QST

February 1967
60 Cents

devoted entirely to

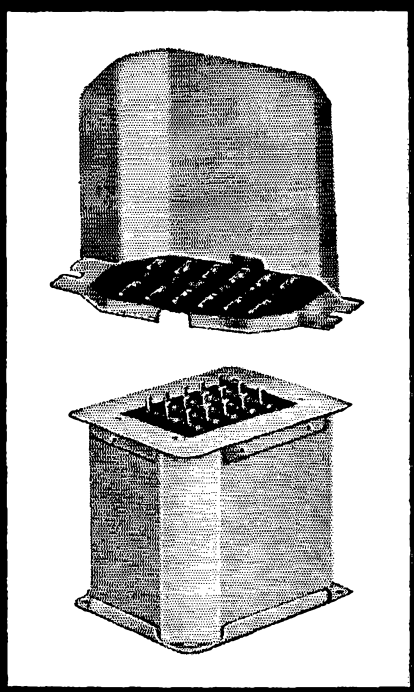
amateur radio

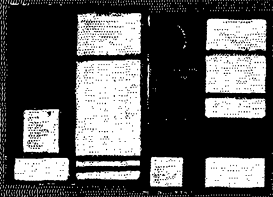
OFFICIAL JOURNAL OF THE ARRL

UTC

PIONEERS IN MINIATURIZATION

"S" SERIES





hold your ears... hallicrafters has unleashed another brute

SR-2000 "Hurricane"

5-band amateur transceiver

SPECIAL FEATURES: Patented Receiver Offset Control (RIT) permits ±2 ks adjustment of receiver frequency, independent of transmitter, for round-table, net or CW operation. Hallicrafters exclusive Amplified Automatic Level Control.

FREQUENCY COVERAGE: Full coverage provided for 80, 40, 20, 15 and 10 meters. All crystals provided for 28.0 to 30.0 mcs.

GENERAL: Dial cal., 1 kc. Linear gear drive with less than 1 kc readout. Adjustable IF noise blanker. Provision for plug-in external VFO/DX adapter. Built-in VOX plus break-in CW and PTT. Built-in CW sidetone. Hi-Low power switch useable in CW or SSB.* 2.1 kc crystal lattice filter. S-meter-RFO-AALC and final screen metering.* Two-speed blower, 100 kc crystal cal. VFO covers 500 kc.

TRANSMITTER SECTION: Two 8122 output tubes. Variable Pi network. Power input, 2000 watts P.E.P. SSB; 1000 watts CW. Carrier and unwanted SB suppression, 50db; distortion products, 30db. Audio: 500-2600 cps @ 6 db.

RECEIVER SECTION: Sensitivity less than 1 μv for 20 db S/N. Audio output, 2W.; overall gain, 1 μv for ½ W. output.

*Meters for final plate current and voltage built into P-2000AC power supply. Also Hi-Lo power switch.

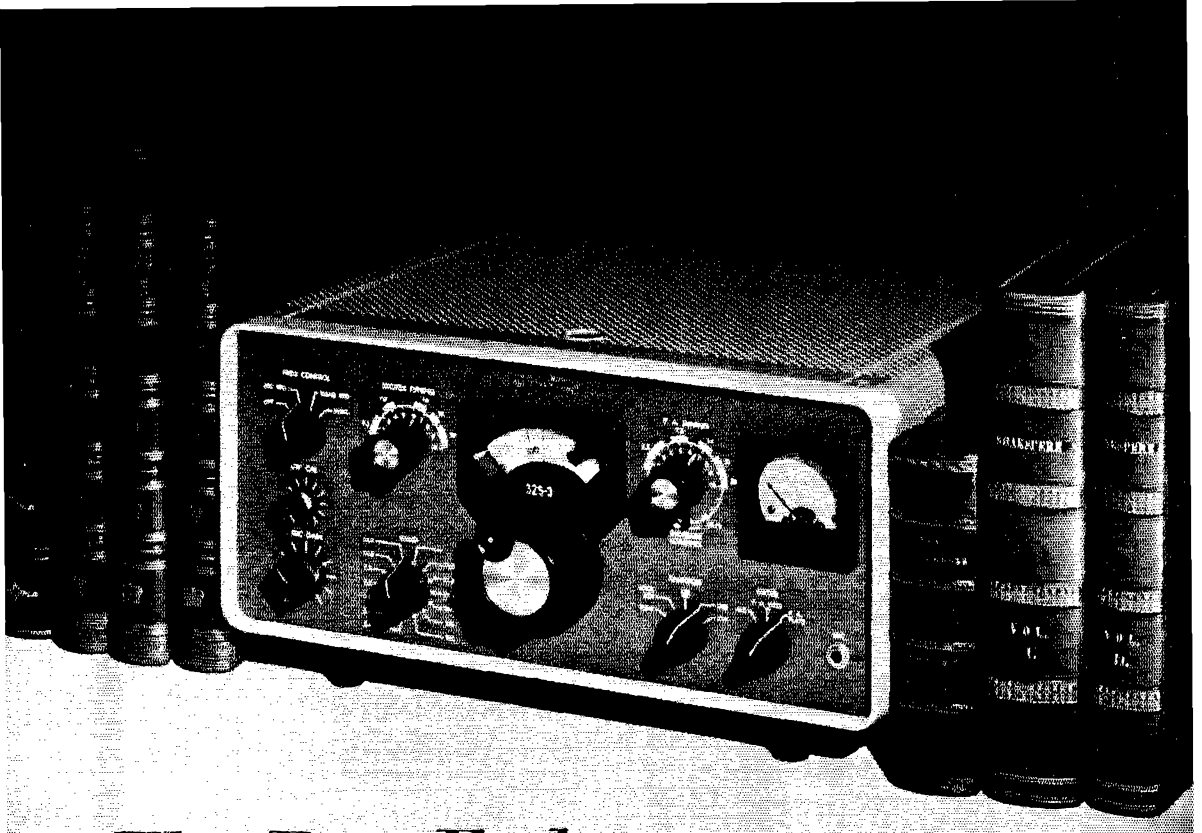
amateur net: $995.00

less power supply

the wild ideas are tamed at... hallicrafters

5TH & KOSTNER AVES., CHICAGO, ILL. 60624

EXPORT: INTERNATIONAL DIV.—CANADA: GOULD SALES CO.



The Best Endure

A classic is a work of enduring excellence. That's why the 32S-3 Transmitter is a classic in amateur radio. The 32S-3 offers USB, LSB and CW versatility, transceiver operation with S/Line receiver, mechanical filter sideband generation, permeability-tuned VFO, crystal-controlled HF oscillator, RF inverse feedback and automatic load control. Stop in at your Collins distributor and browse through the S/Line classics.

