel City Amateur Radio Club...	W3UUG/3	5025-5
Hamilton T.W.P. Radio Assn.....	W2RLY/2	4968-4
Bloomfield Radio Club.....	W2JC/2	4928-3
Amateur Radio Transmitting Society.....	W4FR/4	4809-5

Sacramento Amateur Radio Club, Inc.....	W6JN/6	4748-8
East Bay Radio Club.....	W6UDS/6	4698-4
Norwalk Amateur Radio Assn....	W1NDS/1	4689-2
Tulsa Amateur Radio Club.....	W5LW/5	4550-4
Nashville Amateur Radio Club...	W4MB/4	4479-4
Mon-Yough Amateur Transmitters Assn.....	W3KRL/3	4437-3
San Diego Amateur Radio Club...	W6VOP/6	4428-8
Charleston Amateur Radio Club...	W8COE/8	4395-5
South Hills Brass Pounders and Modulators.....	W3BL/3	4361-6
Owachita Valley Radio Amateur Club.....	W5CNG/5	4284-4
San Francisco Radio Club.....	W6CIS/6	4245-8
Kalamazoo Amateur Radio Club...	W8VY/8	4239-4
Worcester County Radio Assn....	W1LTA/1	4140-4
York Radio Club.....	W9TH/9	4062-6
Mountaineer Amateur Radio Assn	W8BIA/8	4023-9
Austin Amateur Radio Club.....	W5DLF/5	3994-6
Hamfesters' Radio Club.....	W9DXU/9	3987-4
Frankford Radio Club.....	W3BES/3	3942-1
San Francisco Naval Shipyard Radio Club.....	W6CXO/6	3939-5
Niagara Radio Club, Inc.....	W2QYV/2	3924-4
Joliet Amateur Radio Society....	W9MWI/9	3906-3
El-Ray Radio Club.....	W1OMI/1	3845-6
Civilian Amateur Radio Monitoring and Relay System.....	W8WSX/8	3822-4
Buckeye Shortwave Radio Assn...	W8ODJ/8	3780-3
Westlake Amateur Radio Assn....	W8KS/8	3726-2
South Lyme Beer, Chowder and Propagation Society.....	W1EH/1	3690-1
Delaware Valley Radio Assn.....	W2ZQ/2	3645-6
Schuylkill Amateur Radio Club...	W3NIF/3	3645-3
Racine Megacycle Club Emergency Corps.....	W9UDU/9	3609-3
Northern New Jersey Radio Assn.	W2AR/2	3578-5
San Joaquin Valley Radio Club...	W6TO/6	3578-2
Beacon Radio Amateurs.....	W3ETA/3	3501-2
Detroit Amateur Radio Assn., Inc.....	W8NLG/8	3501-2

NONCLUB GROUPS & INDIVIDUALS

(Listing shows call used by each group, number of operators, claimed score, and number of simultaneously-operated transmitters.)

W6EYH/6	2-6197-1	W0DEP/0	5-4086-2
W9ERU/9	8-5225-2	W2UBU/2	7-3929-3
W6JTB/9	16-4968-5	W6MNG/6	5-3815-5
W9EDK/9	10-4815-4	W1BDI/1	7-3785-1
W6NIK/6	10-4617-5	W6WSQ/6	4-3618-3
W9BVG/9	3-4167-2	W8PQK/8	2-3294-1
W5AA/5	37-4154-4	W8GW/8	6-3276-3
W1ORP/1	2-4131-1	W2JBJ/2	2-3254-1
W6LDJ/6	5-4118-2	W3EIS/4	10-3110-5

TRAINING AIDS

More Quizzes. This will confirm last month's notice and definitely make available a new quiz, Q7, on "Public Relations and BCI," consisting of 20 questions of the true-false type. If your club is one of the many who have been beleaguered with BCI complaints, a try at this quiz will probably tell you if you have been going about it the wrong way.

Also now available is Q8, "Technical," consisting of ten multiple-choice questions on technical subjects. Most of the questions were selected with a view to their practical amateur application, with emphasis on popular misconceptions and fallacies. We predict that this quiz will find considerable use among amateur radio clubs.

AMATEUR RADIO SAVES A LIFE

A three-minute relay, a carom shot, in fact, was responsible for the saving of the life of 12-year-old Gary Maiben of Monterey Park, Calif., on Field Day. When his bicycle came to grief on a tortuous motorcycle trail and caused him serious internal injuries, a companion sped to the near-by FD site where W6NAT and his gang were getting set for the 4 o'clock starting time. A distress call directed to the Monterey Park Police Department was originated by W6NAT and was delivered to its destination by W6CXQ. W6CHY provided the intermediate relay point. The police ambulance was at the accident scene less than ten minutes after the filing of the appeal at W6NAT.

WITH THE A.E.C.

The September hurricane season is almost upon us. From reports received at Headquarters the gang in the Gulf Coast "hurricane belt" are ready. Swell! How many of you remember 1938 and 1944 when New England was caught unprepared? Is Baltimore safe? Will Philadelphians awaken to find many of their homes destroyed? Are you ready?

Athan Cosmas, W2PKD, ARRL regional emergency coordinator between the amateur service and Region 1, U.S. Weather Bureau, reports that the majority of the river valleys in the Northeast in which the Weather Bureau wishes to enlist the services of amateurs as an emergency stand-by facility are well covered. Two notable exceptions are the Delaware River and tributaries and the James River. Amateurs in Eastern Pennsylvania and Virginia who wish to assist in this worth-while project are urged to contact W2PKD. Members of present traffic nets in the two areas are especially urged to assist, in view of their well-developed skill in the handling of third-party traffic.

Are you ready for the October Simulated Emergency Test?

The AEC group of the Heart of America Radio Club held a special simulated emergency test on June 26th. A fixed station gave detailed instruc-

While the little town of Shediac, N. B., was being ravaged by fire, and was cut off from Moncton, nearest possible source of aid, on February 16th, a QRRR from VE1BB requesting that a telephone call be made to the Moncton authorities was swiftly handled by WINAX, of Milford, Mass., and the heart of the isolated town was spared utter destruction. Here is a view of WINAX with op Phil Sherman at the controls. (Milford Daily News Photo)

tions to several mobile units, the last instruction being to proceed to a public park. The gang was pleasantly surprised to find that at that park a picnic and miniature hamfest had been planned to cap their efforts. A great time was had by all.

DX CENTURY CLUB AWARDS

DNCC Certificates based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below. The countries-worked totals indicated have been certified by examination of written evidence under the award rules as published in March, 1947, QST.

HONOR ROLL

W1FH.....190	W3BES.....173
W6VFR.....181	G6ZO.....172
G2PL.....181	W2BXA.....171
W8HGW.....177	W3GAU.....171
W4BFD.....176	W2HHF.....165

NEW MEMBERS

W2QCP.....111	W4INL.....102
W3EYF.....111	W8BKP.....102
W6SRU.....107	W2AGU.....100

ENDORSEMENTS

W3DPA.....157	W4JXM.....126
ZL1HY.....155	W6BFD.....122
W1ME.....152	W2UFT.....122
W3KT.....152	W9AIW.....121
W8FNA.....131	PA0GN.....112
W2BRV.....130	W0DAE.....111
ON4JW.....130	

RADIOTELEPHONE

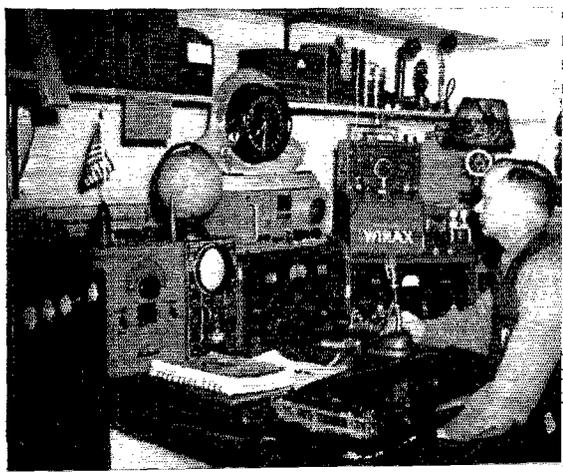
W1FH.....152	W1HKK.....125
W6DI.....135	W2AFO.....120
W1JCX.....133	XE1AC.....120
W4CYU.....133	W6VFR.....118
G2PL.....127	W2BXA.....117

NEW MEMBERS

W8KML.....107	W1GOU.....105
---------------	---------------

COUNTRIES-LIST CHANGES

From time to time changes and additions are made to the ARRL Countries List, the official standard used in connection with the Annual DX Competition and the DX Century Club. The committee has unanimously adopted the following change: delete Little America and add Antarctica. This new area includes the entire continental area with the exception of those areas which are now considered separate countries, i.e., South Shetland Islands, South Orkney Islands, etc. Make this change on your list and watch this department for other changes as they are made.



CODE PROFICIENCY CERTIFICATES

The ARRL Code Proficiency Program provides the opportunity for you to increase your code-copying ability. Special code-practice transmissions are made each evening, Monday through Friday, at 10:00 P.M. EST, from Headquarters Station W1AW. See the W1AW schedule on this page for details on frequencies and speeds.

Once each month special transmissions are made to enable you to qualify for an ARRL Code Proficiency Certificate. The next such qualifying run will be made on September 14th at 10:00 P.M. EST. Identical texts will be transmitted simultaneously from W1AW, W6OWP and W0CO. Frequencies of transmission from W0CO will be 3534, 7053 and 14,040 kc., from W6OWP 7248 kc. W1AW will transmit on the same frequencies as those used for code practice. Send your copies of the qualifying run to ARRL for grading, indicating whether you copied W6OWP, W0CO or W1AW. If you qualify, you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers indicating progress above the first certified speed.

References to texts used on several of the practice transmissions are given below. These make it possible to check your copy.

<i>Date</i>	<i>Subject of Practice Text from July QST:</i>
Sept. 3rd:	<i>Practical Single-Sideband Reception</i> , p. 11
Sept. 7th:	<i>Fun on 420 with the BC-788</i> , p. 21
Sept. 9th:	<i>A QRP Portable</i> , p. 24
Sept. 14th:	Qualifying Run, 10:00 P.M. EST
Sept. 15th:	<i>An Inexpensive and Compact 2-Meter Mobile Transmitter</i> , p. 37
Sept. 17th:	<i>An S.S.S.C. Adapter</i> , p. 40
Sept. 20th:	<i>A Modification of the BC-810 Exciter Unit</i> , p. 54
Sept. 23rd:	<i>The World Above 50 Mc.</i> , p. 64
Sept. 29th:	<i>Expedition "Gon-Waki,"</i> p. 80

A.R.R.L. ACTIVITIES CALENDAR

Sept. 14th: CP Qualifying Run
 Sept. 17th: Frequency-Measuring Test
 Sept. 25th: V.H.F. Party
 Oct. 16th-17th: Simulated Emergency Test.
 Oct. 18th: CP Qualifying Run
 Oct. 23rd-24th: CD QSO Party
 Nov. 13th-14th, 20th-21st: Sweepstakes Contest
 Nov. 17th: CP Qualifying Run
 Dec. 17th: CP Qualifying Run
 Jan. 13th: CP Qualifying Run
 Jan. 15th: V.H.F. Sweepstakes
 Jan. 22nd-23rd: ARRL Member Party

 Jan. 1st-Dec. 31st: Most-States V.H.F. Contest
 First Saturday night each month: ARRL Officials Nite (Get-together for SCMs, RMs, SECs, ECs, PAMs, Hq. Staff, Directors, Alt. and Asst. Dirs.)

W1AW OPERATING SCHEDULE

Operating-Visiting Hours

Monday through Friday, 8:30 A.M.-1:00 A.M.
 Saturday, 7:00 P.M.-2:30 A.M.
 Sunday, 3:00 P.M.-9:00 P.M.

A mimeographed local map showing how to get from main state highways (or from Hq. office) to W1AW will be sent to amateurs advising their intention to visit the station.

Official ARRL Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies: 3555, 7215, 14,150, 28,060 and 52,000 kc. (voice — 3950, 14,280, 52,000, 146,000 kc.)

Times: Monday through Friday, 8:00 and 11:30 P.M. EST (0100 and 0430 GCT, Tuesday through Saturday)

Sunday 1:00 A.M. and 8:00 P.M. EST (0600 Sun. and 0100 Mon., GCT)

Bulletins are sent simultaneously, first at 25 w.p.m. and then repeated at 15 w.p.m., on all frequencies during the early schedule to facilitate code practice. Telegraph bulletins are followed, in turn, by voice transmissions on 3950 kc. and 52,000 kc. simultaneously, and then on 14,280 and 146,000 kc. simultaneously. Any changes from this schedule will be announced.

Code Proficiency Program: Practice transmissions at 15, 20, 25, 30 and 35 w.p.m. are made Tuesday and Thursday on the above-listed frequencies, starting at 10:00 P.M. EST, and on Monday, Wednesday and Friday at 9, 12, 18, 25 and 35 w.p.m. Approximately ten minutes' practice is given at each speed. Next certificate qualification run is scheduled for Tuesday, September 14th.

General Operation: In addition to performing the services already mentioned, W1AW engages in two-way work with amateurs on the various bands. You are always welcome to call the Headquarters station, especially during the periods listed below, whether to relay a message or just to rag-chew with the operator on duty at the time.

Monday through Friday, all times EST —

10:00 A.M.-10:30 A.M.	14,150-kc. c.w.
*10:30 A.M.-11:00 A.M.	14,280-kc. voice
*11:00 A.M.-11:30 A.M.	28,060-kc. c.w.
*11:30 A.M.-12 noon	29,150-kc. voice
* 3:00 P.M.-3:30 P.M.	14,280-kc. voice
3:30 P.M.-4:00 P.M.	14,150-kc. c.w.
5:30 P.M.-6:00 P.M.	3850-4000-kc. voice
6:00 P.M.-7:00 P.M.	7215-kc. c.w.
11:00 P.M.-11:30 P.M.	3555-kc. c.w.
12:15 A.M.-1:00 A.M. (Tues. through Sat.)	7215-kc. c.w.

* Effective beginning October 11th

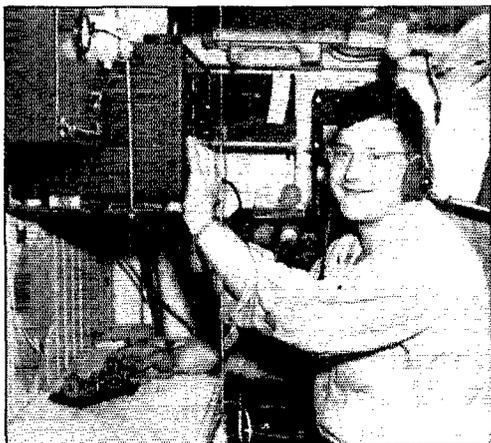
Saturday and Sunday (excepting dates of official ARRL activities).

Saturday: Midnight-1:00 A.M. (Sun.)	3555-kc. c.w.
Sunday: 1:45 A.M.-2:30 A.M.	7215-kc. c.w.
6:00 P.M.-7:00 P.M.	3850-4000-kc. voice
7:00 P.M.-8:00 P.M.	7215-kc. c.w.

W1AW is not open on national holidays.

The station staff:

T. F. McMullen, jr., W1QVF, "fm"
 Richard N. Eidel, W2MHW, "re"



The MacMillan Expedition sailed in June on a cruise that will take it to within 11 degrees of the North Pole. The smiling lad above is Bill Deusch, W2VTV, radio operator of the expedition schooner *Bowdoin*, KLPO. He is keeping the crew in touch with home using an ART13 transmitter and HQ-129 receiver. As we go to press, Bill has just sent us an "all's well" message from Greenland.

FREQUENCY-MEASURING TEST

W1AW will transmit signals for the purpose of frequency measurement starting at 9:30 P.M. EST (6:30 P.M. PST), Friday evening, September 17th. The signals will consist of dashes interspersed with station identification. They will follow a general message sent to enable listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3610, 7180, 14,090, and 28,990 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:36 P.M. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At midnight EST (9:00 P.M. PST), W1AW will transmit a second series of signals for the Frequency-Measuring Test. Approximate frequencies used will be 3750, 7270, 14,170 and 28,315 kc.

Individual reports on results will be sent ARRL members who take part. Copies of this report are sent SCMs so eligibility for OO appointments is known. When the average accuracy reported shows error less than 71.43 parts per million, or falls between limits of 71.43 and 357.15 parts per million, the participants will become eligible for appointment by SCMs as Class I or Class II official observers, respectively. It is only necessary that the individual amateurs have the interest and other qualifications for carrying forward in such League-organization posts.

This ARRL Frequency-Measuring Test will be used to aid qualification of Class I and Class

II observers. Observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy for these classes of appointment. It is required that all Class I and Class II OOs participate in at least two Frequency-Measuring Tests each year.

Awards

All League members (and only members) who take part and who are not connected with the Official Observing System will compete for an electric-clock award by submitting their best measurements on the FMT. It will be presented to the member whose readings show the highest accuracy. A second electric-clock award will be presented to the leading Class I official observer. To be considered for the clock award it is necessary to attach a statement that you, alone, as operator, handled your equipment in making the readings submitted to the Communications Department of the League.

All participants may submit frequency measurements on one or all frequencies listed above. However, no entry consisting of a single measurement will be considered eligible in the prize competitions; at least two readings must be submitted. Awards will be based on the over-all accuracy, as compared with readings submitted by an independent professional frequency-measuring organization. An award committee will examine results to insure fairness to all, and its decisions shall be final.

GENERAL TRAFFIC PERIOD

6:30-8:30 P.M., Your Local Time

GENERAL TRAFFIC CHANNELS

3575 to 3600 kc. 7150 to 7175 kc.

ARRL recommends the above-mentioned hours and frequencies for use by those amateurs who have an occasional message to send but are unable to keep regular schedules or participate in organized networks. ORSs and other active traffic handlers will monitor the General Traffic Channels, particularly during the General Traffic Period. They will be watching for your directional CQ to the state your message is addressed (for example: CQ Illinois, CQ Oregon, etc.). If you wish to break into message handling, it should be possible for you to use the General Period and Channels to pick up traffic from fellows like yourself for relay or delivery. No ARRL nets will be registered in the General Traffic Channels. These frequencies have been purposely kept free to aid the casual message handler. Use the facilities provided and let us hear of your results.

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — ELI received his OES appointment. EU is QRL farming. The Delco Club station is back on the air. This club has just elected the following officers: AIG, pres.; PX, v. ce-pres.; DZ, secy.; AJS, treas. The EPA Net plans a get-together for members and YLs and XYLs, to be followed by a gabfest and dinner. The SARC, with eight operators and three transmitters, made 378 contacts and 3645 points in Field Day. The Car-Le Radio Club used HA/3 during Field Day and ran a BC-458 and an ARC-5 transmitter from batteries with 20 watts input. A group of Philadelphia area amateurs supplied communication for the Red Cross during the Fairmount Park July Fourth celebration. Many messages relative to casualties and lost children were handled, as well as much administrative communication. The Net Control Station was set up and operated by ISE and FWH at the Park Guard Headquarters. This station was an ARC-4 and used a four-element colinear vertical. A TR-4 was used by CYV at the Red Cross field hospital. A Sperti walkie-talkie did special service under the call 2HEH. BES used a TR-4 at a remote Park Guard house. EKK used a TR-4 at the Volunteer Medical Corps stockade, and CPV cruised mobile with another TR-4. KIT brought an SCR-522 but it and a spare TR-4 supplied by MFM were not needed. 2NLL/3 and 3NPK supplied outside telephone contact. QRM to the net was simply supplied by 2IL. Several of the DX chasers were visited by 0YXO, 0JRI, and KL7MH. GYV has finally collected his 100 cards for DXCC. MFM is building a new 1-kw. final. FUF has a new three-element beam on 14 Mc. BES has arrived at the double century mark in countries worked. BXE's antenna suffered severe damage from lightning. QV has retired his lattice tower after fifteen years of faithful service in favor of an extended telephone pole. CPV worked ZD9AA. Traffic: W3NHI 158, DZ 34, VMF 30, ELI 21, KFA 16, CAU 2, DUU 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Eppa W. Darne, W3BWT — The Baltimore Amateur Radio Communications Society, at its June 21st meeting, had Atlantic Division Director Bradley Martin speak on ARRL activities. At the previous meeting the following officers for the coming year were elected: JCL, pres.; BIL, vice-pres.; HJY, treas.; IBX, secy. The Atlantic Division Convention in June, at Washington, sponsored by the Washington Area clubs, was a huge success in all respects and all who attended had a swell time. It also was successful financially, showing a nice profit after all expenses and obligations were paid off. AM, the convention chairman, and all the committees who worked very hard toward its success, are to be congratulated on a splendid job, well done. The Maryland-Delaware-District of Columbia Section Net resumes its operation on September 15th. The same frequency of 3650 kc. will be used and the net time is 7:30 p.m. on Mondays, Wednesdays, and Fridays. All section ORS are urged to report into the net, as well as all others who can operate on the frequency. Here's your chance to "keep your hand in" in traffic work, and to keep your fist "well oiled." The SCM at this time expresses his sincere thanks to all members of the section for their fine work and splendid co-operation during the past season. We shall all strive to make the coming season one of even greater achievement and keep our section one of the best in all phases of amateur activity. UP has been reappointed ORS and operates mostly on 7 Mc. JHW recently was reappointed ORS and is on 3.5 and 14 Mc. LVJ is now up to 122 countries. KZS is on 7 Mc. IEM graduated from college and has transferred his ORS appointment to this section from Virginia. John operates on 7 Mc. and is A-1 operator and member of ROWH. KRJ is on 144 Mc with five-element beam that can be changed to either vertical or horizontal polarization. MWD is on 7 Mc. CJS continues to get out well on 7 Mc. OQF is new call issued to "Barbie" Houston. IZL puts out a nice signal on 28-Mc. phone. NB is increasing power on 14-Mc. c.w. CIC puts out a swell signal on 14-Mc. phone and gets out very well.

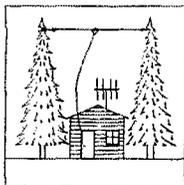
Traffic: W3BWT 15, LVJ 9, AKB 8, JHW 5, IEM 4, CJS 1, SOUTHERN NEW JERSEY — SCM, G. W. (Bill) Tunnell, W2OXN — The South Jersey Radio Assn. has lost an able and well-liked president, 20QN, who has moved to New England. The traffic banner again goes to SUG, who incidentally is building a 1-kw. rig. ZI reports for the Delaware Valley Radio Assn., which operated Field Day from Boy Scout Headquarters in Mercerville. OQS, PWP, WCP, and ORS have organized a 420-Mc. club which meets on the air Monday nights. BAY was active on 50 Mc. during the recent VHF Sweepstakes. RPH would like to hear from anyone interested in a 7-Mc. traffic net. OEW has volunteered to stir up some interest in emergency work in Morris County. Give him a hand, fellows. YSP is a new ham; that Class B ticket made a nice present for his fifteenth birthday. The Lakeland Amateur Radio Assn. staged an FB amateur radio exhibit August 17th to 21st in connection with the Morris County Fair. PAU submitted an excellent OES report and by the time of this reading you have enjoyed another of his mountaintop mobile expeditions. The Hamilton Township, Delaware Valley, Frankford, and South Jersey Radio Clubs are known to have had Field Day set-ups in this section. SXX has been active in the NNJ and SSN Nets. UKS reports for the Ocean City gang as follows: YAO is a new ham. BLR is active again on 28-Mc. phone along with VUM. Traffic: W2SUG 76, SXX 49, ZI 44, ORS 32 BAY 1.

WESTERN NEW YORK — SCM, Harding A. Clark, W2PGT — SEC: SJV. RM: FCG. Many groups of Western New York amateurs were heard working in the annual Field Day. This event is rapidly growing in popularity with the gang. RSL and WPU are planning 3.5- and 144-Mc. station for Rochester Red Cross Chapter Bldg. TTQ is happy with new pair of 304THs and is building new 14- and 28-Mc. beam. UTF is operating in 7-Mc. traffic net. ABV has a Sterba curtain — his neighbors call it a pigeon trap! Down Penn Yan way CYQ is on 14-Mc. phone and 28-Mc. mobile. AKC and DY are chasing DX. The Syracuse Amateur Radio Club recently held its annual dinner and business meeting at which ABV, ROT, and RWS were elected to the board. NCK and PKL were elected secretary and treasurer, respectively. YNI is new ham in Orchard Park and is looking for contacts on 3/4 and 1 1/4 meters and 12 cm. He has worked 1/2 mile on 3 cm. Traffic: (May) W2SJV 64, FCG 26. (June) W2WPU 30, PGT 5.

WESTERN PENNSYLVANIA — SCM, Ernest J. Hlinsky, W3KWL — The ARRL has sent many notifications to ARRL appointees notifying them that their appointments have not received annual endorsement of the SCM. Your SCM has automatically cancelled any appointment that has not been renewed one year after date of appointment. I urge you to carefully check your appointment certificates and make sure it bears the annual endorsement. It's your job to keep tab on your appointment as it's the SCM's job to keep all official appointments on an active status. To those whose appointments have been cancelled, a letter to your SCM will straighten things out. The Radio Association of Erie held its annual hamfest at the VFW Hall on June 19th with Toastmaster WBM introducing the speakers, Al Davidson, Division Director QV, and BWH. Congrats are due UER, NXX, MMI, and NNU for making it an FB affair. 7KIY has returned East and is meeting old friends at his home in Export, Pa. AER still is DXing plus some traffic. KXU has new 14-Mc. Workshop beam. RIS is all set up with Collins E-10 exciter and 75-A receiver. YA is kicking loads of traffic around. LFG graduated from State College with an engineering degree and now is associated with Bureau of Standards. PY reports activity of the Ohio River Net. NCJ and his XYL attended RAE Hamfest. Your SCM had quite a rag-chew with them. NUG reports from new QTH and is QRL getting things set for traffic net. LOE is expected to demonstrate his s.a.s.c. gear to ATA. NLU reports that NGB is running 600 watts to p. p. 8005 final. GJY is taking things easy by working DX; his latest is EA1A and VQ5GHE. LSS is taking his job as OPS in stride. NRV again is active on c.w. with DX his goal. WUZ turned correspondent with a scoop. The Fort Necessity Amateur Radio Assn. has acquired 7 1/2 acres of ground and expects the club house to be ready by late summer. RUW received QSL from a J he worked on 23 Mc. USS got his Class A license and has deserted 23 for 3.85 Mc. MYN and LJQ report that 15 stations from Altoona are on 144 Mc. Traffic: W3YA 259, AER 48, NCJ 22, PY 12.

CENTRAL DIVISION

ILLINOIS — SCM, Wesley E. Marriner, W9AND — NN I has been busy at WGN with Republican and Democratic Conventions. He also tries to clean up bad notes on the c.w.
 (Continued on page 72)



MANY THANKS to the A.R.R.L. for sponsoring the annual Field Day. It provided a good opportunity to give some of our receivers a work-out in the field as well as a good excuse to get away for a week-end of fun. There is a definite difference between theory and practice and many operating details are brought out during actual operation that are overlooked while thinking it over at

home. Many practical points are learned by experience that can never be found in a text book. For example: never get up at club meeting and suggest that the club ought to participate in such an event. Undoubtedly, you will be appointed chairman of the field day committee immediately!

The Eastern Massachusetts Amateur Radio Association sponsored the particular expedition in which several of National's more adventurous hams participated. An NC-173 on forty meters, an NC-183 on eighty and ten meters, and an HFS receiver on two meters were used. The entire layout was powered by a gasoline-driven 110 volt A.C. generator. All receivers operated satisfactorily throughout the contest. The noise limiters were effective in eliminating spark-plug and key-click QRM and the stability of the oscillators was appreciated. Phones had to be used, of course, because of two or more receivers being operated in close proximity. On two meters, the use of sharp selectivity reduced harmonic interference from the lower frequency transmitters considerably.

One example of practical inadequacy was brought out by operation on forty meters. The transmitter, a small unit using a pair of 6L6 tubes, had a B + switch connected between the rectifier tube and the filter input. At one time the switch had been connected after the filter. With the switch open, the electrolytic filter condenser would break down so the switch had been put back to its original position. After that, when a station was called, it was necessary to throw the receiver B + switch, the antenna switch and the transmitter B + switch to stand by for the station being worked. If the station worked was on or near our own frequency, no copy could be made until the power stored in the filter of the transmitter power supply had died down to a point where the crystal would stop oscillating. By that time, the other station had finished his call and was transmitting his report which was invariably terminated by a "K" without a final sign. As a result, several stations were worked when the only way the operator knew that he was in contact was the coincidence of the other stations comeback! A relay or two working from the B + terminal of the receiver, or a master switch, and a revision of the transmitter could cure this trouble and provide efficient operation. No trouble was encountered from "rusty code-speed" as a "code here pre-war" remark brought an automatic QRS. Incidentally, we gained a lot of respect for these c.w. operators.

Antennas are always somewhat of a problem. The eighty, forty and ten meter antennas were dipoles fed with 70 ohm twin-lead. They were mounted well up in some trees that had been placed at strategic points many, many, years before. Why do the trees that are properly located always have their lowest branches so far from the ground? Incidentally, if you want to see a group of usually active fellows turn into marble statues, just remark "who's going to hang up the antennas?"

Besides the fun we had operating, a good time was had by all and no one regretted the lack of some of the comforts of home. One participant was heard remarking "I had a wonderful time, they tell me."

CAL HADLOCK



bands. AQH is increasing power and has Mark II transceiver in operation. CDM is ex-D4AVK and has just returned from overseas. Yard work and work at Red Cross, DUA, kept BUK busy. OIM has 600 watts on 14 and 28 Mc. and 25 watts on 50 Mc. He is actively carrying on experiments on 2400 and 3300 Mc. with Cavities and APR-1s. The Electron Club of Chicago includes the following members: PFA, LZV, DVH, LWE, LME, BLQ, BKK, VEZ, OER, and OIM. Officers are: OIM, pres.; PFA, vice-pres.; DVH, secy-treas.; LWE, ways and means committee. OIM collects ancient firearms as a hobby. LQP is building a new home in Franklin Park. He will be confined to mobile on 28 Mc. while moving the fixed rig. BJA, Seatonville, joined the Illinois Valley Radio Assn. He operates 144 Mc. JVC stacks his beams on a one-inch water pipe. IQC has officially raised his 40-ft. tower. OLM is excited about putting up a 14-Mc. beam. ZHB not only worked the XE stations on 50 Mc. but made first Worked All States on 50 Mc. Films and slides from ARRL are to be used at future meetings. Disappointment was rampant at the Peoria hamfest. APK helped LNI to get the rig operating on 28 Mc. BRX had to work both Field Days, but spent the evenings at WCRA portable camp site signing 9WQ/9. At a recent Society Radio Operators' meeting, a talk on Radio Sonde was given by RLZ. SWO gave a talk on mobile equipment and introduced the new Stancor mobile transmitter kit. New additions to SRO membership include SRJ, ADQ, OD, DWG, IKS, DPY, and SRO. FKI worked his 7th state on 144 Mc. for this year. He schedules ZHB, BPV, and EHX daily on 144.14 Mc. WDD has new Meck T-60 and three-element beam on 28 Mc. He plans to be on 50 Mc. soon. Down Starved Rock Radio Club way, BIN is on 3.85-Mc. 'phone again. NIU forgot about Weldon Springs hamfest until QLZ came home with a tag on his shirt. NGG is operating on 14 Mc. since the 3.5-Mc. antenna came down. If ORS, OBS, OO, OPS, EC, etc., information fails to arrive in the mails it is because your appointment has not been sent in for endorsement for another year, and under ARRL rules and regulations the SCM must cancel the appointment. So you'd better check your certificates at once and send 'em in for renewal. Traffic: W9AQH 18, ASN 7, NN 4, EBX 3, BUK 2.

INDIANA — SCM, Charles H. Conway, W9FSG — The Northern Indiana 'Phone Net has operated 20 consecutive months without a break. BKJ, PAM, and the gang have a quality net with high operating standards. Gary: JSR, CWA, and CWB are new in Gary. All have BC-453A transmitters on 7 Mc. WKN moved to the West Coast, leaving a promise to be EGQ's first W6 contact. PBS completed radio school in Omaha and is trying to get the old rig to work. The Lake County Amateur Radio Club had a big turnout for Field Day. Indianapolis: The Indianapolis Radio Club demonstrated amateur equipment at a community fair in Northeast Indianapolis. KQQ's 144 Mc. equipment was used for local contacts, and BNS's mobile rig was used for out-of-State contacts. BNS, BOQ, CKP, DNG, EMK, YOT, and UEM did the operating. NPS is awaiting the QRN trying to keep traffic rolling. CKP is sweating out two more cards for DXCC. MKM is new OPS. PSG has new two-core la Clapp. South Bend: BCJ completed new 1-kw. final for use on OB. Look for him on 3795 kc. EBY has new three-element beam on 28 Mc. EGT is new on the air and has 100-watt transmitter. AB, Mishawaka, has a square corner reflector for 144 Mc. It's W6 or bust. ESH is back on the air after all these years. DKY, Auburn, who just passed his 15th birthday, now has a 20-w.p.m. endorsement. Muncie: TE is going after a 25-w.p.m. endorsement. Muncie: TE is new member of Delaware Amateur Radio Assn. NGB found the right girl and now is happily married. Evansville: UIA converted his AFS-13 for 420 Mc., and is working about everything he hears on 50 Mc. Vermont, and Wyoming were worked, making his WAS total 33. The Muncie and Fort Wayne papers gave their local clubs very nice write-ups on Field Day operations. The Delaware Amateur Radio Assn. had the largest number of AEC members reported, twelve. The Lake County Amateur Radio Club had 25 operators. Fort Wayne 24, Michigan City Amateur Radio 9, Newcastle Amateur Radio Association 6, Five Dearborn County operators operated under K9AA/9. Traffic: W9NH 37, BCJ 17, BKJ 11, MKM 10.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — The Manocod Club operated on Field Day as JAW-9 with all gear battery-powered. ESJ vacationed in Northern Wisconsin and stopped at Wausau for a personal QSO with us. SIZ operated portable at Eagle River while on vacation. Congratulations to CIH for his consistent accuracy on Frequency Measuring Tests. Accuracy this time was within .00022 per cent! It must run in the family — his brother, BQM, was right behind him with .00249 per cent. RQM caught up with 26 states on 50 Mc. in June. KYC is operating portable in the 5th call area. New licensees in Madison are ECU and DZB. The latter is the 18-year-old son of RBL. LJJ is now 30JU, in Philadelphia. Madison has some real DX men with country totals as follows: RBL, 157 on c.w. and 121 on 'phone; RNK, 97 on 'phone; LNM, 136 on c.w. Field Day results show: SWQ-9, Madison, with 763 contacts using 5 rigs battery-powered; RQM-9, Wausau, with 623 contacts using 2 rigs; AKY-9, LaCrosse, with about 3000 contacts using 6 rigs. LBC on 50 Mc. has had many swell contacts. DDG is working 14-, 28-, 50-, and 144-Mc.

'phone and c. w. KQB is getting DX on 7 Mc. with new antenna and BC-459. CYN installed new beam rotator. OVE, BZU, and QFC are working 28-Mc. mobile. Be sure you always have several self-addressed stamped envelopes at the QSL Bureau. It will help CFT and at the same time keep those juicy DX cards coming to you. If you are interested in appointment as OO, ORS, OPS, OBS, or OES, your inquiry is invited. Traffic: W9ESJ 98, LFP 28, SIZ 25, IQW 17, CIH 11, RQM 10, DND 9, MUM 3.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Bossoletti, W8GZD — North Dakota 3.5-Mc. C.W. Net will resume activity Sept. 1st. Net membership is open to all interested in this section. Drop a line if you'd like a State 3.85-Mc. 'phone net in North Dakota. The Fargo High School Radio Club's call is JME, EFJ is on 28-Mc. 'phone from Edmore. Jamestown now is represented in the Emergency Corps by WXS. AFK talked her OM, ZKL, and HDD. UJH, UAI, and EEK into putting up a full-wave 3.5-Mc. skywire and half-wave 7-Mc. Zepp for her. SSW stunned the c. w. boys by being heard on 3.85-Mc. 'phone with his 5-watt'er. ZXT has new Stancor rig with HK54 final. TUF bought a used RME-43. YKB is hounding 3.5-Mc. c. w. in spite of QRN. K8NAM has two new 60-ft. poles on top of dormitory at Minot State Teachers. NVK is operating with a BC-610 exciter for rig. HSM is back on in Grand Forks. Enroll in the Emergency Corps with your SEC, SSW.

SOUTH DAKOTA — SCM, J. S. Fosberg, W0NGM — CRY has just completed a de luxe ham shack in his back yard, complete with bunk and coffee pot. The only thing he left out was a space for a heater. It is 8 x 10 and he is now planning on some sort of dog house to house the heater. New members of the SFARC are BJH and KYZ. KYZ is on 3.5, 7, 14, and 28 Mc. with an HT-6. DOP, RRR, KYZ, and BJH are employed by the telephone company. PYU is operator at KIHO. OIG is building a new home across the road from KELO. RRR has his commercial 1st class 'phone license. GKU is installing a mobile job in his car. The Sioux Falls Club operated ZWY on Field Day from Rowena with BLZ, DOP, RRR, BJH, KYZ, ZRA, ZIQ, and CRY as operators. Mobile activity in Huron includes PVE and NFO on 28 Mc. with UVL in the building stage. PVE and ILL have 50-Mc. beams up and are ready to go. The Bear Butte Radio Club operated Field Day from Tiford. Traffic: W0NGM 3.

MINNESOTA — SCM, Walter G. Hasskamp, W0CWB — It seems that the biggest event of June was the Gopher Hamfest in Minneapolis. The section's many thanks to the St. Paul and Minneapolis Clubs for a wonderful bang-up job on a really worthwhile get-together. Don't know why EG is going to build a new frequency standard. Perhaps an average error of .00082 per cent is off the beams for George! YBM can give close checks also. His FMT reports show an error of only .00145 per cent. RJJ schedules the Federated Net System. BUL is rebuilding some 274N transmitters for VFOs. GPH uses a 453 for a Q-tuner. JRI, YXO, and KL7MH took a trip East by car and visited all the leading hams east of here. Not only were layouts and antennas studied but the DX men's operating techniques were learned for use in future contests. EPJ is going to rebuild the entire station into one compact rig, all-band, to run about 150 watts. CO is operating a BC-954. BCH, of Mandan, N. D., has been operating portable in Minnesota this summer and will make Collegeville his new QTH come September. Ex-SCM 90MI now is BRE. UJZ has assumed the management of an XYL along with his ham gear. IIC is sporting a new Collins 32V-1. After much controversy UWG finally got his nicely-painted 30-ft. pole up with a 1/2-wave doublet suspended from it. ACO is building a 400-watt 144-Mc. final and is also getting some 420-Mc. experiments underway. The Dakota Division QSO Party results are as follows: SWC, first; BOL, second; YCR, third. Though these were the only logs received, many more stations are known to have exchanged reports so possibly the contest can be considered a minor success. Probably more fellows became acquainted with the 3.5-Mc. band, and after all that was the main idea of the party. Don't forget — MSN 'Phone Net on 3892 kc. and MSN C. W. Net on 3795 kc. will resume operations October first at 6:15 p.m. and 7:00 p.m., respectively. Please do your part by attending net sessions as often as possible. Traffic: W0GPH 45, RJF 31, EG 2.

DELTA DIVISION

ARKANSAS — SCM, Marshall Riggs, W5JIC — HPL finally made it on 3.85 Mc. after the long-time construction of speech amplifier. JXO visited MRD, JIC, and AQF on a recent trip. MRD and JIC visited EA over night recently. The meeting at Little Rock was well attended from all parts of State. New calls are OOS, Fort Smith; ONL, Little Rock; and OQS, Fort Smith, all using 274N transmitters with 8-40s, S-38s, and HQ-129s. Please look them up. OCX is proud owner of BC-348 and has finished 829 rig. NRG now has p. p. 807 and has come in with Ozark Net. NCM is on 28 Mc. with 829. JIN is revamping the 812 rig. KBH is vacationing. JHL is debugging p. p. 812s. DRW

(Continued on page 74)



CW MEN:
 YOU WANT ACTIVITY AND
 PR GIVES IT TO YOU!

Chirpy signals... due to sluggish crystals... are a thing of the pre-war past for amateurs who insist on PR Crystal Controls. Yes—PRs follow your bug at high speed—on the highest frequencies. You get perfect keying activity without sacrifice of crystal output by excessive "backing off." This means more excitation to the final, higher input potential, more watts in the antenna, better final efficiency... clean keying with the weights off!

PR Crystal Controls are *unconditionally guaranteed*. Low drift at all frequencies... less than 2 cycles per MC. Accurate within .01 per cent. Exact frequency (integral kilocycle) at no extra cost! Gasket sealed against contamination. Stable under the most severe high power output conditions. Available for ALL BANDS at your jobber now! Accept no substitute! Petersen Radio Company, 2800 West Broadway, Council Bluffs, Iowa. (Telephone 2760)



PR Precision CRYSTALS

10 METERS PR Type Z-5.	Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit\$5.00
20 METERS PR Type Z-3.	Harmonic oscillator. Low drift. High activity. Can be keyed in most circuits. High power output. Just as stable as fundamental oscillators\$3.75
40 & 80 METERS PR Type Z-2.	Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration...\$2.75

is due to show on 3.85 Mc. soon. Traffic: W5FMF 64, MRD 33, EA 2.

LOUISIANA — SCM, W. J. Wilkinson, jr., W5VT — KTEB has been adding some new equipment to his collection. NBK was a visitor and reported his efforts in handling traffic. GND really has a rag-chewing time on 7 Mc. LDH is planning a stay in South America. KYK is on 7, 14, and 28 Mc. and has a new HRO. NRS, Naval Reserve Amateur station in Shreveport, was operated on Field Day by KMN, MEJ, 6DBX/5, 5MF5, NAL, JFO, JSW, KEK, and visitors from the Caddo Amateur Radio Club. BQD, BYY, JFF, OMG, and KKI also took part in Field Day activities. OM reports USN activity for the New Orleans Naval Reserve. The CARC injected some spice into its meeting by taking time to listen to the broadcast of the Louis-Walcott fight. LDH, KXP, and NIN will be officers of the Tulane University Radio Club during the '48-'49 semester. YU wants to contact other high schools and college clubs around the country. NTZ has QRT radio for awhile and is doing a hitch in the Army. MSL is back in Louisiana after studying in Indiana. KTB has returned from a stay in Argentina. ZV is back on 28 Mc. after several months of vacationing. LAE is dissatisfied with his four-element wide-spaced beam. IXL has a new mobile rig. JYK has been quite inactive since being married. BSR is working overtime with director's duties. CEW and GDC are working plenty of DX on 14-Mc. c. w.

TENNESSEE — SCM, Ward Buhrman, W4QT — Despite the poor skip conditions on the popular bands some good scores were made by Field Day stations in this section. NUW is new call in Chattanooga. The new ticket arrived during a 50-Mc. opening. George was ready for business and his first call was answered. Hot weather and QRN have diverted quite a few of the fellows to the higher frequency bands. FKA has returned to this section, having moved to Memphis after several years' absence from Tennessee. He runs 500 watts on 'phone. FLW has nightly schedule with HFO. The new jr. operator at FDP arrived on LO Nite. EBQ keeps the 'phone net rolling. OV now is DIARY and welcomes Tennessee contacts on 14-Mc. 'phone. His usual operating frequency is approximately 14.385 kc. ENL again is active on 28-Mc. 'phone. KFK operated mobile on trip to West Coast. MKB lacks Indiana for 28-Mc. WAS, MPB has an 813 on 14-Mc. c.w. and 28-Mc. 'phone. Traffic: W4CZL 10.

GREAT LAKES DIVISION

KENTUCKY — SCM, W. C. Alcock, W4CDA — KLP, Louisville EC, has over 20 AEC members. NNC, new at Danville, is on 7 Mc. ARL works 'phone net but keeps up code speed on 3.5 Mc. NHR is new at Lancaster. FQQ, on 7083 kc. for the summer, is building QRP rig. JTO's son and WYW are studying for Class A exam. HAV is working 28-Mc. mobile while building VFO. TXX keeps KY Phone Net going through the summer on 3955 kc. Lexington Club's picnic will be held at Pandora, Herrington Lake, Sept. 12. Bring gear for auction. JCN is trying 14 Mc. for South Africa after QSOs with Alaska, Newfoundland, and Europe. LSE seeks to work all states on 15 watts. MQ is building up surplus business. CDA wants Emergency Coordinator for each radio club, so pick your man and let BEW know. KFI has been appointed OES. KYNet leaves 3810 kc. and new frequency will be 3600 kc. Come on in with those OPS applications. See TXX and FBJ about them. FBJ is new PAM for the 145.8-Mc. Net. FR and KQI get .00131 and .01781 percentages in Frequency Measuring Test. BAZ is getting ready for reopening of KYNet in September. EDV continues on KYP Net. IUP has broadband converter working. MKJ is new-comer on 144 Mc. KKG's sixteen-element beam is working. KMX is having a hard time being heard on super-hets. KLP is going to 144 Mc. MFI is trying out 144-Mc. antenna. RBK, JBF, KIV, MFI, and FBJ hit 50 Mc. hard. FBJ bagged 25 states, 4 Canadian districts, and LU6DO on 50 Mc. Traffic: W4TXX 19, EDV 4, BAZ 3, CDA 3.