COLLINS

QST

FEBRUARY 1967

VOLUME LI NUMBER 2

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

OFFICES

225 Main Street
Newington, Connecticut 06111
Tel.: 203-666-1541

Subscription rate $6.00 per year postpaid: $6.50 in Canada; $7.00 elsewhere. ARRL Membership, including *QST*, available only to individuals with a bona fide interest in amateur radio: $5.00 per year; $5.25 in Canada; $6.00 elsewhere. Single copies, 60 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.

Second-class postage paid at Hartford, Conn. and at additional mailing offices.

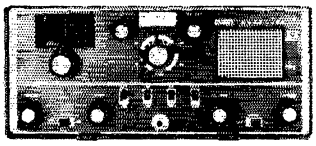
INDEXED BY
Applied Science and Technology Index
Library of Congress Catalog Card No.: 21-9421

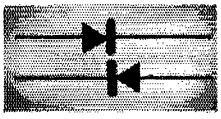
OUR COVER

A 1-watt armfull of 50-Mc. transceiver gets a winter workout from a high spot in Newington. Build yours this winter for fun in the spring. See page 11 for details.

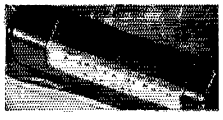
—CONTENTS—

SBE



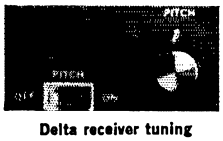


No relays—
Solid-state switching.

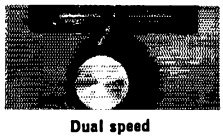


Collins
Mechanical Filter.

Panel switch
selects USB or LSB



Delta receiver tuning
plus/minus trans. freq.



Dual speed
receiver tuning

One knob controls band-
switch and exciter tune.

features for the future . . .

all present

It would be easy to reel off another dozen **SB-34** features, most of them solid-state—like bi-lateral 2-way circuits—many of them exclusive. But when you actually pick up this mighty miniature —heft its 19 pounds—you will realize how much solid-state components have helped to shrink the size and weight of the package. It would be only natural if you marvelled a bit about the fact that you have at your fingertips a powerful, full-fledged, 4-band SSB station in a package only 5"x11¼"x10".

Not shown in the film clip at the left is the all-important handle for the SB-34 provided to encourage you to take advantage of the utility of this fine transceiver—and to use it at home, in your car—or boat—or plane—or ski resort? Of course you'll also be packing the dual 117V AC and 12V DC power supply. But this time no extra handle—the supply is built right into the SB-34 cabinet. (and is included in the price of $419.00.)

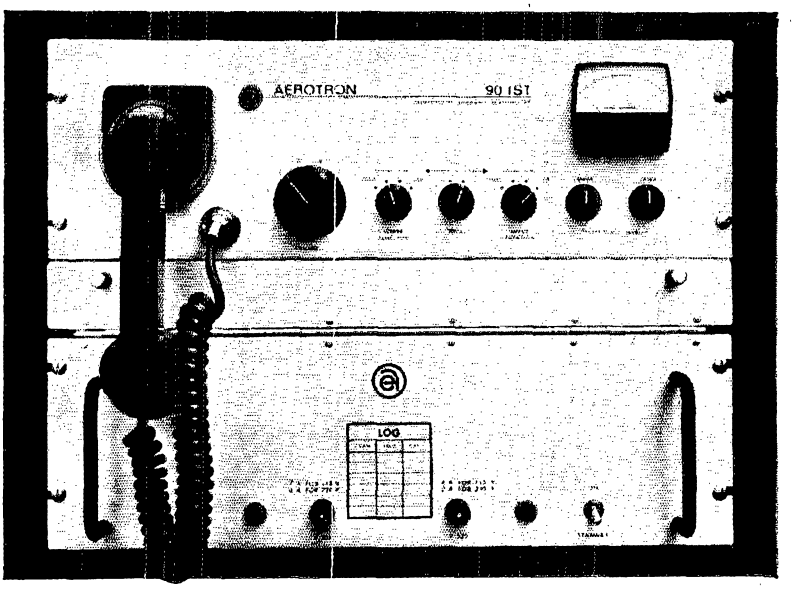
Carry on!

SBE, Sideband Engineers, 213 East Grand Ave. South San Francisco, California.

RAYTHEON

Export sales: Raytheon Company, International Sales & Services, Lexington 73, Mass. U.S.A.

A NEW LOW COST APPROACH TO HF CHANNEL CONGESTION



COMPLETELY NEW... INDEPENDENT SIDEBAND TRANSMITTER

VOICE, CW, TELETYPE, DATA... *Simultaneously!*

Now . . . the first completely new and modern independent sideband transmitter in the low priced field. The AEROTRON model 90/IST . . . 150 watt PEP transmitter with more design and operating features than you would expect to find in equipment costing twice as much.

The 90/IST is complete in itself. Utilization of ultra-modern circuitry provides years of solid trouble-free service. In addition, matched pairs of mechanical filters provide performance approaching laboratory standards for independent sideband transmission. The superior model 90/IST is the result of careful engineering and production techniques developed in the award winning AEROTRON factory.

● SIX CHANNELS (2.0-15.0 MC) ● DIRECT, REMOTE OR PBX CONTROL ● 150 WATTS, P.E.P. ● VOICE/CW/RTTY ● 115/230 VOLTS, 50/60 CPS ● REMOTE CONTROLS, RECEIVER, LINEAR AMPLIFIER AVAILABLE.

MANUFACTURER OF FM AND AM TWO-WAY RADIO, SSB AND ISB COMMUNICATIONS, CONTROLATOR FUEL CONTROL & DATA EQUIPMENT, AMECO* HAM, CB AND SHORT WAVE LISTENING EQUIPMENT.

* AMECO A SUBSIDIARY OF AEROTRON, INC.

WRITE FOR FREE LITERATURE.

AEROTRON

U.S. HIGHWAY 1, NORTH
RALEIGH, NORTH CAROLINA 27608

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in areas shown to qualified League members. General or Conditional Class licensees or higher may be appointed ORS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

ATLANTIC DIVISION				
Delaware	W3HC	John Thompson	1016 Parkside Drive	Wilmington 19803
Eastern Pennsylvania	W3ZRQ	Allen R. Breiner	212 Race St.	Tamaqua 18252
Maryland D. C.	K3JYZ	Carl E. Andersen	14601 Claude Lane	Silver Spring, Md. 20904
Southern New Jersey	W2ZI	Edward G. Raser	19 Blackwood Drive	Wilburta Gardens, Trenton 08628
Western New York	K2HUK	Charles T. Hansen	Warner Gulf Rd.	Holland 14080
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	K9IVG	Mrs. M. Roberta Kroulik	401 El Portal Drive	Michigan City 46361
Wisconsin	K9GSC	Kenneth A. Ebneter	822 Wauona Trail	Portage 53901
DAKOTA DIVISION				
Minnesota	WØTCK	Herman R. Kopischke, Jr.	RFD 2	Janesville 56048
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	KØTXW	Seward P. Holt	Box 58	Clear Lake 57226
DELTA DIVISION				
Arkansas	K5GKN	Don W. Whitney	1117 North Drive	(P.O. Box 311), Osceola 72370
Louisiana	W5PM	J. Allen Swanson, Jr.	RFD 1, Box 354-E	Covington 70433
Mississippi	W5ZMM	S. H. Hairston	2321-27th Ave.	Meridian 39303
Tennessee	W4UVP	William A. Scott	115 East Holston Ave.	Johnson City 37601
GREAT LAKES DIVISION				
Kentucky	WA4KFO	Lawrence F. Jeffrey	1605 Antler Ave.	Owensboro 42301
Michigan	W8FX	Ralph P. Thetreau	27209 W. Six Mile Road	Detroit 48240
Ohio	W8AL	Wilson E. Weckel	1317 Logan Ave., N.W.	Canton 44703
HUDSON DIVISION				
Eastern New York	W2EFU	George W. Tracy	1138 North Country Club Drive	Schenectady 12309
N. Y. C. & Long Island	K2IDB	Blaine S. Johnson	266 Cypress St.	Massapequa Park, L. I. 11762
Northern New Jersey	W2LQP	Louis J. Amoroso	180 Pleasant Ave.,	Bergenfield 07621
MIDWEST DIVISION				
Iowa	WØBDZ	Owen G. Hill	RFD	Gilman 50106
Kansas	KØBXF	Robert M. Summers	3045 North 72nd,	Bethel 66009
Missouri	WØTPK	Alfred E. Schwaneke	Edgar Star Rte	Rolla 65401
Nebraska	WØQGP	Frank Allen	Box 272	Gering 69341
NEW ENGLAND DIVISION				
Connecticut	W1GVT	John J. McNassor	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Maine	K1DYG	Herbert A. Davis	RFD 1	Franklin 04634
New Hampshire W1SWX/K1DSA		Robert Mitchell	Box 137-A, RFD	Chester 03036
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	E. Reginald Murray	3 Hillcrest Drive	Montpelier 05601
Western Massachusetts	W1BVR	Percy C. Noble	8 St. Dennis St.	Westfield 01085
NORTHWESTERN DIVISION				
Alaska *	KL7DG	John P. Trent	2429 Maple Ave.	Anchorage 99504
Idaho	W7ZNN	Donald A. Crisp	3727-14th st.	Lewiston 83501
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave.	Anaconda 59711
Oregon	W7AJN	Everett H. France	3335 S.E. 116th Ave.	Portland 97266
Washington	W7HMQ	Everett E. Young	2217 Fifth St., S.E.	Puyallup 98371
PACIFIC DIVISION				
East Bay	K6LRN	Richard Wilson	107 Cordova Way	Concord 94521
Hawaii	KH6BZF	Lee R. Wical	45-601 Luluku Rd.	Kaneohe 96744
Nevada	W7PHV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	WA6JDT	John F. Minke, III	6230 Rio Bonito Drive	Carmichael 95608
San Francisco	WA6AUD	Hugh Cassidy	77 Coleman Drive	San Rafael 94901
San Joaquin Valley	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	W6ZIJ	Jean A. Gmelin	10835 Willowbrook Way	Cupertino 95014
ROANOKE DIVISION				
North Carolina	W4BNU	Barnett S. Dodd	420 West Franklin St.	Salisbury 28144
South Carolina	K4LNJ	Clark M. Hubbard	124 Fant Lane	Union 29379
Virginia	W4SIJ	H. J. Hopkins	8600 Hammett Ave.	Norfolk 23503
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554
ROCKY MOUNTAIN DIVISION				
Colorado	KØFDH	Richard Hoppe		Lawson 80460
New Mexico	WA5FLG	Bill Farley	1306 Spruce	Alamogordo 88310
Utah	W7VSS	Gerald F. Warner	4765 South 275 West	Ogden, 84401
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	K4WHW	Edward L. Stone	1806 Spring Ave., S.W.	Decatur 35601
Canal Zone	KZ5TT	Mrs. Lillian C. Smith	P.O. Box 191	Balboa
Eastern Florida	W4MVB	Jesse H. Morris	P.O. Box 1241	Jacksonville Beach 32050
Georgia	W4RZL	Howard L. Schonher	P.O. Box 1902	Columbus 31902
West Indies (P.R.-V.I.)	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073	Caparra Heights San Juan, P.R. 00922
Western Florida	W4RKH	Frank M. Butler, Jr.	494 Elliott Rd.	Fort Walton Beach 32548
SOUTHWESTERN DIVISION				
Arizona	W7FKK	Floyd C. Colyar	3411 West Pierson St.	Phoenix 85017
Los Angeles	W6BHG	H. G. Garman	3732 Chatwin Ave.	Long Beach 90808
Orange	W6DEY	Roy R. Maxson	1434 South Olive St.	Santa Ana 92707
San Diego	W6LRU	Don Stansifer	4427 Pescadero	San Diego 92107
Santa Barbara	WA6OKN	Cecil D. Hinson	1933 Coventry Court	Thousand Oaks 91360
WEST GULF DIVISION				
Northern Texas	W5BNG	L. L. Harbin	4515 Calmount	Fort Worth 76107
Oklahoma	K5CAY	Daniel B. Prater	1401 E. Oklahoma Ave.	Enid 73701
Southern Texas	W5AIR	G. D. Jerry Sears	5634 Eskridge St.	Houston 77023
CANADIAN DIVISION				
Alberta	VE6TG	Harry Harrold	1834-5th Ave. N.	Lethbridge, Alta.
British Columbia	VE7FB	H. E. Savage	4553 West 12th Ave.	Vancouver 8, B. C.
Manitoba	VE4JT	John Thomas Stacey	19 Cottonwood Cres.	Brandon
Maritime	VE1MX	J. Harley Grimmer	40[illegible] Rosedale Ave.	Fairview, Halifax Co., N. S.
Ontario	VE3NG	Richard W. Roberts	170 Norton Ave.	Willowdale, Toronto, Ont.
Quebec	VE2OJ	Jim Ibey	209 Brookdale Ave.	Dorval, P. Q.
Saskatchewan	VE5QC	Mel Mills	P.O. Box 801	Saskatoon