MICHIGAN — SCM, Joseph R. Beljan, jr., W8SCW — SEC: GJH. RMs: NOE, PVB, and UKV. GJH has been appointed Section Emergency Coordinator, succeeding PVB, who was forced to resign because of the pressure of work. GJH is no new-comer to emergency work, having done a fine job with the WERS during the war and as Regional EC for the Flint area since the first of the year. With your cooperation I'm sure that Gary will do a bang-up job for the State, so if you are not a member of the AEC now request application blanks from GJH, SCW, or your local EC. The Annual ARRL Field Day was well represented by Michigan stations, and from reports received so far the MCRC again led the State. Operating MRM/8 with two rigs, the MCRC made 557 contacts. The GRARC, operating six rigs under IV/8, had 512 QSOs. The DARA, with NLG/8 and two rigs, connected 364 times. The Calhoun Area Radio Club had one rig on with NZ/8 and had 172 contacts. The Edison Radio Amateurs Assn., operating AW/8 with five rigs, made 116 contacts. The Oakland County Radio Club, with one rig as BBJ/8, had 78 QSOs. The Genesee County Radio Club, with club call ACW/8, on one rig, made 77 contacts. NJ/8, one operator, made 16 contacts. A non-club group, operating YFI/8,

the Allegan Area Radio Club as CMA/8, and others were active but failed to report their results to me. Congrats to NOH on the arrival of the new YL operator. RNC gave a very interesting talk on helical beams at the Atlantic Division Convention. KPL also attended. OCC has new three-element beam. TRN has new triplex beam. KOS enjoyed a vacation in the East and visited ARRL Headquarters. AHT is now Class A amateur and is planning on increasing power. The BR Net held a picnic in the Grand Rapids Area and enjoyed a fine turnout. The gang elected LR, pres.; TDO, vice-pres.; and AQA, secy. YNG was elected MEN Net manager for another year. KBI opened a new photo studio. Ex-OTG now signs VV. QAM sold all his equipment. UFR is building a t. v. set. PUV has 813 final on 3.5 and 14 Mc. YDR built an electronic key. Traffic: (May) W8UKV 70, G8J 61, WVL 24, MGQ 7, KPL 6, URM 5. (June) W8PRN 132, ARJ 72, UUS 45, NOH 13, TBP 6, KOS 3, SCW 2, UKV 2, UGR 1.

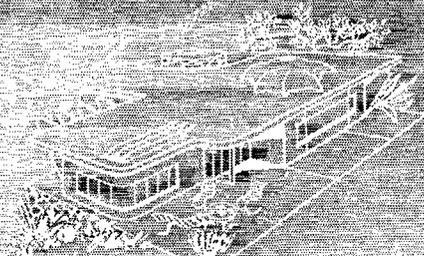
OHIO — SCM, William D. Montgomery, W8PNQ — Very few reports were received this time — probably because of the July 4th holiday season. WRN reports from Columbus that BAX is back on 144 Mc. for the first time since before the war. He is using a 522. LQK also is on 144 Mc. regularly with a BC-625. We see that WRN himself has worked five states and over forty different stations on 144 Mc. The Central Ohio Radio Club has joined the ranks of the ARRL affiliated clubs. Congratulations, fellows. PUN reports that the Dog House Net has a new station call, CUD. We bet there are some PUN's on that one! WAB has been forced to resign as EC of Columbus because of his many other duties. We like EGP's vocalization much better these days since he has regained his dental elements. Be sure to send your reports to me until the new SCM has been elected. Announcement will be made as soon as the election is completed. Traffic: W8GZ 78, PUN 24, DAE 9, WAB 8, DZO 6, TH 6, WE 3, AQ 2.

HUDSON DIVISION

NEW YORK CITY & LONG ISLAND — SCM, Charles Ham, jr., W2KDC — Field Day was held with many of the Long Island clubs participating. The Nassau and the Sunrise Radio Clubs got a message off to ARRL via the SCM, as did VOS and SGK. AEC activities continue at a very good level in Nassau with 22 fixed and 2 mobile stations. YKM, YDN, and SNO are welcomed. JXP has an outstanding mobile job. BTA is building ditto. PQD also has excellent crystal-control mobile unit. WI worked two W4s on 144 Mc. From Suffolk, OQI concentrated on Field Day but plans to increase EC activities. He and OEO have obtained several 60-ft. poles and are trying to vertically polarize them. YPA is a new station at Smithtown. WXJ is new at Center Moriches. From Queens, BSP says SYW is doing a fine job in the northern section. He and LGK handle much QSP each Monday. Interest is being shown in 3.5-Mc. portable c. w. equipment. From Brooklyn, the AEC is on a summer schedule with a streamlined operating set-up. Full activities are scheduled to start in September. ALH and VHS, cooperating with K2NAR, assisted nobly in reporting the Albany-New York Boat Race. 7 Mc. was used between Albany and Poughkeepsie and a 144-Mc. relay carried down to OHE and out to ER, at Oceanside, who operated NA3AA relaying to Coast Guard boats in the Hudson. AST, HWX, AGF, and WCR all have 420-Mc. equipment but can't find any activities. How about working yourselves, boys? Question of the month: What is the cubical quad antenna? Contact VHS for 7-Mc. AEC Net dope. The Mid-Island Radio Club is concentrating on 420 Mc. and about half the members are AEC members. LUY is now at Hicksville and is on 144 Mc. WHB is very active as Manhattan's EC. He has contacted more affiliated emergency services than we knew existed. In Staten Island the Field Day participation was cancelled at the last minute because of the heavy dew, so reports SGA, secretary of SIARA. A series of talks is planned for the summer, with GHK and NZX telling how to combat T.V.I. AMO says the best way to cure it is to build your own t.v. receiver. VJU is QRL building a wire recorder. VHS lives among a t.v. antenna farm — 27 of them within 150 feet — but he has managed to work 27 countries and 47 states within the last year on 7 Mc. using 5 watts. QBS, in a neck-and-neck finish, won the Hidden Transmitter Contest at Beth Page during the AEC outing in June. A swell time was had by all and KDC and BGO learned that they should not play softball anymore. RQJ finally got the break-in working on his 3 SCR-274 sets. TUK had a busy month; he helped QBS in Hidden Transmitter Contest, visited ARRL, and is attending summer college. OBU is improving the rig and getting ready for NYC-LI activities, which resume on September 7. SHE still is active on teletype. VVN is giving up 144 Mc. for the summer. YPI is the local outlet of I1IN, of Headquarters. RTZ joined the Eastern Shuttle Net. Hope is Friday NCS for SSN. She also spent Field Day at LR/2. The YLRL visited K2UN and suspended operations until fall. VOS is trying to clean up his note and antenna during the hot months. KV4AF/2 is QRL because of lack of adequate antenna. YDG is active on 7 Mc. and is in the SSN net. W1AA/2, formerly of these parts, is in Buenos Aires where he has visited many LU stations. Wally

(Continued on page 76)

MODERN DESIGN IS COMPACT!



Because they're *compact*—with real big-tube performance—Ken-Rad precision-made miniatures are a “must” for your streamlined rig!

THESE tubes simplify your design problems, giving you extra working space with no increase in chassis area. Also, Ken-Rad miniatures run neck-and-neck in performance with their larger counterparts—*excelling* them in r-f work, where short internal leads allow operation at higher frequencies.

Close side-by-side tube mounting is possible with Ken-Rad miniature tubes—an important aid to h-f rig efficiency. And because miniatures have no bases, external lead inductance is cut.

Group these advantages, then add advanced tube design, and you have Type 12AT7. This tube was specially developed by Ken-Rad and General Electric engineers to serve as a converter and r-f amplifier in FM and Television. It's a great little tube for *you* as an amateur—a two-in-one marvel ready to become the heart of any h-f converter unit you're building!

One triode section will serve as mixer, the other as oscillator. Operating frequencies range up to 300 mc. With each section of the tube having its own cathode, you retain full freedom of layout in respect to biasing and coil-tapping.

See the 12AT7—and other precision-made Ken-Rad miniatures—at your nearby Ken-Rad distributor or dealer. You'll like their small size with sturdy structure . . . high-rating performance . . . versatility . . . *economy prices!*

12AT7 9-pin miniature high- g_m TWIN TRIODE



CHARACTERISTICS

Heater voltage	12.6 v or 6.3 v
current	150 ma 300 ma
Max plate voltage	300 v
Max plate dissipation, per section	2.5 w

KEN-RAD

Radio
Tubes

PRODUCT OF GENERAL ELECTRIC COMPANY

Schenectady 5, New York

178-GA10-8850

Make the nearest Ken-Rad distributor or dealer your preferred source for amateur tubes

has QSPed home via MDQ and QKE. PKD has moved to Amityville where he continues his excellent job as coordinator for the Weather Bureau Flood Reporting Set-up. Traffic: W2RTZ 132, TUK 90, OBU 75, VOS 32, OUT 27, YPI 22, QBS 19, VNJ 9, RQJ 5.

FLEA-POWER CONTEST

A Field Contest for "flea-powered" battery-operated stations will be sponsored by the Westchester Amateur Radio Assn. on Sunday, October 17th, adjacent to the Kings Street entrance to the Westchester Airport, Harrison, N. Y., on Route 120A. Purpose of this activity is to stimulate interest in reliable battery-powered transmitters and receivers.

All amateurs are invited to compete. The contest will be held on all recognized amateur bands during the period 1:00 P.M. to 4:00 P.M. Entrants must register with officials no later than noon. Each contestant must carry his complete station alone 100 feet from a starting point selected by judges, set up equipment and antenna, refrain from using existing local supports, and contact as many noncompeting stations as possible; he may have a second operator to help assemble and install but not to carry the gear. Storage batteries may not be recharged but may be replaced if carried by the contestant. Standard phone jacks with tip connected to final plate and sleeve to B — must be provided for purpose of judge's power measurement. Receivers may be regenerative or superregenerative but shall not be preceded by an r.f. stage and shall not cause undue interference to other participants; this restriction shall not apply on frequencies above 148 Mc.

A suitable prize will be awarded to the contestant having the highest score in each band. Special acknowledgment will be sent to each station that works a station competing in the contest upon receipt of QSL addressed to the Westchester Amateur Radio Assn., % W2R H.R.F.D. 1, Port Chester, N. Y. Further details may be obtained by writing W.A.R.A.

MIDWEST DIVISION

IOWA — SCM, William G. Davis, W6PP — DLD reports for North Iowa Transmitting Assn. and says they had a great Field Day using BC-654, JUI, RKQ, RJD, PUE, GCZ, DLD, ATA, QDB, MOW, and RJU took an active part. The Association has a nice bulletin called *Splatter*. FDL reports activity on TLCN. AUL threw a party for TLCN. HMM reports NFN acted as cross-country net for ARC traffic from Washington flood area. PP visited with the Sioux City ham club. A good meeting was held and they are a swell gang. The Cedar Rapids gang sponsored a picnic at Devil's Backbone State Park June 27th. OSC is AEC member. WML filed an FB report on Field Day activity. PP furnished contacts for lots of the boys in the field. Who was it informed PP that Field Day was over just as he was going big guns with 654? 'Twas only three days after. SQN sent in a report on his Field Day activity. Fellows, Field Day in Iowa was a big success but your reports wouldn't indicate it. I know it's a job to write them up but it is difficult to do justice to you all if I don't have your reports from which to work. KKB vacationed in Minnesota. PP is busy with f. m. and t. v. at WOC. The Iowa 75 'Phone Net is planning its first picnic. HMM again is high in traffic for Iowa. 6YRQ visited UOP, MBR, BAL, CK, and PP. UOP and BAL did things to his mobile 28-Mc. rig. OCG is rebuilding. SWI operates his rig, with extension controls, from a lawn chair in the back yard. Traffic: W9HMM 604, AUL 30, QVA 10, PP 5.

KANSAS — SCM, Alvin B. Unruh, W8AWP — YOS made the Brass Pounders' League by handling Oregon flood traffic. He complains that many Field Day stations, although dedicated to emergency preparedness, refused to assist with "P" traffic! BKT also handled emergency traffic. AHA continues to handle traffic on the Slow Speed Net. VBQ's traffic was with Japan and Guam on 14-Mc. 'phone, where he keeps tri-weekly schedules for the benefit of the parents of GIs. HVL registered for the Emergency Corps. IZJ reports Emporia will be represented by MDT's pair of 304TLLs. BQJ is working DX from Hutchinson with long-wire antenna. He says QRN messed up the last CD Party, but he made 186 contacts. DEA, the Division Director, addressed several clubs including the HARC, Kansas City, and the WARC, Wichita. While at Wichita he discussed plans for the Midwest Division Convention to be held there October 16-17. BPL has new 28-Mc. beam, and reports 50-Mc. activity increasing. ZOC has 829-B on 50 Mc. He reports AEW was a visitor. AHM took Class A exam. YOS has new e.o.o. BKT is active in Transcontinental Net (TCN) on 7100 kc. He keeps seven schedules daily. OAQ reports most traffic with Wake Island and Germany. ZAT

has 813s on 28 Mc. GHE has windmill tower for beams. DGG, Kansas City, is looking for 144-Mc. schedules with Wichita. He has 522 rig and four-element rotary beam. Traffic: W9YOS 535, OAQ 56, AHA 12, BKT 7, BQJ 5, VBQ 4, AB 3, AWP 2.

MISSOURI — SCM, Ben H. Wendt, W9ICD — Much interest was shown in the recent Field Day activities. The HARC reported the greatest activity. ZIS had a 50-Mc. opening to VE1s, VE2s, and VE3s; also to W1s, W2s, and W3s. The Missouri Emergency Net on 3.85 Mc. meets Wed. and Fri. at 7:30 p.m. and on Sundays at 10:00 a.m. The Net Coordinator, NIP, has 54 members on the list. QYA had an average error of 266 cycles in a recent ARRL Frequency Measuring Test. INK was heard in England with 40 watts on 3755 kc. OMG WACD, on 14-Mc. 'phone in 2½ hours. KAIAR visited with OMG. TSZ has QSY'd to Poplar Bluff. The MON is operating each Mon., Wed., and Fri. at 7:00 p.m. on 3755 kc. OUD installed a line filter to reduce key clicks. Traffic is being hampered by QRN. ARH is using low power on 28 Mc. and boasts contacts with KZ5s, YU5s, and ZLs, being handicapped by poor band conditions. The ½-kw. rig of EEE soon will have a modulator. The MON, 3755 kc., is crying for a Kansas City outlet. CRM has 107,701 contacts to his credit since 1922. AGP and TEA are operating all bands between 3.5 and 28 Mc. with kw. rigs. A prominent c.w. operator wants to know why 'phone operators never look up message forms! The Missouri School of Mines reports three new operators. JEJ is on 3.5 and 7 Mc.; JHJ is on 3.5 Mc.; and JMR is on 3.5 Mc. GKT is the control station on the school's practice traffic net. Traffic: W9QXO 261, GEP 35, CRM 33, OUD 14, OMG 13, EEE 8, ICD 8, ARH 5, VMO 3, NNE 2.

NEBRASKA — SCM, William T. Gemmer, W6RQK — Oct. 1st is the proposed opening date for trunk lines and most of the nets. New PRC officers: JJA, pres.; AYO, vice-pres.; EIE, treas.; RCH, act. mgr. New Fremont calls are: JJA, JLF, and JGT. HQQ has new Mon-Key. HXH is putting 304TLLs on 7 Mc. and using an 829 on 28 Mc. with 100 watts input. VFL is using a pair of VT127s on 14 and 28 Mc. WBE is building a new console with racks on each end. VEC has a four-element beam on 144 Mc. CME and VEC are on 144 Mc. HQQ is putting DK-3 on 144 Mc. LRF, ex-9CVP, LEF, OZC, ZTE, NVE, VMP, DDP, LWK, YCG and their families held a hamfest at David City June 20th. DNW put up three-section 8JK. GMO has a pair of 826s at 250 watts perking. New NPARC officers: OHK, pres.; OHU, vice-pres.; VHP, secy.; CBH, treas. JLO is on 7-Mc. c. w. The SENRC combined a picnic with Field Day operation, with rigs on 3.85, 28, 3.5, and 7 Mc. JYW, of Denver, attended with a 40-watt mobile rig. ZTE was present with his less-than-1-watt 3.85-Mc. 'phone rig. EIE is running 1 watt on 3.5-Mc. c. w. OED is rebuilding to a 100-watt all-band rig. KVZ is rebuilding to 7C5, 807, and 35Ts in final with 3000 volts on the plates. SAT has 2 poles 62 feet out of the ground. ZOQ has two 52-footers. BIW and EXP each have a 55-footer. BBS has four 65-footers. 6STS of Los Angeles, visited North Platte. His mobile rig had an 807 in the final modulated by a pair of 6AK6s. Traffic: W9OHU 4.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, W1VB — Connecticut Field Day in Connecticut seems to have been a success with the Manchester Club unofficially claiming the highest number of contacts, 483. ORP has new 97-ft. tower supported by five 270-ft. wires forming Vee beams. TD is keeping his OBS schedules. IIN has rebuilt and is back on the air with a pair of 46s at 50 watts, 3.5 through 28 Mc. IKE has new 14-Mc. four-element beam working and is trying n.f.m. HYF complains of the heat. BIH reports RBS, the CQ Radio Club station, is active nightly on 7110 and 7138 kc. APA has DXCC with 103 confirmed, but painting his house is cutting in on radio time. AW is rebuilding the 28-Mc. rig, and is keeping schedules direct with West Coast and Hawaii. Jim White, PHW, is back at AW for the summer. BDI is setting up his Field Day rig in home station for emergency. BGJ and PRT applied for AEC membership. The Stratford gang received a nice write-up in the local paper on its Field Day activities. It is with deep regret that we announce the resignation of EFW as Route Manager. Milt has served the gang well, and we hate to lose him. By the time this is in print, it is hoped a new RM will be appointed. NJM's tube keyer is completed and working on 8C-896A. Traffic: (May) W1ORP 23, IKE 9, (June) W1AW 177, IIN 95, BIH 75, INF 63, NJM 30, HYF 21, APWA 20, BDI 14, QMI 14, VB 4, IKE 2.

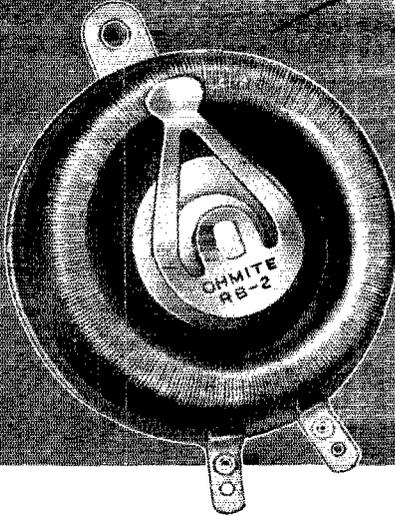
MAINE — SCM, F. Norman Davis, W1GKJ — SEC: LNI, RM: NXX, PAM: FBJ. Renewed EC appointments: FBJ and KEZ. BV/1, at Wells Beach, is on 144 Mc. with 75 watts. DEO and OUN have been making weekly trips to Mt. Agamenticus, near York, with 144-Mc. portable gear and have worked out fine, including some W2 contacts. QYQ has an SCR-522 in his car and uses a ground plane antenna. 2PRW/1, at Pine Point, is working 144 and 50 Mc. with 75-watt rig besides his usual 28-Mc. operation. NXX has constructed a 14- and 28-Mc. two-element beam. DFC now has 3.5- to 28-Mc. rig using 807s in the final and

(Continued from page 78)

New OHMITE

Direction Indicator Potentiometer

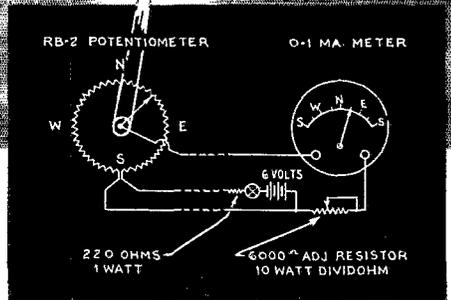
MODEL
RB-2



... for rotary-beam
Antennas

● Now you can make a simple, compact, and accurate direction indicator for your rotary-beam antenna at an amazingly low cost.

Simply couple the shaft of the new Ohmite RB-2 potentiometer to your rotary-beam antenna so it rotates with the antenna. Then connect the potentiometer to a 6-volt battery and an ordinary d-c, 0-1 millimeter with specially marked scale. The meter will indicate the position of the antenna. The maximum current drain of the RB-2 unit is only a few milliamperes, which means that any dry



cell type battery lasts practically its shelf life. If desired, a 6-volt a-c source can be used together with a d-c meter incorporating a dry-disc rectifier.

A special meter with scales calibrated in directions is available for use with the RB-2 potentiometer. Ask your Ohmite distributor about this meter and the potentiometer.

Write for Bulletin 128

OHMITE MANUFACTURING CO.

4863 Flournoy Street, Chicago 44, Ill.



Be Right with

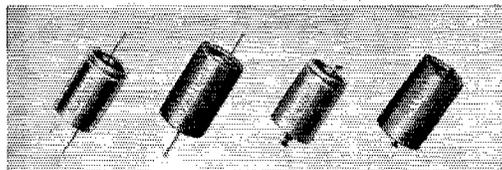
OHMITE

RHEOSTATS • RESISTORS • TAP SWITCHES

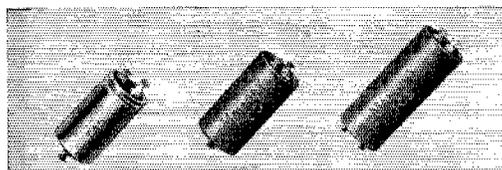
Give Your Rig Long Life Insurance

For low RF impedance, good filtering, long life, corrosive resistant capacitors, specify Mallory. There is a Mallory capacitor for every part of your rig. All are built to the same rigid specifications to withstand excessive heat with a minimum of change in value.

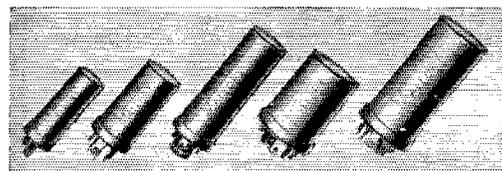
Note these standard Mallory types.



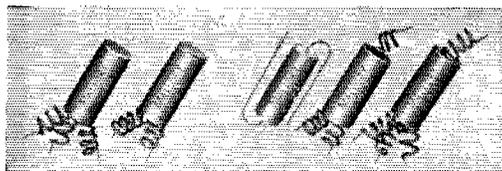
Tubular Aluminum Case—leads or lugs—covered or uncovered.



Tubular Aluminum Case—Dual—Dual covered—covered, separate sections.



*Tubular Aluminum Case—vertical mountings—*Fabricated Plate Anode—Etched Plate Anode.*



Cardboard Tubular—single end, single or dual section—Double end, single, dual or triple section.

You can rely on Mallory Precision manufacturing to furnish you with dependable resistors, ham band switches, push button switches, controls—rheostats—potentiometers—pads, dry disc rectifiers, vibrators, and vibrator power supplies, practically every component you need to keep your rig in A-1 condition. Available at your Mallory Distributor. For further information, write direct.

**Exclusive Mallory Development to get equivalent capacity in less space.*

P. R. MALLORY & CO., INC.
INDIANAPOLIS 6 INDIANA

P. R. MALLORY & CO., Inc.
MALLORY

also is on 144 Mc. with a TR4. Drop a line to the RM if you desire to join the Pine Tree Net this fall, or call in when the net opens in September. How about a little news from you fellows upstate? Traffic: WINXX 2, NKM 1, QUA 1.

EASTERN MASSACHUSETTS—SCM, Frank T. Baker, jr. W1ALP. The following renewed their appointments: BDU and JCK as ORS; BBL as EC; LQQ as OFS. BHW as 00 Class 1-2. Don Meserve, FL, says to look for VO2FL on 14 and 28 Mc. He will be on with a BC-270D soon. IML, MP, AR, BHD, AY, and others are interested in an emergency net on 3.85-Mc. phone. MRQ is hunting DX on 14 Mc. and rag-chewing on 3.85 Mc. LXQ spent some time in the hospital. IVI has moved to Boston to be near his work at WBZ-TV. The T-9 Radio Club went to Holt's Hill, Andover, on Field Day and held a meeting at BPF's. HDQ gave a very nice talk at the Eastern Mass. AKA on AKRL's activities. New officers of the Eastern Mass. ARA are as follows: GLS, pres.; OFT, vice-pres.; MPP, secy.; JNX, treas.; HNN, BB, and FSK, directors. LK says his call is being used by somebody else. The South Shore Amateur Radio Club will hold one meeting a month on the 3rd Friday at the Quincy YMCA. MDU is getting over final exams at Harvard. NBS finished up at Harvard. RFE, in Malden, is on 28 Mc. A meeting of the Eastern Massachusetts Net was held at BL's QTH attended by the following: ALP, BV/L, QQL, QQP, NBS, CCF, JYC, PYM, TY, QMJ, PLQ, AQE, and B1SP. QPH, in Braintree, is on 144 Mc. QA is on 144 Mc. LGG, OKK, QMD, QOS, GOU, and CSZ have gone n.f.m. on 28 Mc. n.f.m. and PXII are n.f.m. on 14 Mc. QJK is on 28 Mc. n.f.m. fixed-portable during the day and a.m. at night at home. The 11th Annual Boston Hamfest will be held on Saturday, October 9th, at Mechanics Building. Boston LMG is chairman; WK, vice-chairman; QON, secy.; ALP, in charge of tickets. The motto this year is "A Better Hamfest." KNI got three new states on 50 Mc., Wisconsin, Indiana, and Minnesota. JEL, in Saugus, is on 50 Mc. LM is holding down this end of Hit & Bounce Net. QMJ is building 300-watt rig. EMG is going to National Guard Camp. GDY is home from a trip to the West Coast. BDU has been working BB all the way across the country. BGW got DXCC and is putting rotator on 14-Mc. dipole. WU took 265-word message from 7UTM for Doc Hayes, at ARRL. QJB finally worked South Dakota for WAS and had a game of chess with QWB on 3.5-Mc. c.w. Anyone else interested? PLQ is working on a farm in Stow and has rig with him. JLK held a Hams Own Church Call at his church. He preached the sermon and MPP was soloist. EKT, DJ, QIR, KPW, and others were present. QHC reports that the call of National Guard at Commonwealth Army in Boston is R4G. Headquarters Battery, 180th Field Artillery. 5GNV now is in Honolulu. MMM is in Huntsville, Ala. LIX is living in Lawrence, L. I. JOJ renewed his EC and OFS appointments. HUV held a meeting of the 56-Mc. Minutemen at his QTH. He will leave for the West as soon as he sells his house. Traffic: (May) WIQQD 14, (June) WITY 40, LM 33, PLQ 25, QJB 17, QMJ 15, EMG 13, GDY 8, WU 8, MDU 6, RBK 6, PYM 3, BGW 1.

WESTERN MASSACHUSETTS—SCM, Prentiss M. Bailey, W1AZW — SEC: UD, RM; BVR, PAM; NY, NY is coming along fine now but will have to take it easy for a while. JCY is sufficiently supplied with parts to build up his 808 final. OMJ's call has been changed to DPY. Bob has been having trouble with his final band-change switch. GVJ is spending the summer in Cape Neddick, Me., just two miles from BDV. COI built new power supply for VFO and portable work. MUN turned in nice FMT results. 3.8 parts per million is a small error. The Worcester County Radio Club supplied communications during Worcester Centennial Parade. ODU has new 14-Mc. beam. IBZ reports the Fitchburg boys have reorganized and now we have the Wachusett Amateur Radio Assn. HFO is going mobile with the onset of warm weather. BVR is taking it easy after a very busy season. JE is sure going to town with the SS Net. Hal gets time to work a little DX on 7 Mc., too. I wish I had the space to describe the doings on Field Day. All had a swell time and gained a lot of experience. The boys at NY/1 had generator trouble but had enough fun and eats to make up for it. The Pittsfield Club used a 300-ft. wire supported by an Army surplus balloon on Field Day and worked wonders in making contacts on 3.5 and 3.85 Mc. However, they had their troubles. Nine cars became mired in the mud and they had to hire a tractor to pull them out. The Worcester and Fitchburg boys report a swell time and good scores. CCH sends in a wonderful OES report. UD did a nice job of organizing West. Mass. for the West. Mass.-NYC-LI AEC drill. 52 messages were handled in the two-hour drill. AZW visited BVR. Traffic: (May) W1NY 117, JGY 24, GVJ 11, DPY 4, (June) W1JE 112, BVR 8, AMI 7, GVJ 4.

NEW HAMPSHIRE—SCM, Gilman K. Crowell, W1AQO — The 144-Mc. Net is in operation with KEX as Net Control. DUB reports Field Day activities from KAE/1 with 13 operators. HTO reports the Nashua Club is busy with building program. QGL/1, PVF, and 8CVR, on Field Day from base of Mt. Prospect, operated on 3.5, 7, and 144 Mc. 8CVR, now in Whitefield, would like QSOs on 144 Mc. BFT qualified for Class 1 OO using only a Collins 75A-1 receiver and a 100-ke. frequency standard. LSN worked Texas on 50 Mc., for a total of 36 states. LB has a three-

(Continued on page 80)

BUILD YOUR OWN TEST

EQUIPMENT

with the
MARION
MULTI-RANGER
METER

- **ACCURATE!**
- **DURABLE!**
- **DEPENDABLE!**
- **A GREAT VARIETY OF SIZES!**

When it comes to TEST EQUIPMENT build your own with Marion Multi-Ranger Meters. They will solve your problem of finding reasonably priced instruments with the critical accuracy you demand for test equipment or other auxiliary equipment with multiple functions.

These Multi-Ranger Meters permit you to assemble a highly accurate instrument for use as a voltmeter, milliammeter, high and low resistance ohmmeter, AC voltmeter and decibel meter. — Build As Many Ranges As You Desire.

All instruments use Alnico Magnets, have full 100° three-color scales, feature the new, tough Marion "Bulldozer" moving system that insures long life under severe operating conditions plus the highest degree of accuracy.

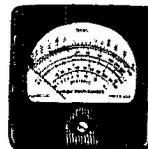
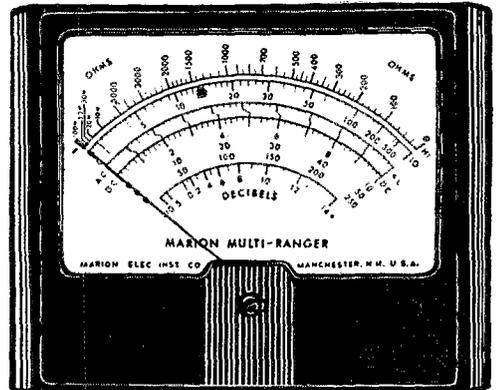
MARION RESISTOR KIT
NEW! LOW-PRICED! VERSATILE!

Contains: 18 Resistors Ranging from .4 Ohms to 750,000 Ohms. A Schematic Diagram for Constructing Your Own Test Equipment.

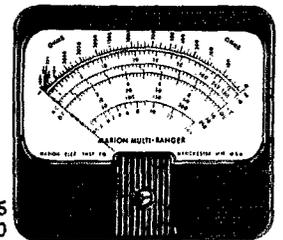
It's easy to construct accurate, useful, versatile test equipment with the Marion Resistor Kit, used in conjunction with Marion Multi-Ranger Instruments. List \$12.50

ASK YOUR DEALER . . . OR WRITE DIRECT

Model 57 S List \$20.00



Model 53SN List \$12.00



Model 55 List \$15.00

SCALE RANGES POSSIBLE WITH STANDARD RESISTOR KIT

VOLTS AC-DC
0-10 Volts 0-250 Volts
0-50 Volts 0-1000 Volts

MILLIAMPERES
0-1 MA 0-50 MA
0-10 MA 0-500 MA

OHMS
0-500 Ohms 0-1 MEG
0-100 M 0-10 MEG

DECIBELS
-10 — +14 decibels
+4 — +28 decibels
+18 — +42 decibels
+30 — +54 decibels

ALSO AVAILABLE WITH VTVM SCALES

THE NAME "MARION" MEANS THE "MOST" IN METERS



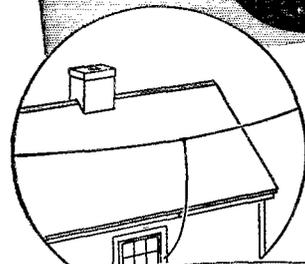
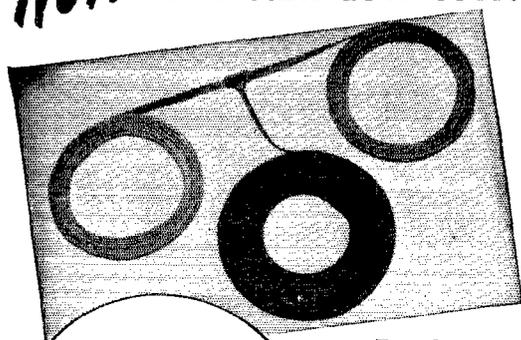
MARION ELECTRICAL
INSTRUMENT COMPANY

Manchester, New Hampshire

Export Division
458 Broadway
New York 13, U. S. A.
Cables MORHANEX

In Canada:
The Astral Electric Company
Scarboro Bluffs, Ontario

**NOW! A REAL DX ANTENNA
AT A NEW LOW COST!**



AMPHENOL

TWIN-LEAD FOLDED DIPOLE AMATEUR ANTENNAS

Complete, for 28 mc Band Only \$4.63 ^{Amateur} _{Net}
(OTHERS IN PROPORTION)

Look to Amphenol for the new ideas in amateur radio. Now, Amphenol offers you complete packaged Twin-Lead folded dipole antennas ready-cut to your choice of four bands. Inexpensive and rugged, they offer you unusual DX, are easy to install. Simply trim to your operating frequency in accordance with instructions furnished, add end insulators and go on the air with one of the best broadband antennas ever developed.

The folded dipole antenna section is Amphenol Twin-Lead No. 14-022. Conductors are "copper-clad" steel for strength to withstand wind, ice-loading, etc. The 75-foot lead-in is Amphenol 300 ohm Twin-Lead No. 14-056. It affords a perfect match, and is joined to the antenna with a weather-proof molded polyethylene jacket.

Radio Servicemen Note!

The 7 mc antenna may be trimmed to provide top reception on the shortwave BCL 9 or 12 mc bands. See your jobber today for complete information and prices.

Amphenol Accessories Simplify Installation:

For highest efficiency, and maximum convenience, ask your jobber also for Amphenol Polyethylene Stand-off Insulators, Clear Plastic Window Pane and Silicone Compound.

AMERICAN PHENOLIC CORPORATION

1830 South 54th Avenue, Chicago 50, Illinois
COAXIAL CABLES AND CONNECTORS • INDUSTRIAL CONNECTORS, FITTINGS AND CONDUIT • ANTENNAS • RADIO COMPONENTS • PLASTICS FOR ELECTRONICS

80

For these
bands:

3.5 mc

7.0 mc

14.0 mc

28.0 mc

element beam on 50 Mc. GQV is on 50 Mc. The Manchester Club reports Field Day activities from Bear Brook. HY/1 operated on Field Day from Stinson Lake with one transmitter, battery operated. The Nashua Mike and Key Club announces the following new officers: HQE; pres.; OMZ, vice-pres.; QJE, secy.; QJH, treas.; HTO, act. mgr. The Concord Brasspounders, OC/1, operated on Field Day from Pleasant Pond using three transmitters. The Great Bay Radio Club has scheduled an organization meeting. Correction: The New Hampshire Hamfest will be held in Concord, Masonic Temple, September 19 at 10 A. M. The C. W. Net will be back on regular schedule Sept. 8. Traffic: WICRW 132, ANS 21, AQM 12, QJY 5.

RHODE ISLAND — SCM, Clayton C. Gordon, WIHRC — At this time of the year the traffic nets seem to have closed down for seasonal vacation. The main topic of conversation when folks gather in radio stores is television. Your SCM took his annual mountain-climbing trip in the White Mountains, where he donated generously to the black fly blood bank. After that, he attended the Vermont Hamfest at Burlington, Vt., on July 3rd, where he saw a lot of old friends and made some new ones, won a small prize, had a fine supper, and had a swell time. While there he found that 28-Mc. signals from Rhode Island are getting up there as well as into New Hampshire, but we do not seem to hear them as readily as they hear us. Activity on 144 Mc. does not seem to be very brisk up there, however, and what little there is seems to be of the modulated-oscillator type. We know that there were two outfits in the Field Day, the PRA and NAARO, one at the Providence Journal location and the other in the middle-southern part of the State, but our entire information consists of the fact that the NAARO had 15 operators. Traffic: WIICE 2, HRC 1.

VERMONT — SCM, Burtis W. Dean, WINLO MMN and MMV tracked down the hidden transmitter and walked away with first place in the 144-Mc. "treasure hunt." BFT was first in the code contest, with BVR a close second. KH6DU attended the hamfest from the furthest distance. Members of the BARC had emergency rigs on exhibit. BVR spoke on highlights of ARRL Board of Directors Annual Meeting and League policies. PTB has converted garage into ham shack and is on 28-Mc. 'phone and 3.5-Mc. c.w. FSV is on 3.5 and 7 Mc. with a surplus rig running 100 watts. NWW has new Millen Variarm. GMARC is constructing a Hammarlund transmitter kit, not a Hallicrafter, as mentioned in August QST. AVF and PTB are on 144 Mc. QVS has new VHF-152A, AZV, CGX, CUN, MEP, OKH, and QQ are putting Vermont on the map by working out on 50 Mc. 3EEB and his XYL tried out t. v. receiver on Mount Mansfield. Traffic: W1AVP 10.

NORTHWESTERN DIVISION

ALASKA — SCM, August G. Hiebert, KL7PQ — GV reports a super successful picnic of Juneau amateurs at the FA cabin. GV is changing from relay rack to table top installation using an HT-18 to drive an 813 and SX-28 receiver. New calls recently checking into Adak are RO, QQ, QS, and QZ. 14-Mc. 'phone traffic to the States from "the rock" is handled by W7AS/KL7. GD has converted a lifeboat transmitter from 500 kc. to the 3.5-Mc. band for AEC work, using a Pierce 6C5 oscillator and 6L6 amplifier. For an emergency receiver he has converted a BC-454 to 6-volt operation. BA has 300 watts into an 805 on 'phone and c. w. on 4 and 14 Mc. BD is GAA station manager at Moses Point. PY is giving his pair of 807s a workout running 200 watts. GF is using an 813 in the final and an HQ-129 receiver. FA's rig is a Techrad using a pair of 813s in the final. DY has been joined at Sitka by JP and CD. Traffic: KL7BD 2, GV 1.

IDAHO — SCM, Alan K. Ross, W7IWU — Here in Idaho, Field Day seemed to be a story of break-downs, but the gang had lots of fun, nevertheless. In Twin Falls, the fellows rolled up a nice score despite the fact that JMX's rig was taken out by a storm, and they had fuel pump and carburetor trouble. In Boise, both HPH and IWU stalled their cars halfway up the mountain. GHT was practically rained out on Lucky Peak. IQG waited patiently for IWU, three hours late. Shall we do it differently next time, gang? KEK vacationed in California and LNC vacationed in Iowa. KRK is leaving FCC for Forest Service job. MIEJ's ticket earned him sergeant's stripes for National Guard duty. IOA went to Salt Lake City for his Class A exam. IEY won a meter in Field Day contest and is under pressure to build a rig around it. No reports from North Idaho. What say up that way? Traffic: W7LQN 20, IWU 18, KEK 4, JMX 3, IY 2.

MONTANA — SCM, Fred B. Tintinger, W7EGN — Billings: KGF, KGJ, and FMV received Class A tickets. New hams are MJU and MKB. MKB is running 30 watts on 3.5- and 7-Mc. c. w., and MJU is starting out with 100-watt all-band c. w. 'phone rig with an 809 in the final. A high wind blew down FTV's rotary beam. Huntley: LCM is using VFO now. Great Falls: IOC is back in Montana as studio technical supervisor of new b. c. station, KMON. He can be found on 7-Mc. c. w. and 28-Mc. n. f. m. with 70 watts to an 807. Havre: CBY, now OPS, has finished a Lazy Man's Q5-er and is completing a 28-Mc. beam. Kalispell:

(Continued on page 82)

Follow the Leaders to

Eimac
TUBES
The Power for R-F

STILL NONE BETTER



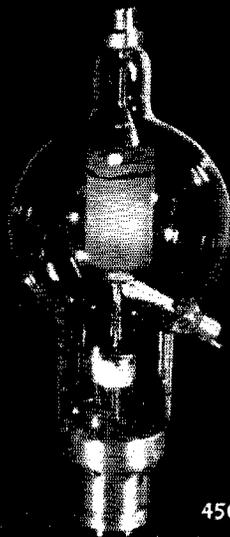
35TG



100T



250T



450T

STANDBYS OF RELIABILITY AND PERFORMANCE

After more than a decade of proven service these Eimac triodes are still the workhorses of electronic equipment . . . from communication to industrial applications.

Recently improved by post-war developments, these tubes provide a big plus in performance, dependability and life expectancy.

As future replacements in the hundreds of thousands of applications in which they now

function and as components in new equipment yet to be developed Eimac triodes are the wise buy. Remember when you specify an Eimac tube . . . you don't gamble . . . their performance is **proven** and **guaranteed**, and future procurement is assured . . . they're carried by better dealers everywhere.

Eitel-McCullough, Inc.
202 San Mateo Ave., San Bruno, California

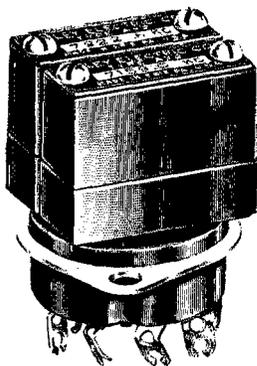
EXPORT AGENTS: Frazer & Hansen—301 Clay St.—San Francisco, Calif.

Tube Data

ELECTRICAL CHARACTERISTICS	35TG	100TH	250TH	450TH
Filament: Thoriated Tungsten				
Voltage - - - - -	5.0 volts	5.0 volts	5.0 volts	7.5 volts
Current - - - - -	4.0 amperes	6.3 amperes	10.5 amperes	12.0 amperes
Amplification Factor (Average) - - -	39	40	37	38
MAXIMUM RATINGS				
Plate Dissipation - - - - -	50 watts	100 watts	250 watts	450 watts
D-C Plate Voltage - - - - -	2000 volts	3000 volts	4000 volts	6000 volts
D-C Plate Current - - - - -	150 ma.	225 ma.	350 ma.	600 ma.
Grid Dissipation - - - - -	15 watts	20 watts	40 watts	80 watts
RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR				
Class-C Telegraphy (Key down conditions)				
Typical Operation—1 Tube				
D-C Plate Voltage - - - - -	1500 volts	2000 volts	3000 volts	4000 volts
D-C Plate Current - - - - -	125 ma.	165 ma.	333 ma.	450 ma.
D-C Grid Current - - - - -	40 ma.	39 ma.	90 ma.	85 ma.
D-C Grid Voltage - - - - -	-120 volts	-80 volts	-150 volts	-200 volts
Plate Power Output - - - - -	141 watts	235 watts	750 watts	1350 watts
Plate Input - - - - -	188 watts	335 watts	1000 watts	1800 watts
Plate Dissipation - - - - -	47 watts	100 watts	250 watts	450 watts
Peak R. F. Grid Input Voltage, (approx.)	250 volts	230 volts	395 volts	410 volts
Driving Power, (approx.) - - - - -	9 watts	8 watts	32 watts	35 watts

NOW WITH . . . Pyrovac Plates · Processed Grids

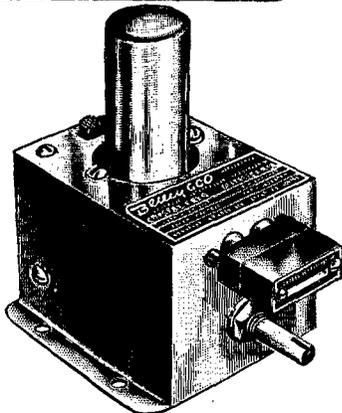
CRYSTALS



TYPE AX2, the first plated crystal for amateur frequencies, is just one example of the advanced design and "techniquality" that are yours in Bliley crystals... first on the amateur bands since 1932.

Ask your Bliley distributor for BULLETIN 35

OSCILLATORS



CCO-2A another Bliley "first"... a completely packaged crystal controlled oscillator for the 2-6-10-11 meter bands. An ideal nucleus for new construction or conversion of existing equipment. Uses Bliley Crystals Types AX2 and AX3.

Ask your Bliley distributor for BULLETIN 35

Bliley

CRYSTALS

BLILEY ELECTRIC CO. • UNION STATION BLDG. • ERIE, PA.

BHP has new jr. operator. LOB and GBL are organizing 3.5- and 7-Mc. c. w. emergency nets to give both day and night coverage. Belton: HMT is building a 1/2-kw. rig using VFO to drive p.p. 813s. KAQ schedules EGN on 3.5-Mc. c. w. Missoula: COH is Montana RM. Anyone wanting to get in a little brasspounding should drop COH a line. Whitefish: The Glacier Radio Club met at AFM's shack and appointed a committee to study ways to acquaint the general public with ham radio, especially toward reducing BCI complaints and creating goodwill. Traffic: W7EGN 20, CT 15.

WASHINGTON — SCM, Clifford Cavanaugh, W7ACF — SEC: GP, RM: FRU, PAM: JPX, LVB, secretary of the Skagit Radio Club, writes that the club furnished free communications during the big five-day celebration held up there July 2, 3, 4, and 5. 144 and 28 Mc. were used for lining up the parade and for reports to City Hall. Those participating were FXD, JKB, LVB, BTM, LFA, and LAN, LAG, who has been in the hospital, would like his old DX friends on 7 Mc. to look for him again. FRU was beauty contest judge at the WSNET picnic, and he sure can pick 'em. LEC is busy soldering in National Guard Camp. JWD leaves battleground for points north. RAO handled piles of flood emergency traffic. KNV says he is off of radio for the summer. BG reports having some FB rag-chews with several old-time spark men, 6BPC, who was old 7BA in Tacoma back in 1919, and 6RL, who was old 7SF in Aberdeen at the same time. KWC reports that the Mt. Baker Radio Club worked 167 stations on Field Day. MBX, MCT, JIL, FOK, and KWC were the operators. ZU took a trip to the East Coast and visited many hams en route. BL has rods and feeders for new 28-Mc. beam and now is looking for a strong back to do the heavy work. Notes from the Valley Radio Club: EBJ has most of the bugs smoked out of his 14-Mc. beam. The club is purchasing an automatic keyer for c. w. help for members. KHL is building a new tower for his 28-Mc. beam. Field Day operations were very successfully carried out on JJK's farm. Participants were EBJ, KHL, HMU, JREI, and HZ. Thanks for the dope, fellows. FWD is busy farming and revamping AEC gear. ETK and DXZ sent in FB OO reports. GHI is busy with portable-mobile. IOC has moved to Great Falls and will be on 7-Mc. c. w. and 28-Mc. n.f.m. as soon as he gets antenna up. CKT says traffic is slow, but he reports a total of 1236! ETO keeps Wenatchee on the air via WSNET. JER has gone south to learn how to build a W6 kw. 'phone. LJM still is pounding away with only one watt on 3.5-Mc. c. w. JDC had hard luck — he lost all of his portable gear overboard while exploring the upper reaches of the mighty Green River in a rubber boat. Traffic: W7CKT 1236, RAO 190, FRU 174, KWC 140, ACF 109, FWD 56, ETO 27, LEC 24, ZU 21, CWN 4, GHI 4, BL 2.