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

NEW from International

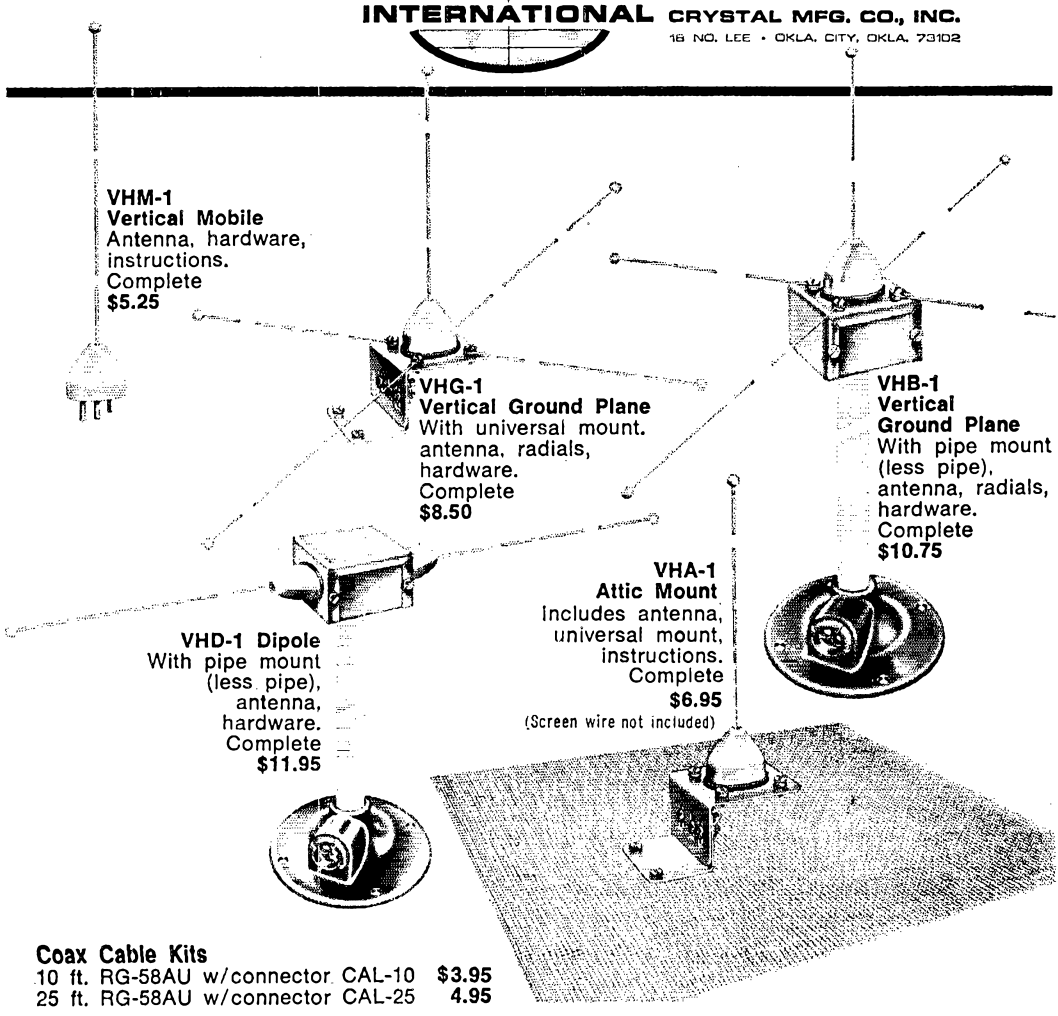
low cost VHF space-saver antennas

144-430 mc **120-480 mc**

* *Designed for full performance*
* *Solid molded bases*
* *Easy mounting*
* *Low cost*
* *Mobile Fixed Base*

If antenna space is a problem, you will find International Space-Saver antennas the answer. The new line of Space-Savers keep antenna display and space requirements to a minimum with full operating performance. Manufactured from the finest material, yet low in cost.

INTERNATIONAL CRYSTAL MFG. CO., INC.
18 NO. LEE • OKLA. CITY, OKLA. 73102



VHM-1
Vertical Mobile
Antenna, hardware, instructions.
Complete
$5.25

VHG-1
Vertical Ground Plane
With universal mount. antenna, radials, hardware.
Complete
$8.50

VHB-1
Vertical Ground Plane
With pipe mount (less pipe), antenna, radials, hardware.
Complete
$10.75

VHA-1
Attic Mount
Includes antenna, universal mount, instructions.
Complete
$6.95
(Screen wire not included)

VHD-1 Dipole
With pipe mount (less pipe), antenna, hardware.
Complete
$11.95

Coax Cable Kits

10 ft. RG-58AU w/connector CAL-10	**$3.95**
25 ft. RG-58AU w/connector CAL-25	**4.95**

THE AMERICAN RADIO RELAY LEAGUE, *INC.*,

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

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

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

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut.

Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914–1936
EUGENE C. WOODRUFF, W8CMP, 1936–1940
GEORGE W. BAILEY, W2KH, 1940–1952
GOODWIN L. DOSLAND, WØTSN, 1952–1962
HERBERT HOOVER, JR. W6ZH, 1962–1966

Officers

President . . . . . ROBERT W. DENNISTON, WØNWX
Box 73, Newton, Iowa 50208

First Vice-President . . . . WAYLAND M. GROVES, W5NW
1406 West 12th Street, Odessa, Texas 79760

Vice-Presidents . . . . . CHARLES G. COMPTON, WØBUO
GILBERT L. CROSSLEY, W3YA

Secretary . . . . . JOHN HUNTOON, W1LVQ

Treasurer . . . . . DAVID H. HOUGHTON
225 Main St., Newington, Connecticut 06111

• • • • •

Honorary Vice-Presidents . . . . . ALEX REID, VE2BE
FRANCIS E. HANDY, W1BD

• • • • •

General Manager . . . . . JOHN HUNTOON, W1LVQ

Communications Manager . . . . . GEORGE HART, W1NJM

Technical Director . . . . . GEORGE GRAMMER, W1DF

Assistant General Manager . . RICHARD L. BALDWIN, W1IKE

Assistant Secretaries . . . . . PERRY F. WILLIAMS, W1UED
WILLIAM SMITH, W1DVE WILLIAM I. DUNKERLEY, JR, WA2INB
225 Main St., Newington, Connecticut 06111

• • • • •

General Counsel . . . . . ROBERT M. BOOTH, JR., W3PS
1100 Vermont Avenue, N. W., Washington, D. C. 20005

Associate Counsel . . . . . ARTHUR K. MEEN, Q.C., VE3RX
Suite 2212, 44 King St. West, Toronto 1, Ont.