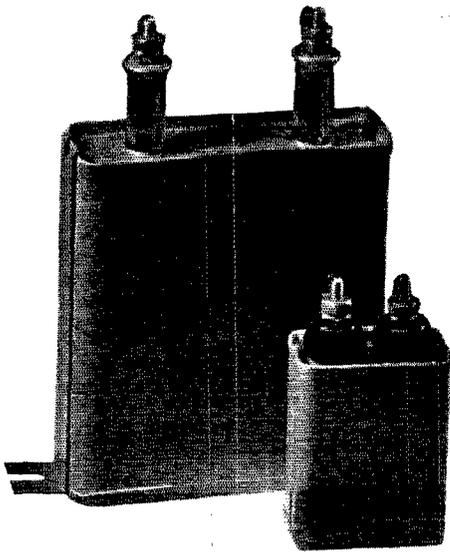
PACIFIC DIVISION

NEVADA — SCM, N. Arthur Sowle, W7CX — Asst. SCM, Carroll Short, jr., 7BVZ, SEC: JU, ECs: OPP, BED, TJY, QYK, JLV, and JVV, RM: PST, PAM: KHU. PGD has a BC-459 on 7 Mc. LGS has a tank rig on 7 Mc. ONG, SXD, and BVZ are on 7 Mc. TZZ went to 28-Mc. c. w. and JLN and CDM to 28-Mc. 'phone. Ex-6FC now is 7ZT in Carson City. JO is running close to a kw. on 7 Mc. TJY is having trouble getting his kw. on 50 Mc. KLK is on 50 Mc. with his kw. rig. LZK has a portable rig in the hospital. LXF has an n.f.m. mobile rig going. TQZ and TJI have new a.m. mobiles on the air. GC and EBF work DX on 14-Mc. 'phone. JLV is on 50 Mc. with a three-element beam, as are TJY, PST, and CX. KCB and BIC are putting on SCR-399 on the air as the State Civil Air Patrol control station. QAY is on 28 Mc. PWE is putting up large antennas. CX has worked 15 states on 50 Mc. KWA works DX on 14-Mc. c. w.

SANTA CLARA VALLEY — SCM, Roy E. Pinkham, W6BPT — Asst. SCM, Geoffrey Almy, 6TBK, RM: CIS, ECs: CFK and TPZ, REF is active in United Air Lines Net on Tuesday at 8 p. m. on 7.02 Mc. The Monterey Bay Radio Club was active in Field Day from Mt. Madonna with twenty club members present. The club also has net in operation on 27 Mc. using BC-659 as mobile rigs. AVJ is building ten-element rotary for 28 Mc. Walt hopes for better DX with this beam. TAN is using n.f.m. on 28 Mc. working DX in very good shape. WNM is moving into his new QTH near Campbell. VIQ has QSY to 3.85-Mc. 'phone for contacts to Los Angeles to keep in touch with his folks. JKN has an 815 running about 75 watts on 50 Mc. Glad to hear you, Red. MLY now has over 100 countries and has applied for DXCC membership. TBK was QRL on a trip to Los Angeles so was not on 28 Mc. for about ten days. The Mission Trails held annual hamfest at the ranch. JTB recently. Everyone had a bang-up time working their portable emergency rigs. 2ISQ/6 is new ORS in Menlo Park. Welcome Jack, and we hope your W6 call comes through as ISQ. SCCARA did good work in Field Day under the able guidance of NX. WUI has returned from his vacation and is back at work as chief operator on station KEEN. Traffic: W6WJM 239, JSB 18, RFF 4.

EAST BAY — SCM, Horace R. Greer, W6TI — Asst. SCM, C. P. Henry, 6EJA, SEC: OBJ, ECs: AKB, EHS, NNS, IT, IDY, QDE, ZB, and WGN. FDR turned in a

(Continued on page 84)



PLASTICON

Plastic Film Oil-Filled

CAPACITORS

1. *More Economical*
2. *Smaller—Lighter*
3. *Better Electrical Characteristics*

1. More Economical

MFD.	Volts DC	List Price Paper Capacitor	List Price Plasticon AOC	Saving
10	1000	\$15.18	\$10.67	\$4.51
1	2000	13.67	9.24	4.43
2	3000	22.78	15.40	7.38
1	4000	33.54	27.50	6.04
2	5000	48.73	41.25	7.48

Above are typical examples.

PLASTICONS are the result of technological advances
 ... cost less to manufacture, give better performance

2. Smaller—Lighter

3. Better Electrical Characteristics

MFD.	Volts DC	Approx. Weight		Approx. Cubic Dimensions	
		Paper Capacitors	Plasticons	Paper Capacitors	Plasticons
10	1000	1.95 lbs.	1.7 lbs.	31 cu. in.	30 cu. in.
4	2000	2.0	1.23	31	23
2	3000	2.0	1.21	31	19
1	4000	1.77	.94	28	19
2	5000	5.2	2.9	70	60

	Paper Capacitors	Plasticons
Power Factor at 85°C 60 cycles	0.7%	0.3%
Resistance at 85°C megohms per Mfd.	40	100
Capacitance Temp. Coefficient 100% at 25°	-40°C = 73% +85°C = 97%	-40°C = 91% +85°C = 103%

PLASTICON CAPACITORS given are Type AOC, mineral oil-filled.
 PLASTICON ASC silicone-filled have better characteristics.
 Paper Capacitors given are chlorinated diphenyl impregnated.



Condenser Products Company

1375 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS

MANUFACTURERS of GLASSMIKE CAPACITORS and HIGH VOLTAGE
 POWER SUPPLIES

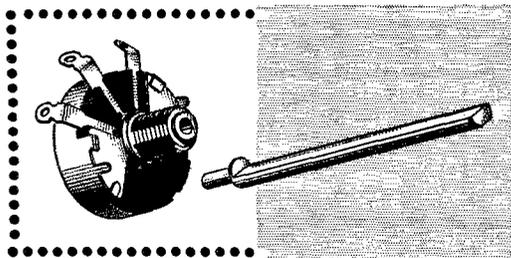


**For Instant
Positioning
Easy Calibration**

IRC CONTROLS with DOUBLE-FLATTED, TAP-IN SHAFTS

Remember the last control you installed in your rig — the tedious filing, tinkering with shaft inserts, tiresome "build-up"? With IRC *double-flatted* tap-in control shafts you avoid all that bother.

With the *double-flatted* shaft you can position for either set screw or push-on type knobs—match knob pointers with dial scale—quickly, easily, accurately the first time. Just insert shaft, calibrate, cut to proper length, and install knob. The whole operation takes just a few moments.



Every standard IRC tap-in control is equipped with the *double-flatted* shaft. And 12 special tap-in shafts provide adaptability for every rig requirement. Specify IRC next time you order controls for your rig. Only IRC offers the *double-flatted* standard shaft for instant positioning and easy calibration. See your distributor—or if more information is desired, write us direct.



**INTERNATIONAL
RESISTANCE CO.**

401 N. Broad Street, Phila. 8, Pa.

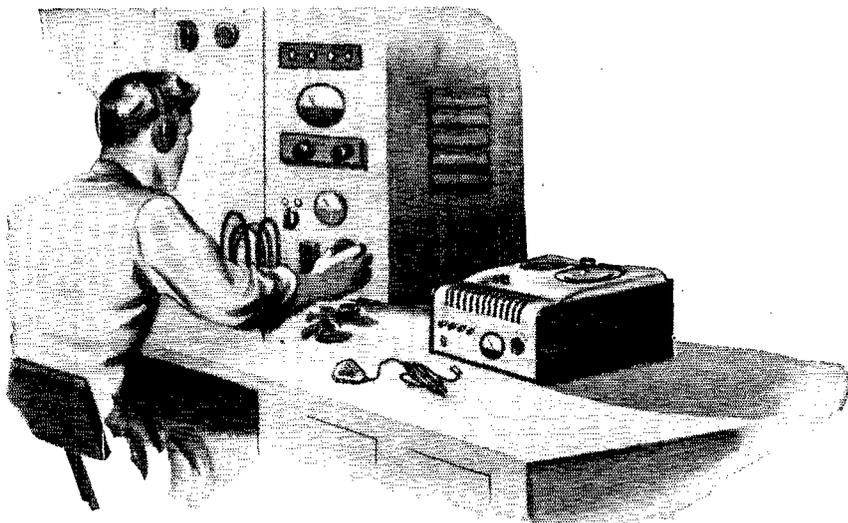
IN CANADA: INTERNATIONAL RESISTANCE COMPANY LTD.,
TORONTO, LICENSEE

traffic report of 1496 messages, the largest turned in since the war. OT, Oakland Radio Club, now is an OBS appointee. EJA reports that the new call of the Richmond Amateur Radio Club is IFZ. YDI is QRL Mission Trail Net, both on c. w. and 'phone. QXN spends 90 per cent of his time handling traffic. CDA hopes to become more active shortly. GEA has new YL operator. VDR reports that the Mission Trail Net needs new members who would like to handle traffic, and that the gang had its hamfest at Coyote on July 3rd, 4th, and 5th and a good time was had by all. ZM made the trip and enjoyed himself. OJW has worked all California counties. SAN has a new Sterbu curtain antenna up for Europe along with one to South America. FXX is using Hertz drive-yourself set-up. DMM is about ready to get back on the air. At the June meeting of the Northern California DX Club, TI was reelected president and PB, secretary-treasurer. MEK was elected vice-president. BUY and WB remain as directors. On August 7th the Oakland Radio Club was host at a gala hamfest in Oakland. After all types of doings the day was finished off with an evening banquet at the Scottish Rite Temple on the shores of beautiful Lake Merrit. There seemed to be more interest than usual this year with the clubs in ARRL Field Day around the bay. Every radio club was doing its part having fun. The SARO gang ran up about 19,000 points, which should place them high on the list nationally. In each issue of QST you will note the ARRL Activities Calendar. Throughout the year the League has planned events in which everyone should take an active part in some way. Let's keep posted and participate. FDR won the Hammond Memorial Bug for the January-June period. This trophy is given each six months to the person in the East Bay section handling the most traffic and reporting it on time. TT and DUB are getting to be super fishermen. Give them a hand for trying; after all you can't catch them all. I think they are better DXers anyway. OBJ is doing an FB job as SEC and spends each week end out in the field. AUT was sent to Washington FBI Academy. He was the only California sheriff to make the trip. Traffic: W6FDR 1496, VDR 93, QXN 56, YDI 48, OJW 20, TI 12, EJA 4.

SAN FRANCISCO—SCM, Samuel C. Van Liew, W6NL—Phone JU 7-6457 CWR is rebuilding his rig for high power. NAO is using plenty of surplus gear. FYY also is rebuilding for more power. IYN is working lots of DX. SLX is using surplus with mighty fine results. AUB is trying out new circuits. The Humboldt Radio Club and friends of the members held a get-together and a good time was had by all. The club now has moved to the YMCA Building, Eureka. ABEY is secretary of the club. MEF will resume operation next October. VW and CHP made a trip to Mt. Hamilton over the Fourth of July week end. The object was to test low-power portable equipment. RBQ has received his WAC Certificate. Bill is working traffic and 144-Mc. 'phone. He has a schedule with Sacramento and Stockton on 144 Mc. ZDXF is visiting in San Francisco and is staying with RBQ. The San Francisco Radio Club had a bang-up Field Day at McLaren Park, San Francisco. Although the fellows experienced some trouble with their equipment they ran up a very good score. They also had a chance to demonstrate their ability as fire-fighters. A grass fire nearly routed them out. The San Francisco Naval Shipyard Radio Club also took part in Field Day on the hills above Daly City. Trouble started before the opening bell when a transmitter and receiver blew up. These were repaired just in time for the starting flag. A good score was run up. One of the generators threw a bearing and stopped the 14-Mc. rig three hours before the finish. Both clubs operated all bands. A great deal of traffic has been handled through the month from the Portland disaster. Many of the boys stayed on the job both night and day. A set-up of the activity of the Emergency Corps has been brought about by the selection of San Francisco as the location for the regional Red Cross radio station. Because of resignations we now have a new Section Emergency Coördinator, DOT, and a new San Francisco Community EC, BYS. The June meeting of the San Francisco Radio Club was honored by a talk and demonstration on "Transmitter Circuit Refinements" by Fran Wells, which was enjoyed by all. The second annual picnic-hamfest of the Golden Empire Radio Club was held June 27th at the Ranchoero Airport at Chico. A good time was had by all who attended. Traffic: W6JWF 70, RBQ 64, NL 18.

SACRAMENTO VALLEY—SCM, John R. Kinney, W6MGC—Asst. SCM. R. G. Martin, 6ZF. SEC: KME. RM: REB. The Mt. Shasta Radio Club will hold its 2nd Annual Hamfest in mid-September. For details see QST Hamfest Calendar and contact CAT. The Golden Empire Radio Club held its super hamfest on June 27th. QXJ took home a VHF-152 and M GCwon a BC-659J to go mobile on 28 Mc. The following Chico members were responsible for the finest hamfest Northern California has yet seen: WYX, GUV, GHG, RHC, ZNU, DHD, WTN, TKE, CKV, YQC, RAQ, PJV, ZFJ, and QEE. For the Sacramento Amateur Radio Club, ZF is the chairman in charge of the radio booth at the California State Fair in Sept., to be held in the Educational Bldg., East End, with a television exhibit and message-handling free throughout the U. S. SEC KME reports that seven stations operated under emergency set-up for 24 hours continuously, using three PE-75Us power

(Continued on page 88)



Record those Good QSO's on Wire

Many other valuable uses too, for a Webster-Chicago
Electronic Memory Wire Recorder in your Ham Shack

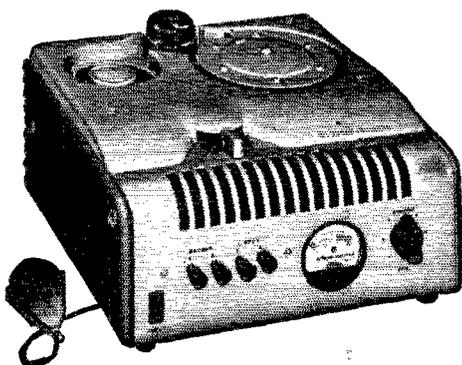
The Webster-Chicago Model 78 Wire Recorder is a real asset in ham radio operation. It takes input from microphone, phono pickup or direct from your receiver. Outputs for external amplifier or speaker. Push button control makes Model 78 easy to operate while you are on the air, and provides all desirable recording, playback, and erasing combinations.

Record your QSO's. Take down those Dx's for some well-earned gloating when the gang is in. Test your modulation levels and the quality of your rig.

Model 78 Wire Recorder is ideal for handling traffic—no chance of error in relaying important messages.

Stop in tomorrow and see the Webster-Chicago Model 78 Wire Recorder. Check Webster-Chicago Recording Wire, too. It is *pretested* for magnetic, physical and chemical characteristics—your assurance of best results.

See Your Ham Supply House



Famous for Webster-Chicago Record Changers and Magic Nylon
 Phonograph Needles



WEBSTER-CHICAGO

5610 W. BLOOMINGDALE AVE., CHICAGO 39, ILL.

the new MEISSNER

Now



as a complete assembled unit

Amateur Net \$99.50

The new and improved MEISSNER SIGNAL SHIFTER is the most versatile and stable equipment available today for dodging ever mounting QRM on the crowded amateur bands.

Recent improvements and exclusive features put the SIGNAL SHIFTER way out in front. Coils are turret-mounted for high electrical efficiency and operating ease. Built-in band-switching is achieved with a six-position switch with no coils to change. New, built-in turret coils, include 10, 11, 15, 20, 40 and 80 meter bands with a blank strip for an additional band when needed. SIGNAL SHIFTER comes completely assembled and tested with self-contained power supply. There's nothing to buy — just plug it into 115 volts AC, and use it to drive your high powered transmitter or as a low power rig. See it at your dealer today or write for descriptive literature.

additional features

Band Switching — Accomplished with six position shielded turret—with complete coverage on 10, 11, 15, 20, 40 and 80 meter bands. Blank positions in coil turret for 20 or 75 meter band-spread or 6 MC coverage.

Stability — Achieved by high quality components, zero-temperature coefficient capacitors, turret-mounted inductors, exclusive MEISSNER stand-by circuit, voltage regulation.

Tuning Control — Single tuning control for the selection of any frequency within band.

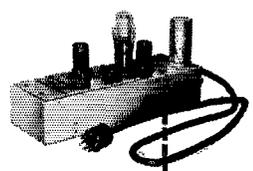
Crystal Control — May be used as xtal controlled exciter for any band (especially desirable for net operation.)

Output — Excess of six watts with 807 loading.

Keying — Two front panel jacks for keying in either osc. or amp. circuit.

Tubes — 6V6GT/G oscillator-doubler, 807 amplifier-doubler.

Power Supply — VR-150 and VR-75 voltage regulators, two 5Y3 rectifiers.



MEISSNER

MEISSNER MFG. DIVISION
MAGUIRE INDUSTRIES, INC. • MT. CARMEL, ILLINOIS

SIGNAL SHIFTER

*available two ways**



in complete kit form

save 50%

\$49⁷⁵

amateur net price



BUILD IT YOURSELF IN AN EVENING!

You'll only have to spend one evening—and a highly enjoyable one at that—to completely build the new MEISSNER SIGNAL SHIFTER!

Complete, easy-to-follow, step-by-step instructions including schematic diagram, a host of photos and pictographs make assembling a joy. In fact, it's so simple the beginning ham would have no trouble following the assembly instructions.

The one difficult job is **already done for you!** The complicated shielded turret assembly is already completely built up, ready to install.

All you need is a pair of pliers, a screw-driver, a soldering iron—and a desire to have a really superlative eco. Everything else is furnished—including tubes—even down to wire and solder!

You'll find it no trick at all to exactly duplicate the peak performance of the factory built model.

Hams, here's your opportunity to own a high quality MEISSNER SIGNAL SHIFTER at a really remarkable low price. At the same time you'll have the pleasure of assembling your own—finding out what makes it tick. Your pride of ownership will be doubled—your costs halved!

*Order your kit at your dealer today—
you'll be glad you did!*

Complete MEISSNER SIGNAL SHIFTER Kit, Part #10-1207.. \$49.75

announcing the new Meissner **PHASE MODULATOR FMX**

Illustrated at left is the new MEISSNER FMX PHASE MODULATOR, designed exclusively for use with the Model EX SIGNAL SHIFTER. The combination of the FMX MODULATOR and EX SIGNAL SHIFTER gives the radio amateur a complete low power phone and cw transmitter at ridiculously low cost. Higher power, up to one KW, can be obtained with a power amplifier driven by the SIGNAL SHIFTER.

The FMX MODULATOR is installed in the position normally occupied by the power supply, lower photo, the latter becoming a remotely located unit. Plate and filament voltages for the FMX are secured from the SIGNAL SHIFTER power supply. Tubes required: 6SJ7, 6SG7 and VR-150.

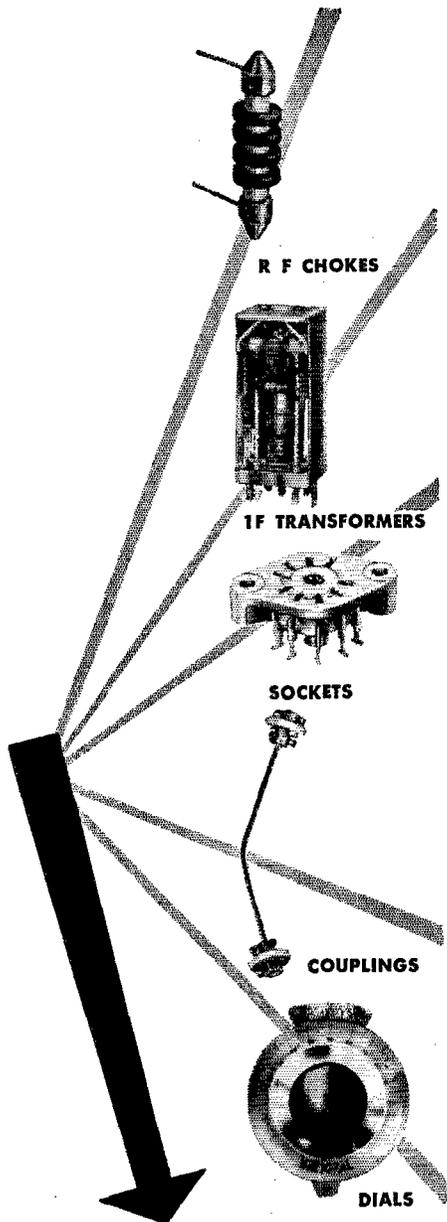
This is another precision-built product, designed by MEISSNER for the discriminating amateur who is satisfied with nothing but the best!

**Model FMX PHASE MODULATOR, complete, less tubes,
Amateur Net \$12.00**

MEISSNER

EXPORT SALES • SCHEEL INTERNATIONAL, INC.

4237 NORTH LINCOLN AVE., CHICAGO 18, ILLINOIS • CABLE HARSHEEL



FREE
the new 1948 catalog of famous
National precision components, parts,
and communication receivers.

WRITE TODAY TO

National
EST. 1914
NATIONAL COMPANY, Inc.
61 Sherman St. Malden, Mass.

(Continued from page 84)

plants, with fifteen operators and six AEC members at Annual Field Day, operated under the call JN. MYL has taken CZB's position in 144 Mc. Net. AF reports that a new club has been formed, the Feather River Amateur Radio Club. The president is MXW, chief engineer of new b.c. station KDAN. Members of the club are: BLW, BHM, VQS, SLS, SHW, DVD, OEX, SLY, KRX, and AF. JDN is new applicant for ORS appointment. AP WACed and WASEd on 28-Mc. phone. During the recent Oregon flood disaster REB worked up a traffic total of 2048. Traffic: W6REB 2048, ZF 56, JDN 10, WTL 4.
SAN JOAQUIN VALLEY — SCM, Ted R. Souza, W6FKL — Asst. SCM, James F. Wakefield, 6PSQ. ONK has full gallon on 7 Mc. KUT has 120 countries confirmed. KAX is new National Guard station for Fresno. JWK has new cabinet for rig. VTS is new ham in Fresno. PSQ is rebuilding. PHL has mobile rig on 28 Mc. EXH is Net Control of a swell emergency net on 148.8 Mc. VPV reports the following on the Stockton gang: AQG and BNV are active on 7 Mc. BHI is attending school in Berkeley. CPT is new ham in Stockton. NDJ has apartment troubles. GJO has new three-element beam on 14 Mc. GHS is active on 3.85 Mc. ILH and his bride are happy in their new house. INP and his XYL, FJF, are building separate rigs. MDQ is keeping 144 Mc. hot, as is OYF. QUE can be found on the Pioneer Net. RLG is opening a 5 & 10 store of his own. TID and ZYN are planning a big hamatorium in Stockton. SAH maintains schedules with Hawaii. UWY still is fighting 300-watt final on 144 Mc. VSI has new Zapp. VKD finally got Nevada for WAS. WHO is building new six-element 28-Mc. beam. The Stockton gang had a fine time on Field Day, as did the Fresno and Turlock gangs. VKR is building 6-inch scope. WHB is experimenting with L.m. GQZ, IVA, and EXH's XYL can be found on 7 Mc. in the early mornings. YGZ takes sound movies of the Stockton fellows' shacks. SMH has emergency-power generator built. ZJQ is suffering from Ylitis. WBZ has fine 3.85-Mc. phone emergency rig in operation.

ROANOKE DIVISION

SOUTH CAROLINA — SCM, Ted Ferguson, W4BQE/SANG — FNS reports the arrival of YL Frances. Hugh now is with Sou. Bell T. & T. EJH and FNS are joint owners of a new kw. The Palmetto Amateur Radio Club of Columbia, under the direction of its president, BZX, and EC, MJT, worked more than 300 stations in the Field Day Contest. CXO is NCS for the South Carolina 3.85-Mc. phone net, 3930 kc., 8:00 p.m. Monday, Wednesday, and Friday. MJR reports activity in two nets, the South Carolina and Cracker. IJR operated 7-Mc. c.w. CXE reports activity on 7 and 28 Mc. DFC has new 500-watt rig on 3.5-, 7-, and 14-Mc. c.w. CZN sticks to 7-Mc. c.w. and EAL Net. DNR says that because of sky wire space it's 14 Mc. for him. CE makes it 3.85- and 28-Mc. phone. ANK is driving for a more active and better coordinated emergency set-up in South Carolina. He is Section Emergency Coordinator and looks for your support. Do you have an Emergency Coordinator in your city? If not, apply to ANK. A nice report was received on the operations of the Charleston Amateur Radio Club, Inc., on Field Day under the direct supervision of the SEC. 445 stations were worked. Traffic: W4ANK 81, W4RJ 63.
VIRGINIA — SCM, Victor C. Clark, W4KTC — Since QST space is limited it sometimes may be necessary to condense reports received. However, let's be sure to use all of our allotted space! Have your club secretary forward monthly news of members' doings. Drop me a line occasionally, or pass the information via radio to any Washington area ham. My phone number is Falls Church 7461. The following attended the Atlantic Division Convention held in Washington in June: KYD, NFG, (3LEM/4), IA, WT, WSM, WI, NNN, KXN, MKM, KPT, RQR, KVM, IWO, FF, 1MV/4, MOJ, LRI, JUV, and QV. LZI is being transferred to KB6. MKM to Connecticut. NNN of VP7NG fame, is joyfully raising antennas at his new QTH in Jefferson Village. KXN, on 14-Mc., shared his 150th country. The following expounded on the Field Day experiences of 3LGM/4, 91L/9, 4KFC/4, 4MOJ/4, 3EIS/4, and 3USA/3 at a recent meeting of the Potomac Valley Radio Club: 4KVM, 3RJS, 4RQR, 4MOJ, 3EIS, and 4NNN. NQV, aged 14, is new. Annandale ham. JFE is trying hard to make DXCC before he is transferred to parts unknown; efforts to date have produced 116 countries worked. 50 confirmed. Virginia hams get around: HLLAE is from Norfolk, ELSA from Phoebus. TA3EAS is none other than 4LIU! KJT, on a business trip to HB, has been pounding the key at HB9AW. NCK passes along the following news from the "tide-water" area: HRP's portable was used by KEK. Peninsula Amateur Radio Club, on Field Day with FB results. NRO is none other than AKN, jr.! MT lost his way en route to KEK Field Day site! KZP is doing well with mobile rig. LWG and MUE landed their first ZL recently. IQQ's 807s went up in smoke during a QSO with Phoebus! KEK (PARC) soon will be in business in its new home at the White Signal Tower at Old Point Comfort, thanks to the efforts of MXY, HPC, and others. NCK QSOed his brother, 1BEU, in Maine.

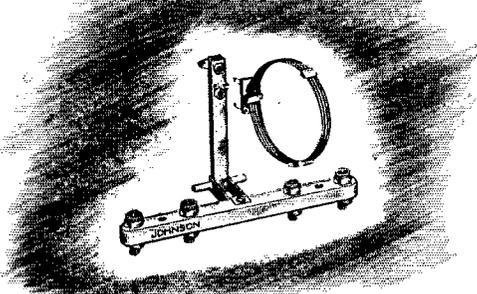
(Continued on page 80)

Now...

IMPEDANCE MATCHING

with **NEW**

JOHNSON PLUG-IN LINKS



Now, for the first time, the amateur can avail himself of matching plug-in swinging links and matching inductors that are built to commercial standards. With the new JOHNSON PLUG-IN SWINGING LINK and SEMI-FIXED LINK SERIES, the days of inefficient compromise are over — attempting to use a single link with any transmission line regardless of frequency or line impedance. The new JOHNSON Plug-In link assembly permits the correct link to be used on any band — not only with JOHNSON inductors but with all conventional, competitive inductor assemblies. Simply plug in a link with the necessary turns to couple your line. Various links are available for anything from 50 to 600 ohms line impedance. Shaft permits front panel control.

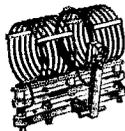
Because of the different JOHNSON Plug-In links that are available, all transmission lines from 50 to 600 ohms impedance can be coupled without any antenna tuning network, if the line is near balance at the antenna feed point. Actually an amateur may require but three links, for this number covers an entire 6- to 80-meter inductor series in one power size. Full range of coupling is attainable from completely "in" to completely "out."

Better Efficiency And Harmonic Reduction

Better efficiency and harmonic reduction are secured through the availability of two fundamental types of inductors for each band — inductors designed for use with either high-voltage low-current tubes and inductors designed for use with low-voltage high-current tubes. Each of these models is available in 150, 500 and 1,000 watt ratings. Also available in all power sizes is a complete line of semi-fixed link inductors.

Coils, jack bar assemblies, swinging link arms, etc., fit present-day competitive components. Buy what you need — all are packaged individually.

See Them at Your Dealer
or Write for
New JOHNSON Inductor
Catalog



JOHNSON

a famous name in Radio

E. F. JOHNSON CO. WASECA, MINN.

WEST VIRGINIA — SCM, Donald B. Morris, W8JM — The KVARA, MARA, and Charleston Radio Club report swell turnouts for Field Day. PQQ schedules F8EO and FESAB Saturdays on 14 Mc. TDJ worked Texas on 50 Mc. and YGL QSOed 5 in Pittsburgh on 144 Mc. ESQ, Rhodes, and JM are converting var surplus for v.h.f. work. VAB, YDO, YBQ, and ASO operate VAB's 1-kw. phone rig from his summer cottage. HUG will assist USWB in the EC Net between Pittsburgh and Cincinnati. JIL works in Ohio River Net regularly. QG and BTW attended Atlantic Division Convention in Washington. 2AFO, 3GEG, 3NCD, 3MKM, and 5KVM visited MARA meeting. REH and KWI passed commercial tests. GBF presented new club charter to MARA. Traffic: W8GBF 31, PQQ 10, QHG 5.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Glen Bond, W8QYT — June was rather a hectic month with Field Day and traffic from the flood area, but everything is back to normal again. SGG, in Colorado Springs, handled quite a few, as DYS was in the hospital in Pueblo the early part of the month. SGG has finished his new transmitter and has pair of 1625s in the final built around a new multiband tank by National and with bandswitching driver. MOM invites all amateurs to join their slow-speed c. w. net. This is a good chance to build up your code speed as well as move some traffic. ECN did some experimenting with a balloon-supported vertical. Everything went fine until someone shot down the balloon with a 22 rifle. LZY sent in one of his QSL cards with his picture on it. In the near future all Colorado amateurs will receive a letter from the Civil Air Patrol asking them to lease their stations to the CAP and form a State emergency net on 2374 kc., both phone and c.w. There is no pay and the lease only applies when operating on CAP frequency. However, crystals will be furnished. AAB has the building bug. Andy is building up another mobile rig, 829B in the final. VGC has his Sonar back and on the air again. JBI is rebuilding both station and beam between fishing trips. VGR is looking for a new QTH. LXM is mobilizing on the East Coast. Ken has just finished a new home. Traffic: W8SGC 69, LZY 19, MOM 8, ECN 3.

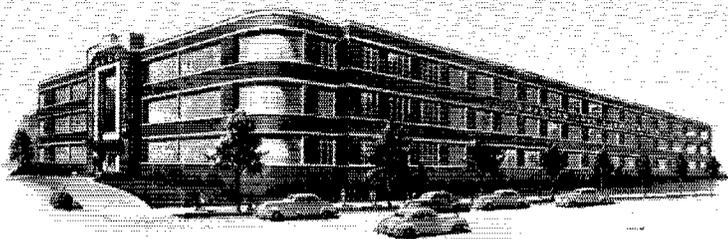
UTAH-BUILDING — SCM, Alvin M. Phillips, W7NPU — TPV is buying a VFO and working 28 Mc. short skip. He also works vacation relief at KLO. LEN reports that PARR is looking for a Utah contact on 14,010 kc. between 0700 and 0900 GMT. LPQ has a Collins VFO. UTM handled a lot of QRR traffic from the Portland flood area. The UARC tallied 2025 points during Field Day. The group operated at Little Mountain and used two 110-volt gas jobs for power. Bands used were: 7- and 14-Mc.c.w., 14- and 28-Mc. phone. This club publishes an FB paper called, *The Microvolt*. JHL is transferring to San Francisco. Many appointments are being cancelled because of failure of appointees to submit their certificates to the SCM for endorsement and for failure of some to send in monthly activity reports to the SCM: RFD #2, Box 381-1, Ogden, Utah. BLE has moved to 1723 Laird Avenue, Salt Lake City. Traffic: W7UTM 379.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GJW — A Your section now has 60 AEC members with additional applications pending. Current operations are on 3715 kc. nightly at 1900 and on 3955 at 1800 CST. The ball is rolling; let's all get behind it! KTP, of Dothan, is recent applicant. MMK is president of the Auburn University Club and informs us they will have a 400-watt rig operating soon. NED, of Florence, reports he is ready with emergency-powered BC-191. MXU is apportioning the greater amount of his time on 7-Mc. traffic. DTV informs us that the Mobile gang is well-prepared with 7-Mc. mobile rigs. BMM has complete station in pick-up truck ready to operate anywhere. GBR and FSU also are emergency-prepared. CJZ is on 3.5 Mc. with a Federal surplus rig. If 144-Mc. enthusiasts will write the SCM, an attempt to coordinate your activities will be made. CYC advises that the Phoenix gang is equipped to operate under emergency conditions. This report has intentionally stressed Emergency Corps activities, and all section stations are requested to affiliate their stations either on a Full or Supporting membership basis. Help us achieve our aim of covering the State with Emergency Corps stations. Traffic: W4MXU 8, GJW 5.

EASTERN FLORIDA — SCM, John W. Hollister, W4FWZ — In line with ARRL policy, your local Emergency Coordinator is the king-bee in emergency work. See him today and let him know what you can do to help. (See East Florida Emergency Manual.) The big news in July was the announcement from BYF, Miami, about the Dade Club, NVU, working out details for carrying official WX reports for interception and rebroadcasting by b. c. stations in line with Florida Assn. of Broadcasters. Stations wishing to cooperate: Write BYF, write your NCS, call on your local b. c. station and WX bureau. This will cover only Official WxBu releases. NVU has teletype facilities for this purpose. This is only one phase of the emergency plans for

(Continued on page 92)



CUSTOM MADE TECHNICAL CERAMICS
for electrical and electronic uses

(SOLD ONLY TO MANUFACTURERS)

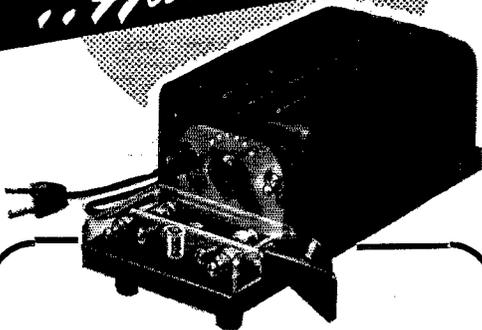
47TH YEAR OF CERAMIC LEADERSHIP

AMERICAN LAVA CORPORATION

CHATTANOOGA 5, TENNESSEE

DON'T ENVY A GOOD FIST

...Have One!



ELECTRONIC MONITOR AND KEY

Flawless CW — smooth and rhythmic as a tape — can now be yours in short order with the new, sensational **MON-KEY!**

Providing you with a short cut to a perfect fist, the **MON-KEY** automatically makes dots — and dashes — both evenly spaced according to their length.

Here's everything you've ever wanted in a key — **MON-KEY!**

FEATURES

- Automatic dots and dashes
- Dashes equal to 3 dots in duration
- Speed approx. 8 to 45 words per minute
- Speed changed instantly with new dial setting
- No weights to adjust
- 3 tubes — 2, 12AU7; 1, 35W4
- Built in monitor with volume control
- Operation, 115 v. AC or DC

Only \$29.95 — Amateur Net, Subject to Change Without Notice

See your dealer today. If he can't supply you, send check for \$29.95 direct to us. We'll make immediate shipment on a Money Back Guarantee.

ELECTRIC EYE EQUIPMENT CO.

6 West Fairchild Street, Danville, Ill.

Manufacturers of specialized electronic devices since 1937.
EXPORT: Rocks International Corp., 13 East 40th Street, New York 16, New York.

East Florida. Again, the nets are: 3675 kc., Tues., 7:30 P.M.; 3910 kc., Tues., 6:15 P.M.; 7290 kc.; Mon.-Fri., 7:00 P.M. BYR reports no emergency nets yet on 50 and 144 Mc. GYO and EID will handle the u.h.f. and v.h.f. in the northern end of the State, possibly with Orlando. Probable link into Jacksonville will be on 7290 kc. via DFU. Miami Red Cross and Dade Club are on a highly cooperative basis for emergency work. Jax: K4NAR is setting the pace on 14 Mc. with well-designed "V" beam and only 55 watts. Jensen Beach: VWL, ex-9VWL, and XYL NGE, ex-9ZTY, now are located here and want to join in with the gang. 14-Mc. c. w. DX is their meat. Brooksville: MNT schedules KS4AH on Thursdays. MNT now is EC. Miami: IYT reports 108 toward DXCC with 76 confirmed. MKP is rebuilding, but as ANCS Gator Net finds time for nice traffic score. *East Florida News Letter* readers: IQV is unable to continue as publisher. His radio activities are curtailed because of business pressure. A volunteer is wanted. Traffic: W4ES 66, MKP 43, BYF 20, MNT 13, IYT 10. BXL 7. BT 4.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DAO. RM: AXP. SEC: ACB. RM: AXP. BGI built a new converter. NFM built a new rig. KYJ works into Pensacola on short skip. LRX, NAA, and FOX are heard on 7 Mc. by the Pensacola gang. NJC is new Panama City call. FJM went to 28-Mc. 'phone. COS runs 300 watts to single 813. ACB is building 50-Mc. rig. JBJ is building for higher power using a pair of 813s. JV made WAZ. NGS, NFM, and NOG visit NDB frequently. NDB made WAC and WAS. New officers of the PARC include: EQR, pres.; HIZ, vice-pres.; LCY, secy. MSX reports the Crestview fellows, including NAA, JBH, and MSX, are eager to organize an emergency net for their section. CDE renewed ORS appointment. MS and EGN run schedules with J stations on 14-Mc. 'phone. BFD changed from n. f. m. to a. m. DZX has new QTH in Pensacola. NJB has new three-element beam. NOX and NGU are new Pensacola calls. Traffic: W4AXP 8.

GEORGIA — SCM, Clay Griffin, W4DXI — SEC: BIW. PAM: BOL. The Cracker Net had its annual meeting at Cochran, July 4th, with about 40 present. A good time was had by all. The Atlantic Club, with 12 operators, operated at Roswell on Field Day and made over 500 contacts on all bands. BIN has moved to Decatur. BTI met with local Red Cross at Marietta. LXE is new EC for Macon area (Bibb County). 5NVK, from Oklahoma City, is in Macon on 7-Mc. c. w. NLK is new ham in Emanuel County. LNG operated portable in Michigan on 50 and 144 Mc. during June and July. Thanks to CYC, of Phenix City, for the following Columbus news; VX has finished a three-element wide-spaced 14-Mc. beam. DDQ is putting up a three-element 28-Mc. beam. GKI finished rebuilding his transmitter. GTG operated portable in Phenix City on Field Day. AYF has a five-element 28-Mc. beam. IZV is station operator for K4NAL in Columbus.

WEST INDIAS — SCM, Everrett Mayer, KP4KD — AM worked OK, Z8S, VQ5, ZP8, and VS7 for new 28-Mc. 'phone countries and made his WAC. Roger received his 28-Mc. 'phone WAS Certificate. HR, AM's XYL, worked LU, ZP, and PY for three new countries and has 40 KP4s toward WPR-50. AY reports lots of DX, including ZD4, ZEL, EL7, VS7, and KJ6, with 600 watts to p. p. 813s. WIFTY/KP4, in San Pat, is active on 14 and 28 Mc. The SPRAC elected the following officers: ES, pres.; BQ, secy.; CI, treas. BQ has new three-element beam. ES has windmill tower three-element 14- and 28-Mc. beam. The PRARC had Field Day set-up at CK/CL country QTH operating KP4DV/KP4 with JA's gas-engine plant. DV's 50-watt 14-Mc. rig, and KD's 25-watt 7-Mc. rig, 142 contacts were made. BL, DV, and KD did most of the brass-pounding, assisted by DU, BJ, and CH. JA was chief engineer of the power plant. Reporters were AM, HR, AY, and WIPPT/KP4.

CANAL ZONE — Both Atlantic and Pacific Chapters of CZARA are operating code and theory classes. The Pacific Chapter has fifty students in a code and theory class; the Atlantic Chapter is packing them in with Signal Corps basic theory educational films. AU, AX, AY, BL, BN, ED, GD, PA, SW, VB, and WG are among those with full 28-Mc. 'phone schedules. PF is our first high school student to get his ticket. VB is a medic at Gorgas Hospital. BD and CG are back from Stateside leave; ED has an eight-element stacked beam on 28 Mc. While FB is on leave AU is keeping his transmitter warm. FA is on the air day and night with lots of 'phone traffic. BH is fighting bugs in his modulator. AX, MB, and AW are rebuilding and stringing new skywires for renewed attack on 7-Mc. c. w. AK, AW, and XJ are sticking to 14-Mc. c. w. DSO issued new and revised amateur regulations for C. Z. FS has your copy if you have not received one.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Vincent J. Haggerty, W6IOX L — Asst. SCMs, W. J. Schuch, 6CMN, and Irvin O. Hege, 6RYW. Attention, AEC members and ECs in particular: Roy Brady, UXN, 618 E. Buckthorne, Inglewood, is our new Section Emergency Coordinator. Send your reports on AEC matters to him. The YL Club of Los Angeles

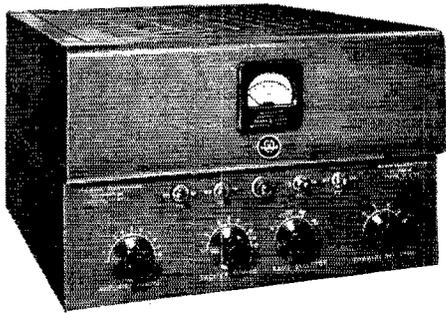
(Continued on page 84)



Transmitters

BY **STANCOR**

FOR AMATEURS
who want the best!



STANCOR'S ST-202-A TRANSMITTER

A compact, 100-125 watt CW transmitter operable on the 10, 11, 15, 20, 40 and 80 meter bands offering a high degree of flexibility through use of a novel band-switching exciter circuit, an efficient RF amplifier using plug-in coils, selection of six crystals frequencies and ease of adjustment. Adequate excitation on all bands is provided for the amplifier tube of which there is a choice among five triodes. Contains two separate power supplies. For radiotelephony, either amplitude or frequency modulator applicable.

Supplied as a kit with all constructional components, prefabricated wiring cables and detailed instruction manual.

AMATEUR NET PRICE in kit form, less accessories **\$92⁸⁰**

STANCOR'S ST-203-A MOBILE TRANSMITTER

This small AM transmitter functions on the 10 and 11 meter bands either in a mobile installation or at a fixed location. A special mounting arrangement for the car makes it quickly removable for use elsewhere. Power applied from suitable AC or DC supply to suit mode of operation. Amplifier plate input with 500 volt supply—27.5 watts.

Other features—"Press-to-Talk" operation, two-channel crystal switching, and self-contained antenna changeover relay. Designed to work with accessories available at low cost. Chassis copper-plated for electrical efficiency and finished in durable silver-grey hammertone.

As a kit all constructional components are furnished along with prepared lead wires and comprehensive instruction manual.

AMATEUR NET PRICE in kit form, less accessories . . . **\$44⁷⁰**
 Also available completely wired and tested, less accessories **\$58⁹⁰**



Visit Stancor's booth at the 1948 National Convention of the ARRL in Milwaukee Sept. 4th, 5th and 6th.

SEE THESE STANCOR PRODUCTS AT YOUR DEALER OR WRITE DIRECT FOR DESCRIPTIVE LITERATURE



STANDARD TRANSFORMER CORPORATION

Electronic Division

3574 ELSTON AVENUE • CHICAGO 18, ILLINOIS



**YOU, too,
may EARN
\$3,000 to
\$7,500 a year**

I can train you to pass your FCC License Exams in a few short weeks if you've had any practical radio experience. My time-proven plan can help put you, too, on the road to success. I'll send you the entire story free of charge. Just fill out the coupon below.—*Edu. H. Guilford, Vice-President.*

**GET
YOUR**

**FCC COMMERCIAL
RADIO OPERATORS'
LICENSE!**

Add the FCC license to your ham experience and you can fill broadcast jobs that pay from \$3000 to \$7500. You can get your FCC ticket in a few short weeks by using CIRE simplified training and coaching methods at home in your spare time. Get the full story now. Fill out the coupon below.

Look what Broadcast Men Earn

(Average Pay Reported by FCC Nationwide Survey)

Position	Big Stations	Little Stations
Transmitter Engineer	\$4800	\$3000
Studio Engineer	5000	3650
Chief Engineer	7700	4300

Get these 3 FREE



**MAIL COUPON TO GET
THESE FREE BOOKLETS**

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
QT-9, Terminal Tower, Cleveland 13, Ohio

I want my FCC commercial ticket. Send me your FREE booklet, "How to Pass FCC License Examinations" (does not cover exams for Amateur License) as well as sample FCC-type exam and Catalog A showing opportunity in growing field of radio electronics.