DIRECTORS

Canada

NOEL B. EATON VE3CJ
R.R. 3 Burlington, Ontario

Vice-Director: Colin C. Dumbrille VE2BK
116 Oak Ridge Drive, Baie d'Urfe, Quebec

Atlantic Division

GILBERT L. CROSSLEY W3YA
734 West Foster Avenue, State College, Pa. 16801

Vice-Director: Jesse Bieberman W3KT
RD 1 Valley Hill Road, Malvern, Pa. 19355

Central Division

PHILIP E. HALLER . . . . . WØHPG
6000 S. Tripp Ave., Chicago, Ill. 60629

Vice-Director: Edmond A. Metzger . . . . . WØPRN
1520 South Fourth St., Springfield, Illinois 62703

Dakota Division

CHARLES G. COMPTON . . . . . WØBUO
1011 Fairmount Ave., St. Paul, Minn. 55105

Vice-Director:

Delta Division

PHILIP P. SPENCER W5LDH/W5LXX
29 Snipe St., Lake Vista, New Orleans, La. 70124

Vice-Director: Max Arnold W4WHN
612 Hogan Road, Nashville, Tenn. 37220

Great Lakes Division

DANA E. CARTWRIGHT W8UPB
2979 Observatory Ave., Cincinnati, Ohio 45208

Vice-Director: Charles C. Miller W8JBU
4872 Calvin Drive, Columbus, Ohio 43227

Hudson Division

HARRY J. DANNALS W2TUK
RFD 1, Arbor Lane, Dix Hills, Huntington, N.Y. 11743

Vice-Director: Stan Zak K2BJO
13 Jennifer Lane, Port Chester, New York 10573

Midwest Division

SUMNER H. FOSTER . . . . . WØGQ
2110 Goblin's Gully Dr., S.E., Cedar Rapids, Iowa 52403

Vice-Director:

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, Conn. 06340

Vice-Director: Bigelow Green W1EAE
11 Law's Brook Rd., South Acton, Mass. 01771

Northwestern Division

ROBERT B. THURSTON W7PGY
7700 31st Ave., N.E., Seattle, Wash. 98115

Vice-Director: R. Rex Roberts W7CPY
837 Park Hill Drive, Billings, Mont. 59102

Pacific Division

HARRY M. ENGWICHT W6HC
770 Chapman, San Jose, Calif. 95126

Vice-Director: Ronald G. Martin W6ZF
1573 Baywood Lane, Napa, Calif. 94558

Roanoke Division

VICTOR C. CLARK W4KFC
12927 Popes Head Road, Clifton, Va. 22024

Vice-Director: L. PHIL WICKER W4ACY
4821 Hill Top Road, Greensboro, N.C. 27407

Rocky Mountain Division

CARL L. SMITH . . . . . WØBWJ
1070 Locust St., Denver, Colo. 80220

Vice-Director: John H. Sampson, Jr. W7OCX
3618 Mount Ogden Drive, Ogden, Utah 84403

Southeastern Division

CHARLES J. BOLVIN W4LVV
2210 S.W. 27th Lane, Miami, Fla. 33133

Vice-Director: Albert L. Hamel K4SJH
220 N.E. 25th Street, Pompano Beach, Fla. 33064

Southwestern Division

JOHN R. GRIGGS W6KW
11422 Zelzah Ave., Grenada Hills, Calif. 91344

THOMAS J. CUNNINGHAM W6PIF
1105 East Acacia St., El Segundo, Calif. 90245

West Gulf Division

ROEMER O. BEST W5QKF
P.O. Box 1656, Corpus Christi, Texas 78401

Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla. 73159

"It Seems to Us..."

"DROP DEAD"

Periodically we mail, to those few who have not renewed their membership in ARRL, a letter asking them to rejoin. To some the arguments are effective — they use the membership blank to sign up once again. A scattering of the recipients enjoy using the business-reply envelope to return unsigned comments.

There is about one per month which says only, "drop dead." There are perhaps two which say, "are you kidding?" and once in a while the ashes of the membership blank are returned. We are happy the League can furnish therapy for hostilities at such a bargain price.

Once or so a month the anonymous remarks are, "I belong to IoAR." We wish these chaps lots of luck.

But currently the predominant theme of the non-joiners returning the literature is — what else? — incentive licensing. What really concerns us are the misconceptions which, after all these years and all the words in *QST* and elsewhere, they still manage to believe. Some samples:

You're promoting the selfish interests of a few. But incentive licensing is only one stone in the fort ARRL is building to protect amateur privileges from loss at future international allocations conferences — for the benefit of members and non-members alike . . . U. S. citizens, Canadians and foreigners. Under the pre-1953 licensing structure, which was an accepted, supported and effective procedure ARRL wants to reinstate, some 40% of our number advanced to the higher grade. This is "the few"?

Foreign governments could care less whether we are all 35 w.p.m. holders or PhDs in electronics. This particular building block in our wall, this incentive licensing program, is primarily intended to show our own authorities that amateurs can become an even more useful reservoir of highly motivated, technically-trained men and women to be relied upon in time of emergency. But there are rumblings, whether or not justified, in some other countries that the U. S. amateur service does not meet international concepts of technical competency; so the proposal will have a salutary effect elsewhere as well.

What good is 20 w.p.m. to a phone man? ARRL's RM-499 specifically asked that no additional code test be imposed on the reactivated Advanced Class license we were requesting. But FCC's Docket 15928 differs from the League's original; it is based on contents of ten other petitions in addition to the League's, and includes some of the Commission's own views. FCC obviously feels that code proficiency is still a very important requirement (see "League Lines" last month). However, the proposed speed for the First Class license is 16 w.p.m., not 20.

You will force most of us off the air. The current docket calls for half the phone segments of 80, 40, 20, and 15 to be set aside for First (and Extra) Class. If enacted, no amateur would be denied the use of any mode of emission on any band he is now authorized. No one would be forced off the air nor forced off any band nor denied any mode. At the worst, he would have fewer kilocycles available, but still some on every band. No one would *have* to take any examination. No one would lose his license.

The proposal favors eggheads and experts. If anything, the proposal is anti-egghead. The Extra Class has been a fact of life, for 15 years, and some 5000 eggheads (if you will) in our ranks have already tackled it. But many amateurs feel the gap between General and Extra is too wide for the average ham — the one who wants to be an "expert" without becoming an egghead or a professional. Prior to 1953, some 40,000 holders of the old Class A ticket were "experts" in the sense they had a real dedication to the avocation of amateur radio, and were willing to expend a little effort to advance themselves — and in the process contribute to the growth in the amateur radio's technical stature. They demonstrated this interest by a separate trip back to the FCC office for the higher-level technical exam — more often than not, on the day after the one-year required time under their basic license. Many appeared for exam who had not the slightest interest in or intention of using the extra voice privileges; they were eager to accept the challenge to upgrade.

Over the past several years, legitimate appraisals of amateur sentiment have shown an almost even division of those for and those against an expanded incentive system. Under the FCC's proposal, the half of our number who seek a challenge of upgrading would be provided it, along with half the major voice bands; those who have no such interest would retain the other half, without any effort required. It would be difficult for Solomon himself to come up with a more equitable solution. QST

FCC sources are hinting that there will be news on incentive licensing "early in the new year." Whether it's this month or later, help frustrate the rumor mills: get your factual dope firsthand from W1AW bulletins and from QST, rather than from people you work on the air or meet at the club. W1AW bulletin schedules using Greenwich Mean Time and dates are on page 102 of this issue.