Name

Address

City State

Veterans check for enrollment information under G.I. Bill.
NO OBLIGATION — NO SALESMEN

took to the broadcast band on June 18th when the "Salute the Ham" program was aired from KUSC's f.m. station. Several of the girls gathered at stations UFA, TDL, NZP, and WQK and their voices were picked up on 3.85-Mc. phone at KGC-6, where NAZ was mistress-of-ceremonies, and from whence the program was relayed to KUSC. New officers of the YL Club are: UHA, pres.; CBA, secy.; and BIS, treas. YXI, ZYD, and AWW were visitors from San Diego's YL Club. Congratulations to the WSW/WSW menage on the advent of a YL jr. operator. NAZ had her ORS ticket transferred from W2 to this section. BCT reports the Two Meter and Down Club went 9000 feet up Mt. Baldy on Field Day to operate ZUX on 144 and 420 Mc. MVK says the Metropolitan Club had a well-organized Field Day under MBA. ZOL looks for more daylight work on 3.5 Mc. PQT has a new beam and a kw. on 14 Mc. OHM schedules IDNY daily. IWU operated portable at a Boy Scout camp during July. MU is new vice-president of the Metropolitan Radio Club; Barney says he is fixing his shack for big activity this fall. VGA has a BC-810E on 14 and 3.85 Mc. JBO works DX with 20 watts. More power to him! ATC is new call of ex-80FC. CTS is a new ham. CMN says vacationing slowed up his radio activity. He visited the SCM during his vacation. DDE also visited the SCM and subsequently inveigled IOX into a 3.85-Mc. QSO. MYH is putting 28-Mc. mobile rig in his car. LKF is EC for northern SLO County and CTJ is his assistant. Paso Robles Radio Club Field Day operators were LKF, CTJ, MSG, HFY, FYW, ZND, EGC, and YCZ. AM is erecting a 95-degree rhombic antenna 1380 ft. long and 480 ft. wide to be aimed at Miami, Fla. The Florida boys may dive for the storm cellars when Don's signal hits their receivers hereafter. WOO and QAE did some traffic work. KEI has a 2500-watt power plant available for emergency work. YSK got an OO appointment, works 28-Mc. mobile, and schedules his brother, JDV, on 3.85-Mc. phone. AMD worked some traffic but didn't report his total. DGN is on 7 and 14 Mc. in Santa Barbara and has been handling traffic also. How about a report from you non-reporting traffic handlers? Reports from all active hams are welcome. Just drop a card to the SCM at the end of each month. The Santa Barbara Amateur Radio Club took to the hills for Field Day. It didn't set the world on fire in the matter of a score, but some invaluable experience in operating and traffic procedure was gained by the operators who participated. AOA had RM and OBS certificates endorsed, runs traffic schedule with WIAW Thursdays and Fridays on 14 Mc. and is assisting PAP on ARRL convention publicity. CHG is working for WAS. BES awaits CD Parties. DGA will be on shortly with 350 watts c.w. Traffic: W6IOX 445, CMN 139, DDE 134, RXT 111, FYW 30, AOA 26, AM 14, WOO 11, QAE 9, BES 4, KEI 4, YSK 3, ZOJ 1.

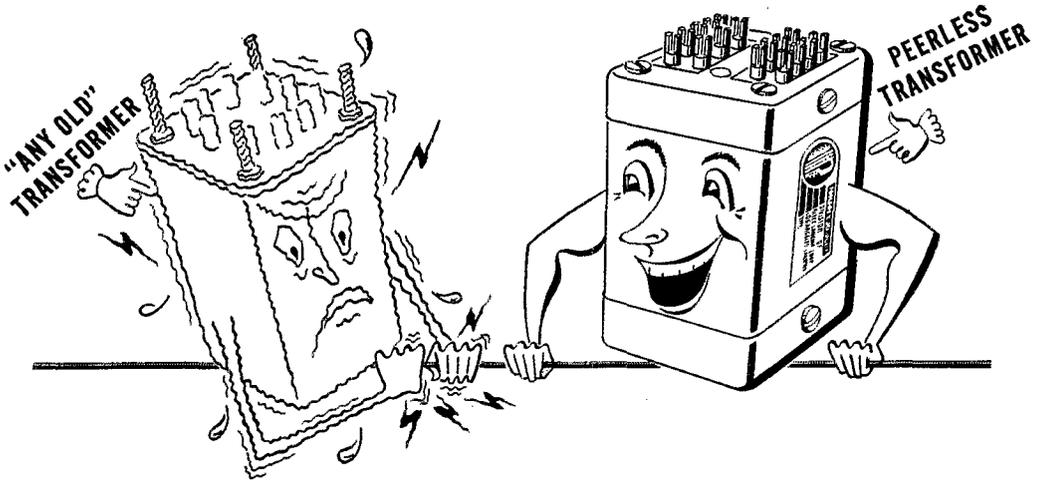
ARIZONA — SCM, Gladden C. Elliott, W7MLL — LAD has a new three-element beam on 40-ft. pole. LPK, in Tucson, worked MII, in Casa Grande, on 28 Mc. and MGM, in Tucson, worked MES, in Ft. Huachuca, on 28 Mc. YNJ/6, located in Tucson, is on all bands. The Tucson Clubs had a staff of 35 operators for their four transmitters for Field Day and used the call KWW. UMG has 125 watts on 28 Mc. JMQ is still working ZLs on 3.85 Mc. TZW, KAC, MAM, MEK, and MII are on 28 Mc. KQR has a vertical three-element 28-Mc. beam on a 65-ft. pole. SGG operates 2 wats 28-Mc. mobile. 50-Mc. stations active in Arizona are MWQ, QLZ, UPF, QAP, OWX, LQK, LHI, FGG, UPR, and JXL. New Tucson hams are MKK and MKY, both active at D-M Field. OIF and 7 operators worked Field Day on 3.85 Mc. from Seven Springs. The Arizona gang reports many contacts with LUK at ZPIX. MIO has a real husky 3.85 Mc. signal at Pinetop. MJD is a new call in Phoenix, and is on 3.5- and 7-Mc. c. w. JIY is on 28-Mc. phone. KFS has a new 500-watt final. LQB and LWQ are on 7-Mc. c. w. LOJ has a new HT-19 and JFG a new HT-9. LZA has a new NC-183. MFG and LLX are on 28-Mc. n.f.m. UPR is operating 3.85 Mc. at Don Luis. Traffic: W7LPA 51.

SAN DIEGO — SCM, Irvin L. Emig, W6GC — Asst. ACM and SEC, Gordon Brown, 6APG. RM; BGF. LYF has been reappointed ORS. DEY schedules 7MKW weekly on 7 Mc. CGF and BVA are ready to go on 420 Mc. MMO is running 200 watts on 144 Mc. to a 32-element array. FMJ, WNN, and GC received reports on May F. M. T. BAM reports Orange County Club now meets once a month during the summer. PG revamps old 160-meter transmitter to operate on 28-Mc. phone. WKO, operating portable from Mt. Frazier, worked INP and PJF in Stockton, a distance of 250 miles on 144 Mc. The 144-Mc. EC Net is going strong with ABD, coordinator, and BLK, BJK, EDJ, NQV, WU, EOP, KD, NBJ, YXM, DBW, PNW, ANQ, PLF, MNO, APG, BWI, AGN, ZBK, TIX, and GRD regular members. The Southern Border Net (3550 kc. daily at 9 p.m.) is now sending in traffic and activities reports via radio. Members are BAM, BGF, BKZ, CNT, CQP, FR, LYF, VTS, ZSF, WXW, and DBZ. The San Diego YLRL members were well represented during Field Day by YXI, AWW, BGC, ZYV, BCU, AQL, ZYD, and BLF. The Imperial Valley Amateur Radio Association's Ham Gram, one of the best club publications in the section, reports many helpful hints as a result of Field Day experiences. New calls CQW, CNZ, BSP, and DED were heard operating on 7 Mc. Heard on 7 Mc. were EAR, DLN, WOP, and KNL. WHW is active on 144 Mc.

(Continued on page 96)



For the best...
look west
of the Rockies



when others groan and sweat
Peerless transformers
EASILY CARRY THE LOAD!

What's the good of gambling on transformers that overheat and overstrain in carrying the load for which they are designed? Peerless transformers carry the load easily — because Peerless doesn't overrate its product! When the Peerless "specs" say the transformer will meet the rating

— the Peerless transformer *will* meet the rating — with power to spare! No wonder hams are saying — and saying it out loud! — "Make *mine* Peerless!" (That's what a lot of the leading contractors for the Army and Navy are saying, too!)

**PEERLESS ELECTRICAL
PRODUCTS DIVISION**

6920 McKinley Ave., Los Angeles 1, Calif.

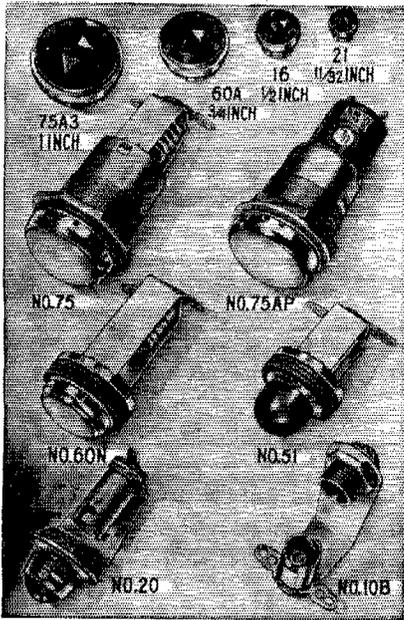
Frazar & Hansen, Ltd., 301 Clay St., San Francisco 11, Calif.
Exclusive Export Agent





PILOT LIGHT ASSEMBLIES

WILL BEAUTIFY YOUR INSTRUMENT PANEL



Give your instrument panel that professional look with *Drake Jewel Light Assemblies!* These highly finished glass jewels and bull's-eyes, attractively mounted in polished chrome-plated holders, are exactly the same as those used by leading commercial manufacturers throughout the country. Efficient, good-looking, well made—*Drake Pilot Light Assemblies* will give you the best in performance and, at the same time, real pride in the appearance of your panel.

Ask your local jobber to show you the big Drake line. If he doesn't have a complete stock, write us for Catalog Q — just off the press.

Socket and Jewel LIGHT ASSEMBLIES

DRAKE
MANUFACTURING CO.
DEPT. Q, 1705 W. HUBBARD ST., CHICAGO 22

LVN has new 10-over-20 on tower which is slowly sinking into the ground. The following clubs reported to the SCM via radio on Field Day: Helix Club, Palomar Club, San Diego Club, and the FAETUPAC (Ream Field) Club. VCD is rebuilding for all-band operation. NA is holding schedules on 3.85-Mc. 'phone with Catalina Island, 8CCX/6, operating on 7 Mc., is representing the GE Company in this area on 10-cm. equipment. Traffic: WLYF 51, BGF 24, WXW 18, VTS 12, GC 10, BKZ 8, FMJ 8, K6MNC 8, W6BAM 4.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, N. C. Settle, W5DAS/MNL — Asst. SCM, Joseph Bonnett, III, SEC: JDZ, RM: CDU, PAM: ECE. Your SCM wants every ARRL appointee to send him a card listing his appointment and advise whether or not he wishes to keep same. NUX is on 14 and 3.85 Mc. with ART-13. LGY never fails to send in a report from Sulphur Springs. He says a new ham there is OLD. NWY had the highest honors at ETSC, a four-year average of 94.49 per cent. KUP is building a grid dip oscillator. IXP, in Burnett, is on 28 Mc. CJJ is head of Northeast Texas Net Sundays at 8:00 a.m. AJ is on 3.85 Mc. in Longview. KUJ has HT-9 on all bands. LOI has 100 watts and passed Class A exam. DAS has been building a new shack. If you are not a League member, better send in your application today. IYJ is editor of East Texas Club's paper, *The Radiator*. This contains some good dope so don't miss it. HAJ is very active at Troupe, The Caravan Club, a mobile club, boasts 35 members with mobile rigs and all are on 29,150 kc. It costs \$5.00 to join and you must have a mobile transmitter operating in your car. See DXR, or EDW, or JQY, or your SCM if interested. A mobile transmitter will tide your amateur radio through the summer. Everybody had fun at the convention, attended by a fine group of hams in Houston. Your SCM has tried to do a good job during the past two years and has met lots of good radio amateurs. If we can help you in any way let us know. See you on the air.

OKLAHOMA — SCM, Bert Weidner, W5HXI — Asst. SCM, George Bird, 5HGC. SEC: AST. RM: IGO. OLZ and Oklahoma Emergency 'Phone Nets are operating on regular schedule, although attendance is not so good during the summer months. IGO is on the Federated Net System and had to have a new mill. GVS is rebuilding for more power. HGC is very much occupied with Naval Reserve Nets. AHT visited OCARC to explain and help organize emergency nets. HXM handled emergency traffic to the Hydro Flood area. The Oklahoma A. & M. Amateur Radio Club now is affiliated with ARRL. A representative from West Hartford will visit Oklahoma City after the Houston Convention. Watch for the special meeting date. Traffic: W5MDZ 153, AST 86, NMM 77, KDH 14.

NEW MEXICO — SCM, Lawrence R. Walsh, W5SMA — SEC: ZM. RM: HJF. PAM: FAG. The following took part in Field Day activities: Sandia Radio Club, MPZ, Albuquerque, had 15 operators and 6 transmitters on Cetro Peak; N. M. State College of A. & M. A., GEM, had approximately 17 operators and 5 transmitters; Santa Fe Radio Club had 7 operators and 3 transmitters; Los Alamos Radio Club, MYQ, had 11 operators and 7 transmitters. In addition, NSZ was heard on 7 Mc. LZA and MYI, at Santa Fe, have two-element beams on 28 Mc. FAG is building a three-element wide-spaced 14-Mc. beam and a five-element beam for 28 Mc. ELL, Albuquerque, is working EWU, Sandia Park, cross-band 50 to 144 Mc. with a 3000-foot mountain between them. MYP has a new four-element beam on 28 Mc. LGS has 102 countries now. JYW reports that ISW is back in Hobbs working 28-Mc. 'phone. URB now is in Hobbs working 28-Mc. 'phone. Joe has been doing all right by himself with 3 new countries in one week. NJR is holding bi-weekly schedules with 9HQA, BIW, and XYL, DRA, VDM, and OMT are active now from Las Cruces. KAO had an average error of 39 parts per million on recent Frequency Measuring Tests. Traffic: W5NJR 3, MPZ 2, MYQ 2.

CANADA

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — SEC: M. FQ. EK submitted a score of 1120 points covering his Field Day operation. DB reports a visit from W3CKI. MZ's QTH turned out to be a Mecca for the Halifax gang in search of surplus gear. ET has turned his attention to the low-power 3.8-Mc. 'phone rig now that 28 Mc. is not so good. BC and OW are on 3.8-Mc. 'phone and work out quite well with low power. DQ has been putting the Lazy Man's Q5-er through its paces during contacts with 8NB and 8OE. QZ has been snagging some DX on 14-Mc. 'phone while keeping one eye on 50 Mc. The 3.8-Mc. boys will regret to hear that GR is confined to the hospital. CR has been putting out a swell 'phone signal on 3.8 Mc. New calls in this area are WL, WO, WI, WQ, WM, WK, and WU. DP recently appeared on the 'phone net. OL is a new ham in Fredericton. From the *LCAEC Bulletin* we note net frequencies as follows: Mondays 7:00 p.m. ADT, 3835, Maritime; Tuesdays 7:00 p.m. ADT, 3803, Fundy. BG is a

(Continued on page 88)

8224

8223

8222

8205

8209

8204

8216

8225

8235

TRANSMISSION LINE CABLES

Every Type for Every Service

Sold Exclusively Through Recognized Wholesale Distributors

8210

8226

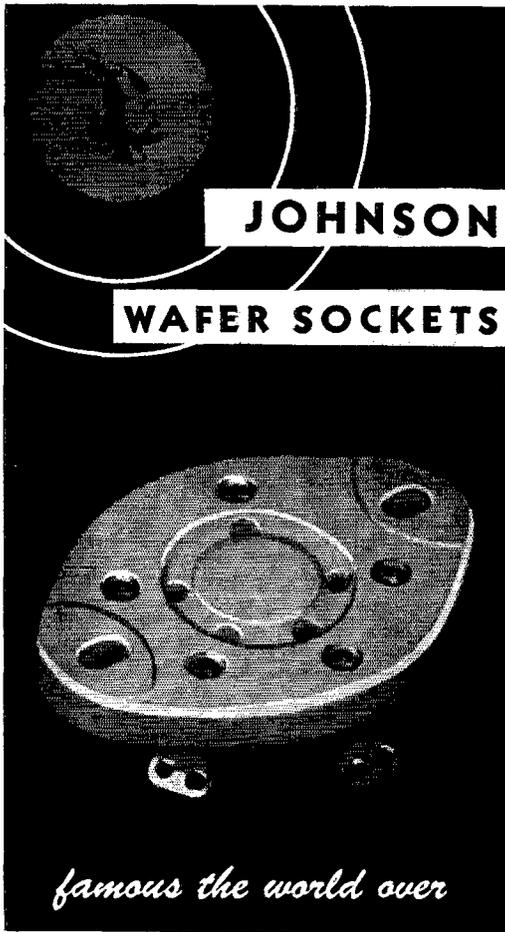
8227

8229

8228

Belden

Radio WIRE



Exacting users prefer JOHNSON wafer sockets because they are insulated with grade L4 streatite or better, top and sides are glazed, the underside is impregnated against moisture. Contacts are brass with steel springs, cadmium plated and are mounted against phenolic washers in molded recesses to prevent movement. Rivets are countersunk and mounting holes bossed to permit sub-panel mounting. Locating grooves facilitate tube insertion.

Illustrated above is the 122-225, a 5-pin socket which can be used with such tubes as the 807.

Additional Types

- 122-224, 4-pin for tubes such as the 812 or T40
- 122-226, 6-pin for tubes such as the T21
- 122-227, 7-pin medium, for tubes such as the RK34
- 122-217, 7-pin small, for tubes such as the 6A7
- 122-228, octal, for tubes such as the 6L6 and 815

▶ Also available are Giant wafer sockets for transmitting tubes, of 5 or 7-pin bases, sockets incorporating a base shield, and Super Jumbo 4-pin base sockets.



JOHNSON

a famous name in Radio

E. F. JOHNSON CO. WASECA, MINN.

member of the Canadian Authors Assn. The Yarmouth ARC, HN, used a 19 set powered by gas-driven generator for Field Day operations. Have YOU sent in your LARGE envelope to FQ for those DX cards! Traffic: VE1DQ 52, FQ 17, MZ 4, DB 2.

ONTARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — I wish to take this opportunity to thank all who helped make the Ontario section one of the best, and trust that you will give my successor the same support you have given me during the past two years. The Hamilton Club had a good time on Field Day with 583 contacts, using 7 transmitters and 27 operators. The London Club also had an FB week end but did not make many contacts. The Windsor Club also made a big comeback on this year's Field Day. Plans are under way for an emergency net in Essex County, and also an Ontario emergency net. APS is bothered with electric razor QRM, but manages to keep BN schedule. The following news came from BBQ, Kirkland Lake: BBQ got delivery on Hallcrafters HT-18 VFO and went out and worked VK, ZL, KH6, ON, OK, I, VP, LU, VS6, PA, G, F, and all VE districts except VE4. Ex-4NH now has the call 3BXO. ANH has pair of 814s with 4-kw. on 14 Mc. BNI, BBU, and BFS are on 7-Mc. c.w. PH now modulates amplifier for the new church organ just behind his home. AZZ is going strong on 14-Mc. c.w. PA keeps daily schedule with VESOB. BJE has brand-new plumber's delight. BGI still QRMs PH next door. ANK has converted Bendix. ALU is new Beaver Net member. The Kingston Club had 182 QSOs in Field Day for a score of 2034. WK schedules W6QXO and VE2BB. BUR is handling Michigan traffic. NI is busy on 3.85-Mc. phone. The Beaver Net still is functioning. FQ, GB, and YJ are using n.f.m. on 3.85 Mc. HI is working plenty of DX with his new Hammond beam. Three new Emergency Corps members in Peterboro are AMM, BRC, and BXE. Don't forget to send the next report to Thomas Hunter, jr., VE3CP, 1774 Westcott Road, Windsor, Ont. BCNU on 3.5, 7, and 14 Mc. Traffic: VE3ATR 51, APS 44, CP 28, DU 25, BUR 21, VD 15, WK 10, BCP 8, NI 3.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GL — This report is submitted from Mont Joli, where the SCM is on business, so only a few of the reports have caught up with him. BB continues active on 7-Mc. c.w. but reports activity slowed down during the summer. By the time this appears conditions will be more suitable for hauning and BB will welcome your application for ORS appointment. WILM visited BB, LO, and TM. XA and HH are now located in Dorval. VE1AQ has located an abode in Nitro and is awaiting his VE2 call. OL spends a bit of time on 7- and 14-Mc. c.w. but gets a lot of QRM from the business end of a rake. Field Day week-end weather was exceptionally fine and from all accounts resulted in one of the most active Field Days in VE2 history. Next year the boys want to make it even bigger, so now is the time to start rebuilding and building the portable rigs. VB is located in Mont Joli and is building a new rig. We are saddened by the death of BV, who will be missed from all the contests. LZ continues to hold up his end of the Quebec Phone Net and your SCM and ZO had the pleasure of visiting him and enjoying a QSO with XX, who handled traffic to their respective XYLs.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VE6MJ — Alex Reid, VE2BE, spent four days in Edmonton in his official capacity of CGM. A very successful meeting was held during which Mr. Reid outlined many of the problems confronting the Canadian amateur. His visit was very much enjoyed by all. He also visited Medicine Hat and Calgary. BG, GB, and MJ attend summer camp with RCAF at Gimli, Manitoba. MJ had the call 4UJ while there and passed traffic for the boys in camp. LQ succeeds HM as Assistant CGM. EY and WS have rebuilt rigs into new metal cabinet. BW moved his place of business to new and more spacious quarters. WB spends much of his time in the air as pilot instructor. JP rebuilt VFO. We are pleased to hear that his XYL is very much improved after spending some time in the hospital.

PRAIRIE DIVISION

MANITOBA — SCM, A. W. Morley, VE4AM — Thanks for the honor you have given me in reflecting me SCM. With your help we can make this section tops. How about it? Highlight of the month is GQ's DX work on 50 Mc. Minto worked 32 stations on openings of June 14, 15, and 16. Both East and West Coasts were worked with 30 watts and a vertical dipole. DG and EA put the section on the map on Field Day. This is the first time Manitoba has had a completely portable rig operating in the event. Congrats, Doug and Frank. EH is back in Manitoba and soon will be
(Continued on page 100)

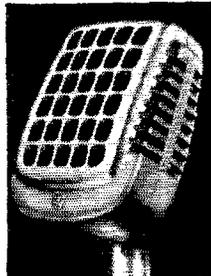
"WHEN YOU CALL *CQ*-YOU'LL GET THROUGH" WITH THESE DEPENDABLE SHURE MICROPHONES...



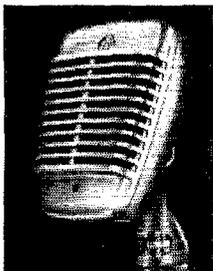
Model "718A"

The "VERSATEX," versatile Crystal microphone, features high-output, maximum speech response, moisture proof Crystal, shock proof Plastic case, R-F Filter. Eliminates mechanical noise pickup. Ideal for Ham communications. Also fine for recording and low cost P. A. systems.

The "MONOPLEX," the only super-cardioid crystal microphone. Has high-output, wide-range frequency response. Perfect for Hams who want the extra "push" that insures a "strong" voice. Features high-quality performance at low cost.



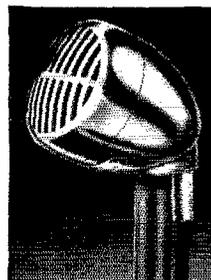
Model "737A"



Model "51"

The "SONODYNE," high-output dynamic microphone with wide-range frequency response. Has moving coil unit. Features a Multi - Impedance switch. A rugged unit with high sensitivity, yet perfect for Hams in high temperature and high humidity locations.

The "ECONODYNE," an economical high-output dynamic microphone with wide-range frequency response. Ideal for Hams who require good performance at low cost. An outstanding buy for any Ham.



Model "52"



Model "55"

Multi - Impedance "UNIDYNE." A high quality super-cardioid dynamic microphone for Hams whose rigs are rigged for dependable performance, even under difficult conditions. Has same mechanical properties as Model 556, except for vibration isolation unit.

Multi - Impedance "BROADCAST" dynamic microphone. The perfect microphone for the veteran, experienced topflight Ham who wants only the best in communications equipment. Features a vibration-isolation unit. Eliminates feedback. Random noise reduced 73%.



Model "556"

Other SHURE Microphones and Phonograph Pickups are illustrated in the new SHURE Catalogs. Write for catalogs No. 159 and 160.

Patented by Shure Brothers and licensed under the Patents of the Brush Development Company

SHURE BROTHERS, INC.

Microphones and Acoustic Devices
225 W. Huron St., Chicago 10, Ill.
Cable Address: SHUREMICRO

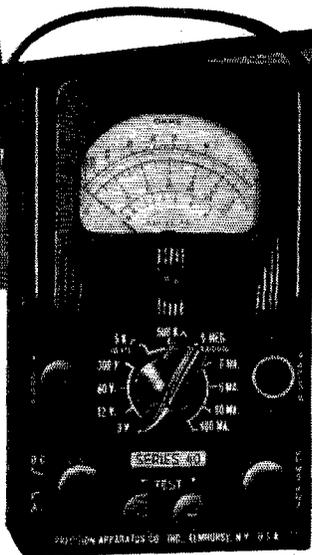


a Pocketful of
PRECISION



Series 40

**Compact Wide-Range
Circuit Tester**



**Self-Contained to 6000 V
5 Megs, 600 MA, + 70 DB,
with full size 3" Meter**

Complete with bat-
teries and test leads.
Net Price \$24.75

In custom molded carrying case, Series 40 is ideally dimensioned and engineered as a portable, compact test set to withstand the hard usage of amateur radio, servicing, production test, etc.

Series 40 offers features and components as incorporated in "Precision's" larger test sets, including: Rotary Selection — 1% shunts and multipliers — heavy duty insulated pin jacks — large numerals, easy reading meter.

ALL RANGES ARE SELF-CONTAINED

RANGE SPECIFICATIONS

- ★ 6 A.C.-D.C. & Output Voltage Ranges:
all at 1000 ohms per volt.
0-3-12-60-300-1200-6000 volts.
- ★ 4 D.C. Current Ranges: 0-6-6-60-600 MA.
- ★ 3 Resistance Ranges: self-contained batteries.
0-5000-500,000 and 0-5 megohms.
- ★ 6 Decibel Ranges from —22 to +70 DB.
- ★ 1% Wirewound & Metallized Resistors.
- ★ Only 2 Pin Jacks serve all standard functions.
- ★ Recessed 6000 volt safety jack.
- ★ Anodized, etched aluminum panel:
resistant to moisture and wear.

See this new "Precision" Test Set at all leading radio parts and ham equipment distributors. Write for the Precision 1948 catalog describing quality Electronic Test Instruments for all phases of modern radio-electronics — A.M., F.M. and TV.

**PRECISION APPARATUS
COMPANY, Inc.**

92-27 Horace Harding Blvd., Elmhurst 13, N. Y.

Export Division: 458 Broadway, N. Y. City, U.S.A.
Cables: MORHANEX

back on 3.85 and 28 Mc. T.J. is working lots of DX on 14-Mc. c. w. WF is in new QTH. QV visited GE/IF. GI has new 40-foot tower. LF has elements for new beam. G2FL gave a talk on f. m. at WARC meeting. DX is new call of ex-HZ. SS is rebuilding VFO. LC is newest OBS. Listen on 28,304 kc. Tuesdays and Thursdays at 3.00 p.m. The Manitoba 'Phone Net will be swinging into action again by the time this appears in print. Each of you should be OPS. Drop me a line. See you all at the Hamfest, St. Vital Fair Grounds, September 12th. The annual simulated emergency is due in October. All AEC members are requested to get their gear ready. You will be hearing from me.

Correspondence

(Continued from page 52)

yet and I'm sure that in the one year that he has had his licenses he has forgotten the little code that he first knew so that he would be unable to recognize even an SOS

In closing, I want to retract my earlier statement and say that anything the ARRL does is OK with me.

— [Name withheld by request.]

Harrison, Arkansas

Editor, QST:

After listening to a great amount of hot air on 75 meters concerning alleged negligence of the ARRL in keeping our frequencies intact and in trying to shove c.w. down the 'phone operators' throats, we are moved to make a few comments ourselves.

We have been familiar with amateur radio for many years and it is our humble opinion that without the ARRL organization, commercial and foreign interests would have grabbed our frequencies long ago. No organization, including the ARRL, is perfect. It is also true that an organization such as ours is only what the individual members make it. If a large number of hams are dissatisfied with the way ARRL is being run, let them pay their dues, get in the organization, vote their "ball-playing" director out of office, and put one of their own egotistical spokesmen in. Most of them are chronic "knockers" anyhow but a good deal of harm is done when our newer members are exposed to their line of propoganda for hours on end.

We think it proper and fitting that advanced requirements for amateur privileges should be established at this time, even if all present license-holders were required to take a new examination and code test. The fact that amateur radio is a hobby should not be allowed to hinder the advancement of the art. We learn best by doing and a new amateur with no previous experience must have a starting point but we think the requirements could be made a little stiffer. . . .

— Fred E. Ward, W5LUX; Loren C. Watkins, jr., W5JXO

920 Alpha St., Inglewood, Calif.

Editor, QST:

Congratulations on the Board's action requiring new hams to spend a year on telegraph before being allowed 'phone privileges below 30 megs. There has been too strong a trend postwar for people barely to learn the code, purchase a commercially-built rig, and come on 'phone exclusively. They contribute nothing but QRM and do not constitute a trained reserve for national emergencies. Was also happy to see the code speed increased for Class A. Let the special privileges be awarded to the advanced amateur who excels in all phases of the game.

There is the usual hullabaloo about these changes but in listening to a six-way QSO a few days ago on ten-meter 'phone, I noted that five of the men favored the changes and the criticism was directed at the ARRL's "high-handed" method of instituting such reforms without all licensed hams being allowed to cast votes. You can put me down as solidly in favor of the changes and I only wish they could be made retroactive so all hands would have to measure up.

— George Dery, W6HG

106 Fifth St., Lackawanna, N. Y.

Editor, QST:

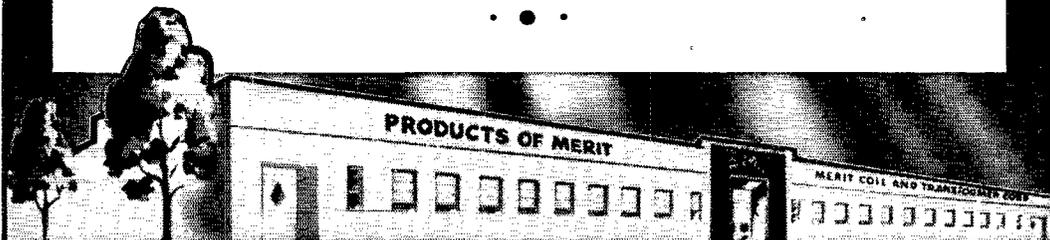
There is a rumor, and I hope it is just a rumor, that you are advocating a code test of 16 words per minute for renewal of Class A licenses. I wonder what screwball at Headquarters thought of that? Time after time the present staff

(Continued on page 134)



Merit
EXPANDS
ITS
CATALOG

—showing many new transformers now available for amateur and industrial use. Your local distributor has them in stock. Ask to see these outstanding new models and get your copy of the new Merit catalog.



MERIT COIL & TRANSFORMER CORP.

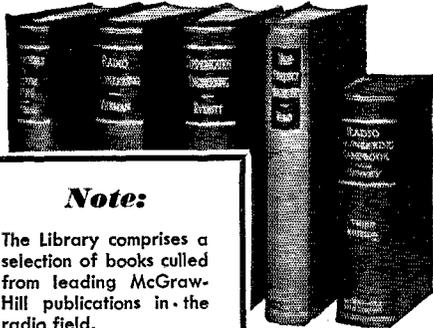
TELEPHONE

4427 North Clark St.

Long Beach 6311

CHICAGO 40 ILL.

NOW
a really high-powered
**RADIO
ENGINEERING
LIBRARY**



Note:

The library comprises a selection of books culled from leading McGraw-Hill publications in the radio field.

- especially selected by radio specialists of McGraw-Hill publications
- to give most complete, dependable coverage of facts needed by all whose fields are grounded on radio fundamentals
- available at a special price and terms

THESE books cover circuit phenomena, tube theory, networks, measurements, and other subjects — give specialized treatments of all fields of practical design and application. They are books of recognized position in the field — books you will refer to and be referred to often. If you are a practical designer, researcher or engineer in any field based on radio, you want these books for the help they give in hundreds of problems throughout the whole field of radio engineering.

SPECIAL LOW PRICE • EASY TERMS

Special price under this offer less than cost of books bought separately. In addition, you have the privilege of paying in easy installments beginning with \$2.50 in 10 days after receipt of books and \$5.00 monthly thereafter. Already these books are recognized as standard works that you are bound to require sooner or later. Take advantage of these convenient terms to add them to your library now.

EXAMINE THESE BOOKS 10-DAYS FREE

McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. C. 18

Send me Radio Engineering Library for 10 days' examination on approval. In 10 days I will send \$2.50 plus few cents postage, and \$5.00 monthly till \$27.50 is paid, or return books postpaid. (We pay postage on orders accompanied by remittance of first installment.)

Name.....
Address.....
City..... Zone..... State.....
Company.....
Position..... GST-9-48

**5 VOLS.
3319 PAGES
2289
ILLUSTRATIONS**

1. Eastman's Fundamentals of Vacuum Tubes.
2. Terman's Radio Engineering.
3. Everitt's Communication Engineering.
4. Hund's High Frequency Measurements.
5. Henney's Radio Engineering Handbook.

A Peaked Audio Amplifier

(Continued from page 17)

the amplifier somewhat regenerative and, therefore, improves the selectivity of the amplifier. Tubes with various amplification factors were tried, but it was found that tubes with medium μ (about 20) gave the best results. Using higher- μ tubes ($\mu = 50$ to 100) made the system tend to oscillate.

Fig. 3 shows the selectivity measured at minimum and maximum selectivity settings. The amplifier is reasonably flat over the entire audio range with the selectivity control at minimum, but it will sharpen up to a bandwidth of 20 cycles or so in the "maximum" position.

Matching with Line Segments

(Continued from page 21)

and $\beta = 26.2$ feet.

Example 2 —

Given: A shunt-balanced network with $Z_L = 8$ ohms, $Z_0 = 75$ ohms (Twin-Lead), $V = 0.71$, and $W_0 = 1$ kw., operating on 14.1 Mc.

Solution: Needed are θ and X_{BP} . With due consideration for Footnote 2, it is decided not to use the 75-ohm Twin-Lead in the transformer section, since the power is high and Z_L and Z_0 are quite different. To assure a minimum of losses, 1-inch tubing spaced $1\frac{1}{2}$ inches is tried.³ This has a Z_T of 150 ohms and an estimated V of 0.95. According to Table I, formulas (5) and (6) are used. Then

$$\tan \theta = \sqrt{\frac{\frac{75}{8} - 1}{\left(\frac{150}{8}\right)^2 - \frac{75}{8}}} = 0.156$$

and $\theta = 9.0^\circ$ which, when converted to feet, equals 1.66 feet.

$$X_{BP} = 150 \frac{1 + \left[\left(\frac{150}{8}\right)^2 (0.156)^2 \right]}{0.156 \left[1 - \left(\frac{150}{8}\right)^2 \right]}$$

= - 26.2 ohms

and when converted to capacitance equals 431 $\mu\mu\text{fd}$. Note that in these networks the value of Z_T does not have to be between the values of Z_L and Z_0 . Z_T may be of any value that complies with the requirements of Footnote 3.

Summary

Engineering handbooks give formulas for finding the sending-end impedance of a segment of line having any value of terminating impedance. Typical of these is

$$Z_S = Z_T \frac{\frac{Z_L}{Z_T} \cos \theta + j \sin \theta}{\cos \theta + j \frac{Z_L}{Z_T} \sin \theta} \text{ ohms.}$$

(Continued on page 104)

Stay away from "over modulation"

MODEL 3296
MODULATION MONITOR

MAKE THE MOST OF YOUR *Station Power*

Every time your modulation exceeds 100 percent, harmonic distortion is introduced which causes interference with other stations, and violation of FCC Regulations. With this Modulation Monitor you can modulate to the fullest for top power-output, yet you know instantly when you are *over-modulating*. Model 3296 provides four separate circuits for measuring amplitude modulation—(1) percent modulation, average; (2) peak flash percent modulation; (3) carrier shift; and (4) audio output for headphones. These methods may be used separately, all at once, or in any combination. The peak indicator can be pre-set for any percent of modulation from 20 to 120, and will flash when pre-determined modulation is reached. You can figuratively "see" the signal received by your listener!

A handsome, precision-built instrument, Model 3296 blends with any standard amateur equipment, enhances the appearance of your station, and will greatly step up your operating efficiency.

VOLT-OHM-MILLIAMMETER

MODEL 666HH

A new streamlined tester with wider ranges: A.C. and D.C. Volts 0-10-50-250-1000-5000 at 1000 ohms per volt; D.C. Milliamperes 0-10-100-500; ohms 0-2,000-400,000. Molded, insulated, pocket-size case. A top value.

SEE YOUR DISTRIBUTOR FOR DETAILS OR WRITE TODAY. Address Dept. J-98

Triplet

ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO

Crystals for the Critical

LET US SOLVE YOUR CRYSTAL PROBLEMS

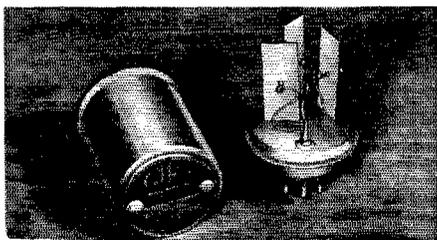
The James Knights Co. is equipped to build "Stabilized" crystals to your exact specifications. A special production system meets your needs for short runs . . . and the price is right! Whether you need one, ten, or several thousand crystals, The James Knights Co. can deliver quickly and at modest cost.

In addition, The James Knights Co. fabricates a complete line of "Stabilized" crystals to meet every ordinary need—precision built by the most modern methods and equipment.

If you want quality—speed—price, contact The James Knights Co.

New James Knights Co. Catalog on Request

An ENGINEER wanted three crystals on approximately 90 kc in one hermetically sealed holder. The James Knights Co. made delivery in 72 hours, our Type H18.



The JAMES KNIGHTS Co.



SANDWICH
ILLINOIS

From this basic equation, the network formulas in this paper were derived.

From the standpoint of efficiency, there is little choice between the three general systems treated here. Because of its simplicity, the Q-section is the logical choice when the necessary value of Z_T is within the practical range of characteristic impedances mentioned earlier.²

The importance of having a purely-resistive driving point in the antenna is stressed. As in other types of networks, any appreciable amount of reactance (as compared with the resistance of Z_L) will cause standing waves to appear on the transmission line. The driven element should be self-resonated before attaching the network.⁴

With the aid of the formulas included here, a network having a minimum of losses can be designed to accommodate about any conceivable combination of antenna and transmission-line impedances. It is hoped they will be helpful.

⁴For methods of resonating the driven element, see Potter, "Establishing Antenna Resonance," *QST*, May, 1948, and Smith, "Adjusting the Matching Stub," *QST*, March, 1948. — *Editor*

10-Meter Mobile

(Continued from page 37)

you must say "W1ABC operating 5 miles north of Bethesda, Maryland." Cultivate the habit of using correct procedure. It is entirely possible to get a ticket for improper mobile procedure — and it's just as easy to do it right!

One of the greatest problems in mobile work is that of keeping a proper log. Many fellows use the taxi-driver system, making entries at stop lights and other traffic stops. Some use a scratch pad and "write big" while driving, transcribing it into permanent form when the opportunity presents itself. A second operator can be a big help. Some have even considered various forms of automatic recorders, transcribing portions of a tape when a final log is needed.

QRR

(Continued from page 39)

attracted a large number of desperate citizens seeking help. Don found himself in the middle of a pitiful cluster of people pleading, crying, and sobbing for assistance . . . a woman with a bedridden 80-year-old mother and without money to get a taxi ride from the threatened area . . . a person with three blind people to care for and no means of summoning assistance . . . a man with three children sick with the measles whom no one would carry to safety. It was part of the tragedy of Vanport that the authorities did not realize the danger in time. Don did what he could and then returned to his home.

Shortly after his arrival there the sheriff's office sent word requesting his assistance and, after a conference with the captain-in-charge of the sheriff's office and the Vanport Housing Authority, Don went to work. As they were readying a place in the sheriff's office for him to set up his equipment, another of the countless stream of

(Continued on page 108)

THE RADIO AMATEUR'S LIBRARY

These are the publications which every Amateur needs. They form a complete reference library for the Amateur Radio field; are authoritative, accurate and up to date.



<i>Title</i>	<i>Price</i>
QST.....	\$4.00 per year*
Operating an Amateur Radio Station	
	Free to members; to others 10c
The Radio Amateur's Handbook.....	\$2.00**
The Log.....	50c each
How to Become a Radio Amateur.....	25c
The Radio Amateur's License Manual.....	25c
Hints & Kinks for the Radio Amateur.....	50c
Lightning Calculators:	
a. Radio (Type A).....	\$1.00
b. Ohm's Law (Type B).....	\$1.00
A.R.R.L. Antenna Book.....	50c
The Minilog.....	25c
Learning the Radiotelegraph Code.....	25c
A Course in Radio Fundamentals.....	50c

*Subscription rate in United States and Possessions, \$4.00 per year, postpaid; \$4.50 in the Dominion of Canada, \$5.00 in all other countries.

** Postpaid in Continental U. S. A. —
\$2.50, postpaid, elsewhere. (No stamps, please)



THE AMERICAN RADIO RELAY LEAGUE, INC.

WEST HARTFORD 7, CONNECTICUT

PEERLESS PACKS Value PUNCH!

RECEIVING, TRANSMITTING & SPECIAL PURPOSE TUBES

1B24.....	\$1.49	EF50.....	\$.59
2C26A.....	.98	RKR72.....	2.95
2X2.....	.49	VR78.....	.39
2X2A.....	.89	99X.....	.59
3B24.....	.98	VU111.....	.69
5CP1.....	3.95	VT-127.....	.39
5D21.....	18.50	252A.....	1.98
6AC7.....	.79	450TL.....	39.50
6AG7.....	.98	631P1.....	1.79
6AJ5.....	.98		
6AK5.....	.69	Sirobotron	
6C4.....	.39	708A.....	2.95
6J5.....	.49	717A.....	.69
6J6.....	.69	725A.....	4.95
6L6.....	.98	810.....	5.95
6L6G.....	.98	813.....	5.95
6SN7GT.....	.69	829B.....	4.95
6SU7GT.....	.89	872A.....	1.95
6V6G.....	.49	830B.....	4.95
7DP4.....	14.95	832A.....	2.25
7EP4.....	17.95	836.....	.98
10Y.....	.09	837.....	.98
12A6.....	.59	954.....	.49
12H6.....	.39	955.....	.49
12S17.....	.59	957.....	.39
12SK7GT.....	.59	1603.....	5.95
12SL7GT.....	.69	1619.....	.49
15E.....	.98	1624.....	.89
(same as 8023, 4C30)		1625.....	.49
REL21.....	.98	1626.....	.49
30 Spec.....	.59	1629.....	.49
35L6GT.....	.49	1635.....	.98
35W4.....	.49	8020.....	1.79
45 Spec.....	.59	9001.....	.69
(VT52)		9002.....	.69
		9004.....	.49
		9006.....	.49

IMMEDIATE DELIVERY!

MINIMUM ORDER \$5.00

10% discount on quantities of ten or more of each type
We carry large stocks of all types of tubes—write for
free list—we will be pleased to quote on other types
not shown here

Information on above tubes available on request
All prices F.O.B. Jamaica, N. Y. Please add postage

Write Department Q



92-32 Merrick Road Jamaica 3, N. Y.

Branch: 71 Murray Street, New York 7, N. Y.

When in BROOKLYN, visit:
Peerless Electronics Distributors Corp.
76 Willoughby St., Brooklyn 1, N. Y.
Phone: ULster 5-6155

reports that the dike had broken came in to the desk sergeant. For several days the authorities had been faithfully checking each such report only to find it the result of exaggeration and excitement. Because the already-overworked sheriff's cars were at the time all out investigating previous reports, the desk sergeant asked Don to hop into his car and check on the latest report.

It was thus that fate chose Don to herald the doom of a city.

With the break in the dike W7GCZ, along with many others, went on a 24-hour schedule. The disaster was now going full blast. The tempo of events increased in a dizzy crescendo as each minute grew into days. Old-timers . . . young squirts . . . wives . . . YLs . . . stray military personnel . . . ex-hams . . . ex-commercial operators — perfect strangers, all — suddenly swung into action together, rolling up their sleeves and plunging into a race against time. New stations to be set up . . . more circuits needed . . . more operators needed to man them. Messages . . . faces . . . names . . . calls. One dawn coming after another with still no sleep. More dikes breaking. Cups of coffee never tasted. Conversations trailing off into nothingness with all concerned working like machines. All about, wooden Indians with glassy stares, moving mechanically. Faster and faster, on and on, with no relief until all silently prayed that somehow they might get a little sleep.

At 10:00 A.M. on May 31st the ARRL Emergency Coördinator received an urgent request for ham communications from Sauvies Island which suffered from disruption of ferry service and only sporadic service via the one remaining telephone line. The prospects were for complete inundation of the island with probable heavy loss of life and property. Highest priority was given to the establishment of the required circuit, and W7HDN and his son made their way to the island by a circuitous water route. They set up in the Soil Conservation Office and successfully made contact with W7ADH. This circuit was kept open for several days, and the channel was often referred to as the "dike-watch frequency."

When the first impact of the Vanport traffic load lightened somewhat, a second radio center was established at the Army Engineer district headquarters. Dual 144-Mc. intercom positions were installed there to tie the new center into the existing nets. The Emergency Coördinator transferred his headquarters there from the Red Cross offices.

On Wednesday, June 16th, almost three weeks after the start of the operation, the dismantling of the amateur nets was begun. The job could finally be classified as completed, with all agencies assisted heaping high praise upon the emergency work of the amateurs. Among those served were the Coast Guard, Army, Navy, National Guard, Red Cross, U. S. Engineers, Sheriff's Office, Civil Air Patrol, State Police, public utilities, and others. Upwards of 10,000 messages were

(Continued on page 108)

CREI Training is Your
DOWN PAYMENT
 ON PROMOTION, MORE MONEY,
 SECURITY



Train With One of America's
 Foremost Technical Institutes

RADIO- ELECTRONICS!

TELEVISION!

**CREI Training Can
 Help You to a
 Better-Paying Job!**

Every week letters from students and graduates tell us of new pay increases and promotions that are made possible through the help of modern technical training with CREI.

Said one man recently: ". . . I am happy to report that in the past seven months with Station K - - -, I have received three increases in salary and a promotion which can be partly credited to CREI."

Hundreds of engineers and technicians with key positions in the radio industry, broadcasting, FM and Television owe their successful training to CREI. We are ready to help you in the same way we have been helping others for over 20 years.

Even if your radio experience is limited, there

is a CREI course for you. CREI takes you all the way to a practical engineering level. CREI does not drop you off at the elementary job training phase. You quickly advance lesson-by-lesson to the more advanced study of engineering principles and practice. The courses are practical, authoritative and easy to follow.

Your future success can be assured by the plans you make today. Just figure out for yourself how many good jobs are waiting for good men to fill them. These men must have modern training to handle intricate present day equipment. You can't say, "I don't need more training." Every radio man needs more training to increase his technical knowledge, no matter how limited or how great his experience.

Mail Coupon for FREE BOOKLET

If you have had professional or amateur radio experience and want to make more money, let us prove to you we have the training you need to qualify for a radio job. To help us intelligently answer your inquiry — in writing, PLEASE STATE BRIEFLY YOUR BACKGROUND OF EXPERIENCE, EDUCATION AND PRESENT POSITION.



VETERANS! CREI TRAINING AVAILABLE UNDER THE "G.I." BILL!

Capitol Radio Engineering Institute

An Accredited Technical Institute.

DEPT. Q-9 16TH AND PARK ROAD, N. W., WASHINGTON 10, D. C.

Branch Offices: New York (7): 170 Broadway • San Francisco (2): 760 Market St.

CAPITOL RADIO ENGINEERING INSTITUTE
 16th & Park Rd., N. W., Dept. Q-9,
 Washington 10, D. C.

Gentlemen: Please send me your free booklet, "CREI Training for Your Better Job in RADIO-ELECTRONICS," together with full details of your home study training. I am attaching a brief resume of my experience, education and present position.

Check Practical Radio-Electronics
 Course Practical Television

Name

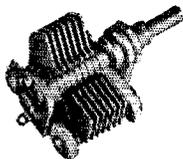
Street

City Zone State

I am entitled to training under the G.I. Bill.

LOOK

CONDENSER SPECIAL



100 mmf. or 140 mmf. either size, brand new.

The biggest bargain we have ever offered. Famous make double-bearing condensers, regularly listing at \$2.70 and \$3.00, isolantite insulation, semi-circular plates (straight-line capacity) .024" air-gap,

ONLY **89¢**

Famous BC-221



W4FU, W8JIN, W8FGX, all top-notch DX men, use the BC-221 to mark location of weak DX so they can quickly return to his frequency. An excellent fone or CW monitor. This instrument is accurate to .02% from 125 KC to 20 MC. Compact 150 volt power supply can be mounted in battery compartment. Add two 6AG7 voltage amplifiers and you have a terrific VFO. Complete with tubes, crystal, frequency charts. Excellent condition. **\$39.95**
With internal modulation, for signal tracing. **\$79.50**

10 HENRY 300 MA. CHOKE



A terrific bargain. Audio Development Co. high-quality 10 Henry 300 MA. filter choke. All black-crackle finish, new, 100 ohms DC resistance, very compact, 4 3/4" x 3 3/4" x 4 3/4", 10 lbs., only. **\$3.50**

STRUTHERS-DUNN RELAY

110 VOLT AC

Control all of your equipment with this one relay. 110 VAC coil, 4-pole, 2 double throw, 2 single throw, 6 Amp. contacts, screw terminals, insulated base, 3" x 3 1/2", a terrific bargain at. **\$2.00**



Thordarson filament transformer, 2.5 volt 10 A., 6.3 volt 5.5 A., 6.3 volt 1 A., 5000 volt insulation. . . **\$2.95**

- S-57 • 2.5 VCT 10 A. \$4.50
- S-59 • 5 to 5.25 VCT 13 A. 4.50
- S-61 • 7.5/6.3 VCT 8 A. 4.50
- S-63 • 14/12/11 VCT 10 A. 10.00
- SC-3 • 24/16/12/8/4 V. 4 A. 4.00
- S-21 • Univ. Modulation 110 watts. 15.50
- VM-3 • Univ. Modulation 125 watts. 18.00
- CM-16 • Cathode Modulation 35 watts. 4.25
- S-33 • Filter Choke, 20 H. 300 Ma. 7.00
- PA-104 • Filter Choke, 12 H. 300 Ma. 12.60
- PA-301 • 475/425/250 VDC, 500 Ma. 15.00
- PA-302 • 760/610 VDC, 325 Ma. 18.00
- PA-305 • 2000/1500 VDC 350 Ma. C.D. 40.80
- VT-10 • Speech Band-Pass Filter. 9.00

Steinberg's

633 WALNUT STREET • CINCINNATI 2, OHIO

handled with \$50,000 worth of amateur equipment in use in the Portland area alone. It must be stressed that much of the hams' work in portable or mobile positions was extremely hazardous, in constant jeopardy of their lives and property. A large portion of the mobile work was done on weakened dikes with the constant threat of their giving way. To see the ghosts which returned from mobile assignments was proof enough that these were the fellows who knew what looking death in the face at 3:00 A.M. was like, yet they could not be kept from taking the very next assignment which would take them right back there again. The same goes for the walkie-talkie gang who took assignments from which they knew they had only a 50-50 chance of returning.

In closing, your reporter wishes to say that, as in other emergencies, it is impossible to give credit to all who participated, with many calls going unnoticed because of the modesty of those who served. The following list of those who participated is known to comprise only a fraction of the total, each of whom did his part in writing another bright chapter in the history of amateur public service:

W5COE, K-W6QAF, W7s ACZ, ADH, ADW, AEF, AGR, AIA, AIE, AJN, AKQ, AMQ, APG, AQJ, ARY, ASF, ASR, AVV, AWD, AXA, BKC, BIM, CQB, CEJ, CSC, CUJ, CVL, CYT, DCJ, DDG, DHX, DIS, DNB, DNP, DZL, ECI, EDK, EEA, EFP, EPT, ENU, ERA, ESJ, EVR, EXQ, EYW, FE, FHJ, FJZ, FNK, FNS, FU, FXE, FZA, GAN, GCT, GCZ, GJD, GJY, GM, GSH, GTU, GUR, GWA, GXA, GXO, HAE, HCQ, HCV, HDN, HIA, HIK, HJI, HKI, HKT, HKU, HOQ, HRR, HSZ, HTS, HVX, IAC, ICA, IDG, IE, IES, IEY, IFN, IHA, IHI, IIA, IIJ, IIV, IIX, JAS, JAZ, JBE, JGY, JIG, JJX, JMY, JMZ, JN, JNG, JPQ, JQ, JRT, JRZ, JSK, JSM, JTK, JWJ, KAW, KBX, KCA, KCF, KCL, KDC, KER, KJC, KJG, KJV, KLP, KM, KNE, KOF, KOM, KOV, KPK, KRO, KSA, KTD, KTL, KTS, KUF, KUT, KVB, KWE, KWH, KXD, KY, KZA, LAH, LAO, LAX, LAZ, LBV, LCL, LDB, LFJ, LHB, LHP, LHT, LI, LIN, LIV, LJJ, LJR, LLI, LMC, LMF, LOU, LPV, LQJ, LQS, LT, LTW, LTY, LVQ, LWD, LXR, LY, LYE, MBI, MFS, MHK, OZC, VT, WJ, ZK, W8QGZ, KG6AC, and KL7ME.

Supplementing EC Davis' account, other reports received at ARRL headquarters indicate that the following stations were also "on-the-spot" contributors to the success of the emergency communications effort: W7s APF, CIH, OKT, ETO, FAW, FNZ, FRU, FWD, HBO, JWD, KKI, RAO, SSQ, UTM and ZU.

SWITCH TO SAFETY!



HARVEY HAS

the best

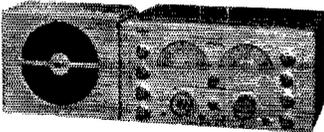
NATIONAL RECEIVERS

HRO-7

\$311³⁶



The old standby in its latest form. Covers 1.7 to 30 mc with four coils. Complete with power pack, and 8" speaker.



NC-183

\$269⁰⁰

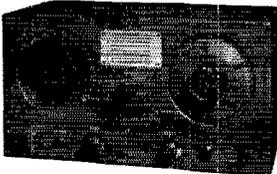
5 bands from 540 kc to 56 mc. Bandspread tuning, crystal filter, noise limiter, etc. With 10" speaker

NC-57

\$89⁵⁰



9-tube super with BFO and ANL, built-in speaker. A good receiver at a moderate price.



HFS-VHF

\$125⁰⁰

Receiver with range from 27 to 250 mc. Can also be used as

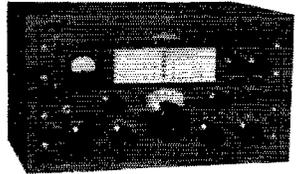
a converter or front end of hi-fidelity FM.
POWER SUPPLY, National 5886.....\$22.43

COLLINS EQUIPMENT

75A-1 RECEIVER

\$375⁰⁰

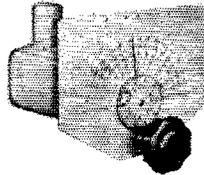
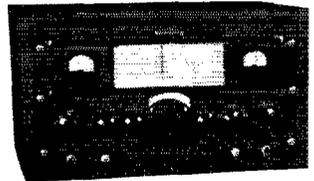
80, 40, 20, 15, 11 and 10 meter ham bands. With speaker in matched cabinet. Shpg. wt. 93 lbs.



32V-1 TRANSMITTER

150 watts CW, 120 watts phone Shpg. wt 128 lbs

\$475⁰⁰



70E-8 VFO

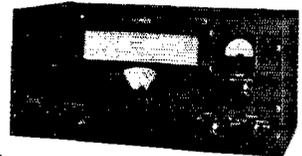
\$40⁰⁰

Basic unit for high quality VFO exciter unit. Shpg. wt 8 lb.

310B-1 EXCITER

\$190⁰⁰

Self-contained band-switching exciter, 15-watt output. Shpg. wt. 48 lbs.



310C-2 EXCITER — 70E-8 and multiplier to drive power stage or plug in xtal socket. Sht. wt. 28 lbs. **\$100.00**

310C-1 EXCITER — Same as 310C-2 but without power supply Shpg. wt. 26 lbs. **\$85.00**

30K-1 TRANSMITTER — 500 watts CW, 375 watts phone, complete with 310A exciter unit. Shpg. wt. 601 lbs. **\$1450.00**

Telephone: **LONGACRE 3-1800**

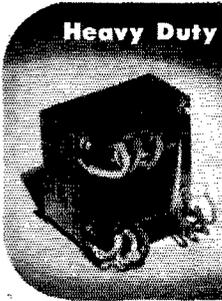
HARVEY RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

All items on this page in stock for immediate delivery.

All prices Net, F.O.B. N.Y.C., and subject to change without notice.

Heavy Duty 24 Volt Transformer



Just the thing for the SCR-274N and ARC-5 Transmitters and other surplus equipment. Secondary 24 volts $4\frac{1}{2}$ amps tapped at 20 volts. Primary 115 volt 60 cycle. Six inch flexible leads. Using two of these transformer's back to back makes an excellent 100 watt isolation transformer. Dim: $3-1/8"$ x $3\frac{1}{2}"$ x $3\frac{1}{4}"$ high. Net wt. $4\frac{1}{2}$ lb.

\$2.99

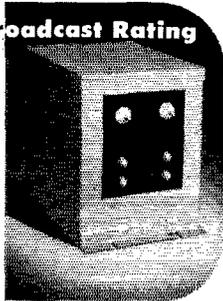
Shpg. wt. 6 lb.
Stock No. C-787A

Plate Transformer Broadcast Rating

Primary 240 Volt 50-60 Cycle, tapped at 200 and 220 volts. Secondary DC output 3000 volts at 900 ma. and 2000 volts at 750 ma., simultaneous ratings. Made by Electran Mfg. Co. Gray steel case. Dimensions: 9" wide x $16\frac{1}{2}"$ long x $12-5/8"$ high. Only 15 left in stock at this low price.

Shpg. wt. 259 lb.
Stock No. C-95A

\$79.50

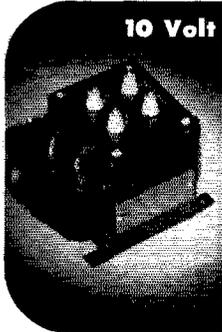


10 Volt Filament Transformer for Regulated Service

11.5 Volt 11.3 Amp. Filament Transformer. Use rheostat in primary to give you perfect 10 volt operation for 810's, 813's, 8005's and other popular 10 volt tubes. Beautifully made and a wonderful buy. Manufactured by one of the world's largest manufacturers. Ceramic insulated screw terminals. Primary 115 volt 60 cycle. Dimensions: $3\frac{1}{2}"$ x $4\frac{1}{2}"$ x $4\frac{1}{2}"$ high. Net wt. $8\frac{1}{2}$ lb.

ONLY \$3.99

Shpg. wt. 10 lb.
Stock No. C-721A



Miniature 1000 Cycle AUDIO OSCILLATOR

RC circuit 1000 cycle audio oscillator using either a 6SK7 or 12SK7 tube. Makes an excellent code practice oscillator, MCW oscillator, test oscillator, or CW keying monitor. Works very nicely as a monitor with the SCR-274N Transmitters by using the keyed oscillator voltage for your plate supply. Housed in a 2" square by $1\frac{1}{2}"$ high aluminum box. Complete instructions furnished. Price less tube.

Stock No. C-859A



98¢ ea

\$1.15 each postpaid
anywhere in the U.S.A.

We are glad to offer these surplus items at money saving prices. SREPCO has been radio parts distributor for over 16 years and carries all the well known lines such as Amphenol, B and W, Johnson, Millen, National, Stancor, etc. Include your standard parts requirements on your orders for surplus. Your orders and inquiries will receive our prompt and personal service.

TERMS - Orders under \$3.00, cash with order; orders over \$3.00 require 20% deposit, balance C.O.D.

ALL PRICES ARE NET,
F.O.B. DAYTON, O.

SREPCO

STANDARD RADIO & ELECTRONIC PRODUCTS CO.
135 E. Second St. - DAYTON 2, OHIO. - Tel. FULTON 2174

Hidden-Transmitter Hunts

(Continued from page 40)

mitter and antenna as best you can. Have a second undisguised transmitter running beforehand, to allow contestants to acquaint themselves with the art of direction finding at microwaves. Then all hams, SWLs, YLs, XYLs and even the kiddies can chase around your convention hall in search of the hidden transmitter. With a modicum of intelligence and equipment, the luckiest one in the hall can find the hidden transmitter in less than an hour, come rain or shine outside. During this time, the not-so-lucky folks can be having some amusement and getting their introduction to reception on the microwaves.

A transmitter hunt of this type will be a feature of the Hudson Division Convention at Albany, October 2nd and 3rd (adv.).

I. A. R. U. News

(Continued from page 41)

'phone operation outside the United States be carried on principally above 14,300 kc. was recorded.

The Calendar had, as attachments, annual reports from the *American Radio Relay League* and the *Norwegian Radio Relay League*, the only ones received from member-societies in response to the December Calendar.

COLOMBIA

On May 19, 1948, all outstanding licenses of amateur radio operators in Colombia were canceled. Amateurs were given a period of 30 days in which to appear at the Ministry of Posts and Telegraphs to apply for a new license. Only those military reservists who had fulfilled all requirements of the Ministry of War were granted new licenses. According to our information, these steps were taken because telecommunications of all types are considered the primordial base of national defense and the preservation of public order.

NORWAY

At its annual General Assembly at Hamar on May 29th and 30th the *Norwegian Radio Relay League* celebrated its 20th anniversary. About 250 hams and XYLs were in attendance. Highlight of the celebration was the presentation by OM Dalby, LA6G, of a challenge cup given by His Majesty King Haakon VII. A competition for the cup will be held every year. One of the rules of the contest is that all transmitting equipment must be homebuilt and the power must not exceed 50 watts.

During the general assembly, the following officers were elected: president, W. Pallvik, LA4L; vice-president, Ch. Syvertsen, LA9II; secretary, E. Granby, LA8B; treasurer, S. Tomter, LA8K.

WHEN YOU DEAL WITH THE RADIO SHACK IT'S EASY TO HAVE THE NEWEST EQUIPMENT

DEPOSIT ONLY 10% . . . and take a year to pay the balance. That's how easily you can own the latest gear . . . to enjoy on our "play as you pay" plan.

- IMMEDIATE SHIPMENT of the gear you want is assured by our complete stocks of receivers, transmitters, instruments and other amateur apparatus.
- EASY, MONEY-SAVING TERMS require only a small service charge on time payments.
- WHATEVER YOU NEED for full enjoyment of amateur radio is ready for you at the Radio Shack. C. O. D. orders filled promptly with 20% deposit.

CHECK CHOICE HERE LIST PRICE SEND US ONLY

	COLLINS	
75A rcvr	\$ 375.00	\$ 37.50
30K xmtr	1450.00	145.00
32V-1 xmtr	475.00	47.50
310B-1 exctr	190.00	19.00
310B-3. exctr	215.00	21.50
310C-1 exctr	85.00	8.50
310C-2 exctr	100.00	10.00
70E-8. exctr	40.00	4.00

HALLICRAFTERS

S38 rcvr	47.50	4.75
S40A rcvr	99.50	9.95
S47 rcvr	229.50	22.95
S51 rcvr	149.50	14.95
S53 rcvr	79.50	7.95
S55 rcvr	129.50	12.95
S56 rcvr	110.00	11.00
SX42 rcvr	295.00	29.50
SX43 rcvr	179.50	17.95
SP44 panadapter	49.50	4.95
T-54 TV rcvr	169.50	16.95
HT9 xmtr	350.00	35.00
HT18 xmtr	110.00	11.00

NATIONAL

NC-33 rcvr	65.95	6.60
NC-57 rcvr	89.50	8.95
NC-173 rcvr	179.50	17.95
NC-183 rcvr	269.00	26.90
NC240D rcvr	241.44	24.14
HRO-7 rcvr	279.00	27.90
HFS	125.00	12.50

HAMMARLUND

HQ129X rcvr	189.15	18.92
SP400X rcvr	450.00	45.00

R. M. E.

HF-10-20 rcvr	77.00	7.70
VHF-152A rcvr	86.60	8.66
DB22A	77.00	7.70
RME-84	98.70	9.87
RME-45	198.70	19.87

MILLEN

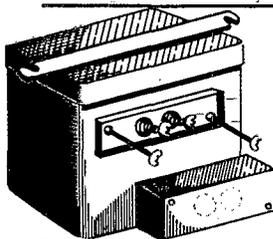
90800	42.50	4.25
90881	89.50	8.95
90281	84.50	8.45

We can also furnish from our complete stocks test equipment by RCA, Sylvania, Simpson, Supreme, Triplett, Precision, Dumont, Hickock . . . all on our easy terms that put equipment in your hands on a down payment of only 10%.

HALLICRAFTERS TV RECEIVER Model T-54

\$169.50

You can't beat this receiver for efficiency at low cost. Built to Hallcrafters' quality standard, it is compact, easy to operate, and low-priced. Gives clear, steady pictures on the seven-inch CR tube. Write for details — and if you are near Boston come in and look it over.



Brand New EXIDE Storage Battery

\$8.95

Aircraft-type, NAF-1062-17A, 12-volt battery with non-spill vent plugs, lacquered aluminum shield case, screw-stud terminals and wing nuts, metal terminal cover with cable knockouts in end and side. Dry-charged; 17 amp.-hr rating; wt - 27 lbs. Individually packed. Perfect for your mobile rig or private plane.

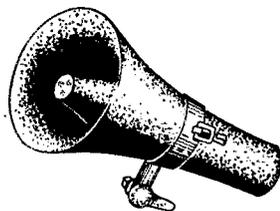
Here's a SOUND investment!

25-WATT BRENTWOOD AMPLIFIER - Brand New **\$34.95**



This splendid amplifier is suited to a multitude of services. Input controls for microphone and phono pickup; bass-treble adjustment; two 6L6's in output stage; output matches 4-8-16-250 and 500 ohms; input at 115 volts and 60 cycles; steel case 1 1/4 x 8 x 10 1/2", finished in black and gray crackle. Furnished complete with tubes, immediate delivery.

15-25 WATT LS-104 TRUMPET **\$21.95**



Ideal for outdoor or sound-truck service. Re-entrant-type speaker with PM driver having built-in transformer tapped for 250/500/1000/2500 ohms. Adjustable mounting bracket locks speaker at desired angle. A Radio Shack Surplus Special.

The two items above combine to make a fine, mobile sound system . . . bound to be in demand during the presidential campaign.
BE PREPARED for SOUND OPPORTUNITIES

Here they are! Genuine Par-Metal RELAY RACKS



- Securely welded
 - All steel
 - Take "A" or "C" panels
 - 20-inch base extends front and rear
 - Panel space 7 1/4 x 19"
 - Black ripple finish
 - Ample hardware
 - Immediate delivery
- Plan now for future needs. Get this all-steel rack while you can. Price **\$17.40**

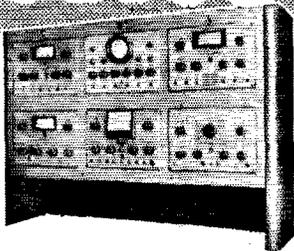
The RADIO SHACK Corp.
CABLE ADDRESS - RADIOSHACK
167 WASHINGTON ST., BOSTON, MASS., U.S.A.

NEWARK INSTALLS **FREE** TELEVISION SERVICE LABORATORY

**Sensational News
for Television
Set Builders!**

**A FREE SERVICE
for Our Patrons**

... we're installing an elaborate, up-to-the-minute Test and Service Laboratory in All Our Stores for the exclusive use of our customers to test, align, or service Television Kits and Parts. Yes, you have FREE use of this Complete Laboratory with a specially trained technician to help or advise you... to get top performance from any TV kit you purchase at Newark. So take advantage of this Big Offer Now! Choose Your Favorite Television Kit from our complete stock of all makes, and with it you get the assurance of professional guidance and service!



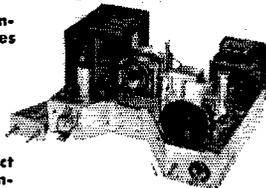
BIGGEST TELEVISION KIT BUY

Tech-Master 630TK 10" TV KIT

Complete with All Parts, Instructions and 30 RCA Tubes (including 10BP4)

\$198.50

Duplicates in every respect the Famous RCA 630TS, generally accepted as the best engineered Television set available.



RCA Service Manual with schematics and pictorial diagrams included.

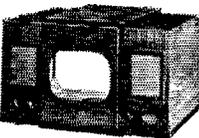
This is the television kit for those who are able to assemble from a schematic and service manual. The RCA 630TS is the product of the top engineering skill in the industry. And this 630TK kit is a copy of that famous set. It contains the efficient RCA Front End 13-Channel Tuner—completely factory-wired and aligned with 3 RCA matched tubes, plus built-in Wave Trap. Highest quality parts used throughout, with 30 RCA tubes (12 or 15" tube can be substituted for 10BP4 if desired). Dual controls for picture and FM sound and for horizontal and vertical control. Kit is complete with RCA Schematic and Service Manual, but less wire, solder and mtg. screws. This Amazing Buy is possible only through mass production. Enjoy TV at its best!

Cat. No A-19752, Shpg. Wgt. 70 lbs. Your Cost. . . \$198.50

CABINET for 630TK Set

A beautifully made, finely finished walnut cabinet to accommodate RCA 630TK set above. Shpg. Wgt. 20 lbs.

Cat No. A-19753. . . . Only \$42.50



Complete Stock of All Standard Makes of Television Kits, Parts, Antennas and Accessories Always on Hand!

NEW YORK
Offices & Warehouse
242 W. 55th St., N.Y. 19

NEWARK
ELECTRIC COMPANY, INC.

CHICAGO
323 W. Madison St.
Chicago 6, Ill.

New York City Stores: 115-17 W. 45th St. & 212 Fulton St.

25 Years Ago

(Continued from page 10)

There is a wealth of antenna information in this issue, all of an extremely practical nature. We read "The Best Dimensions for Amateur Antennas," by Ross Gunn, ex-8ZO, "Antenna Dimensions," by Technical Editor Kruse, "The Nodal Point Explained," by Department Editor Mason, and "How to Build a Good 70-Foot Mast," by C. R. Sawyer, 1GL. To add fuel to our antenna investigations, we have the timely presentation of the final report on the Bureau of Standards-ARRL Fading Tests.

"The Most Southwest Station in the U. S." is the eye-catching caption describing 6ZH, San Ysidro, Calif., station of Lester Picker. Other prominent ether-busters pictured are Clifford Himoe's 9AOG, Lawrence, Kansas, Vincent Rosso's 5KC, Plaquemine, La., and Princeton University's 3XM.

This month sees a new name on the QST masthead, that of Assistant Editor F. C. Beckley, ex-3JS-1WC. "Beek" succeeds Willard B. Cowles, who has resigned to go into YMCA work.

Converter for 144 Mc.

(Continued from page 48)

Some commercial receivers have rather low sensitivity on 28 Mc., and a coil-and-condenser combination for 7 Mc. would have been unduly large, so 14 Mc. seemed a good compromise. Tuning 144 to 148 Mc. thus requires an oscillator tuning range of 130 to 134 Mc., bringing the image response to 116 to 120 Mc. If there is commercial activity in the image band in one's immediate vicinity, it may be desirable to shift the intermediate frequency slightly.

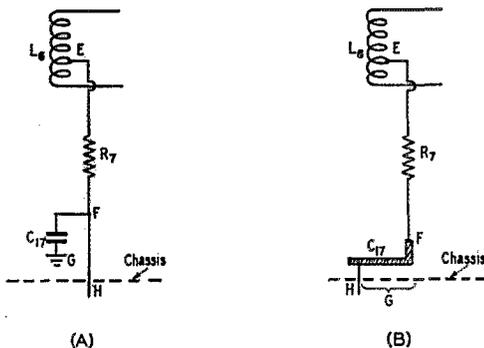


Fig. 3—Operation of special by-pass capacitor and conventional components compared.

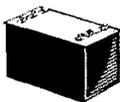
Alignment

Before aligning the circuits loosen the setscrews of all shaft couplings so that the tuning condensers may be adjusted individually. Adjustment should start with the oscillator range, spreading or compressing the oscillator coil to bring the oscillator frequency to the proper value, depending on the intermediate frequency to be used.

(Continued on page 114)

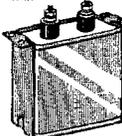
NEWARK VALUES LEAD THE FIELD!

High Voltage, High Current PLATE TRANSFORMER



This rugged unit is just the thing for a medium power phone and CW xmitter. Designed to deliver 1345 volts AC, each side and CT at 500 ma., from 110 V, 60 cycle source. It will supply power for many hours without "cooking". Primary tapped for 105, 115 and 125 V. Size: 6W x 9 5/8 L x 8 7/8" H. Heavy screw terminals on bakelite board. Inverted type mtg. Limited Quantity! Shpg. Wgt. 65 lbs.
No. S-877.....Special **\$14.95**

GE PYRANOL CONDENSERS



Be sure the power supply in your rig is adequately filtered! These excellent GE condensers are just what you need... at a big saving. Made to rigid specs for use in commercial equipment.
S-861.... 8 mfd—1000V.....\$1.69
S-862.... 6 mfd—1500V.....\$1.89

SENSITIVE RELAY

SPST. Small, light weight — operates on 2 ma. Coil resistance 6500 ohms. For use with photo cells or in plate circuits where sensitive switching device is required.



No. S-843.....Only **88c**

LEACH DPDT RELAY



For dependable control of your xmitter power circuits. Ruggedly built for industrial use. 3"16" silver contacts. DPDT—coil operates on 115V 60 cycles. Metal base constr. No circuit is grounded to frame.
No. S-876.....Special **\$1.39**

Special! HAMMARLUND FREQUENCY STANDARD

FS-135-C

\$6.95 with Tube & Crystal
(Formerly \$14.25)



Be Sure You're in Your Band! With this precision unit, your receiver becomes a hairline Frequency Meter—no worry about FCC Sec. 12.135. BRAND NEW—Guaranteed. Complete with 6AK5 tube, 100 Kc crystal, instructions.....No. S-774

TRANSMITTING and SPECIAL PURPOSE TUBES

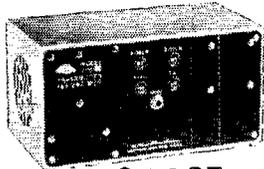


ALL BRAND NEW, Top Grade Tubes — Made by RCA, GE, Kenrad, Sylvania. Some boxed, some unboxed—at Wholesale Cost and Below! Quantities Limited—Buy Now!

2AP1	\$2.49	809	\$1.65
2C40	.89	810	6.95
2C44	1.35	811	2.29
2D21	.98	813	7.95
2E22	1.50	814	4.45
2X2, 879	.49	815	2.95
3AP1	2.39	826	1.35
3CP1	.99	829B	4.95
3CP1S1	.89	830B	5.25
3C24-24G	.67	832A	2.65
3E29	3.49	838	3.95
5BP4	3.95	843	.45
6AC7	.99	845W	3.45
6AG5	.99	872A	1.75
6AK5	.89	931A	2.39
6C4	.29	954	.49
6J6	.89	955	.49
10Y	.59	957	.49
12A6	.29	958A	.49
211	.69	959	.49
304YL	1.39	1619	.49
316A	.49	1625	.49
705A	2.95	1626	.49
717A	1.65	7193	.49
801A	1.49	9001	.49
803	8.95	9002	.69
804	8.95	9004	.69
805	4.95	9006	.49
807	1.15		

Smashing Value!

McMurdo Silver Model 700 XMITTER



No. A-267
Reg. \$36.95

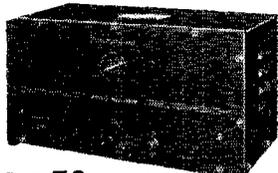
\$19.95

Put out 5 watts @ 240 Mc, easily 8 watts @ 144 Mc. Uses 6AQ5 (tritet xtal osc), 2-6C4 doublers, 832 output. Modulator uses 2-6AQ5 Push-Pull. Input xformer included, takes any carbon mike. Needs 6.3V @ 3.35 amps AC or DC; 300V @ 220 ma. 10x5x 5 1/4", 12 lbs. less tubes, power supply, xtal, mike.

Kit of 6 tubes.....\$4.77
Crystal (specify freq.).. Ea. \$3.95

New Shipment!

HAMMARLUND 4-11 MODULATORS



\$29.50 No. S-713
Complete Kit
Save \$43.00

Kit includes all genuine Hammarlund parts. May be used for 11 Watt Modulator by changing output xformer to match class "C" load. Ideal "as is" for speech amp. High impedance mike input. 500 ohm output. 110 db gain. Flat 200-3000 cycles. Includes 6SL7GT 1st & 2nd AF, 6C5 phase inverter, 2-7C51T PP Output, 5U4G rect. Priced far below cost of parts if bought separately. For 110V, 50-60 cycles AC. 41 lbs.

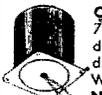
High Quality, Heavy Duty POWER SUPPLY COMPONENTS Designed for Continuous Operation!

Ruggedly constructed units — made for use in fine commercial equipment. Ideal for low voltage power supplies for small xmitter, exciter, amplifier and TV Receiver. Operate for hours with no danger of overheating.



PLATE TRANSFORMER. Pri: 120V tapped at 110V, 60 cycles. Sec: 768V Ct @ 305 Ma. Electrostatically shielded. Flush type mtg. 4 1/8" x 3 1/8" x 5 1/8" overall hgt. Wgt. 12 lbs.
No. S-851...Special **\$3.95**

FILAMENT TRANSFORMER. Electrostatically shielded. Flush mtg. Pri: 117V, 60 cycles. Sec: 5V @ 6 amps and 6.3V Ct @ 6 amps. 3 1/8" x 3 1/8" x 3 1/8" overall hgt. Wgt. 5 lbs.
No. S-852.....Special **\$1.95**



CHOKE. 4.2 hy. @ 300 Ma. DCR 78 ohms. Fully enclosed in round drawn metal case. 2500 volt breakdown. 4" x 4" x 4 1/2" H. Wgt. 8 lbs.
No. S-853...Special **\$2.95**

POWER SUPPLY KIT. Consists of above 3 transformers at a considerable saving.
No. S-854.....Special **\$7.95**

FREE

Send for the New NEWARK Catalog of Radio, Electronic and Television Equipment — Just Off the Press. 132 Pages Crammed Full of Great Values!

Include Postage
All Prices F.O.B.
New York or Chicago
Send 20% Deposit
with C.O.D. Orders

NEW YORK
Offices & Warehouse
242 W. 55th St., N.Y. 19

NEWARK
ELECTRIC COMPANY, INC.

CHICAGO
323 W. Madison St.
Chicago 6, Ill.

Send Orders To
242 West 55th St.
New York 19, N. Y.
or
323 W. Madison St.
Chicago 6, Ill.

New York City Stores: 115-17 W. 45th St. & 212 Fulton St.

Radar Technicians WANTED For Overseas Assignments

Technical Qualifications:

1. At least 3 years' practical experience installation and maintenance.
2. Navy veterans ETM 1/c or higher.
3. Army veterans TECH/SGT or higher.

Personal Qualifications

1. Age over 22—Must pass physical examination.
2. Ability to assume responsibility.
3. Must stand thorough character investigation.
4. Willing to go overseas for 1 year.
5. No dependents permitted overseas.

Base pay, bonus, living allowance, vacation, add up to \$7,000.00 per year. Permanent connection with company possible.

Apply By Writing To

P-57 P.O. Box 3575
Philadelphia 22, Pa.

Give complete history of your experience, particularly in radar maintenance. Interview will be arranged for successful applicants.

Oscillator frequency may be checked with a calibrated absorption-type wavemeter, a calibrated receiver, or Lecher Wires.

Next the mixer output winding should be connected to the receiver terminals, and the receiver tuned to the intermediate frequency to be used, in this case just below 14 Mc. Adjust C_3 for maximum noise, the proper setting for the coil and condenser values given being approximately the midpoint of the tuning range of C_3 .

A signal in the 2-meter band is now required, and a standard signal generator is to be preferred for this operation, though a stable unmodulated transmitter located some distance away or even the radiation from a superregenerative receiver may be used. Substitute a two-turn link from the signal source for the r.f. plate winding. Adjust C_3 for maximum signal, and squeeze or spread the turns of L_4 until the setting of C_3 for maximum signal is the same as C_4 . Replace L_3 in the proper way, and repeat this process with the r.f. grid and plate circuits, this time with the signal source coupled into L_1 . With all shaft couplings tightened, check the performance with a weak signal source, touching up the alignment using the foregoing procedure.

Your QSL Manager

(Continued from page 51)

OPS certificates. Just to make sure that he keeps busy, amateurs in the East Bay Section have elected and reelected Horace as section communications manager for several terms. He is presently president of the Northern California DX Club and a past-president of the Oakland Radio Club. In his spare time, Horace enjoys all kinds of sports and is an ardent traveler.

As if his many activities did not already fully occupy his time, Horace volunteered in 1938 for the post of QSL manager for his W6 amateur friends and since then has enabled hams in his call area to receive thousands upon thousands of DX cards. When the mailman leaves 414 Fairmount each day, he heaves a big sigh of relief easily audible across the bay. Horace gets more mail per day than all of the rest of the mail carrier's route combined. On one particular day, he received over 70 lbs. of choice cards. With W6TI handling between 15,000 and 25,000 cards a month, it is necessary for him to keep a large box on his front porch in lieu of a mailbox. When the postman delivers mail at the Greers', the thump of packages dropping into the box can be heard throughout the house.

A carefully-planned system of sorting and mailing cards enables Horace and his helpers to keep all of the DX-minded amateurs in W6 perfectly happy — no small task. Horace's slogan, in common with his brother-QSL managers, might well be, "If you don't receive that wanted card, it's because you haven't filed an envelope with me or the so-and-so didn't send a card in spite of his solemn declaration that he QSLs 100%!"

As Up-to-Date As Tomorrow Morning's Newspaper

COURSES

FOR AMATEURS
AND PROFESSIONALS

Approved for Veterans.
Licensed, N. Y. State Bd. of Ed.

Advance your hobby or prepare
for a career in a radio school run
by radio men for almost a decade.

Frank Melville, W2AQK

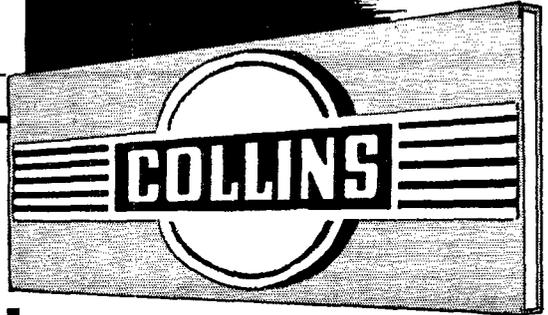
MELVILLE RADIO INSTITUTE

Melville Bldg., 15 W. 46th St., N. Y. 19, N. Y.
Send for Bulletin "B" or call LUXemburg 2-0440



HENRY

HAS



Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stocks of all Collins amateur equipment for immediate delivery. Also complete stocks of all other amateur receivers, transmitters, and parts. I promise you that you can find nowhere else lower prices, more complete stocks, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

Bob Henry
WØARA

**A FEW OF THE ITEMS
WE STOCK ARE LISTED BELOW**

Hallcrafters 538	\$ 47.50
Hallcrafters 553	79.50
Hallcrafters SX43	169.50
Hallcrafters SX42	275.00
Hallcrafters S47	200.00
Hallcrafters S55	119.50
Hallcrafters S56	99.50
Hallcrafters T-54	169.50
Hallcrafters S40A	89.50
Hallcrafters S51	129.50
Hallcrafters SP44	49.50
Hallcrafters HT18	110.00
Hallcrafters HT9	350.00
Hammarlund HQ129X	189.15
Hammarlund SP400X Super Pro	450.00
National NC-33	65.95
National NC-57	89.50
National NC-173	179.50
National NC-183	269.00
National HRC-7	279.00
National NC240D	225.00
National HFS	125.00
RME HF-10-20	77.00
RME VHF-152A	86.60
RME DB22A	71.00
RME-34	98.70
RME-45	198.70
Meck T60	150.00
Signal Shifter model EX	99.50
Millen 90800	42.50
Millen 90881	89.50
Millen 90281	84.50

McMurdo Silver, Gonset, Bud, Sonar, Gordon, Amphenol-Mims; we have everything for the radio amateur.

Some prices slightly higher on the west coast.

FOR EXAMPLE:

Collins 75A-1 receiver	\$ 375.00
Collins 32V-1	475.00
Collins 30K-1	1450.00
Collins 70E-8	40.00
Collins 310C-1	85.00
Collins 310C-2	100.00
Collins 210B-1	190.00
Collins 310B-3	215.00

COMPLETE STOCKS

Henry has *everything* in the ham field.

QUICK DELIVERY

Shipments 4 hours after receipt of order. Send \$5.00 with order and shipment will be made at once C.O.D.

TRADE-INS

You can't beat Bob Henry for trade-ins. Write, wire or phone today about your equipment and Bob Henry will make you a better offer than you can get anywhere else.

TIME PAYMENT

Because Bob Henry finances the terms himself you get a better break. Save time and money, deal with Bob Henry on his personal, profitable time payment plan.

Butler, Missouri

HENRY RADIO STORES

11240 Olympic Blvd.
LOS ANGELES 25
CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

LEEDS

The Home of RADIO

**QUALITY
PRICE
DEPEND-
ABILITY**

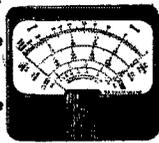


H & H WIRE WOUND RHEOSTAT

150 Watts, 5 ohms, @ 5.48 amps., in approximately 67 steps. Resistance Wire Wound toroidally around refractory core and embedded in vitreous enamel. 4" Diameter. Depth behind panel 1 3/4". Makes excellent control for Toy Trains. A Buy At..... **\$1.95**

A LEEDS LEADER

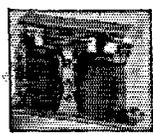
- 50 microamp movement ± 2%
- 2500 ohms DC Resistance ± 2%
- Knife Edge Pointer
- 4 x 4 1/2 Black Bakelite Case
- Easily Read Multitester Scale



This is the exact meter utilized in the G.E. YMW-1A Lab. Type Unimeter. A Great Special. Each

\$9.75

RELAYS



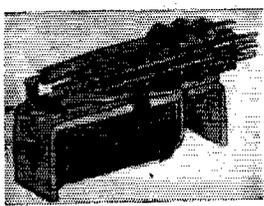
Dual coil with armature pivoted between coils. All contacts normally open. Operates 220-250 Volts. 8000 Ohms each coil, contacts S.P.D.T. Controls rated 2 amps. at 110 VAC. Ideally suited for balanced or bridge type circuits where limited current or power is available. Will withstand 12 G Vibration up to 60 cycles at 35,000 feet

altitude. Special low price **95c**

Multiple Contact

'Phone Type
No. 882—2 windings each 125 ohms.
No. 881—Single winding 12500 ohms.

49c



CS DIFFERENTIAL

OIL FILLED CONDENSERS

- 7.5 Mfd. 330 V. AC. G.E..... **98c**
- 10 Mfd. 600 V. DC..... **98c**
- 2 Mfd. 1000 V. DC. Aero..... **69c**

DM-43A DYNAMOTOR

Manufactured by G.E. New. Input 24 V. @ 23 amps. 7500 RPM; output 515/1030/2/8 V. @ 21.5/260 milliamps; filtered. Special.... **\$2.95**

Not rated 25% with order, balance C.O.D. All prices F.O.B. our warehouse New York. No order under \$2.00. We ship to any part of the globe.

LEEDS RADIO CO.

75 Vesey Street
Cortlandt 7-2612

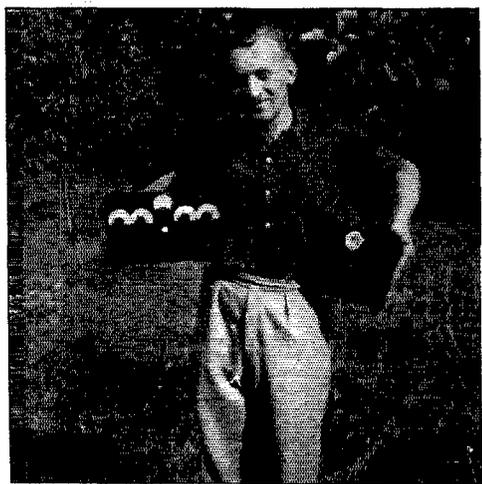
Dept. Q59
New York City 7

How's DX?

(Continued from page 59)

the loss keenly. If you've worked him will you help out with a duplicate, OM? W4TUO hears that I5s are operating in Trieste, while IS1 calls emanate from Sardinia. Jim allows as how SV0AG will QSL first and his q.t. QTH will be on the card. Also, Transjordan data: ZC1AL and ZC1AZ work both 'phone and c.w. while ZC1CL and ZC1AD stick to the pumphandle..... An OK marriage announcement reveals that OK1AW has recently made the big leap..... Those not satisfied with their VS6BA QSLs can obtain a properly-inscribed card by contacting W. A. Musty, 83 Jubilee Bldgs., Sham Shui Po, Hong Kong..... YI2AM reports that YI2FDF (G2FDF) has also closed down, leaving us with a big void in the Near East. [The guy who first started calling the Near East "Near" should try to raise it on our junkheap. — Jeeves]..... J6BMC is on 14 Mc. almost daily and wants his pasteboards via ARRL only..... The abrupt QRT, during QSO, of YU7AA had W4MKM a little worried. But YU7AA has been subsequently heard so must still be in circulation..... Anyone having worked OQ5CR on bands other than 7 Mc. had better pucker up for another try; Everett has received cards confirming bogus 10- and 20-meter confabs..... Having already lost a pile of man-hours in shut-eye because of their DXCC race, J2AHI and J3AAD are back at it in the WAS department. J2AHI eked out a narrow victory, both stations making the grade within one week..... W6AY figured out that C8YCW is C8YR's rig being manned by a few of the local Kansu boys while C8YR visits Nanking..... Odds bodkins, we thought that Luxembourg suffered a lot from the

(Continued on page 118)



A prominent piece of DX which helped enliven the recent 3.5-Mc. season is OK1XU, shown here with his compact homebuilt station under both arms. Operating in Prague, 25 watts input and a two-tube receiver resulted in many countries on four continents being worked.

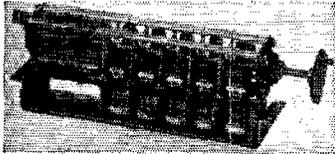
Our 26th Year

LEEDS

The Home of RADIO

QUALITY—PRICE
DEPENDABILITY

VARIABLE CONDENSER



6 Gang, 1 section of .00025 Mmf, 4 sections .000035 Mmf, 1 section of .00005 Mmf, with 5 air trimmers of 15 to 25 Mmf capacity. This condenser is all silver plated.
Each Only... **95c**

100 amp.—6 volt D.C., 3 inch scale, 4 1/2" square, Grey finish, supplied with 100 amp. shunt. Brand New Each as illustrated..... **\$2.95**
0-100 Ma 2" Round McClintock **\$1.95**
0-1 Amp. RF 2" Round General Electric..... **\$2.45**
5-0-5 Amp. Charge & Discharge 2" Round..... **69c**

METERS

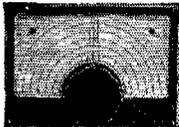


NATIONAL COMPANY DIALS

Direct Calibration Dials—5:1 Drive Ratio

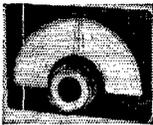
ACN—7 1/4" W. x 5" H.