The Intruder Watch continues to operate, and most successfully. We're building up quite a file of intruders which will be good ammunition for the future, and we've been able, with the excellent help of FCC, to rid the bands of some non-amateur operations. The level of reporting has increased so much that we are now using a specially-designed manifold reporting form to speed our and FCC's processing of complaints. There are about a hundred amateurs each devoting at least a couple of hours a week to this project. We could always use a few more willing hams. If you're a U. S. amateur, write to ARRL Hq. If Canadian, write to Steve Chisholm, VE2ZM, 142 Sherbrooke St., Beaconsfield, Que. If you're in the U.K., the RSGB started the first Intruder Watch, and it's still going strong. If you're anywhere else in the world, better get busy and organize one!

Teaching a class of new amateurs? Our Communications Department has many items to make your chore easier. Tell us your class schedule, too; we may be able to steer some "customers" your way.

Among the most frequent minor infractions of FCC rules are the identifications of portable and mobile stations on phone. Section 97.87 is most clear in requiring "an announcement of the geographical location." Lest even this be misunderstood, FCC follows it with an example: "W1ABC W1ABC W1ABC this is (or 'from') W2DEF W2DEF W2DEF operating portable (or mobile) 3 miles north of Bethesda, Maryland, over."

Our VE2 brethren have things humming in preparation for the 1967 National Convention in Montreal next June/July. Because of crowds expected for Expo 67, be sure to get your reservations in early. Write Doug Shaw, VE2BSX, 7401 Mount Ave., Montreal, P. Q., for forms.

Applications for amateur license renewals may be filed any time from 90 to 30 days in advance of expiration. And say, if you must file an application for modification because you've changed station location, you may renew at the same time, even if your license has a year or more to run. "Happenings" has some additional information on page 148.

Among the ARRL field officials, few work harder than our volunteer district QSL Bureau personnel. Their most frequent complaint: unclaimed QSLs. Help them help you -- even if you rarely work DX, keep a self-addressed stamped envelope on hand with your district bureau (addresses on page 134).

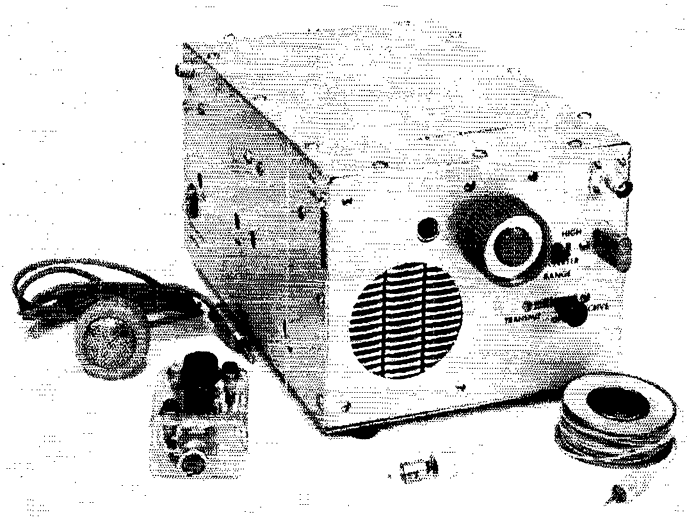


Fig. 1—The 50-Mc. portable station, complete with all necessary operating accessories—total weight: under 5 pounds. Accessories grouped around the transceiver are similar to those used with its 50-milliwatt predecessor: microphone, miniature antenna coupler, pilot-lamp dummy load and a 35-foot "long-wire" antenna.

50-Mc. Transistor Transceiver, Mark II

More Power and a Better Receiver; Still Under Five Pounds. Part I

BY EDWARD P. TILTON, W1HDQ*

To this long-time devotee of mountain-top v.h.f. work, transistors have been a real blessing; the first satisfactory solution to weight and power problems that have beset would-be builders of portable gear since the earliest v.h.f. days. The writer's first full-fledged venture into the transistor-portable field, a 50-milliwatt handful described in *QST* two years ago,[1] struck a responsive chord with many readers of *QST*, and later *The Radio Amateur's V.H.F. Manual*. Through three summers' use from scores of high spots all over the country, it has never ceased to amaze both its owner and the people he has worked with its "talk power" and overall efficiency.

But hams are seldom satisfied for long (fortunately!) and many letters received following the appearance of the "Featherweight" in *QST* asked for more transmitter power, a better receiver, and a version for 144-Mc. service. The first two items are taken care of herewith, and we're working on the third.

How Much Power?

Too many of today's hams are convinced that a kilowatt is necessary for worthwhile work, even on the v.h.f. bands. High power has its place, and we like it as well as the next fellow, but other factors take precedence at times, especially in gear that is to be packed up mountain trails. Just where to aim in the power scale is a question open to individual preference, in which the builder's age and stamina may be deciding factors. Voltage and power levels at which v.h.f. transistors operate efficiently are also important.

Weight and power considerations combined to set the specifications of our second all-transistor portable rig. We wanted economical operation from dry cells at something around 9 volts, with an arbitrary limit of peak power drain under three watts. This is about the maximum that is practical for "D" cells, in operation for extended periods, as in a weekend v.h.f. contest. It would be nice also, we felt, if the rig could be plugged into the car's cigarette lighter, for use in locations that could be reached on wheels.

Choice of usable transistors is narrowed down considerably by these factors. Those for the transmitter output stage had to be capable of standing voltage peaks encountered in 13-volt modulated service, which ruled out most inexpensive types. Conversely, some transistors rated as good performers in the v.h.f. range, at power levels up to 5 watts or more, are high-voltage types that will not work well in the 9-to-12-volt region.

How Good A Receiver?

It is no great trick to build a good 50-Mc. receiver, even with inexpensive transistors. The two-transistor tunable converter and pocket

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

[1] "Featherweight Portable Station for 50 Mc." Tilton, November, 1964, *QST*, p. 24. Also *The Radio Amateur's V.H.F. Manual*, First Edition, p. 149.