\$3.30



ICN—7 1/4" W. x 5" H. with illuminated scale

\$6



NPWO Gear Drive 20:1 Ratio: Shaft perpendicular to panel with Micrometer Dial..... **\$9.00**

PWO Gear Drive 20:1 Ratio: Shaft parallel to panel with Micrometer Dial..... **\$9.90**

We Carry a Complete Line of National Parts and Receivers

PLATE TRANSFORMERS

For Small Transmitters. DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke Input Filter. Using Mercury Vapor Rectifier Tubes. Pri. is for 115 V. 60 cy.

Type No.	Sec. Rms. Volts	Sec. DC Volts	DC Sec. MA.	Dimensions			Price Each
				H.	W.	D.	
P 57	660-660† 550-550	500	250	4 1/2"	3 13/16"	4 1/2"	\$ 5.55
P 58	1080-1080 500-500	1000*	125	4 1/2"	3 13/16"	5"	7.20
P 59	900-900 800-800	750	225	4 1/2"	3 13/16"	5 1/2"	6.00
P 67	1450-1450 1175-1175	1200	300	5 1/2"	6 1/2"	4"	17.85

* For dual operation with simultaneous use of both sec. ratings. † Has 40-volt bias tap.

POWERSTAT VARIABLE TRANSFORMERS

Type 20: 115 V. input, 0-135 V. output @ 3.0 amps. 0.4 KVA **\$12.50**

Type 116: mounted; 115 V. input, 0-135 V. output @ 7.5 amps. 1.0 KVA..... **\$23.00**

Type 116U: unmounted; 115 V. input, 0-135 V. output @ 7.5 amps. 1.0 KVA..... **\$19.00**

Type 1126: 115 V. input, 0-135 V. output @ 15.0 amps. 2.0 KVA. **\$46.00**

Type 1226: 230 V. input, tapped at 115 V. 0-270 V. output @ 9.0 amps. 2.4 KVA..... **\$46.00**

Type 1156: 115 V. input, 0-135 V. output @ 45.0 amps. 6.1 KVA. **\$118.00**



INSULATOR

Porcelain Beehive type stand-off insulator. Type 4451-J. Stands 4 1/2" High, with 2 1/4" Square metal base for mounting with jumbo banana jack in top.

Each..... **24c**
10 for..... **\$2.00**



SELSYN MOTORS

115 Volt AC 60 cycles-Transmitters only. Can be used to turn small beam antenna or as indicators only 3 1/4" Diameter x 5 1/2" High. Shipping Weight 10 lbs. Per Pair. Special Per Pair.... **\$5.95**

Wire Wound Potentiometer

100,000 ohm, precision made. G.R. type, 25 watt, 6" diameter. Brand New. **\$1.95**



TUBES

3C24 Triode 100 Watts output: 6.3 Volts 3 amp. Filaments 2000 Volts plate

@ 75 ma. Each **39c.** 10 for... **\$3.50**

2 x 2/879 Rectifier 2.5 Volts 1.5 amp. **.49c**

FILAMENT TRANSFORMERS

2 1/2 Volts C.T. @ 10 Amps. 7500

Volts RMS Type 40..... **\$2.40**

6.3 Volts C.T. @ 3 Amps. 2500

Volts RMS Type 46..... **\$1.65**

CHOKES

SMOOTHING		SWINGING		BOTH	
TYPE	Hy	TYPE	Hy	MA	Price
C-80	10	C-87	4-16	150	\$2.70
C-81	10	C-88	4-16	200	\$3.45
C-82	10	C-89	4-16	250	\$5.35
C-83	8	C-90	3-14	300	\$5.85

All Above 3000 Volts Insulation

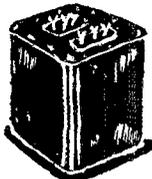
If not rated 25% with order, balance C. O. D. All prices F. O. B. our warehouse New York. No order under \$2.00. We ship to any part of the globe.

PLATE TRANSFORMER

Primary 115/230 Volt, 25-60 cycle. Secondary 820 Volts Center Tapped at 775 Ma. Hardly any voltage drop at 950 Ma. Completely shielded. Dimensions 6 1/2 x 6 1/2 x 7 1/2. Net Weight 36 lbs. Special..... **\$7.95**

FILAMENT TRANSFORMER

Primary 115-230 volt 60 cycle. Secondary 5 volts at 15 Amps., 5000 volt insulation. Swell for 35T, 75T, 100TH, 250TH, HK-54, etc. Completely shielded dimensions 4 1/4 x 5 x 5 1/4. Net Weight 10 lbs. Special..... **\$3.95**



Heavy Duty Choke

6 Henries at 550 Ma. 28 Ohms DC Resistance High voltage insulation. Completely shielded. Dimensions 5 1/2 x 4 1/2 x 5 1/2. Net Weight 15 lbs. Special, **\$4.95**

LEEDS RADIO CO.

75 Vesey Street
COrtlandt 7-2612

Dept. Q59
New York City 7

Enjoy High - fidelity

RADIO RECEPTION WITH THE

Browning FM or FM-AM **Tuner**



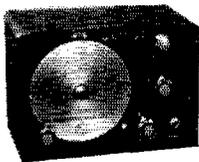
Performance to satisfy the man who knows radio . . . provable by both instrument and listening tests . . . is yours with Browning Tuners.

Model RV-10, the straight FM tuner with self-contained power supply, delivers stable, high-fidelity output to your audio amplifier-speaker system. *Model RJ-12A* covers both the 88-108 Mc FM band and the 530-1650 Kc AM band in a single tuner with excellent sensitivity, selectivity, and quality throughout. Both models are available for cabinet or rack mounting.

You can pre-judge these tuners by their performance curves. We'll gladly send you a complete set of five. Write today for Data Sheet H-489.

✓ *Check with Browning*

AMATEUR FREQUENCY METER MJ-9



Reads directly on 7 bands from 3.5 to 148 mc.

Accuracy .05% at all frequencies.

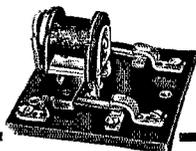
A stable VFO with output voltages comparable to a crystal; lets you work band edges.

Stable — compact — large easy-reading dial — all controls on front panel — low power consumption at 110-120 volts a-c/d-c.



BROWNING
LABORATORIES, INC.
WINCHESTER, MASS.

ENGINEERED FOR ENGINEERS



CHANGE OVER
RELAYS

The popular line of STACO quality relays is again available at your favorite distributor

Type AMA . . . 115 V. AC Mycalex . . . \$4.00
Type ABA . . . 115 V. AC Triplex . . . \$3.00

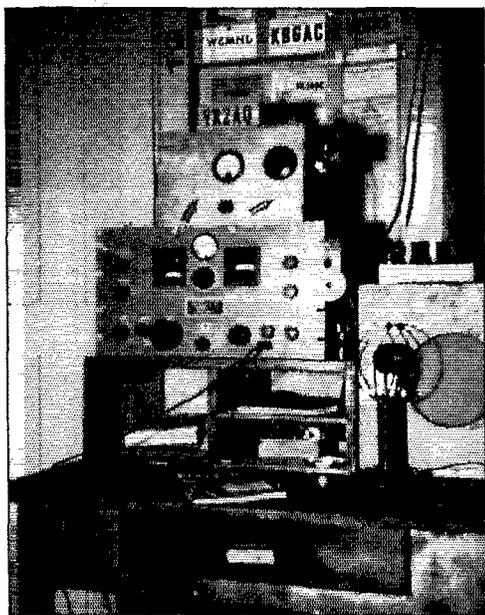
Write for complete relay and transformer catalog

STANDARD ELECTRICAL PRODUCTS CO.

406 Linden Avenue

Dayton 3, Ohio

purloining of calls by pirates, but look at this roster of Guatemalan no-goods: TGs 1CP, 2FU, 2U, 3AE, 3BR, 50L, 6AI, 6CR, 8PC, 8U, 9AG, 9F, 9J, 9JM, 9PB, 9RS, 9FG and 9RF. TG QSL Manager TG9MG brands these clandestine, one and all. W2GMM unearthed the disheartening info that M1A has passed away, leaving M1B to hold the fort in San Marino. 11KN reports that M1B is 'phone-only on 7 and 14 Mc. but has promised to learn c.w. as soon as possible just to handle the great demand for an M1B QSO. Now, that's what we call ham spirit! VQ4HGB is on the go again, this time heading for G. When he gets his G call, Henry would like to line up schedules with Long Branch, N. J. QTH: % 7 Trafalgar Avenue, Worcester Park, Surrey, England. Fellows tracking down AC3SS cards should not lay all the blame on Henry as it was a two-operator one-call deal. We understand that such AC3SS queries can reach either ex-VQ4HGB or Bob Ford through G2MI. KZ5CB is closing down after a pleasant postwar sojourn on 40 and 20. Incidentally, Commander Biele has the commendable record of having QSLd every station he has worked since he first tasted the



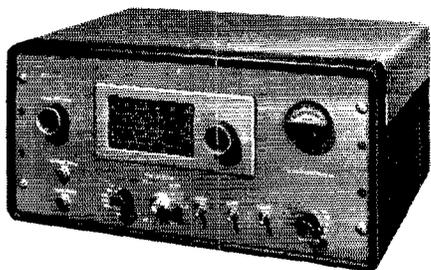
Here's the layout at VR2AQ, on Fiji, operated by J. W. Holden. The transmitter, a 20-watt job, is above the Super-Pro and there's a broadband converter atop the speaker. VR2AQ is one of the more active Fiji stations on 28 Mc.

joys of ham radio as 2AOS in 1920. If any KZ5CB cards have gone astray, try 28 Connecticut Ave., Kensington, Md., for satisfaction guaranteed. ZC1AL writes to inform us that he worked only two stations, W2FGB and W4IUO, while operating portable-ZC6. Jim may try it

(Continued on page 120)

GET ON THE AIR

With this Complete
Allied-hallicrafters
Low Cost Ham Station



hallicrafters HT-19 Transmitter

The ideal medium-power transmitter! Completely self-contained; power output not less than 125 watts on all bands. Covers 5 Amateur bands; 3.5-4 mc; 7.0-7.3 mc; 14.0-14.4 mc; 21.0-21.45 mc; 27.16-29.7 mc. Complete band-switching on all frequency bands; VFO all bands, plus 3-spot-frequency crystal positions; narrow band FM on all frequency bands; FM deviation calibrated for each band; preamplifier for high-impedance mikes; oscillator keyed for CW; temperature compensation and voltage regulation of VFO; variable output impedance from 50-600 ohms; two separate antenna outputs; 4-65A final amplifier. 20" x 18" x 10 1/4". For 105-125 v., 60 cy. A.C. Shpg. wt., 85 lbs. Complete with tubes, less crystals.

No. 97-589. HT-19 Transmitter, f.o.b. Chicago..... **\$298.00**
\$59.60 down, \$21.06 monthly for 12 months.

FREE—ALLIED'S 172-PAGE CATALOG

The Leading Amateur Guide!

You'll find everything you need for your station in the ALLIED Catalog. Get it today. And get ALLIED'S speedy shipment, money-saving values, top-grade equipment, ideal easy-payment terms, and square trade-in deals. Keep your ALLIED Catalog handy—it's the complete, reliable Amateur Buying Guide!



All You Need to Get on the Air at Low Cost

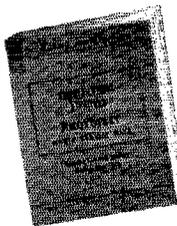
ALLIED makes it easy for the beginning Amateur to get on the air at minimum investment! Complete station setup includes: Hallicrafters S-38 Receiver, HT-17 Transmitter with 40 meter coil, a quality handkey, a 2000 ohm double headset, one Bliley 40 meter crystal, two antenna insulators, a 200 ft. roll of No. 14 antenna wire, ARRL station log-book, Amateur Radio Callbook. Includes absolutely everything you need to get on the air. With this fine equipment, an Amateur license, and a few hours' time, you can get started making exciting contacts across the country on 40 meter CW. Get started today!

No. 97-636. Complete Amateur Station. **\$10375** NET, f.o.b. Chicago, Only.....
Terms: \$20.75 down, \$7.33 monthly for 12 months.

**BE SURE TO SEE US AT THE CONVENTION
IN MILWAUKEE, SEPTEMBER 4, 5 AND 6**

EXCLUSIVE with ALLIED!

Post-War Communications Receiver Manual



New! Invaluable! Complete technical analysis of all important post-war communications receivers. Helps you compare models so you can select and purchase intelligently. Enables you to maintain your own receiver in perfect order. Permits any ham to do factory service work on any post-war model. Covers current communications receivers of all well-known makes. Exclusive, uniform Photo-fact presentation includes schematics, photo views, parts data, full specifications. Covers 53 models; over 300 pages.

No. 38-595. Post-war Communications Receiver Manual, A "must" for all Hams. **\$3.00** NET, Postpaid, Only.....

ALLIED RADIO CORP., D. I. WARNER, W918C
833 W. Jackson Blvd., Dept. 15-J-8, Chicago 7, Ill.

Send FREE 172-Page ALLIED Catalog
 Ship No. 38-595 Communications Receiver Manual
Enter order for Low Cost Amateur Station. HT-19
Enclosed find \$..... Full Payment Part Payment
(Balance C.O.D.)

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

ALLIED RADIO

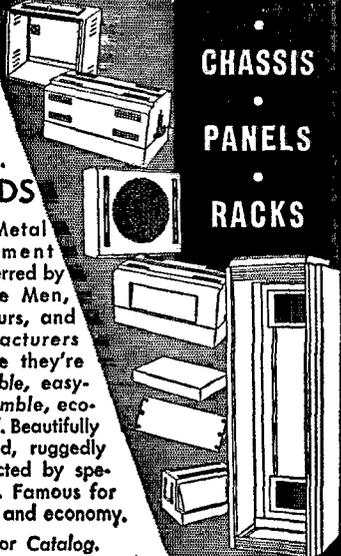
Everything for the Ham

STANDARDIZED METAL EQUIPMENT FOR ELECTRONICS

BUILD BETTER ELECTRONIC EQUIPMENT

PAR-METAL
ELECTRONIC HOUSINGS

for
ALL P. A. NEEDS
Par-Metal Equipment is preferred by Service Men, Amateurs, and Manufacturers because they're adaptable, easy-to-assemble, economical. Beautifully designed, ruggedly constructed by specialists. Famous for quality and economy.
Write for Catalog.



with **STANDARDIZED**
READY-TO-USE CABINETS
•
CHASSIS
•
PANELS
•
RACKS

PAR-METAL PRODUCTS CORPORATION

32-62-49th ST., LONG ISLAND CITY 3, N. Y.
Export Dept.: Rocke International Corp.
13 East 40 Street, New York 16

STANDARDIZED METAL EQUIPMENT FOR ELECTRONICS

again one of these months ZC6XY will accept QSLs *only* via ARRL and will clean up all owed cards in due time VP9T (W2LKX) will finish up his confirmation work upon his return to 8637 138th St., Jamaica, L. I., N. Y. W3GHD's ears grew two inches in all directions when he heard from some source that T18RB was in the Cocos Islands. Could be, but the proof is in the pasteboard. Who has the low-down on any recent Cocos activity? W8WEA/Truk is back in action again after a leave in the States. Harry runs 300 watts to several 150-ft.-high skywires on the low end of 20 and maintains that he is still the only ham active on Truk. W8YJS is W8WEA's brother, Lee. As detailed in the Operating News section of this issue, Little America has been deleted from the ARRL Countries List and Antartica added.

From Syria we hear that AR1WW is very sh-h-h and QSI's will only be accepted through ARRL/IARU. QRG: around 14,000 kc.; QRI: "distinctive!". W6AFR lists Philippine c.w. men as KA1s ABV, ABU, VVS, NL, AC, ACG and AQ. The rest of the boys make with the A3 on 10 and 20 ZS2MI, Marion Island, is giving the gang a run for their milliamperes.



This athletic-looking individual is Essex Blomfield, VS2AL. He's been VS2AL ever since 1938 and did some railroad construction in Siam while a POW during the last conflict but likes his present QTH much better, a rubber plantation some 200 miles north of Singapore. The receiver is an AR-88 and the transmitter, with parallel 807s in the final, runs 75 watts on c.w. and 40 watts on 'phone, operating mostly 14 Mc.

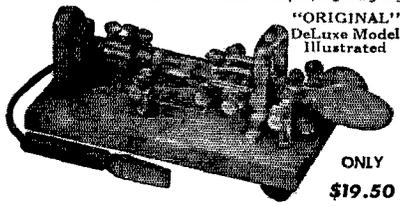
Now . . . A FINER BUG

GENUINE IMPROVED DELUXE

for All-Around Use
VIBROPLEX

Reg. Trade Marks: Vibroplex, Lightning Bug, Bug

"ORIGINAL" DeLuxe Model Illustrated



ONLY \$19.50

This is the BUG with the exclusive PATENTED JEWEL MOVEMENT feature that eliminates tiring sending effort and makes sending easier than you ever dreamed sending could be. 50 percent easier than the straight key. It's that easy because it has all the features that contribute to smooth, easy, brilliant sending performance. Snartly designed. Polished chromium base and parts. DIE CAST contacts and main spring. Colorful red switch knob, finger and thumb piece. 3/16th contacts. Complete with cord and wedge. Your choice of three deluxe models: Original, Blue Racer and Lightning Bug. Order yours NOW! Prompt shipment. Money order or registered mail. FREE catalog.



The "BUG" Trade Mark identifies the Genuine Vibroplex. Accept No Substitute

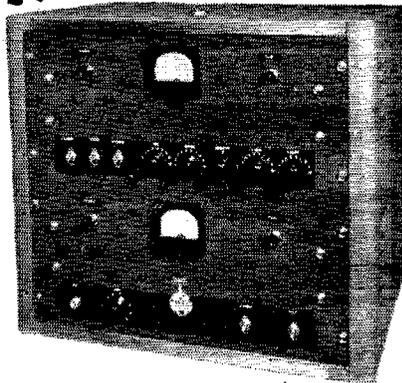
THE VIBROPLEX CO., Inc.
833 Broadway, New York 3, N. Y.

Chances are very good that he will rate as a new country A very suspicious-sounding (too danged loud) AC3GG has been widely worked on 14 Mc. lately. Furthermore, the character says he will QSL upon return to the States! W1KUF, W2QHH and others are daintily holding their noses W2QHH declares that P8NE left Corsica as of July to become just another F feller.

A postal from W7VY tips us off to the swell time he's having on his vacation tour. Gene shook the paws of XE1A and CM2SW and inhaled the Latin slant on DX matters After recently commenting upon the fact that there was no ham activity in Somalia, MD4s TH and JG

(Continued on page 122)

W. R. L. PRESENTS THE "GLOBE CHAMPION"



\$269.00
KIT FORM

- * 150 Watt Input from 10 thru the 80 Meter Band.
- * N.B. F.M. can be used with C.W. XMTR at \$39.50 extra.
- * Provisions for ECO-RF Section is complete C.W. XMTR.
- * Voltage Regulated Oscillator and Buffer.
- * Automatic Bias on final and Buffer Stages.
- * Very compact—streamlined cabinet 22" wide x 15" deep x 19½" high.
- * Complete with tubes and meters; including 1 set of Coils.
- * Write for complete details on this sensational new XMTR.

\$289.00 Wired
Cl. B Modulator complete
with tubes and meter
\$105.00 KIT
\$115.00 WIRED

R.F. Section complete with
tubes meter and 1 Set coils

\$149.00 KIT

\$159.00 WIRED

Complete 150 Watt C.W. XMTR—Ready To Go

All prices include special
crating for safe shipment

**LIBERAL TRADE-INS—CONVENIENT PAYMENTS
WRITE TO LEO TODAY!**

SPECIAL BARGAIN OFFER

EIMAC-75TL	\$2.49
POPULAR-809	\$1.50
POPULAR-805	\$4.95

ALL
BRAND NEW
TRANSMITTING
TUBES



Write for a complete List of Ham Bargains



**GIANT
RADIO
REFERENCE
MAP**

Just right for your control
room wall. Approximately
28" x 42". Contains time
zones, amateur zones, lead-
ing shortwave stations,
monitoring stations.

Look me up in Booth
142 at the National
Ham Convention in
Milwaukee, Sept. 4-6.



**COMPLETE
NEW
CATALOG**



FREE

You'll enjoy dealing with the
World's most personalized
radio supply house.

ONLY 25c

WRITE—WIRE
PHONE 7795

WORLD RADIO LABORATORIES
744 West Broadway
Council Bluffs, Iowa

Please send me:

- Radio Map
- New Catalog

Send "Globe Cham-
pion" information

Name

Address

City..... State.....

World Radio
LABORATORIES INCORPORATED
COUNCIL BLUFFS, IOWA



"DASHBOARD" MOBILE



EVERYTHING AT YOUR FINGERTIPS...

... with this completely new, compact, efficiently designed, 30 watt transmitter, small enough to mount in most glove compartments or under any dash. For complete details write or see the full page ad in August QST.

PHOTO... **ONLY \$79.95** less tubes and accessories
 1/5 ACTUAL SIZE Kit of tubes \$8.00, complete with tubes and two mate antenna connectors \$87.50

SUBURBAN RADIO COMPANY
 82 Herman Street • East Rutherford, New Jersey

S
U
B
R
A
C
O
M
T
-
1
5
X

SINCE 1931 ...



You know that experience talks. The craftsmen at Valpey average eight years continuous association with quartz fabrication.

When you specify Valpey, you get superb oscillating blanks that reflect this long experience... yet you pay no more!

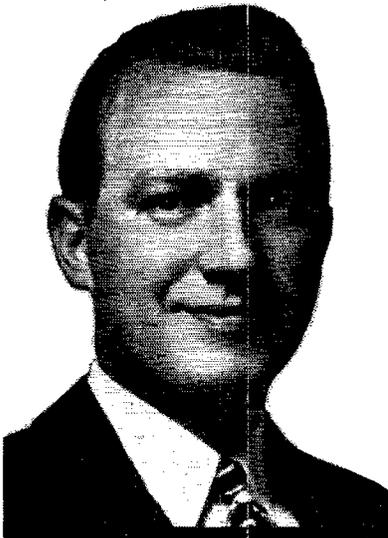
For exact frequency control, look to Valpey! Complete catalog on request.

VALPEY CRYSTAL CORPORATION
 Holliston, Massachusetts

W1ATP W1BZJ W1HVP W1PLX

arise to plague us. Not that we mind; it gives us something more to yak about. TH is keeping a blacklist, so we had better mind our Ps and Qs. MD4TH is so far strictly-c.w. and MD4JG tries a little 'phone on occasions A 'phone, TI2KQ, claiming to be on Clipperton Island, has been messing with W6 people during recent evenings. (???) P0XTX, according to W9AND, has 35 watts on the air in Curacao, at present operating under cover on 14 Mc. And there's a PJ0X fiddling around on 7 Mc. claiming the same status. This hush-hush business seems a little out of place in our hemisphere, but so it goes Those brothers who are breaking their backs to raise their first Chinese station had better skip calling C9AS if they wish to avoid a severe breach of morale — the man says "NO QSL PSE." Maybe some hope at a later date, though, says W7GPP XE1AC bears glad tidings. AI hears that restrictions in Spain are now being greatly liberalized and we should be hearing EAs all over the place very soon HS1SS came back home and doesn't hold much hope for any Siamese activity in the near future. Don says there are a few W6s doing time in HS but aren't inclined to get on the air. Gosh, that doesn't sound like W6 talk to us! OY8LA has been having a tough time working anyone on 14-Mc. 'phone. Reason: rockbound on 14,290 kc. Norway gave us some uncertain moments when they began using their LB prefix and it looks as if Sweden is following suit. A few SL calls can be heard floating around on 20. All you lucky characters who have submitted your DXCC cards and are waxing somewhat impatient as a week or so rolls by should relax a bit. Know how long it takes to check and record each DXCC application? Nothing short of two hours. Since this is one of the League's most exclusive and valued certificates, the job is done very carefully and doubtful cards are checked and double-checked. W1QMI, who really perspires over this chore (and has others besides), would appreciate it if you future aspirants would ship a few extra cards along; make it 103 or so rather than 100 even as there is always a small percentage of rejects (for insufficient QSO data, etc.). Also, stacking your cards from top to bottom in Country List order along with a checked-off list will help to expedite matters.

Jeeves and yours truly received a terrific jolt a few nights ago. As you know, we've been trying to beat our Cuban jinx but so far had only succeeded in making local QRM. Then we shrieked with joy when a CN8 came back to our CQ CM! But what does the guy say but that he's not in Cuba but in some burg called Morocco, probably a suburb of Brooklyn. Now, what we want to know is, if CM is Cuba and CO is Cuba, who put CN in Morocco? Could be that they've changed the alphabet since we went to school but Jeeves is inclined to believe that somebody is pulling a fast one on us.



I GUARANTEE YOU THE *BEST* TRADE-IN DEAL!

YES SIR! I DON'T CARE HOW AMAZING OR SURPRISING ANY OTHER OFFERS MAY BE — IT WILL PAY YOU TO GET YOUR NEW RECEIVER OR TRANSMITTER FROM ME!

DON'T WAIT ANOTHER DAY—BRING IN YOUR OLD EQUIPMENT NOW! YOU WILL BE MORE THAN SATISFIED WITH MY SQUARE DEAL! IF YOU LIVE OUT OF TOWN, WRITE AND TELL ME WHAT YOU HAVE TO TRADE AND WHAT YOU WOULD LIKE TO GET FOR IT.

START ENJOYING THAT NEW GEAR RIGHTAWAY!

73, Bil Harrison, W2AVA

HERE'S WHAT YOU GET WHEN YOU DEAL WITH ME—

- prompt, careful shipment!
- lowest prices — always!
- the most for your used equipment!
- all material shipped in brand new, unused, in factory sealed cartons!
- 90 days free service!
- terms to suit you!
- the backing of my reputation of fair dealing for over 20 years!

HARRISON HAS  **EVERY SET, AND PART!**

HARRISON HAS *Handicrafters* **TO FIT ANY BUDGET!**

HARRISON HAS  **EVERYTHING THEY MAKE!**

HARRISON HAS  **ALL MODELS!**

HARRISON HAS *RMC* **EVEN THE NEWEST ONES!**

HARRISON HAS EVERYTHING!

I stock all nationally advertised parts and equipment! No matter where you see it, in a manufacturer's bulletin or some other ad, I HAVE IT at the lowest prices — so send me your want list today for **REAL SERVICE**. Always remember — "Harrison Has It!"

OPEN NIGHTS New York - Wednesdays **UNTIL 9:00**
Jamaica - Fridays

HARRISON RADIO CORPORATION
12 WEST BROADWAY,
NEW YORK 7, N. Y.

EXPORT DEPT.
CABLE ADDRESS
"HARRISORAD"



NOW...For The First Time!

**A Rotary-Beam
TOWER**

**At A Price You Can Afford!
Attractive—Self-Supporting**

NO GUY WIRES

- Galvanized Steel—Will Last A Lifetime!
- SAFE—Ladder to Top
- COMPLETE—Ready to Assemble
- Easy to Assemble & Erect
- Withstands Heaviest Winds

LOOK AT THESE LOW PRICES!

Three popular sizes. Assembled on the ground with a wrench in a few hours. Made by one of the oldest manufacturers of steel towers. Five other sizes on request.

33 ft.—\$89.75	39 ft.—\$107.25	61 ft.—\$199.75
Ship. Wt. 516 lbs.	Ship. Wt. 616 lbs.	Ship. Wt. 1246 lbs.

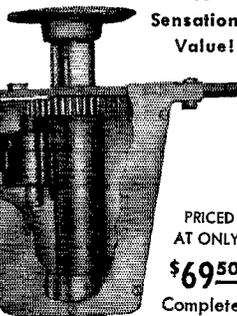
Shipped FOB Kansas City, Mo., 4th class freight. Prices subject to change. Send check or money order or write today for complete FREE information!

VESTO CO., PARKVILLE, MO.

**Don't Lose those Good QSO's
While Turning Your Beam by Hand**

MUNGER

**Electro-Beam
ROTATOR**



**A
Sensational
Value!**

PRICED
AT ONLY
\$69⁵⁰
Complete

Hold those rare DX contacts right through QRM by peaking up your own and received signals in a few seconds. Ruggedly built. Powerful reversible motor. 115V—60 cycles. Swings your beam at 1 r.p.m.

- Price Includes Reversible Electro-Beam Rotator and Accurate Direction Indicator.
- Foolproof Potentiometer and Meter Circuit. Calibrations in Both Degrees and Directions.

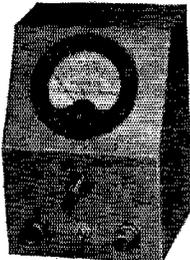
Free Inspection Offer!

Order today. If not satisfied, return rotator within 10 days for refund. (Control-power cable supplied at 10c per ft. in 50' or 100' lengths.)

MANUFACTURED AND SOLD
EXCLUSIVELY BY

REX L. MUNGER COMPANY
4701 Sheridan Road, Chicago 40, Ill.

Illustrated Bulletin
on Request
—•—
Time Payment Plan



World Above 50 Mc.

(Continued from page 61)

Lancaster, Calif. — Tests between W6MFK, Lancaster, and W6NGN, Buena Park, a 50-mile path over very high mountains, have been made under both summer and winter conditions. Last winter it was found that signals could be exchanged between these two points only by both stations aiming at Mt. Baldy, a 9000-foot peak some 45 degrees or so off the line between the two stations. This summer, however, signals make it over the direct route, though with severe flutter and inferior quality. Signals by the reflection path are steady and considerably stronger. Polarization is vertical at present.

Los Angeles, Calif. — Six members of the Los Angeles V.H.F. Club, using the call W6WKO, operated on 144 Mc. from the ranger's lookout on Mt. Frazier, 8036 feet above sea level, over the July 4th week-end. DX worked included W6INP and W6PJF in Stockton, some 260 miles to the north, these contacts being made between 7:30 and 8 A.M. July 5th. Operators included W6s WKO, WWP, NGN, BCT and CQJ. The log shows contacts with 75 different stations for the two days' work. A 522 was used with a 16-element vertical array.

Silver Spring, Md. — Having recently completed a new 2-meter receiver using a crystal-controlled oscillator and three r.f. stages, including a push-pull version of the Wallman low-noise "Cascode,"¹ W3GKP decided to see what could be done with a horizontal array. On the second night's try he worked W3RUE, Pittsburgh, and heard W8WJC, Everett, Ohio. These two points are just short of 200 and 300 miles distant, and over some of the toughest terrain east of the Mississippi river.

After a few evenings of this, Smitty increased power to 500 watts input to a pair of VT-127-As, on straight c.w., and on July 7th he made his first contact with W8WJC. He reports that best reception of W8WJC's A2 was obtained by switching in the crystal filter, audio filter, and b.f.o., and copying the signal as if it were straight c.w. All of which points the way for record aspirants: If you want high power for DX tries, and you don't have the modulator to handle it on voice operation, there's no law against trying straight c.w. It's just possible that the fellow at the other end may be one of those rare birds who uses his b.f.o. in 2-meter listening!

Chicago, Ill. — With the idea of providing another state for the 2-meter DXers of the Middle West, W9s BBU, BXK, OER and LWE set up for business over the July 4th week-end in Calcedonia, in the southeast corner of Minnesota. In three days of operating W4LWE/Ø was not favored with a red-hot band opening, but 15 stations, at distances from 100 to 300 miles, in Minnesota, Wisc. and Illinois, were worked. W8VHB, Fenton, W8Y10, Detroit, and W8BTL,

¹"A Low-Noise Amplifier," Wallman, MacNee and Gadsden, *Proceedings of the I.R.E.*, June, 1948, page 700.

(Continued on page 128)

HOT RADIO VALUES *at Sun Radio*

CRYSTALS!

In the greatest purchase of radio transmitting crystals ever made by one wholesaler in the history of the Radio Parts Industry, Sun Radio acquired title to over a half million dollars (\$500,000.00) of Army Surplus, precision built, exactly tooled crystals in moisture proof holders which are shock mounted. Please note that crystal shipments of 6 or less are packed in cloth containers to expedite handling. . . . No worry because all crystals are shock mounted and guaranteed delivered perfect. All crystals have Army MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

CRYSTALS WITH A MILLION USES

Fractions Omitted

kc	kr	kr											
412	419	426	435	442	448	474	484	492	498	507	507	516	
413	420	429	436	443	466	475	485	493	501	508	508	518	
414	422	430	437	444	468	477	487	494	502	509	509	519	
415	423	431	438	445	470	479	488	495	503	511	511	522	
416	424	433	440	446	472	481	490	496	504	512	512	523	
418	425	434	441	447	473	483	491	497	506	515			

49¢
each

I.F. Frequency Standards

kc	kc	kc
450	459.259	464.815
451.388	461.111	465.277
452.77		

99¢ each

Crystal Frequency Standards 98.356kc

Easily altered for 100 kc Standard. Mounted in low loss 3 prong holder.

\$3.89 each

For Crystal Controlled Signal Generators 525kc

526.388	531.944	536.111
527.777	533.333	537.500
529.166	534.722	538.888
530.555		

99¢ each

ASSORTED MISCELLANEOUS CRYSTALS

Fractions Omitted

372kc	376kc	381kc	384kc	387kc
374	377	383	386	388
375	379			

39¢ each

priced at a fraction of the cost of their holders alone.

FOR HAM AND GENERAL USE

Fractions Omitted

390kc	394kc	402kc	405kc	408kc
391	395	403	406	409
392	396	404	407	411
393	401			

79¢ each

CRYSTALS

FOR SCR 522

5910kc	7350
6370	7480
6450	7580
6610	7810
	7930

\$1.29 each

CRYSTALS FROM BC 610

3/4" Spacing—2 Banana Plugs

2045	2258	2360	2532	3250
2105	2260	2390	2545	3322
2125	2282	2415	2557	3510
2145	2300	2430	3202	3520
2155	2305	2435	3215	3550
2220	2320	2442	3237	3570
				3580
				3945
				3955
				3995

\$1.29 each

* Payments must accompany order. Enclose 20¢ for postage and handling. Minimum order—\$2.00 plus postage.



MAGNETIC HEADPHONES

2000 ohms, 8' Cords with Army plug. All unused; show slight handling... **\$1.98**



TS-13 HANDSET

Has 6' flexible rubber cord with 1-PL55 and 1-PL68 plugs attached. BRAND NEW... **\$2.95**

MICROPHONE

T-17

Brand new single button carbon hand mike by "Shure" with push to talk switch.

99¢



PANEL METERS

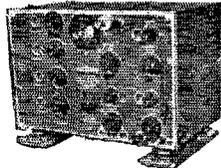
ALL BRAND NEW AND GUARANTEED

Simpson 2" Round	0-15 D.C.-V....	2.97
Triplett 2" Square	0-40 D.C.-V....	2.97
Sun 2" Round	0-300 D.C.-V....	2.97
GE 3" Square	0-150 A.C.-V....	3.49

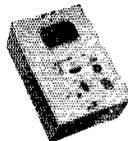
* TERMS: All items F.O.B., Washington, D. C. All orders \$30.00 or less, cash with order. Above \$30.00, 25 per cent with order, balance C.O.D. Foreign orders cash with orders, plus exchange rate.

100 WATT BENDIX TRANSMITTER

4 separate ECO

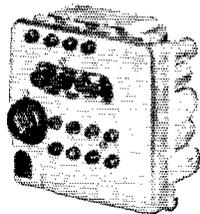


These can be easily converted to 20-40-80 meters. Crystal required for 10 meters. Each electronic coupled oscillator dial has 3000 divisions enabling quick precision shifting. This transmitter was constructed of the highest quality of precision parts, with laboratory precision. Four separate output tanks; one 4-position selector channel switch having seven sections which changes the ECO, IPA and output tanks simultaneously.—BRAND NEW, complete with tubes. **At close out price \$39.95**



V.H.F. Transmitter

Here is one of the greatest offerings in war surplus! Hundreds sold at \$20 and now closed out at an amazingly low price. Brand new. Battery operated (67½ v B and 1½ v A). Frequency 80 to 105 mc. Complete with 2-1G4 tubes and full instruction manual. Ready to go on the air. Less **\$6.95** batteries...



2-6 MC PB Receiver

6 tubes (3-1T4, 1-1R5, 1-1S5, 1-3S4). 2-6 MC in 4 bands. Easily converted to Broadcast band with instructions furnished by us. Push button controlled, has R.F. stage and audio output stage to drive speaker. Complete with 4" speaker and **\$9.95** schematic...

ANTENNAS

(A) Small four-section telescopic aerial ideal for portable receivers, transceivers or test equipment.

99¢

(B) 22" tapered high frequency aerial covering A. 150 to 200 MC. Ideal for mobile or fixed station use.

\$2.69



BUILD YOUR OWN LABORATORY TYPE DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

You've been waiting for this chance to get one of these brand new 3" round foundation meters calibrated in microhms with Good-Bad Scale. Complete with **\$9.50** schematic only...

SUN RADIO

OF WASHINGTON, D. C.

938 F STREET, N. W. WASH. 4, D. C.

Quality Products since 1923
BIRNBACH

pioneers in the design and manufacture of all types of radio hardware, wires, cables, steatite and porcelain ceramics.

Write for new 1948 catalog

BIRNBACH RADIO CO., Inc.
 145 HUDSON ST. NEW YORK, 13, N. Y.

BA **EXCITING! EXCITER BARGAIN**
 25 to 40 WATTS
 10 to 80 METERS

FOUNDATION KIT

Engineered around the BC-610 series of plug-in tuning units. Described in the 11th edition Radio Handbook. Completed exciter uses 6AG7 crystal or electron coupled oscillator, 6L6 buffer-doubler and 807 amplifier. Kit includes four tuning units (illustrated at right above with cover removed), special 5 1/4" aluminum relay rack panel, socket for plug-in units and special hardware, together with full instructions and diagrams for assembling complete exciter. **\$9.95**
 No. 31A28, FU-40 Foundation, SPECIAL

PARTS KIT. Everything needed to complete exciter except tubes and power supply. Includes all mica condensers, resistors, RF chokes, sockets, meter switch, 0-200 ma meter, key jack, and miscellaneous parts. **\$9.31**
 No. 31A28A, SPECIAL Per Kit, Each

WANT RG-58/U?
 Use RG-29/U—exactly the same except clear plastic cover overall. We Have It!!
A BARGAIN—No. 3A105—20 Foot Coils, Each..... 49c
CONTINUOUS LENGTHS—50 ft. and over. 3 1/2c
 No. 2A169. SPECIAL PER FOOT

DID YOU GET IT? THE BIG NEW B-A Catalog No. 481—EVERYTHING in Radio and Electronics. Write if you did not receive it. FREE on request.

BA **BURSTEIN-APPLEBEE**
 1012-14 MCGEE STREET, Company
 KANSAS CITY 6, MISSOURI

South Haven, Mich., were heard, the first two being about 400 miles distant. Several other stations, one in Indiana, one in Iowa, and an unidentified W4 were heard, as well as countless weak carriers, which might have been solidly readable if they had only been on c.w. "Too bad so many of the gang still have not equipped their 2-meter rigs with a keying jack!" sighs W9LWE.

Pittsburgh, Penna.—The working range on 144 Mc. from W3RUE stretched out on several occasions during July. W9TKL, Waukegan, and W9BBU, Elgin, Ill., were worked on the 2nd, both well beyond 400 miles. These, and contacts with W4BCT, Reliance, Va., W3GKP, Silver Spring, Md., W4JBF, Covington, Ky., and W4FBJ/4, Glasgow, Ky., raised Ted's states total on 144 Mc. to 9. He found time to add a couple (W4EPY, Millard, Tenn., and W0UJEL, Pueblo, Colo.) to his 6-meter score, too.

Fort Collins, Colo.—Wanted: Information leading to 2-meter contacts with the Denver area, by W0BCS and W0FRQ, who have been operating on 144 Mc. almost nightly for several months. They get on the air around 7:30, and remain on, standing by at intervals for possible contacts. They are about 55 miles airline north of Denver, and 40 miles south of Cheyenne, Wyo., and they feel that they should be able to work both cities. To date they have worked only W7OWZ/0, mobile en route to Cheyenne. They hear the AAF station at Laurie Field, Denver, operating just outside the low end of the 2-meter band, so they feel that they should be able to make the grade with amateurs there. Polarization is vertical, at present.

Arlington, Mass.—TVI came to the Boston area recently, with the advent of television transmitters there. W1PMS, operating on 220.1 Mc. with crystal control, traced his troubles to a tripler stage the output of which was on 73.5 Mc., adjacent to Channel 4. Moving his frequency farther up into the band cleared the trouble. Moral: If you have Channel 4 in use, and you want to try 1 1/4, move into the high end of the band.

Activity on 220 Mc. is coming along nicely in eastern New England. W1OUN has been operating from Mt. Agamenticus in southern Maine, and from his home in Portland, giving several stations in the Boston area their Maine contact on 220 Mc. W1CTW has 7 1/2 states on 1 1/4, waiting for your conductor to make it two-way for Connecticut. Signals have been exchanged each way on 1 1/4 between Arlington and West Hartford, but all contacts have crossband, to date. W1MNF (an early record-maker on 144 Mc.) is now on 1 1/4 also, so only activity in the right places (several points along the New Jersey Coast would do it) is needed for a new record.

States and Call-Area Listing for 144 Mc.

The territory being covered by many 144-Mc. stations is expanding to the point where a listing of standings as to states and call areas worked

(Continued on page 188)

A.R.R.L. Los Angeles Conventioneers
Welcome to Our Open House Sat. (9 AM to 6 PM) Oct. 2nd, 1948
at Radio Products Sales Inc. See the R.P.S. Power
Conversion Unit in Actual Operation

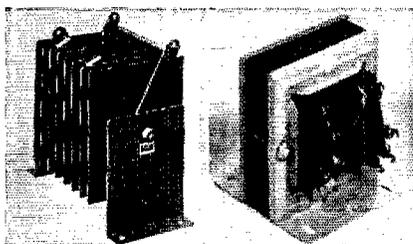
Door Prizes and Refreshments

"Converts All War Surplus d-c Receivers and Transmitters, etc., into a-c use." No rewiring necessary—installed in a few minutes—units available for any rating—a few popular model sets easily adapted to the R.P.S. Power Conversion Unit: BC-453, BC-454, BC-455, BC-312, BC-348, BC-433, BC-624, BC-733, BC-946, BC-1206, R-89/ARN-5A, ARB, BC-457, BC-458, BC-459, BC-375, BC-625, BC-654, SCR-522, SCR-274-N, ARC-4.

**IMMEDIATE
DELIVERY**

**INSTANT
WARM UP**

**SELENIUM
RECTIFIERS**



**IMMEDIATE
DELIVERY**

**NO
MAINTENANCE**

NO TUBES

LOW COST

COOL OPERATION

FREE INSTALLATION DIAGRAM SENT WITH EACH PURCHASE—R.P.S. POWER CONVERSION UNITS ARE AVAILABLE FOR ANY VOLTAGE AND AMPERAGE RATING. The R.P.S. POWER CONVERSION UNITS were designed especially for the radio amateur by VICKERS ELECTRIC DIVISION, Vickers Inc., a unit of THE SPERRY CORPORATION, manufacturers of selenium rectifiers. The transformers were designed by The Thermador Electrical Manufacturing Company and operate efficiently in conjunction with the rectifier prescribed.

IMPORTANT—HOW TO ORDER—The input rating of your dynamotor must not exceed d-c output rating of the rectifier. For example, dynamotor series DMDX—12 v. 2 amps.—requires Rectifier No. S-295A and Transformer RPS-8883.

Shipping weights are listed—please contact your local freight agent for cheapest means of shipment—and include shipping charge with remittance.

ALL NEW—FULL WAVE VICKERS SELENIUM RECTIFIERS

Code Number Rectifier	d-c Output Volts Amps.	Ship. Wt. in Lbs.	Amateurs Net Price
S-295A	14 2	1.25	\$ 6.95
S-458A	14 4.5	1.75	7.25
S-167A	14 10	3.75	10.95
S-292A	14 40	12	29.95
S-296A	28 1.8	1.25	5.75
S-344-A	28 5	5.75	11.50
S-172-A	28 10	6	16.50
S-291A	28 20	12	29.95
S-297-A	28 40	23	52.25

ALL NEW—THERMADOR TRANSFORMERS
50/60 Cycle—117 Volt Primary Rating

Code Number Transformer	Secondary Volts Amps.	Taps See Note A	Ship. Wt. in Lbs.	Amateurs Net Price
RPS-8883	18 3		3.5	\$ 3.75
RPS-8884	18 5.2		5.5	4.25
RPS-8885	18 12		12	6.15
RPS-8886	18 46		35	19.65
RPS-8888	36 2		5	4.15
RPS-8889	36 6		12	6.75
RPS-8892	36 12		25	11.65
RPS-8890	36 23		32	19.25
RPS-8891	36 46		78	51.25

NOTE A: All transformers have 3 extra tappings—for example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts

All prices F.O.B. Los Angeles (California purchasers add 2 1/2% sales tax). Include 25% with order—balance on delivery. Foreign orders cash. Address correspondence Dept. C7.

EXCLUSIVE PACIFIC COAST DISTRIBUTORS OF THE POWER CONVERSION UNIT

LOS ANGELES
CALIFORNIA

RADIO PRODUCTS SALES, Inc.

1501 SO. HILL ST.
Respect 7471

THE AMATEUR'S First Choice



A good volt-ohm-milliammeter is usually the first test instrument purchased by any radio man. Chicago Featherweights offer so great a value in accurate quality, small size, in a wide selection of ranges and sensitivities, that they are the first choice of amateurs everywhere.

Chicago volt-ohm-milliammeters are priced from \$5.25 to \$26.00 depending on sensitivity, ranges, etc. At our modest prices, no ham shack need be without the benefit of this most useful instrument.



See your Jobber or write us today for Bulletin No. 11

Chicago Industrial Instrument Co.

536 W. Elm Street . . . Chicago 10, Ill.



RCA INSTITUTES, INC.

Offer thorough training courses in all technical phases of

RADIO and TELEVISION

WEEKLY RATES DAYS—EVENINGS

VETERANS: RCA Institutes is approved under G. I. Bill of Rights For Free Catalog write Dept. ST-48

RCA INSTITUTES, INC.

A Service of Radio Corporation of America 350 West 4th St., New York 14, N. Y.



Founded in 1909

RADIO TELEPHONY RADIO TELEGRAPHY

Courses ranging in length from 7 to 12 months. Dormitory accommodations on campus. The college owns KPAC, 5 KW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass F.C.C. examinations for first-class telephone and second-class telegraph licenses, write for details.

PORT ARTHUR COLLEGE PORT ARTHUR TEXAS

Approved for G.I. training

50 WAS Mc.

Standings as of July 30th

ALL- Time 1948	ALL- Time 1948	ALL- Time 1948
W9ZHB 48	W4GMP 34	W7JPN 19
W6ZJB 48	W4WMI 33	W7OWX 15
	W4FNR 31	23
W1CLS 44	W4HVV 29	W8QYD 41
W3CIR/1 42	W4FJ 26	W8RFW 25
W1LLL 40	W4EMM 25	W8TDJ 22
W1HDQ 39	W4JML 20	W8LBH 10 10
W1CGY 38	W4LNG 19	
W1HMS 36		W9DWU 46
W1JLK 35	W5ML 42	W9QUV 44
W1NPF 35	W5AJG 41	W9PK 43
W1KHL 34	W5VY 40	W9ZHL 43
W1LSN 33	W5JLY 39	W9ALU 41 10
W1CLH 32	W5FRD 38	W9QKM 37
W1CJL 30	W5FSC 37	W9JMS 36
W1AF 27	W5DXB 35	W9UIA 35 25
W1EIO 24	W5ZZF 34	W9AB 26 6
W1HIL 21	W5IOP 30	
	W5LIU 24	W9USI 47
W2BYM 39 29	W6UXN 47	W9QIN 45
W2AMJ 38	W6OVK 38	W9BJV 45
W2IDZ 38	W6ANN 38	W9KYF 44
W2QVH 37	W6BPT 35	W9DZM 43
W2RLV 37 25	W6AMD 34	W9TKQ 42
W2RGV 26	W6IWS 33	W9SV 42
	W6FPV 31	18 W9INI 42
W3OR 35	W6EUL 22	W9HXY 41
W3OJU 35	W6BWG 18	W9YUQ 39
W3RUE 34 18	W6HZ 13	11 W9JHS 38
W3MKL 33		W9PKD 36
W3MQU 25	W7BQX 45	
W3GKP 12	W7ERA 43	VE1QY 28
	W7EBA 40	VE3ANY 27
W4GJO 46	W7DYD 37	VE1QZ 26 14
W4EQM 41	W7FDJ 36	G8Y 24
W4QN 40	W7FFE 35	XB1KE 23
W4GIY 40	W7KAD 35	VE2KH 19
W4EID 38	W7JPA 34	XE2C 14
W4DRZ 38	W7QAP 32	VE2GT 14
W4FBH 34	W7ACD 28	XE1QE 10

Note that standings are given for the period March 1, 1946, through the present, and for 1948 only. Medallion awards are offered to the amateur working the most states during 1948 on 50, 144 and 220 Mc. and up. See January QST, page 150, for details.

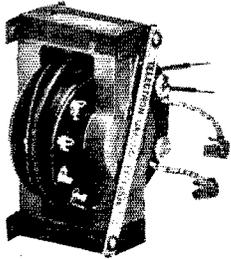
would be of interest. Send in a list of 2-meter stations worked, one for each state, and drop us a card giving the same information for each new state and/or call area added, and we'll run the information in box form when sufficient entries are in. And don't forget, as for several years in the past, ARRL is offering a medallion award to the operator who works the most states in 1948, not only on 50 Mc., for which standings are already being published, but on 144 and 220 Mc. and up as well.

And who has worked the most states and call areas on 144 Mc.? Having no positive information to go on, we're laying our bet on W8WJC, Everett, Ohio, for the present. He has 6 call areas (W2, 3, 4, 8, 9, 0) and 14 states (Ohio, Indiana, Illinois, Wisconsin, Iowa, Michigan, Missouri, Kentucky, W. Virginia, Virginia, Pennsylvania,

(Continued on page 180)

TELECTRON

TELEVISION COMPONENTS



**HORIZONTAL
OUTPUT-HV
TRANSFORMER
(FLYBACK)**

10KV

#HT 115H \$**6⁷⁶**

**HORIZONTAL
BLOCKING OSC.
TRANSFORMER**

#OT 101H \$**1⁷⁶**

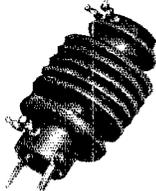
**VERTICAL
BLOCKING OSC.
TRANSFORMER**

#OT 102H \$**1⁷⁶**

**R. F. POWER SUPPLY
COILS**

4½ KV

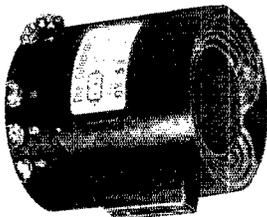
\$**4⁴¹**



10KV

\$**7⁰⁵**

DEFLECTION YOKE



FOR 10"
12", 15"
TUBES
50° 8MH

DY-5S \$**5²⁹**

FOCUS COILS

#FC 22

\$**5¹⁴**

ARROW POINTS TO BETTER BUYS

ECONOMY LINE

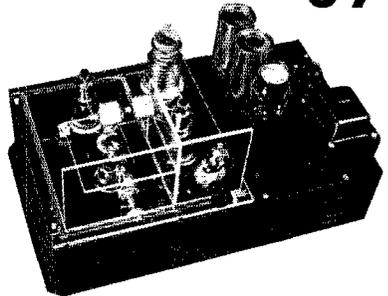
OF POWER SUPPLY COMPONENTS

#15634 **POWER PLATE XFMR**
1750-0-1750 VAC 300MA
\$**14⁷⁰** **OPEN FRAME MOUNT**
110V 60 CY PRIMARY

#15635 **SWINGING CHOKE**
5-10 HENRIES-300MA
\$**3⁴⁹** **OPEN FRAME MOUNT**
5000V DC INSULATION

#15636 **FILAMENT X FORMER**
2.5 V. CT AT 10 AMPS
\$**2⁷⁵** **OPEN FRAME MOUNT**
COMPLETE POWER SUPPLY KIT
1500V DC AT 300 MA.

LESS TUBES \$**39⁹⁵**



30KV RF POWER SUPPLY

FOR USE WITH PROJECTION
TELEVISION

VARIABLE — 10 TO 30 KV
FOR 110 VAC-60 CY

GUARANTEED NO CORONA
USES: 1-5U4 ; 2-6Y6G ; 3-183/8016
COMPLETELY WIRED WITH TUBES
\$**110.00 net**

WORKSHOP 100 MILE TV ANT \$26⁹⁵

500 MMF 10 KV COND 59¢

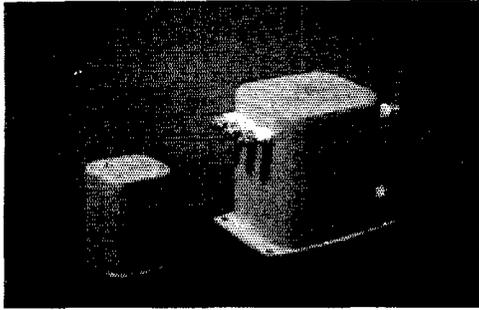
PEAKING COILS 26¢
35-125-250 MICRO-HY

ARROW ELECTRONICS

I N C O R P O R A T E D

82 CORTLANDT STREET, NEW YORK 7, N.Y.

MODULATION & DRIVER TRANSFORMERS



These transformers are suitable for use with type 811, 809, TZ40, TZ20, etc. to modulate either triode or beam tube RF amplifiers. Two secondaries are provided. Impedance ratio primary to secondary number one, 2 to 1. Primary to secondary number two, 16 to 1. Will modulate up to 300 watts input. Modulation transformer, driver transformer, circuit diagrams and other information all for. \$6.90 Please include 50 cents for postage and handling. *Send full amount to speed delivery and save C.O.D. charges. Shipped only in the U. S., its possessions and Canada.*

ELECTRONIC NAVIGATION, INC.
 Box 735, Church Street Station
 New York 8, New York

RADIO

TECHNICIAN and RADIO SERVICE COURSES
 FM and TELEVISION

Approved under the G. I. Bill of Rights

AMERICAN RADIO INSTITUTE

101 West 63rd St., New York 23, New York

TEACHING RADIO SINCE 1935

W8GFK

ALUMINUM CALL PLATES

and polished 1 1/4" letters. Plate size 2" by 6 3/4", 3 styles: P for panel mounting, L for car license and D for desk use. \$1.75 each postpaid.

P & H SALES CO.
 619 Jasper St. Kalamazoo 31, Michigan

Ham Post!

- | | | | |
|----------------------------------|---------|---------------------------------------|---------|
| National NC 57 Receiver..... | \$89.50 | Hammarlund FS-135-C Standard | \$14.25 |
| Columbus Model 610 Converter.. | 79.50 | McMurdo Silver 908 "Micro Match"..... | 29.90 |
| Millen 90810 HF Transmitter..... | 69.75 | Elicor No. 400EA —10 Meter Beam..... | 31.20 |
| Millen 90811 HF Amp Unit..... | 33.00 | | |
| Sonar CFC Exciter. | 59.75 | | |
- DELIVERY FROM STOCK

New York and Maryland), an impressive record, to say the least! His contact with WØKYF, University City, Mo., is believed to be the first Ohio-Missouri 2-meter QSO, and his with W4BCT, mentioned last month, is undoubtedly the first Ohio-Virginia (and W8-W4). Not bad for a fellow whose location is well away from the lanes normally associated with 2-meter DX.

Home-Station DX on 420 Mc.

Though we have reported a number of instances of two-way work on 420 Mc. over distances in excess of 100 miles, heretofore such operation has been from elevated locations, and usually with portable gear. There is every reason to believe that home-station DX should be possible on this band, but the instance reported below is the first we've heard of wherein amateur signals have been heard over a path far beyond line of sight.

On the night of July 9th, W1IYO, Milford, Conn., was working W2HWX, Little Silver, and W2ASL, Rumson, New Jersey, on 144 Mc. The W2s went to 420 Mc., and were copied solidly by W1IYO, who, unfortunately, was unable to transmit on the higher band, having been working on his 420-Mc. rig. The following night the test was repeated, with W1PBB, of Stratford, Conn., joining in. Both New Jersey stations were heard S7 or better by both Connecticut stations when the tests started at 9:30 p.m. Signals began to deteriorate, however, and by 10:15, when W1PBB went over to 420 Mc. to check with W2HWX, the latter had dropped to a barely-readable level, and no two-way contact was made.

From the 10th to the 22nd the nightly schedule was kept without positive result, with W1IYO and W1PBB transmitting tone from 9:30 to 9:45, and W2HWX and W2ASL doing likewise from 9:45 to 10 p.m. On the 22nd W1PBB heard W2HWX again, S3 to S6, and was able to re-broadcast the 420-Mc. tone signal back to W2HWX on 144 Mc. Chet was thus able to peak his beam position by listening to his own signal coming back after a round trip of some 150 miles!

On the 26th both W1IYO and W1PBB were able to hear W2ASL S6 to 8, and W2ASL heard W1PBB for the first time, but unfortunately too weak for solid copy. This is the nearest the boys have yet been able to come to two-way contact over the 75-mile path. Locations at both ends are close to sea level, and higher land (on Long Island) intervenes for some distance near the middle of the path. Both New Jersey stations use APT-5 transmitters, with up to 40 watts output, feeding 16-element vertical arrays. At the Connecticut end, both stations have been using 832-A triplers, crystal-controlled, similar to the unit described by W6OVK in June QST, and W1PBB has recently added another 832-A running straight through on 420 Mc. Though he is unable to get more than one milliampere of grid current the output is more than twice that

(Continued on page 152)



CONTINENTAL SALES COMPANY

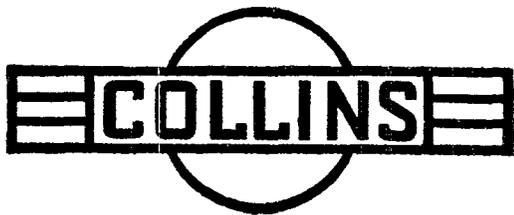
195-197 CENTRAL AVENUE, NEWARK 4, N. J.

• AMPHENOL • AEROVOX • R. C. P. • RADIART • PRECISION • BLILEY • U. T. C. • TRIPLETT • LANGEVIN • WALSCO • J. F. RIDER

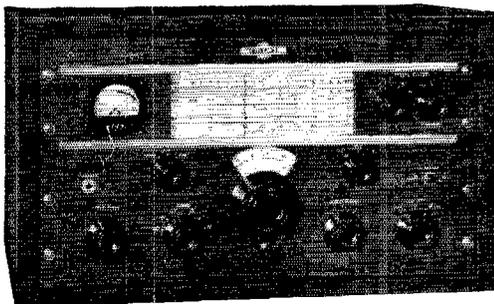
• CLAROSTAT • HALLICRAFTERS • WORKSHOP • INSULINE • JENSEN • MEISSNER • R. M. E. • RAYTHEON • STEPHENS TRU-SONIC

ELECTRONIC WHOLESALERS INC.

Exclusive Distributor for



In The Washington Area



A complete line of Collins transmitters and receivers is always on display in our spacious new showrooms. We invite your inspection of this famous equipment. . . . Just more proof that Electronic Wholesalers has all the greatest names in radio.

- 30K-1 500 WATT TRANSMITTER
- 32V-1 150 WATT TRANSMITTER
- 70E-8A VFO
- 75A-1 RECEIVER
- 310B EXCITER UNITS

Now Ready for Delivery!

SPECIALS

Mica Filled Xtal Sockets. 5 for	29c	OIL FILLED CONDENSERS	
For 3/4" Pins		2 MFD—600 V.	59c
4-Gang Ceramic Switch.	69c	4 MFD—600 V.	69c
3PDT—2PDT—2PDT—SPDT		2 MFD—1000 V.	89c
Ferrule Type Resistor Kit. 10 for	\$1.89	4 MFD—1000 V.	99c
10 to 80 Watts		.25—1000 V.	44c
Hand Keys.	49c	.25—3000 V.	69c
R.F. Chokes 1MH 300 ma. 5 for	69c	HI VOLTAGE MICAS	
Ceramic Standoff		.01—2500 V.	59c
Xmitting Wall Feed Thru		.005—3000 V.	79c
Insulator with cones and Rod		.0001—5000 V.	89c
—Porcelain—heavy duty.	75c	.001—6000 V.	99c
5 BP 4 Tube.	1.89	APC—100 MMFD.	44c
Socket—.54			

● What are your needs? Products of all National Manufacturers in stock — correspondence promptly answered. 25% deposit on C.O.D. orders, F.O.B. Washington, D. C.
Complete Lines of Steel and Aluminum Chassis in Stock.

Washington's Big New Radio Parts Distributor Has All the Greatest Names in Radio

Electronic Wholesalers, Inc.
2010 14th STREET, N. W. • WASHINGTON 9, D. C.
DEcatur 9041



THIS MONTH'S SPECIAL AT E-M-I IS A

BIG SCOOP

OIL-FILLED CONDENSER

4 mfd., 1000 v., with mounting brackets...

79¢

TZ40—ANOTHER REAL BARGAIN!



The TZ40 is without question one of the most versatile and useful of all transmitting tubes available to the amateur today. We have a nice lot of them, armed forces surplus spares, that have never been used — many still in the original factory cartons. All are guaranteed to be brand new and true to rated characteristics. They dissipate 40 watts without cooking, take 7.5 volts on filament and 1500 volts on the plate and operate nicely at full power on all frequencies up to 60 Mcs. These are a bargain at \$1.85 each or \$3.65 per pair.

ACT FAST — All orders subject to prior sale.

EMI is famous for Bargains, New Electronic Items, Service, the finest equipment of National, Millen, Weston, Thordarson, Johnson, Cornell-Dubiller, Cinaudagraph, Radiart and many others. Order by mail, phone, wire or in person.

Terms: 20% cash with order — balance C.O.D.
If "not in stock" we'll refund by check — not credit slip.



ELECTRONIC MARKETERS, Inc.

190 VARICK STREET, NEW YORK 14, N. Y.

Phone: WAtkins 4-4540



CODE SENDING - RECEIVING - SPEED

Learn to send and receive Radio Code. The famous Candler System, maker of world's Radiotelegraph champions, teaches you the "knack" of sound sense and sound consciousness that is the secret of speedy sending and receiving. Quality for Amateur or Commercial License. Good pay, adventure, or fascinating hobby. Learn at home quickly. Rush name for FREE BOOK.

CANDLER SYSTEM CO.
Dept. 4-K, Box 928, Denver 1, Colorado, U. S. A.
and 121 Kingsway, London, W.C. 2, England.

3 YEARS IN ENGINEERING ... AVAILABLE AT LAST!

the exciting, new

MAGNETAPE

TWIN-TRAX* RECORDER

provides ONE FULL HOUR of CONTINUOUS HIGH FIDELITY RECORDING ON STANDARD 1/2 HOUR REELS OF MAGNETIC TAPE

SPECIFICATIONS THAT COUNT WITH THE RECORDING ENTHUSIAST

- Provision for playing disc records.
- Earphone jack provided.
- Sockets for VU meter and foot switch.
- All components easily accessible.
- Heavy duty recording motor. (Eliminates possibility of overheating).
- Flutter and wow negligible.
- Frequency range 50 to 9000 cycles ±3 db.
- Individual bass and treble equalization controls.
- Five watts output.
- Portable and standard models available.
- Extremely low hum level. (DC on heaters).
- 14" wide by 14 1/2" deep by 13" high.

A. C. Shoney's Famous Booklet "ELEMENTS OF MAGNETIC TAPE RECORDING AND 999 APPLICATIONS" IS STILL AVAILABLE AT 25¢

If not available at your dealer, order direct, or send for free literature. **\$285** less microphone (Choice of microphones available)

AMPLIFIER CORP. OF AMERICA

398-11 Broadway, New York 13, N. Y.

of the tripler. Both stages are modulated — not an ideal arrangement, but definitely a big improvement over a modulated oscillator of similar power. Barney suggests making the "U"-shaped tank circuit for the 832-A out of copper strip, to prevent breaking the plate seals on the tubes, as happened with the tubing tanks originally tried.

The Connecticut stations note that the 2-meter signals from Northern New Jersey come in best around 7: 0 to 8 P.M., and then the area of maximum signal moves toward Philadelphia. They suspect that the same thing happens on 420 Mc., and tests are now being run at 8 P.M. as well as the later hour. Next stop — Philadelphia?

To further 420-Mc. interest in the region around the City of Brotherly Love, the Riverside 420-Mc. Club has been formed, according to W2ORS. He requests that 420-Mc. enthusiasts get in touch with him, or with W2PWP, W2OQS or W2WUP.

Bandswitching Transmitter

(Continued from page 16)

denser, C_3 , and grid r.f. choke, RFC_2 . The tube sockets should be mounted with the grid terminals adjacent.

The last subsection consists of the output and antenna-tuner tank-circuit components mounted on a standard 7 × 7 × 2-inch chassis fastened vertically to the left-hand end of the panel. The two variable condensers are separated by a baffle shield, cut from one of the internal covers of the BC-375, to reduce capacitance coupling. L_2 is supported on the terminals of C_9 which is mounted directly behind C_2 . The antenna tank coil, L_3 , is fastened to a pair of pillar insulators which also serve as two of the three antenna terminals. The plate by-pass condenser, C_{10} , is mounted on a pair of salvaged ceramic pillars fastened to the panel close to C_2 . Additional pillars along the lower edge of the panel serve as terminals for power and interstage connections.

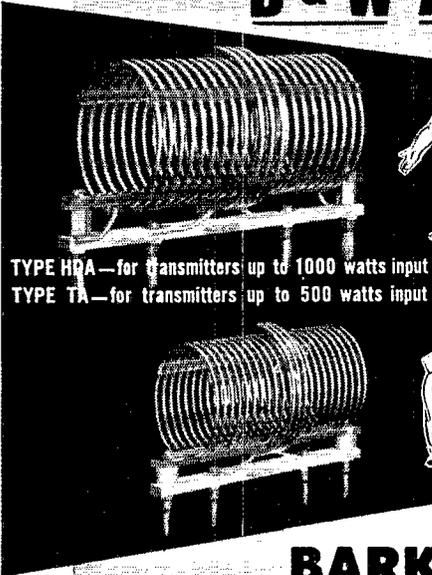
The resulting panel layout is shown in the front-view photograph of this unit. Since all amplifier panels are similar, the one for the 3.5-Mc. unit, with the exception of the holes for the two mica condensers on the panel, can be used as a convenient template for the others.

7-Mc. Section

The wiring diagram of the 7-Mc. unit is shown in Fig. 3. In this section, the 12A6 operates as a tetrode doubler which receives its excitation from the preceding 12A6 3.5-Mc. buffer of Fig. 2. Output from the doubler stage is coupled not only to the 1625s but also, through terminals S and T , to the drivers of the 14- and 21-Mc. units which follow. The arrangement of the 7-Mc. amplifier is identical to that of the 80-meter amplifier, except that no plate-tank padder is necessary. A paper cathode by-pass condenser is used in this unit, as well as in the higher-frequency sections, because instability was experienced with the salvaged mica condensers found satisfactory for the 3.5-Mc. unit.

(Continued on page 134)

Better Performance Begins With B & W ANTENNA INDUCTORS



TYPE HDA—for transmitters up to 1000 watts input
TYPE TA—for transmitters up to 500 watts input



W3DGP



W3GC

Effective coupling at the "head end" of the circuit means a lot! That's why B&W Antenna Inductors are designed to give you all those extra features that mean so much when you're working on your "rig"—features that mean still more in dependable, trouble-free performance when you flip on the power switch!

B&W Antenna Inductors, for instance, are wound with tinned copper wire for ease in tapping feeders to coils. They feature fixed center links for coupling to either fixed or variable linked final tank circuits, and two tinned clips are furnished with each coil.

Who but B&W would foresee all these important details and provide for them in advance? It's all part of B&W's regular policy to make it easier for you to enjoy your hobby and get the results you're after!

Write Dept. Q98 for your copy of the B&W Catalog for Amateurs

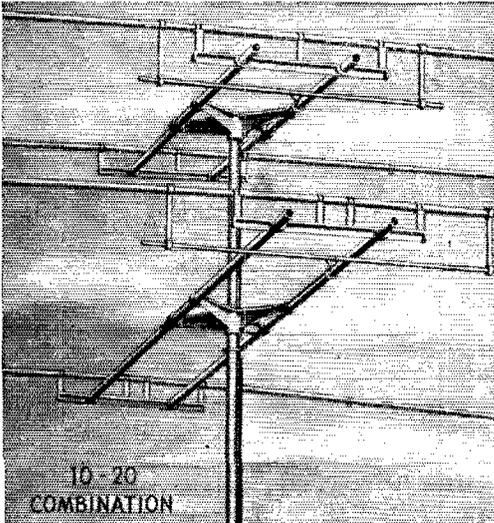
BARKER & WILLIAMSON, Inc.
237 Fairfield Avenue Upper Darby, Pa.

HY-LITE FOR ALL ANTENNAS AMATEUR TV AND FM

74.95
AS PICTURED
BELOW

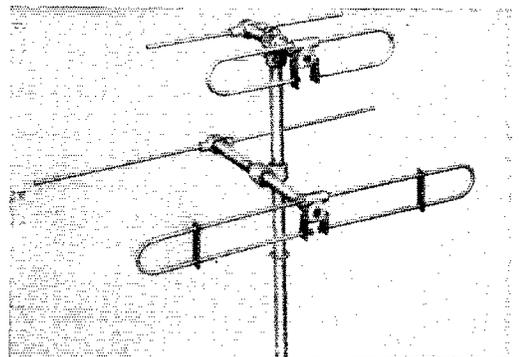
Many hams are TV conscious today. HY-LITE has a complete line of TV antennas, built of the same high grade material and strong aluminum castings found in their very popular Ham beams. HY-LITE TV antennas come in many designs and combinations, complete with 6 ft. mast, guy ring, hinge base, lugs and complete instructions for assembly. WRITE FOR OUR NEW TV CATALOG for determining the antenna or combination best suited for your needs. Price list on request. **JOBBER:** Many choice locations still open. ORDER NOW.

23.00
HY 30 S.
BELOW



10-20
COMBINATION

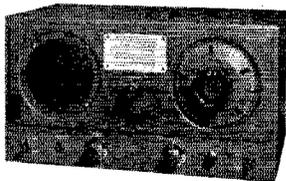
W
R
I
T
E
F
O
R
L
I
T
E
R
A
T
U
R
E



HY-LITE Antennae INC.
Makers of Fine Antennas for AMATEUR · FM · TELEVISION
528 TIFFANY ST., BRONX 59, N.Y.

NOW! PEAK VHF PERFORMANCE

The
NEW
NATIONAL
HFS



Receiver-Converter

Enjoy amazing reception on the VHF bands with the new NATIONAL HFS Receiver-Converter. There's nothing finer for snagging 6 meter DX!

- ★ **Complete Coverage**—27 to 250 MCS in 6 bands
- ★ **AM—FM—CW**—Optimum signal to noise ratio
- ★ **Mobile—Portable—Fixed**—National 686S vibrator supply—5886 power supply—or "A" and "B" batteries.
- ★ **Receiver or Converter**—Makes features of connected receiver usable on VHF.

\$125 (Power Supply Extra)

Distributors for All National
Parts and Receivers

Write for descriptive Literature

CENTRAL RADIO PARTS CO.

1723 W. Fond Du Lac Ave., Milwaukee 5, Wisconsin
Wendell Ciganek • W9SYT

Mass. Radio School

271 Huntington Ave., Boston 15, Mass.

For over 28 years the educational radio center of New England. Prepares for all U. S. Government Radio Operators' Licenses. Also gives Radio Technician Training. (Pre-Television). Approved courses for Veteran Training under G.I. Bill.

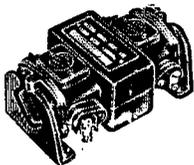
Send for Catalog

Licensed by Commonwealth of Mass.

Department of Education

Carter MAGMOTOR

Exclusive patented Permanent Magnet field design permits highest efficiency and greater output from a small, compact frame. Preferred power supply for Police and Taxicab mobile receivers, small Aircraft transmitters. Low drain, ball-bearing equipped. Many models for 6, 12, and 32 volt operation, outputs from 200 to 400 volt, 5 to 80 watt capacity. Write for new Bulletin No. 447 and name of authorized Carter distributor. **CARTER MOTOR CO., 2649 N. Maplewood, Chicago 47, Illinois. A Well Known Name In Radio for Over a quarter Century.**



Since the 1625s in Fig. 2 are not operating when the 7-Mc. doubler is working, the simplicity of a common coupling and biasing arrangement is permissible. An examination of Figs. 2 and 3 will show that the bias for the 12A6 doubler is made up of a combination of a fixed voltage of 45 from the power supply, the drop across the grid leak, R_2 (Fig. 2), and the voltage developed across the cathode resistor, R_1 (Fig. 3).

Construction of the 7-Mc. unit duplicates that of the 3.5-Mc. section, except that the two plate tank coils are small enough so that they may be mounted directly on the tank-condenser terminals.

(Note: The second half of this article, Part II, will be published next month.)

Correspondence

(Continued from page 100)

of ARRL has pulled boners. Possibly you have heard of a new league forming and the worse your decisions are at ARRL, the stronger this new league grows. I still want to like ARRL, but if this new rumor is true then I also can't see how I can promote such a League which is really against us amateurs, not with and for us. There are good technical radio men who want Class A privileges — old men in age who would find it hard to get their speed up to 16 per. Others are too busy with many problems to be studying code. Yet you are deliberately planning to decimate the Class A ranks.

— John S. Sarich, W2WKO

[Editor's Note: Like most rumors, this one is also untrue. The proposal is not by the Headquarters, which does not participate in policy decisions, but by your elected Board of Directors. The proposal is a 16-w.p.m. requirement for new Class A licenses, not renewals.]

Woods Hole, Massachusetts

Editor, QST:

(An open letter to W8—, and others):

Listening across our amateur bands in search of diversion through long wakeful hours of physical pain, I have heard a great many of your speeches in support of a proposed organization of amateurs whose primary purpose seems to be an attempt to divert a larger proportion of our assigned frequencies to the exclusive use of amateur radiotelephone operators. Tonight you have just been referring to me, with others of our brother amateurs, as the "30,000 'so-and-sos' represented by the ARRL."

My friend, I am a radio amateur. In respect of division of operating time I suppose that I must be classified as a "phone man," yet after listening to yourself, as well as W3—, W2— and a few others, I cannot be proud of the association.

I am neither "pro-c.w." nor "pro-phone." I am pro-amateur. In spite of all of your long, loud declarations to the contrary, you are merely pro-phone. It is my conviction after many years of close observation that the ARRL is truly pro-amateur, and should have the active support of every licensed amateur. It is now and I believe that it always will be our recognized representative in Washington and in international telecommunications conferences. It is staffed by the best men available in the ranks of amateur radio, adequately financed, and possesses the legal and technical "know-how" to command respect in those high places where we amateurs desperately need able representation at all times. I consider that our ARRL has done very well indeed for us all.

None of the rump organizations which have opposed ARRL to this date has ever demonstrated either the ability or the resources to represent the amateur. You and they are bidding for our support solely on the basis of appeals to selfish interest, bolstered by wild promises. Worse, you resort to angry vilification of the ARRL, and especially of individual amateurs among the "30,000 so-and-sos."

To the extent that you and those others may be successful in stirring up dissension among amateurs, dividing our ranks, you render a distinct disservice to all radio amateurs. You threaten the future of our hobby, I resent this deeply, even more than the discourtesies to which you give expression so freely.

— Hollis M. French, W1JLK

(Continued on page 136)

ECONOMICAL DIVERSITY RECEPTION

Now . . . receive more DX with less fading

The Diverse Adaptor, another Decimeter "first", brings diversity reception to the amateur rig at low cost. The DM-430 feeds the signal from either of two antennas through one stage of broad-band amplification, and then to the antenna terminals of any standard communications receiver. It instantaneously switches antennas to follow the strongest signal. Pilot lights indicate the antenna in use. The DM-430 can be used without tuning on any frequency from 3 to 30 MC.

THE DM-430 DIVERSE ADAPTOR

In minimizing the deep fading which often occurs in high frequency communications, the Diverse Adaptor will select the proper antenna on as little as .05 volts of signal at second detector. It is suitable for balanced or unbalanced antennas, and for FM or AM phone signals. Sensitivity is easily adjusted to receiving conditions.

For further information,
write for bulletin 15-A.

- Minimizes fading
- Very low power drain
- Combines best features of two antennas
- Completely automatic electronic action—no relays

DECIMETER

1430 MARKET ST.

INC.

DENVER 2, COLO

distinctive performance

TURNER MODEL 33

Crystal or Dynamic

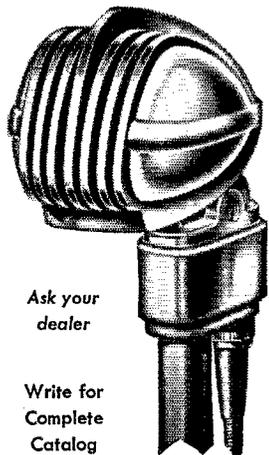
Here's a smooth performer you can depend upon for all-around communications, public address, and recording work. The Turner Model 33 combines high output with smooth response over a wide frequency range. Attractively styled with satin chrome finish.

All these performance features

- Moisture sealed crystal or rugged dynamic circuit
- 90° tilting head for semi- or non-directional operation
- 20 ft. removable cable set
- Barometric compensation
- No blasting from close speaking
- Low feedback

Ask your
dealer

Write for
Complete
Catalog



THE TURNER COMPANY

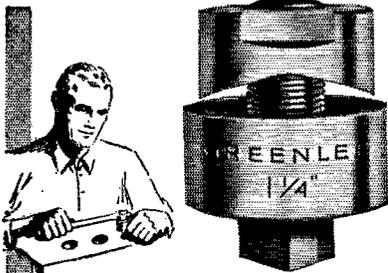
917 17th STREET, N. E. • • • CEDAR RAPIDS, IOWA



Microphones BY TURNER

Microphones licensed under U. S. patents of the American Telephone and Telegraph Company, and Western Electric Company, Incorporated. Crystals licensed under patents of the Brush Development Company.

CUT HOLES FAST IN RADIO CHASSIS



WITH A GREENLEE RADIO CHASSIS PUNCH

Eliminate tedious reaming and filing. Just turn GREENLEE punch with an ordinary wrench and make clean, accurate holes in a hurry. There's a GREENLEE for each of these sizes: $\frac{1}{8}$ " ; $\frac{3}{16}$ " ; $\frac{1}{4}$ " ; $\frac{5}{16}$ " ; 1 " ; $1\frac{1}{8}$ " ; $1\frac{1}{4}$ " ; $1\frac{3}{8}$ " ; $1\frac{1}{2}$ " ; $1\frac{3}{4}$ " ; $1\frac{7}{8}$ " ; $2\frac{1}{4}$ ". Also GREENLEE Knockout Punches and Cutters for conduit and meter holes up to $3\frac{1}{4}$ ". Write for facts. Greenlee Tool Co., 1869 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN

GREENLEE

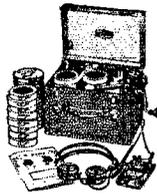


EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for full particulars and convenient rental plans.



INSTRUCTOGRAPH COMPANY

4709 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

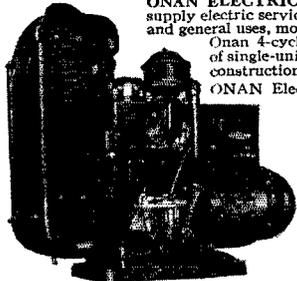
ELECTRICITY

FOR RADIO AND ELECTRONIC APPLICATIONS

ONAN ELECTRIC GENERATING PLANTS supply electric service for electronics applications and general uses, mobile or stationary. Driven by

Onan 4-cycle gasoline engines, they are of single-unit, compact design and sturdy construction.

ONAN Electric Plants are available in many sizes and models. ALTERNATING CURRENT: 350 to 35,000 watts in all standard voltages and frequencies. DIRECT CURRENT: 600 to 15,000 watts, 115 and 230 volts. BATTERY CHARGERS: 500 to 6,000 watts; 6, 12, 24, 32 and 115 volts. Write for detailed literature or engineering assistance.



D. W. ONAN & SONS 4675 Royalston Ave. Minneapolis 5, Minn.

136

Louisville, Kentucky

Editor, QST:

... May I say that the club membership is very much in agreement with the manner in which the ARRL and its directors are handling amateur radio. We have no time for, and want no part of, this bickering and griping that is taking place in the amateur ranks by a few soreheads. More power to you and the gang at Headquarters and you may feel confident that I speak for the entire membership when I say that you have our full support.

— I. W. Lyle, jr., W4KKG, President ARTS

412 West Mercury St., Butte, Montana

Editor, QST:

At a recent meeting of the Butte Amateur Radio Club the proposals made to the FCC by the Board were discussed. We do not object so much to the actual proposals but we emphatically object to the manner in which these proposals were acted upon by the Board. Several months ago a poll of amateur opinion was taken through the medium of the ballot which was included in an issue of QST. On this ballot were several proposals which were to be made and amateur opinion was requested by means of this ballot. However, at the Board meeting several proposals were brought up which did not appear on this ballot. No mention of these proposals was made in QST or by any other means so that the opinions of the amateurs could be ascertained. It was brought out at the club meeting that regardless of our likes or dislikes of the various proposals we are very much opposed to the method of bringing these proposals before the Board and the Board's action of recommending them to the FCC without consulting the amateurs.

— Jack Picard, Secretary, BARC

Box 535, Binghamton, N. Y.

Editor, QST:

The Binghamton Amateur Radio Association feels that restricting the new amateur to voice operation above 50 Mc. for a period of one year is inflicting an unfair discrimination on the newcomer. It further appears that a beginning amateur would be required to be licensed for a period of two years before he could be granted Class A privileges. We object strenuously to these proposals.

— Binghamton Amateur Radio Assn.,
F. B. Porterfield, Secretary

[EDITOR'S NOTE: No, just one year, as now.]

1404 5th Avenue North, Denison, Iowa

Editor, QST:

... It is my opinion that another organization will do the amateur more harm than good. Although it may have the amateur's best interest at heart, it can not help but have some opinions contrary to those of the ARRL. Such being the case, it will lead to nothing but confusion. Yes, I am an ARRL member, and like most I do have opinions that don't always concur with the opinion of the majority. I do feel, however, that the League is doing all that is possible for the amateur. . . .

— Robert W. Davis, W8DUA, ex-W9DUA-W5KBL

2112 Wetmore St., Everett, Wash.

Editor, QST:

... The Board has done a good job and I believe that all amateurs will be benefited by the proposed changes. The Class A license requirements have never been as high as they should be. In fact, I feel that the examination should be nearly as comprehensive as the examination for radio-telephone second class. The Board's action is definitely a step in the right direction.

But whether one is in agreement with the Board's recommendations or not, I feel that they should be supported by all amateurs as they are definitely doing their best for amateurs as a whole.

— Robert C. Olin, W7ALU

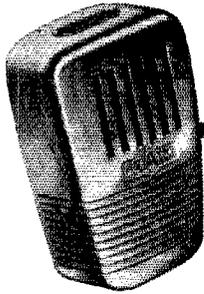
SWITCH TO SAFETY!



USABILITY UNLIMITED . . . The New Astatic



Lies On Its Felt Covered Back



Cardinal CRYSTAL, DYNAMIC AND CERAMIC MICROPHONES

● It's a pacesetter . . . a major new accomplishment in terms of quality performance at modest cost. And, still, that is only part

of the story of Astatic's new Cardinal Microphone. It is so designed, that it may be used in a variety of ways shown in illustrations. Extra convenience in all applications is offered by optional models with Type "S" off-on switch. All models furnished in die-cast case in bright gold finish. The Cardinal works on AC-DC or standard circuits. Crystal and Ceramic models available with substantially flat response or rising characteristics in the voice range. Dynamic models incorporate Astatic's newly developed circular, Alnico 5 magnet, which doubles flux density, providing higher output level, extended range, and more stability, permitting highest quality performance in these more compact units. CB Base, stand adapter and hang-up bracket are accessories, and may be purchased separately.



With CB Base For desk use. Dark brown plastic.



As Hand Mike

Tapered contours allow firm, effortless grip.



With Hang-up Bracket Hangs in automobiles, etc., safely, easily accessible.



Mounted on Floor Stand Special adapter is universal fitting for conventional stands.

Astatic Crystal Devices manufactured under Brush Development Co. patents



Listed in The Radio Industry RED BOOK

Write for prices, specifications

The designer and manufacturer of the "Meck T60" now offers the

IMPROVED

TELVAR—T60-2 TRANSMITTER



A Complete Transmitter
Needs only the antenna, mike and crystal to go on the air.

- Built-in High Gain Speech Amplifier for crystal or dynamic mike.
- Class AB Modulators—Excellent Quality
- Built-in Antenna Relay
- Provisions for Plug-in Battery and Vibropac Operation
- Gray Wrinkle Cabinet 17" x 11" x 9"

COMPLETE — COMPACT
60 WATT fone and CW

Efficient operation on all Ham Bands 80 to 10 meters.

\$150 Amateur Net

including tubes and one set of 10-11 meter coils.

Tubes Included

1—6L6G oscillator (oscillator-doubler on 10 meters), 2—6L6G RF final amplifier doubler, 1—6SN7 GT/G cascaded 2 stage speech amplifier, 1—6SN7 GT/G phase inverter driver, 2—6L6G push pull modulators 1—5U4G final RF amplifier rectifier, 1—5U4G modulator, speech amplifier and oscillator rectifier.

Order now from your favorite Amateur Distributor

AUDAR, INC., Argos, Indiana • Mfgs. of "Telvar" and "Audar" Electronic Equipment

REGULATION

§ 12.136. LOGS. Each licensee of an amateur station shall keep an accurate log of station operation, including the following:

(a) The date and time of each transmission. (The date need only be entered once for each day's operation. The expression "time of each transmission" means the time of making a call and need not be repeated during the sequence of communication which immediately follows; however, an entry shall be made in the log when signing off so as to show the period during which communication was carried on.)

(b) The signature of each licensed operator who manipulates the key of a radiotelegraph transmitter or the signature of each licensed operator who operates a transmitter of any other type and the name of any person not holding an amateur operator license who transmits by voice over a radio-telephone transmitter. The signature of the operator need only be entered once in the log, in those cases when all transmissions are made by or under the supervision of the signatory operator, provided a statement to that effect also is entered. The signature of any other operator who operated the station shall be entered in the proper space for that operator's transmission.

(c) Call of the station called. (This entry need not be repeated for calls made to the

same station during any sequence of communication, provided the time of signing off is given.)

(d) The input power to the oscillator, or to the final amplifier stage where an oscillator-amplifier transmitter is employed. (This need be entered only once, provided the input power is not changed.)

(e) The frequency band used. (This information need be entered only once in the log for all transmission until there is a change in frequency to another amateur band.)

(f) The type of emission used. (This need be entered only once until there is a change in the type of emission.)

(g) The location of the station (or the approximate geographical location of a mobile station) at the time of each transmission. (This need be entered only once provided the location of the station is not changed. However, suitable entry shall be made in the log upon changing the location. Where operating at other than a fixed location, the type and identity of the vehicle or other mobile unit in which the station is operated shall be shown.)

(h) The message traffic handled. (If record communications are handled in regular message form, a copy of each message sent and received shall be entered in the log or retained on file at the station for at least 1 year.)

The

Convenient ∨ ∨ ∨ Complete

ARRL LOG BOOKS

Regular Log, 8½ x 11 • 50 cents each

Mini-Log, 4 x 6¼ • 25 cents each

American RADIO RELAY LEAGUE

WEST HARTFORD, CONNECTICUT, 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 30¢ 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 30¢ rate. Provisions of paragraphs (1), (2) and (3), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested signature and address be printed plainly.

(8) No advertiser may use more than 75 words in any one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

QSL 100, \$1.50 up. Stamp for samples. Griffith, W3FSW, 1042 Pine Heights Ave., Baltimore 29, Md.

COMMERCIAL radio operators examination, question-and-answer. One dollar per element. G. C. Waller, W5ATV, 6540 E. Washington Blvd., Tulsa 15, Okla.

WANTED: old wireless gear from 1905 on up. State condition, price, details. W1CPI.

SELL perfect Tecmo 500GA commercial kilowatt, complete for all-band operation, fone or cw, \$1000. No lower offers, please. Reason: marriage. W3ILD, 4912 Quebec NW, Washington, D. C.

BEAMS pre-focused and matched to typical lines. Large diameter duro-aluminum tubing for elements and boom. Peter C. Housekeeper, 956 Paulding St., Peekskill, N. Y.

AMATEUR radio licenses. Complete theory preparation for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

FREE QSL-SWL samples! Cushing, WH1J, Box 32, Manchester, N. H.

CRYSTALS: Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plus one octal socket. Plus or minus 5 Kc. One dollar each. Exact frequency. \$1.95 ea. Rex Bassett, Inc., Ft. Lauderdale, Fla.

10-METER Beams, \$19.50. Send card for free information. Riverside Tool Co., Box 87, Riverside, Illinois.

BEST BUY! Food! Fun! A Bang-up program for you and your XVL Midwest Division ARRL Convention, Oct. 16-17. Hotel Broadview, Wichita, Kansas. Register early and save! Write Wichita Amateur Radio Club, Box 3, Wichita, Kansas.

QSL SWLS, newest designs, finest stock. Fairest prices. Fastest service. Write Dossett, W9BWH QSL Factory, 857 Burlington, Frankfurt, Ind.

SEE Doc and save! Atlas Radio Jobbers, Nashville, Tenn. Tel. 6-3800.

QSL-SWLS, Meade, W0KXL, 1507 Central Ave., Kansas City, Kansas.

ALUMINUM antenna wire, No. 14 gauge, high strength, 45¢ per 100 feet. M. H. Gould, W1OS, R.F.D. 3, Bridgeport, Connecticut.

WANTED: Early wireless equipment, and literature prior to 1925. Franklin Wingard, Rock Island, Illinois.

THREE BC-348-H, converted AC, outtrigger BC-453-B "Q-5", per June QST, R-meter, noise limiter, improved IR-RF gain. \$100 ea. F.o.b., or trade. Also one BC-348-J as above, plus grounded-grid 6J6 1st RF, \$125, W6HCX.

DON'S QSLs: "Leaders in the Field," Samples. 2106 South Sixteenth Ave., Maywood, Illinois.

BC-610-E converted all bands, new B & W coils, extra 250 Th. Dumont 5 inch scope, HF-10-20. Relays and foot pedal switch turns on all. \$900.00 F.o.b. Bonnam, W8VLV, R.R. 10 Box 416, Cincinnati 27, Ohio.

QSLs, Samples, Albertson, W4HUD, Box 322, High Point, N. C.

SELL: New, Meissner Deluxe signal shifter 80 and 10 M coils, GR Variac 18 amp model 100-Q 2kVA. Best offer takes. Express collect. T. Atkinson, W5HPX, 3319 Kilgore St., Houston 4, Texas.

FOR Sale: Hallcrafters Panoramic SP-44, \$35.00. In excellent condition. Dean Dunn, 2226 North Lincoln Ave., Chicago, Ill.

TRANSMITTER ART-13 Collins. Inspection seals intact. Transmitter with tubes and crystal. Make offer. W3ARR, R.D. #2, Buckingham Way, Morrisville, Penna.

SELL: Abbott TR4, \$30.00. Power supply PE110A, \$18.00. A. Bogart, Emporium, Penna.

SELL Hallcrafters HT transmitter, 814 final, 100 watt output, phone/c.w. Covers 10-11-20-40 meter bands. Includes coils, \$150.00. Best offer. Also a national NC-81X with speaker, \$35.00. All inquiries answered. Sherman Dennis, W2RUH, 704 Pennington St., Elizabeth 2, N. J.

NEW and used Collins, National, Hallcrafters, Hammarlund, RME, Millen, Sonar, Meck, other receivers, transmitters, etc. Reconditioned NC80X, \$39.00; S22R, \$49.00; S40, \$59.00; S53, \$59.00; SX16, \$59.00; SX43, \$119.00; SX42, \$199.00; Super-Pro, \$79.00; HO12X, \$129.00; S257, \$69.00; HRO \$119.00; VHF152, \$59.00; RM1545, \$200.00; S204, \$29.50; S232, \$28.00; SX28, \$28.00; SX17, \$38, NC173, NC183, NC240D, HRO7, KP81, HF-10-20, VHF152A, DD22A, HT9, BC610s, Tech-Rad T3550XM. Time payments. Shipped on trial. Write for list. Henry Radio, Butler, Missouri.