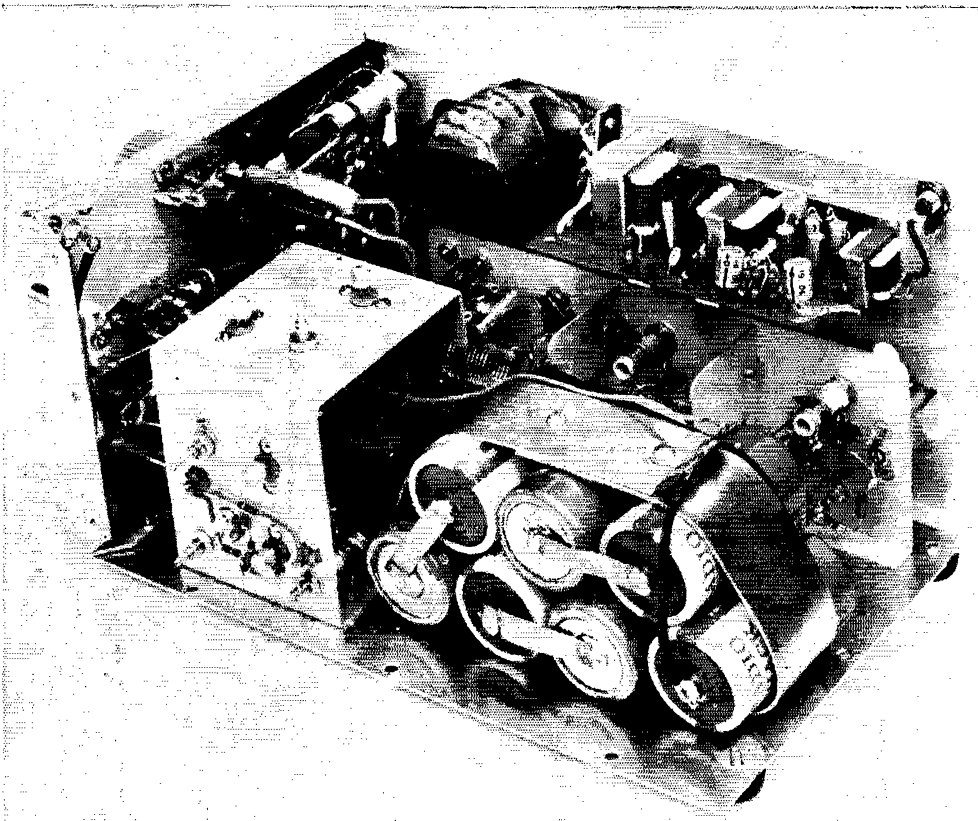


Fig. 2—Interior of the 50-Mc. transistor transceiver, with top plate, right side and rear panel removed. Parts of the switching circuits and the small broadcast receiver used for the i.f. system are seen on the front panel. The C-shaped subassembly at the left is one of several converters tested in the transceiver. The transmitter r.f. asssembly is seen in back of the package of 7 "D" cells. At the upper part of the left-side panel is the modulator.

broadcast receiver used in the 50-mw. "Featherweight" probably would have been more than good enough for this job. Still it is nice to be able to hear everything that anyone can hear, even if you don't stand much chance of working the weak ones with less that a watt of antenna power. Good reception makes mountain-topping more fun.

The pocket broadcast receiver is hard to beat as an i.f. and audio system, so we used the idea again, but with improvements in front-end design. Stability is assured through use of a crystal-controlled converter. Spurious-response problems were reduced with a converter arranged so that the crystal oscillator can be operated on either side of the signal frequency. Selectivity is much better than is possible with the only other simple receiving system, the superregenerative detector. Sensitivity far exceeds that necessary to assure hearing anyone you can work with a half-watt-output transmitter.

Packaging

Designing in subassemblies permits many physical arrangements, but nothing in the way of a ready-made box seemed to fit our needs. Admittedly the transceiver "just grew" as its design progressed, but the end result was a functional shape and reasonably attractive appearance, without difficult metal work. The box is 4¾ inches high, 6 inches wide and 9 inches deep. Total weight, with microphone, batteries, dummy load, and an effective antenna system for portable work, is about five pounds. Station and accessories carry handily in a zippered plastic "gym bag" 5 × 9 × 12 inches in size. Delivering half a watt, the transceiver has an even more favorable power-weight ratio than its 50-milliwatt 2-pound predecessor.

The complete station, ready for use once its long-wire antenna is unreeled and thrown over a tree branch, is shown in Fig. 1. The cover, right side and rear wall were removed for Fig. 2, so that all subassemblies could be seen at once. The interior may appear cluttered, but the separate assemblies are quite simple, and easy to build and adjust. All can be removed readily for service, modification or replacement. The converter shown in Fig. 2 has been replaced, in fact. Its 3-transistor successor will be described in Part II.

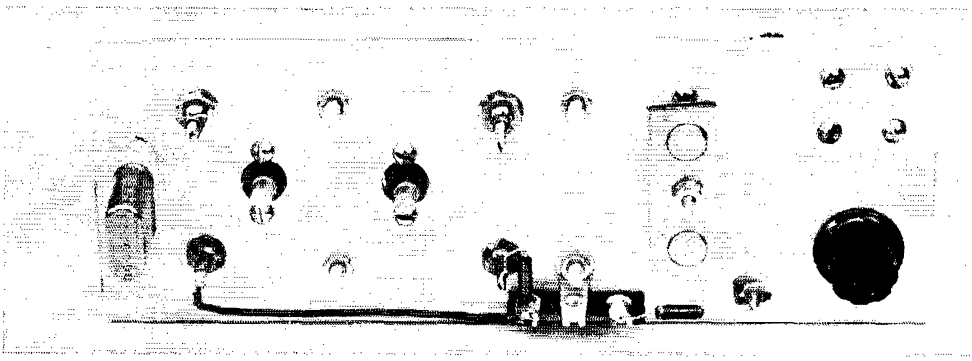


Fig. 3—Transmitter portions of the 50-Mc. transistor rig. At the left side are the crystal oscillator and buffer stages. The two transistors in the output stage are connected in parallel by means of two brass plates, which also serve as a heat sink. The amplifier collector circuit is tuned by means of the knob at the lower right, the surface of which is slotted to permit adjustment with a screwdriver, through a hole in the left side of the transceiver case. The crystal and the two tuning slugs are also provided with access holes.

The speaker grill of the transistor broadcast receiver shows through a 2¼-inch hole in the front panel, in Fig. 1. Just above it is a small hole for viewing the receiver tuning dial, and to the right is the knob that drives the dial through a simple device to be described later. At the lower right of the panel is the send-receive switch. A slide switch just above it selects the desired converter crystal. The antenna jack is in the upper right corner. Physical arrangement can be varied to suit the builder's taste, or to accommodate different types of broadcast receivers.

The left side of the box has a rectangular notch in its upper right corner, for access to the receiver gain control. Core studs for the transmitter oscillator and buffer circuits, L_1 and L_3 in Fig. 4, are reached through small holes, as is the slotted knob on the final stage tuning capacitor, C_1. The microphone jack and the hole for the transmitter crystal are also visible in Fig. 1.

The right side wall, removed in Fig. 2, has access holes for the converter tuning-slug screws. The converter is built on a C-shaped aluminum plate similar to that seen in the left foreground. The pyramid of 7 "D" cells, right, obscures some of the transmitter r.f. assembly. At the top of the picture is the modulator, a ready-made audio amplifier with input and output transformers added for adaptation to modulator service. On the rear wall, also removed for the photograph, are three phono jacks which provide for metering in the negative lead and for selection of internal or external power. More on these features and the converter in Part II.