QSLs. Your design. Samples free. Sunland Print, Box 662, Hialeah, Florida.

ANTENNA mast, never used, 75 foot, triangular, steel, with all guy-wires, insulators, turnbuckles, base plate, zinc pole, rope, complete with instructions for erecting. Shipped knocked-down, \$130.00. F.o.b. Houlton, Maine. M. E. York, W1OCU, 35 Charles Street.

USED open frame relay racks, W. E. drilled, 6 feet high, 100 pounds shipping weight, \$7.50 each. F.o.b. Boston, W11BY, 12 Sunnyside Avenue, Wellesley, Mass.

BC457's (4 to 5.3 Mc.) used. Good, \$3.00 each with tubes and xtal. BC430's with 80 and 40 coils, \$3.00. Interlocking relays. Used, good. Leach type 2406 DEV. Two relays on strip lock each other when closed. Can be flash activated by 110 AC or used as overload circuit breaker with electrical reset. Makes two—opens one or opens two. Makes one on each action. \$1.50 each. Prices F.o.b. Lykesland, South Carolina. R. L. Kalmback.

FOR Sale: 1000 watt phone and c.w. transmitter. Also Super-pro, SP-400-SX. John Savonis, W1DBS, 11 Dwight Court, New Britain, Conn.

FOR Sale: 2500-watt 110 volt a.c. generator, brand new. Complete with spare parts and tools. 125 watt phone/c.w. transmitter complete with power supplies. Write for details. Best offer takes all or part. Rex Bean, W7JIG, Payson, Utah.

SELL: Homemade Jones exciter-doubler-buffer; seven inch black rack panel, Triplett meter, 6A6 and 6A3 tubes, coils, 7 Mc. xtal, 14 Mc. output; ready except power. \$12.00. F.o.b. W2AXP, Hasbrouck Heights, N. J.

FOR Sale: 453's for Q5R's with tubes, \$7.50. 454's for 75 mobile or emergency receiver or excellent converter with tuning knob, no tubes, \$8.00. 455's for 40 easily converted for 10-11 fixed or mobile with knob. No tubes. \$8.00. \$1.00 per unit deposit. C. W. McCollum, W5BAP, Tuckerman, Arkansas.

WANTED: Surplus BC-453-A and second hand Gon-Set converter. **SELL:** For \$80 or to highest offer completely converted BC-375-E. A.C. power supply. Will deliver 900 v. at 200 mls. Tuning unit for 80-40-20-10 meters. Write for further details. David Hardenburg, W2UGT, Portland, N. Y.

HALLCRAFTERS S-42 less speaker, used few hours, \$180.00 or best offer. W3FXR, 123 Belmont Ave., Milmont Park, Penna.

HT-9 for sale. Excellent, postwar model now in use on all bands. Coils for all bands. \$250.00. Information on request. W6OUU, Emporia, Kansas.

FOR Sale: BC3348 receiver and LS3 speaker converted to 110 VAC. Excellent condition, \$45.00. Amertran plate transformer, like new, \$45.00. Hammarlund Super-pro receiver, Army model BC1004C, power supply RA94A and speaker. Frequency 540 Kc to 20 Mc. Guaranteed to be in excellent condition, \$200.00. C. M. Phillips, Veterans Hospital, Gulfport, Mississippi.

WANTED: BC-348, converted, Talbutt, RD #4, Norristown, Penna.

QSLs, SWLS. For distinctive cards, write McEachron, 1408 Brentwood, Austin, Texas.

PANELS, dials, scales, special designs. Gilpin, Box 638R4, Mt. Clemens, Michigan.

FOR Sale: complete volumes of QST, as follows: 1922, 1924, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941 except September, 1942, 1943, 1944, 1945, 1946, 1947. Make offer. General Radio Wavemeter. Type 358, 15-240 meters, 25 year old A. C. Grebe detector and 2-stage audio amplifier, serial 135, pair G-E Knottsons, Model UV-217; National SW-3, with 29, 40, 80-meter band-bread coils. power supply. If interested, write Mrs. C. S. Hoffmann, jr., 47 Lynwood Ave., Wheeling, West Virginia.

QSL? SWLS? "America's Finest!" No cheap trash! Samples, 10¢. QSL Printer, Sackers, W8DED, Holland, Michigan. "Made-to-order QSL cards!"

HQ-129X, HRO, 7 inch television set, test equipment, W2NLL, 1950 Vauxhall Road, Union, N. J.

QSLs! Quality cards priced right. Samples, Ferris, W9UTL, 1768 Fruitdale, Indianapolis, Ind.

FOR Sale: 300-watt Deluxe phone xmttr. PP 813s, all bands, Three enclosed cabinets. \$290.00 F.o.b. Mpls. For complete details, write W0LXR, Malmgren, 2924 Alabama Ave., Minneapolis 16, Minn.

WANTED: To buy or trade for Gon-set 10-11 converter and Sonar MB611 xmttr. Have 80 new unboxed 6AK5 tubes. W4KAI, Neuville, New Bern, N. Carolina.

NEW Harvey-Wells TB550 transmitter, \$80, cash. Frank McDonnell, W9YUC, 118 No. Delphia, Park Ridge, Ill.

CRYSTALS: 100 Kc., guaranteed perfect. Manufactured by nationally known company. Complete with holders, 1/4" pin spacing. \$2.95 postpaid. Art A. Johnson, W9HGO, 1117 Charles St., Rockford, Ill.

QSLs? SWLS? Distinctive designs, glossy stock, one-day service. Samples, Narvestad, Granite Falls, Minn.

BEAM motor operates on 110V, AC 60 cycles. Requires 12 µfd condenser. Reversible Hi-torque 1/4 rpm. No free spinning. Flat mounting surface. Light weight, sturdy. Brand new. Surplus, \$5.95, postpaid in U. S. Alvaradio, Dept. ST-3, 903 So. Alvaradio, Los Angeles 6, California.

SUBSCRIPTIONS, Radio publications a specialty. Earl Mead, Huntley, Mont. W7LCM.

FOR Sale: RME-69, clean and in good operating condition. Xtal filter, noise limiter. Complete with RME speaker, \$75.00. McDonald, W9VHP, 614 No. Oak St., North Platte, Nebraska.

TEN meter phone by RCA 100 watts, perfect quality police transmitter, #7821, \$175.00 F.o.b. Richmond; Meissner signal shifter, pre-war, \$35.00; Echophone receiver, \$17.50; NC46, \$45.00; all in perfect condition. WJOT, 4900 Riverside Dr., Richmond, Va.

SALE: Collins ART13, \$100.00 and BC223 with 110VAC power supply, \$50.00. Inquiries answered promptly. Richard Gridler, 101 Orchard Ave., Scottsdale, Penna.

TRANSMITTER: NBFM Sonar MB611. Perfect shape. Used to drive pair 812s. First \$30.00 takes it, prepaid and packed securely. E. Baker, W4MGW, 823 NE 19 Ave., Ft. Lauderdale, Fla.

TRADE: Entire amateur station for television receiver, RME69, Meissner signal shifter, 250-watt fone rig, 70 watt, 40-meter rig, SCR522 converted with 8 element beam, 2 desks plus many spares. Will not ship. W2HMM 53 S. Bedford Rd., Mt. Kisco, N. Y.

HQ-129X, speaker, FR-135C, Four-20, Four-111 several surplus studs, junk box and tubes (807, 100TH, 3E29, etc.). Need cash for medical bills, must sell all at once for first \$225.00 F.o.b. New York. Hoffman, W2WNL, 158-18 Riverside Drive, West, New York 32, Phone WA-3-8646.

NATIONAL NC173 complete with speaker like new. Best offer over \$150.00. W2FNF, Mike Rosenberg, 625 West 55th St., New York, N. Y.

STURFLISS: Deluxe crystal finishing kits containing holders, quartz blanks, abrasive, etching fluid, complete instructions, \$2.00 each postpaid. Formerly sold \$8.75. Vestco Company, Parkville, Missouri.

THREE aluminum 10M beam Elements, \$5.00. Stamp for sample. Sell NTX-30, \$60.00. Box 814, Evanston, Illinois.

FIVE hundred takes all. Come with truck. Write for list. W1BAU. FOR Sale: Hammarlund HQ-120X, \$90.00. W2OBH, Phone Jamaica 3-7712. G. Epstein, 78-15 141st St., Flushing, L. I., N. Y.

WANTED: APR-5A, APR-4 Receivers and tuning units, ART-13 transmitters, VHF gear, Laboratory and Test equipment of all types. Charles Littell, Jr., 222 Lonsdale Ave., Dayton 9, Ohio.

NEED HQ-129, NC-173 or 40 tube TBS-50, mike, etc. Have Korell reflex, Bentzin Primarflex, Neptune outboard, binoculars, stamps, Precision 920P, spareparts, typewriter, meter for swap. Send for list. All inquiries answered. Edward B. Schofield, 9031 Ft. Hamilton Parkway, Brooklyn 9, N. Y. W2YFO.

HT-9 for sale. Excellent postwar model with xtals and coils 10, 20, 40, \$275.00. E. Blazy, W8QPV, 7122 Harvard Ave., Cleveland 5, Ohio.

SUPER-PRO 0.56 - 20 Mc. Best offer over \$175.00. Gon-Set 10-meter converter, \$25.00. W2HHP, L. Diven, 225 W. 106th, New York 25, N. Y.

SELL Hammarlund SPC400X complete. Guaranteed as new. Offer nearest \$300.00. H. Vosburg, Box 184, Ambridge, Penna.

FOR Sale: Hammarlund HQ-120X, \$90.00. W2OBH, Phone Jamaica 4442 Walton, Chicago 51.

\$60 buys 3-element Workshop Associate beam, excellent home-made rotary mechanism, 90 ft. 8 wire cable, 90 ft. heavy twin lead. Seldyn indicator in cabinet. W2EPZ, Schwartz, 1804 Washington Ave., Apt. 10, Bronx, N. Y.

QSL-SWLS, 34 Harrison, 8001 Piney Branch Rd., Silver Springs, Md. QSL-SWLS.

SALE: Cash: Gross trans-receiver in good condition. Covers 2-meter band and 225 to 270 band. Complete, less power supply. Good for mobile work. W3KOU, 2524 Oswego Ave., Baltimore 15, Md.

SELL: BC-348K, like new. Converted for A.C. with shock-mount beam, xtal phase control, separate AF, RF gain. Less 200 kc. band, \$50.00. E. Mitoma, W8ZHZ, 7413 Lexington Ave., Cleveland, Ohio.

SELL: Transmitter Micamold XTR-1. Used three months, complete with tubes and crystal. \$22.00. W2YO, Orange, N. J.

J2EUG now back in USA. Anyone desiring QSL cards, please drop a card to C. W. Rickley CRM Bldg., #166 CPO Qtrs, US Naval Gun Factory, Washington, 25, D. C. W8EUG.

CRYSTALS: Fine commercial units for SCR-522's, police, taxi, aircraft, marine, geophysical, and other services, except amateur. Commercial regrinding: Many crystals can be economically reground to new frequencies. Inquire! Over twelve years of satisfaction and fast service! Try us first. Edison Electronic Company, Temple, Texas.

COLORTONE QSLs! Outstanding examples of modern designing and quality craftsmanship at reasonable prices! See for yourself! Colortone Press, Tupelo, Miss.

NEED a good receiver? I have two dandies: must sell one. First is latest Cal-o-matic RME-45 in brand new shape. Take it for \$130.00. Second is Hammarlund Super-Pro with speaker and power supply. Perfect as the day it was made. Yours for \$195.00. Also 10-meter Gon-Set for \$28.00. Will ship any one to your QTH freight paid on receipt of certified check. W2VTG, 448 Ontario Street, Buffalo 7, N. Y.

QSL-SWLS. Meade, W0KXL, 1507 Central Ave., Kansas City, Kansas.

BEAM control cable, new material. Two #16; six #20 rubber insulated, coded, tinned conductors. Weatherproof rubber jacket. Heavy armor shield. 1/2" diameter. Price 10¢ foot. F.o.b. Chicago. Trans-World Radio-Television Corporation, 6639 S. Aberdeen St., Chicago 21, Illinois.

LIKE new Hallcrafters, S-20R, Sky Champion, with S-mtr. 1946 model in original box. Used 6 mo. \$49.50. Richard Bruce, 1171 Union Street, Manchester, N. H.

WANTED: HRO. W8PUF, 646 Budlong, Adrian, Michigan.

BC-312-D receiver with AC power supply, variable selectivity crystal filter, tuning meter and speaker, \$45.00. V. T. Lyon, WSLMH, 932 Loma, San Antonio 1, Texas.

NC-46 speaker, excellent condition. \$65.00. W3HRA, Dr. Treat, 2206 So. Broad St., Phila. 43, Penna.

COMMAND transmitters and receivers, \$3.50; Selwyn indicators, \$2.00; S2OR Hallcrafters, \$55.00; Mark II, \$25.00; BC659, \$10.00; AP5B, \$10.00; 12/115 volt inverters, \$12.00; Microphones, 50¢; Ship-shore radiotelephones, \$85.00; Walkie-talkie, \$30.00; battery, 50¢; TBV instruction books and power supplies; Dynamotors, \$1.50; Philco Auto Radio, \$18.00; Want Jefferson-Travis 350A transceivers, Kohler gas generator sets, spare Bendix TA3B; W2OEA, 712 Bergen Ave., Linden, N. J.

FOR Sale: SX-24 and speaker, \$75.00. Box 516, Stryker, Ohio. SELLING out. Write for complete list. Also NC-173. W5OER, Box 295, Velasco, Texas.

HALLCRAFTERS S-27 and S-29. Best offer or trade 30-06 Rifle. Scott Radio, Service, Ridgewood, N. J.

SONAR XE-10 FM exciter, like new, \$30.00. W2PEG/8, 10050 Chesterfield Drive, Parma Heights, Cleveland, Ohio.

FOR Sale: Complete ham station: receiver, transmitter, necessary "extras", many parts, nine transformers, antenna accessories, library, etc. Write for itemized list. Sold in entirety only. First \$325.00 takes it. R. O. Butler, Box 506, Downs, Iowa.

SELL: RME-70 with speaker, Hammarlund Super-Pro without speaker. 2.5 - 20 Mc; 100-400 Kc., tubes: 813, 829, 100TH, 450TH. Best offer. W2MLV, 17 Hackensack Ave., Ridgefield Park, N. J.

VHF-152A, DB22A (slightly used) Bargain. W8ZTV, P. O. Box 218, Holland, Mich.

QSLs: Kromkote cards at a fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

BENDIX TA-12-D transmitter, new, with instruction book, \$35.00; SCR 222 Walkie-talkie, \$10.00; BC-1267A, new, \$30.00; BC412 oscilloscope, \$45.00; SCR522, new, with 12 volt type 12 Dynamotor, remote control vox, cables, connectors, \$10.00; BC191 with tuning unit, \$35.00; Model 78B standard signal generator, \$35.00; tubes, 5D21, \$4.50; 715-B, \$4.50; 3B24, 75¢; 24G, 50¢; 304TH, \$11.00 pair; W8GU, 18944 Sorrento, Detroit 21, Michigan.

BARGAINS: New and used transmitters, receivers, parts: New 150-watt phone, \$199.00; 60-watt phone, \$99.00; Globe Trotter, \$57.50; Signal Shifter, \$29.50; Abbott TR-4, \$29.50; NC-173, \$25.00; \$149.00 ea., HRO-Senior, HRO-129X, \$130.00; RME-45 SX-25, \$99.50 ea. \$40.00, \$65.00; NC-81X, \$35.00; S-20R, \$49.00; NC-45, \$42.00; S-38, \$35.00; many others. Large stocks. Trade-ins. Shipped on approval. Terms financed by Leo, W0GFO. Write for Bargains and best deal to World Radio Labs, 740 Broadway, Council Bluffs, Iowa.

FOR Sale: Two Collins 10-meter mobile transmitters, complete, \$60.00 each; BC611 modulation transformer, \$20.00; James H. Buck, W0ZDS, 1224 Orchard Drive, Ames, Iowa.

QSLs for discriminating hams. Distinctive! Colorful! New! Satisfaction guaranteed! Stamps for samples. Firman, W7JFX, 6338 3rd S.W., Seattle 6, Washington.

FOR Sale or swap: 27W Motorola mobile xmtr complete with power supply, mike, antenna. Gon-Set 10-11M converter. Gon-Set noise clipper, ready to operate, \$100.00. SX-23, less speaker, \$65.00. WANTK, E. J. Schrader, P. O. Box 34, Swainsboro, Ga.

SELL twenty years QST file, complete: January 1925 through to and including December 1944. In excellent condition. \$65.00. Also have odd copies prior to 1925. W2AEB.

TRADE: Perfect condition, Model A-8 Univex 8 mm movie camera and case, for perfect condition BC-221 frequency meter. Joe D. Olson, Box 275, Omaha, Arkansas.

SELL: McEroy tape puller and ink recorder, TG-10-F Gray keyer, American guaranteed Stamps for samples. Record changer-amplifier. W6QBO, 197 N. 14th St. Jose 12, California.

KW NBFM, WFX680 to pair HK257B. Enclosed cabinet. Variac. Coils for Ten. Best parts used. Cash and carry, \$200.00. W2NQO, 1216 85th St., Brooklyn, N. Y.

QSL-SWLS. For distinctive cards, write McEachron, 1408 Brentwood, Austin, Texas, for samples.

SELL: Meissner Shifter and coils for three bands, \$50.00. CREI radio engineering course, \$40.00. W9UBW, Pontiac, Illinois.

SELLING out: 500-watt A. M., N.B.F.M., C.W. transmitter. In gray Par-Metal cabinet mounted on dolly 66" high. Beautiful amateur job, scarcely used due to illness. Excerpt by Meissner signal shifter, Model No. 9-1090 with custom built in N.B.F.M. 10 to 80 meter Hargis-Welch TBS-50, VHF 152A converter, NC-200, National 1-10, Super-Pro SP-400-X. Many other items. Stamp for list. No trades. Come and see, W2WI, Worley, 723 Hamilton Avenue, Trenton, N. J.

NEW Millen exciter with tubes and extra coil, \$33.00; new black crackle 42" standard rack, \$13.00. Misc. xmtrs, xtals, filters, chokes, etc. Also Bell Amp. Send for list. Blum, 2661 Dibles Ave., Columbus 4, Ohio.

PE-103 Genemotors, complete with all cables, \$7.50. J. P. Brown & Sons, 545 Sansome St., San Francisco 11, Calif.

FIRST \$50.00 takes Abbott TR4B, half wave coaxial dipole, electronic 300 V 100 Mill. vibrator supply, 8" encased PM speaker, director and reflector attachment. All like new and operating. Will ship prepaid east of the Mississippi. Dr. H. R. Williamson, W3OFL, 119 E. Broad St., Tamaqua, Penna.

SELL: Cw transmitter, 130 watts, 80 through 10 meters, professional construction, commercial appearance. HQ-129-X with speaker, desk, bug, crystals, phones, new D104 mike, \$400.00; all or separate. Reason: illness. Martin C. Stutzbach, W2WCW, 80-24 62nd St., Glendale, L.I., N.Y.

NEW YORK CITY Hams! Sell: SCR-522 complete, converted to 2-meter operation, including crystal, beam, dynamic mike, schematic diagram, conversion instructions, \$50.00. 110 V AC Instructograph with 10 tapes, like new, \$25.00. Gribetz, W2OCE, 2700 Marion Avenue, Bronx 88, New York, SE 3-4114.

QSL-SWLS. Quality workmanship! C. Fritz, 1213 Briargate, Joliet, Illinois.

WANTED: Sales correspondent with good amateur background for mail contact with manufacturer and jobber customers. Must also be capable of assisting with catalog preparation and with advertising and sales promotion program. Office position at factory. Address Sales Manager, E. F. Johnson Co., Waseca, Minnesota.

SELL: SX-28 with matching speaker, \$135.00, F.o.b. C. DeFosse, Edgewood Club, Alexandria Bay, Thousand Islands, New York.

HALLCRAFTERS xmtr HT-9, block with spare meters; spare RCA 814 new coils for 80, 40, 20, 11 and 10, plus 100V variac for each band. Specify which. Used approximately 200 hours. Complete with instruction book. Price: \$300.00. W1GUC, P. DePasquale, 64 Grant Street, Hartford, Conn.

COLLINS 32-B for sale. Phone/cw xmttr with tubes and coils for 80, 40, 20. Price: \$50.00. F.o.b. Hartford, A. E. Hayes, South Coventry, Conn.

QSLs, SWLs. Finest stock. Fairest prices. W9BHV QSL Factory (Dosssett), 857 Burlington, Frankfort, Indiana.

SELL or trade: Jackson 'scope, Model 523; electronic test board including meters, clock and rheostat; fifty xtals, 2 to 4 Mc.; Majestic magnetic speaker; 1947 Bendix end-table radio. Will trade for a 250-watt xmttr or what have you? W1QKQ, Box 110, Northfield, Vermont.

SKV traveler Portable S-29, recently aligned. Good condition, \$72.00, without batt. Driver xfrmrs S-4, S-9; modulation xfrm S-21, 110 w. wired in, never used. All three, \$13.50. William A. Pfaff, W1PKL, Staples Court, East Norwalk, Conn.

DECALCOMANIA transfers. For car, rig, etc. 2" gold letters. Any call, 50c, 3 sets, \$1.00. QSLs, 500 cards, \$3.25, two color, \$4.25. Stationery, printed name, address, call: 100 sheets, 100 envelopes, \$1.50. Samples all three items, 10c refunded on order. L. W. Pleasant, W9UDZ, Mattoon, Illinois.

SPI I. HT-9, excellent condition, all coils, Post-war model. \$295. F.o.b. W4GOS, Georgia Baptist Hospital, Atlanta, Ga.

FOR Sale: New 872's, \$1.50; 9000's, 4 for \$2.15; 200W Ph-CW transmitter, \$35.00; tubes, meters, misc. ham equipment. Send for list. Want: 1P25 tubes; 3600 RPM synchronous motor; photo light-valve. R. H. Schultz, 1444 S. 15th Ave., Maywood, Illinois.

SELL: BC-348, in good condition, converted to AC, \$59.00, 6000 volt 200 mill. transformer and heavy duty filter choke, suitable for use with transformer, \$30.00. Four new 3E29's, \$10.00. New Stancor P-6170 transformer, 1200 volts center tapped and three filament windings. Preston Huffman, 340 East Highland Ave.; Hickory, No. Carolina.

300-Watt cw/1one, 20-40-80 xmttr, 804's final, complete in 6 foot toy rack, \$250.00. Mark II transceiver 40-80 complete, \$15.00. S-38 in perfect condition, \$40.00. R. Marsino, W2UGM, P.O. Box 368, Cloister, N. J.

HQ-129-X like-new, \$130.00 or best offer. 522 already converted for 2, Triplet 625NA new, and many other parts. Send for list. Reason: moving to west coast. 1720 57th St., Brooklyn, N. Y. P. Esposito, W2PHR.

HIGHEST offer takes Meissner recorder, like-new, or will trade for Harvey TB20 transmitter or what have you. Ernest Arms, Johnston City, Illinois.

HAMMARLUND Super-Pro SP-400-X, with Panadart and Hammarlund frequency standard. Baker, W2TDY, 165 Seaman Avenue, New York City, Lo. 9-2617.

ST. LOUIS and vicinity only! Complete 600-watt phone, enclosed metal rack, HT18 exciter. Now on the air. Many spare tubes and parts. 60-watt 10 meter phone complete. 600 watt r.f. amplifier. W9DUD, Pa. 1761.

COOTIE key, or "sideswiper," wanted. Prefer one made by Bunnell. Please state condition, name of manufacturer, and price wanted. Otto Hinkelmann, 148-10 61st Road, Flushing, L. I., N. Y.

WANTED: BC-453. W9NWT.

SELL Hallcrafters S-40A with built-in S-meter, in perfect condition, \$70.00. A. F. Dvorak, W2WMA, 28-18 100th St., East Elmhurst, L. I., N. Y.

SELL two Amertran 6400 CT, 750 mill, center-tapped Amertran transformers to highest bidder. Too low bids rejected. No swaps. W4GIW.

COLLINS AN/ART-13, good, unconverted, with HFO, spare new 813, 811s, 837, 1625, multivibrator, power coupler, conversion dope, schematic, maintenance manual. Best offer over \$75 takes all. Local sale preferred. Dr. W. E. Neff, Main St., Cheshire, Conn.

SELL: transmitter section 522 converted meter, 120 feet coax, \$?1.00. George Greenstein, 2532 University Ave., N. Y. C.

"KINKS" from Britain! "Practical Wireless," Britain's best radio monthly, covers the latest ideas and developments in British-European radio-television field. Exclusive articles by top radio men "cover there," full details "ham" activities, constructional data newest transmitters and receivers, special television features, etc. Annual subscription (12 issues), only \$2.00, from George Newnes, Ltd., (PW 24) 342 Madison Avenue, New York 17, N. Y.

FOR Sale: 200 watts c.w. rig, conservatively rated. Finest parts on! \$150 takes all, including key and xtals, 4 meters in the rig. Prefer local buyer. Harry Brown, W2KGE, 1669 Bryant Ave., New York 61, N. Y. Dayton 3-6359.

OUR business: Buying and selling amateur radio transmitters. Transmitter Exchange, Wakefield, R. I.

FOR Sale: Meissner 150B, \$200.00, W1BGJ, Southington, Conn.

FOR Sale: Stancor A3895 Poly-Pedance 300 W, modulation xmttr, A4404 Class B, input, P4904 filament 7.5 v. 12 A. Best offer. F.o.b. Waupun, Wisc. Lester H. Miller, W9OFL, 29 S. Watertown St., Waupun, Wisconsin.

SELL: Bargain! Three transmitters complete, with power supplies and modulators, Meissner 150B, Stancor 69P. Also RME-HF-10-20, Millen Variarm, HRO-7, NC-240D, W4ASR.

WANTED: Teletype 1/40TH HP Synchronous motor. W61TH, Moraga, Calif.

SELL: Twenty-six new IN34 crystal diodes for \$25.00. Need cash. G. Greenfield, W2SYY, 7101 Bay Parkway, Brooklyn 4, N. Y.

WANTED: The parts list or values used in the S-45 Hallcrafters 5" Panoramic receiver manufactured in 1942. I have the diagram for the unit. Please write to A. Laperriere, VE2LF, Vercheres, P. Q., Canada.

WANTED: BC-696, W8FXN, 1590 Tiffin St., Columbus 5, Ohio.

FOR Sale: Meissner 150B, converted to 10 and 20 meters as well as 75. Final rebuilt with B & W coils to use on doublet antenna and beam. D104 mike, antenna relay, New U.T.C. modulation transformer. Extra set of tubes, in perfect condition, ready to go. \$275.00 cash and carry. W7HVK/3, Capt. Gordon C. Lynch, Post Signal Officer, Army Medical Center, Washington 12, D. C.

WANTED: BC-348Q, in good condition. Give complete description if converted. W2OZB, Walter Berke, 378 Alphonse St., Rochester 5, N. Y.

Up to the Minute

THE LICENSE MANUAL

is always kept up to the minute. We insert correction sheets whenever there is a change in the amateur regulations which cannot be incorporated in the printing of the LICENSE MANUAL. To keep abreast of amateur regulations, have a copy of the up-to-date LICENSE MANUAL in your shack at all times.

25c postpaid (no stamps please)

THE AMERICAN RADIO RELAY LEAGUE, INC.

West Hartford, Connecticut

RADIO COURSES

- RADIO OPERATING
- RADIO SERVICING
- CODE
- FM TELEVISION

REFRIGERATION SERVICING

Personal Counselling Services for Veterans

Write for Catalog and Picture Brochure

Y. M. C. A. TRADE & TECHNICAL SCHOOLS
15 W. 63rd Street (Near Broadway) New York City

COMMERCIAL RADIO INSTITUTE

A RADIO TRAINING CENTER FOR 28 YEARS

Resident Courses Only • Broadcast, Service, Aeronautical, Television, U.H.F., Preparatory Course, Frequency Modulation and Marine telegraphy. Classes now forming for Fall Term Oct. 1, Entrance examination Sept. 20th.

Literature upon request. Veteran training

Dept. B, 38 West Biddle Street, Baltimore 1, Maryland

COMPLETE RADIO TRAINING!

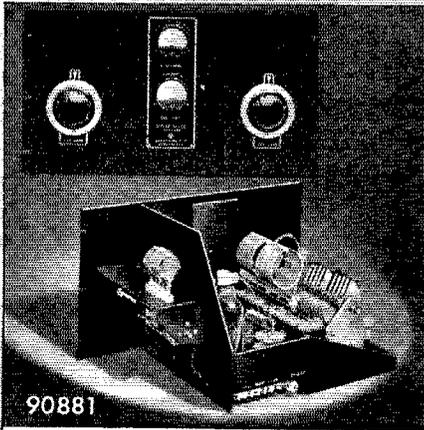
Prepare now to accept a responsible position in Commercial Radio. New developments will demand technicians with thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school equivalency. Courses to 18 months' duration in RADIO AND ELECTRONICS. Approved Veteran training in Radio. Write for Particulars.

VALPARAISO TECHNICAL INSTITUTE
DEPT. TN Valparaiso, Ind.

Designed for



Application



90881

**The No. 90881
RF POWER AMPLIFIER**

This "500" watt, RF power amplifier unit may be used as the basis of a high power amateur band transmitter or as a means for increasing the power output of an existing transmitter. As shipped from the factory, the No. 90881 RF power amplifier is wired for use with the popular RCA or G.E. "812" type tubes, but adequate instructions are furnished for re-adjusting for operation with such other popular amateur style transmitting tubes as Taylor TZ40, Eimac 35T, etc. The amplifier is of unusually sturdy mechanical construction, on a 10 1/2" relay rack panel. The panel contains the grid and plate tank tuning capacitor dials, as well as the grid and plate current milliammeters. Plug-in inductors are available for operation on 10, 20, 40 or 80 meter amateur bands, from stock, as well as special coils to order for commercial frequencies. The standard Milen No. 90800 exciter unit is an ideal driver for the new No. 90881 RF power amplifier.

**JAMES MILLEN
MFG. CO., INC.**

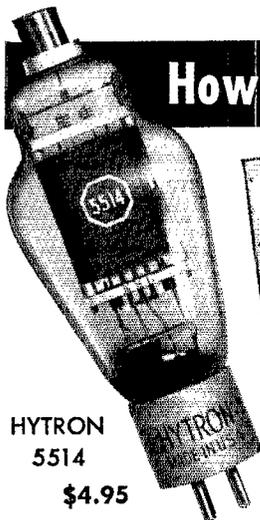
MAIN OFFICE AND FACTORY
**MALDEN
MASSACHUSETTS**



Index to Advertisers

Allied Radio Corporation	119
Altec Service Corporation	95
American Lava Corporation	91
American Radio Institute	130
American Phenolic Corporation	80
Amplifier Corp. of America	132
Arrow Electronics, Inc.	129
Astatic Corporation	137
Audar, Incorporated	137
Barker & Williamson, Inc.	133
Belden Manufacturing Company	97
Birnbach Radio, Inc.	126
Bliley Electric Company	82
Browning Laboratories	118
Burstein-Applebee Company	126
Candler System Company	132
Capitol Radio Engineering Inst.	107
Carter Motor Company	134
Central Radio Parts Co.	134
Chicago Industrial Instr. Co.	128
Cleveland Inst. of Radio Elec.	94
Collins Radio Company	3
Commercial Radio Institute	141
Condenser Products Co.	83
Continental Sales Company	130
Decimeter, Incorporated	135
Drake Manufacturing Co.	96
Eitel-McCullough, Inc.	81
Electric Eye Equipment Co.	92
Electronic Marketers, Inc.	132
Electronic Navigation, Inc.	130
Electronic Wholesalers, Inc.	131
Electro-Voice, Inc.	144
General Electric Company	1
Greenlee Tool Company	136
Hallcrafters Company, The	4, 5
Harrison Radio Corporation	123
Harvey Radio Company, Inc.	109
Henry Radio Stores	115
Hy-Lite Antennae, Inc.	133
Hytron Radio & Electronic Corp.	143
Instructograph Company, The	136
International Resistance Company	84
Jensen Manufacturing Company	7
Johnson Company, E. F.	90, 98
Ken-Rad	75
Knights Company, James	104
Leeds Radio Company	116, 117
McGraw-Hill Book Company	102
Mallory & Company, Inc., P. R.	78
Marion Electric Instrument Co.	79
Mass Radio & Telegraph School	134
Meissner Manufacturing Co.	86, 87
Melville Radio Institute	114
Merrit Coil & Transformer Corp.	101
Milten Mfg. Company, Inc., James	142
Munger Company, Rex L.	124
National Company, Inc.	71, 88, Cov. III
New York YMCA Schools	141
Newark Electric Company	112, 113
Ohmite Manufacturing Co.	77
Onan & Sons, D. W.	136
P & H Sales Company	130
Par-Metal Products Corp.	120
Peebles Radio Distributors, Inc.	106
Petersen Radio Company	73
Port Arthur College	128
Precision Apparatus Co., Inc.	100
RCA Institutes, Inc.	128
Radio Corporation of America	Cov. IV
Radio Products Sales, Inc.	127
Radio Shack Corporation, The	111
Shure Brothers, Inc.	99
Standard Electrical Products Co.	118
Standard Radio & Elec. Products Co.	110
Standard Transformer Corp.	93
Steinberg's Inc.	108
Suburban Radio Company	122
Sun Radio of Washington	125
Triplet Electrical Instrument Co.	103
Turner Company, The	135
United Transformer Corp.	Cov. II
Valparaiso Technical Institute	141
Valpey Crystal Corp.	122
Vesto Company	124
Vibroplex Co., Inc., The	120
Webster Chicago Corporation	85
World Radio Laboratories, Inc.	121

How Hams are using the HYTRON 5514

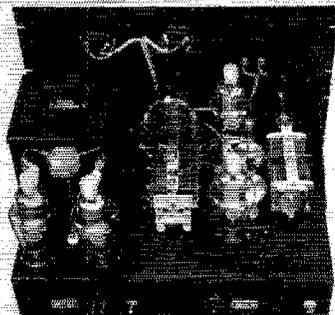


HYTRON
5514

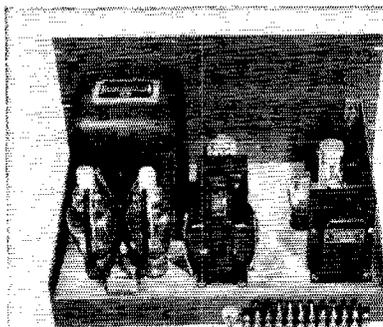
\$4.95



Most complete characteristics sheet for a transmitting triode; typical operation data for 8 plate potentials. Also class B interchangeability Chart demonstrating comparatively the 5514's superiority over other triodes. Write for both.



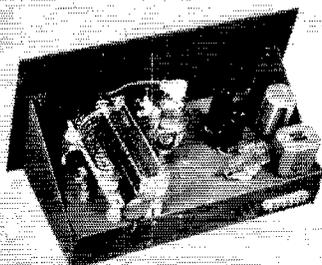
WIPEK's complete 350-w, 3.5-to-28-mc, 'phone/c-w transmitter uses 4 Hytron 5514's — class B and C — and only 7 cubic feet of space. QST for Sept., 1947, pp. 37-46.



Two 5514's class B deliver 300 w at 1250 plate v, zero bias. (At 1500 plate v, -4.5 v bias, 5514's will give 400 w class B.) RADIO HANDBOOK, 11th Ed., pp. 336-337.



WIIVU's half-kw rig on single chassis. Economical zero bias throughout. All Hytron: 2E25 osc., 5514 driver, 5514 push-pull final. CQ for Oct., 1947, pp. 32-35.



Simple, economical, 3-stage, 3.5-to-28-mc outfit. Single 5514 gives 43 to 200 w output at 400-1500 plate v. THE RADIO AMATEUR'S HANDBOOK, 25th Ed., pp. 184-187.

Tube data sheets are helpful. Those for the Hytron 5514, unusually so. But *seeing* how the other fellow has put the 5514 to work is even better. The articles describing the illustrated transmitters bristle with "hot" ideas. It will pay you to review them. Write also for both of the 5514 data sheets. Discover for yourself why the Hytron 5514 is so popular: Low internal tube drop and consequent high efficiency at plate potentials from 400 to 1500 volts. Generous output, low drive. Ready interchangeability with other triodes. In short, an economical, all-purpose ham tube designed for hams. Plan to put the 5514 to work in your rig, too. See it — buy it at your Hytron jobber's.

GOT TVI TROUBLES?

Two 5514's in properly balanced Class B RF—1500 v at 350 ma plate, -4.5 v bias, 6.5 w grid driving power—deliver 400 w c-w output essentially harmonic-free. See National ad p. 85, July QST.

SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921

HYTRON

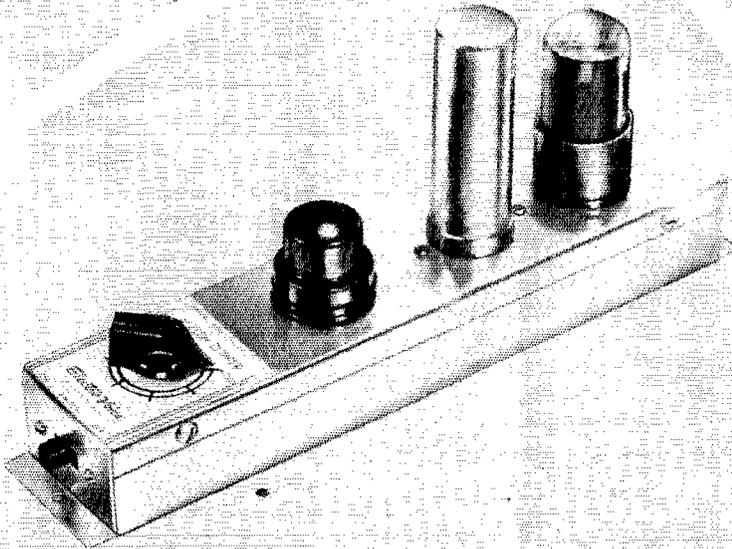
RADIO AND ELECTRONICS CORP.



MAIN OFFICE: SALEM, MASSACHUSETTS

NEW  **MODEL 1000** *Speech Clipper*

ADDS GREATLY TO ARTICULATION
HOLDS MODULATION AT 100%
...in 'Phone Communications!



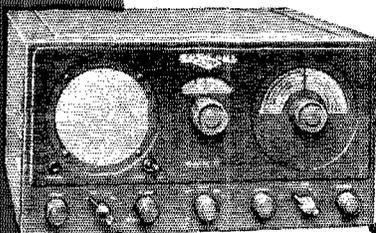
THE SPEECH CLIPPER is a specially designed Peak Limiting Pre-Amplifier . . . Clips the tops and bottoms from speech frequencies which rise above a pre-set amplitude . . . Increases the ratio of consonant-to-vowel intensity . . . Adds greatly to articulation and intelligibility in speech transmission, especially in the presence of high QRM or QRN . . . Attenuates sidebands above 3000 cps. as recommended by ARRL . . . Holds modulation to 100%. Small, compact, easy to install and operate. Model 1000, List Price . . . \$24.50

Ask your E-V Distributor or write for Bulletin No. 145

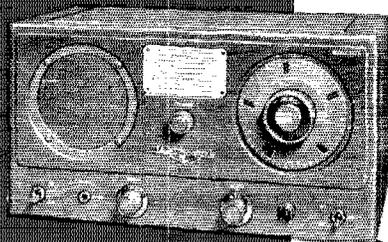
ELECTRO-VOICE, INC., BUCHANAN, MICH. Export: 13 E. 40th St., New York 16, U.S.A. Cables: Arlab

ANOTHER FINE PRODUCT BY

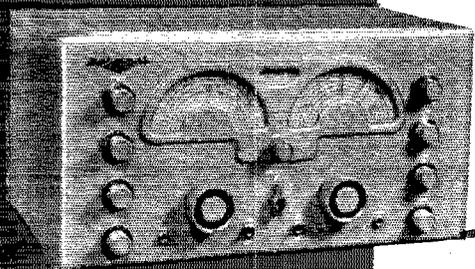
Electro-Voice



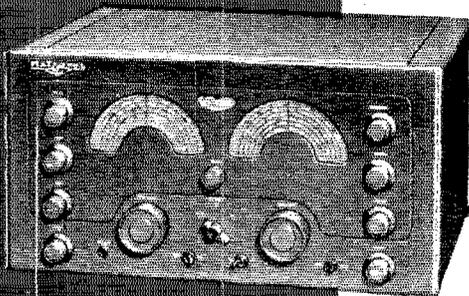
NC-57



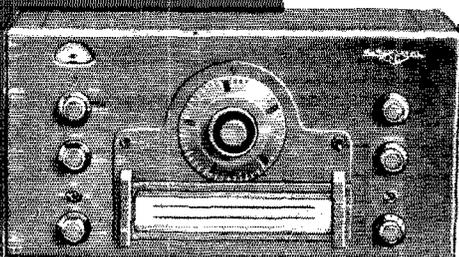
HFS



NC-173



NC-183



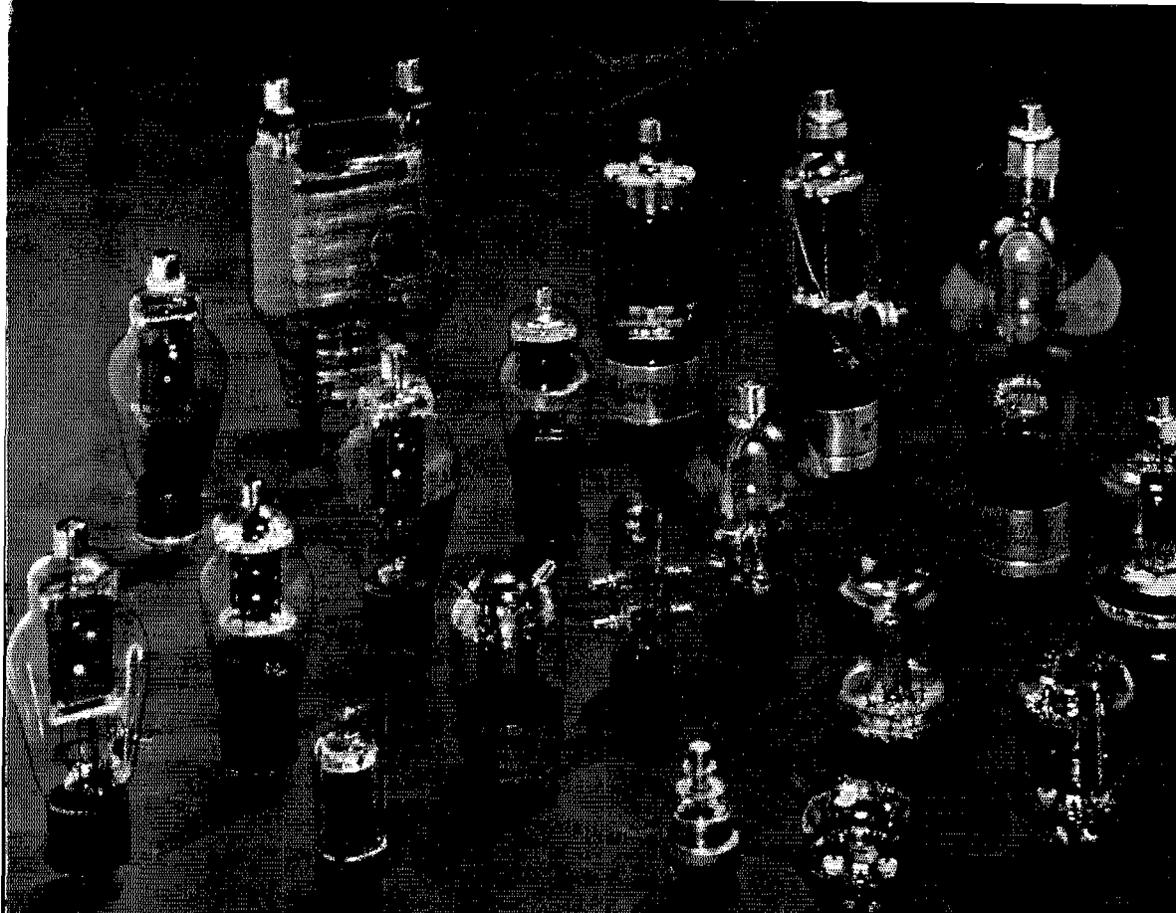
HRO-7



There is a National receiver for every purpose, at every price — designed and built with famous National engineering skill and craftsmanship.

See your National dealer listed in your classified phone book or write for free 1948 Catalog.

National
 © EST. 1914
NATIONAL COMPANY, Inc.
 MALDEN, MASSACHUSETTS



***If grid emission
is your problem...***

...solve it simply—with RCA tubes

● No worry... and no risk... with soaring plate current in RCA tubes. No need either to reduce d-c grid current and plate input to halt it.

Why this freedom from grid emission and grid bias cancellation?

Simple enough. RCA power tube grids are made of special materials, such as platinum-clad molybdenum, having very low grid emission. They run cool because they are built with special heat-conducting side rods and because RCA tube plates are large and operate at relatively low temperature.

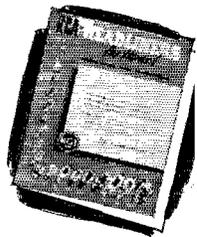
To get all the tube power you pay for... and get

The Fountainhead of Modern Tube Development is RCA

high-efficiency performance right up to full input, buy RCA tubes. They're available at your local RCA Tube Distributor.

FREE—RCA Headliners for Hams

... 4 pages of power tube data charts that quickly tell you the correct voltages, currents, driving power, dissipations, etc., for each tube service. Indispensable to every transmitter man who builds equipment. Ask your RCA Tube Distributor for a copy of Headliners, or write RCA, Commercial Engineering, Section IM54, Harrison, New Jersey.



TUBE DEPARTMENT

RADIO CORPORATION of AMERICA

HARRISON, N. J.