Transmitter R.F. Unit

The transmitter is shown in Figs. 3 and 5, with its circuit diagram in Fig. 4. Parts are mounted on an aluminum plate made from a sheet 3 by 7 inches, with ⅜ inch folded up at the bottom. This fastens to the transceiver bottom plate with self-tapping screws. The oscillator and buffer stages use 2N706 transistors. These are at the left side of Fig. 3 and the right of Fig. 5. Aluminum shields 2 by 2½ inches are mounted on spade lugs at 2 and 4 inches in from the left side, as seen in Fig. 3. Leads from L_2 and L_4 run through these shields and are insulated from them by sleeves of polyethylene made by removing the conductors from small pieces of RG-58 or 59 coax.

The output stage has two silicon v.h.f. power transistors in parallel. Several types are usable, but the least expensive we've found are the Archer (Radio Shack) 27R131 shown here. RCA's 2N3553 and 2N3866 also work well, and can be run at higher input if desired. 2N706s also work well in the final, but will not stand amplitude modulation voltage peaks encountered with 12 volts on the collectors. Nearly all silicon v.h.f. transistors work well in the oscillator and buffer, but the 2N706 has a higher dissipation rating than most. They also can be obtained for as low as three for a dollar from surplus sources.

The safe dissipation rating for transistors can be raised by even the simplest of heat sinks. A strip of thin brass or flashing copper 3/16 inch wide can be bent into keyhole shape and slipped over the 2N706 case for this purpose. The brass plates holding the final stage transistors together (Fig. 3) serve the dual purpose of heat sink and parallel collector connectors. Dimensions are not critical, but ours are 0.041 by ⅝-inch brass, about 1¾ inches long. Aluminum would be equally good. Be sure that these do not touch the mounting plate or the socket-mounting screws at any point, as the collector is connected to the case in power transistors, and thus has the supply voltage on it. Center-to-center spacing of the holes should be the same as that of the transistor sockets, one inch in this case.

Various output circuits were tried, with the series-tuned center-tapped arrangement shown in Fig. 4 working out best for this setup. Output is taken off through a series-tuned loop, L_6, wound around the midpoint of L_5 The series capacitor C_2 is a high-minimum mica trimmer, visible directly over the tank coil in Fig. 5. It can be adjusted for optimum transfer to a 50-

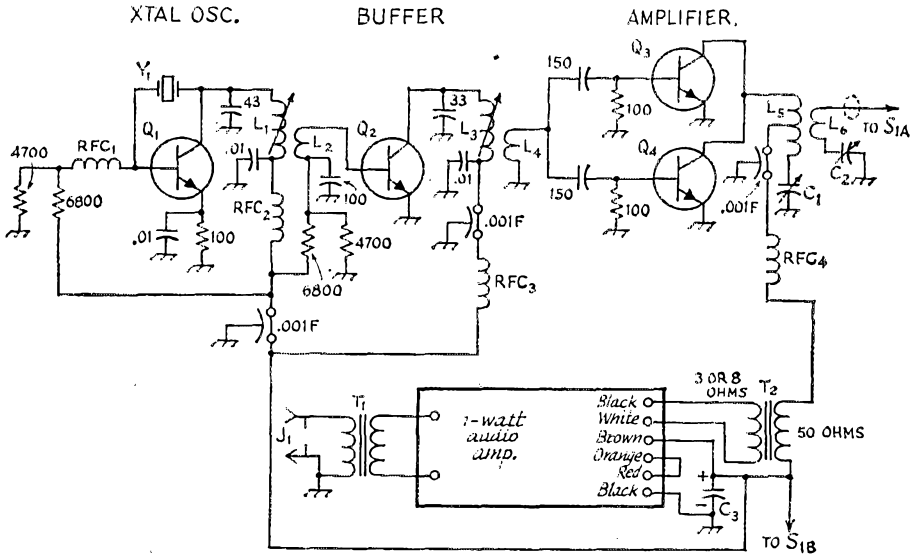


Fig. 4—Schematic diagram and parts information for the transmitter portion of the 50-Mc. transceiver. Resistors are all ¼ watt. Decimal values of capacitance are in μf.; others in pf. Suffix F indicates feed-through type. All others not described are Mylar or dipped-mica, 50-volt rating or more. The modulator is shown in outline form only, since it is a ready-made unit. Lead colors given are for Radio Shack audio amplifier, type 277-038, having a 1-watt rating.

C_1—35-pf. subminiature variable (Millen 25035E).
C_2—180-pf. mica trimmer (Arco 463)
C_3—5-μf. 25-volt electrolytic.
J_1—Phono jack.
L_1, L_3—5 turns No. 24 enamel, closewound on ¼-inch iron-slug form. (Miller No. 4501, with 3 turns removed or wind on No. 4500 form.)
L_2, L_4—2 turns insulated wire wound near bottom end of L_1 and L_3, respectively.
L_5—10 turns No. 20, 16 t.p.i., ½-inch diam., center-tapped (B & W No. 3003 Air-Dux 416T, PIC 1730).
L_6—2 turns insulated wire around center of L_5.
Q_1, Q_2—2N706 or equiv. See text.
Q_3, Q_4—Silicon v.h.f. power transistor, 1-watt or higher dissipation. See text.
RFC_1-RFC_4, incl.—8.2-μh. iron-core r.f. choke (Millen J300-8.2).
T_1—Input transformer, high-impedance microphone to amplifier input, 200k to 1000 ohms (Archer 27-1376).
T_2—Output transformer; 45 to 50-ohm primary, 3.5 or 8-ohm secondary. Connect low-impedance winding to amplifier output, and run final-stage collector current through 50-ohm winding (Knight 54D4147).
Y_1—Third-overtone crystal, 50.11 to 54 Mc. (International Crystal Mfg. Co. Type FA-5 or FA-9).

ohm load and left set thereafter, since adjustment is not critical.

Modulation

The audio amplifier used for the modulator (Radio Shack 277-038, 1-watt rating) has an output transformer with a low-impedance secondary. This must be replaced with one suitable for modulation purposes, or a step-up transformer can be added. We chose the latter, as it was easier to find than one designed specifically for modulator service. An input transformer to match the high-impedance microphone must also be added. The extra transformers, T_1 and T_2 in Fig. 4, are visible in Fig. 2, mounted at opposite ends of the amplifier. The modulation transformer is connected "back to back" with

The amplifier has p.n.p. transistors, so it is the final stage of the transmitter running through its 50-ohm winding.

The amplifier has p.n.p. transistors, so it is set up for positive ground, as is the broadcast receiver. In using the transceiver in negative-ground cars (U.S. standard) the "ground" side of the amplifier and receiver must be isolated from the transceiver case. The amplifier is mounted on an aluminum bracket, making sure that the mounting screws do not come in contact with the positive-voltage circuits of the module. Parts of the amplifier circuit that connect to the positive lead (brown lead in the unit used here) are bypassed to the transceiver case with an electrolytic capacitor, C_3 in Fig. 4.

The amplifier unit is intended for 12-volt service, but it works well at lower voltages. Its output tracks with the input to the final stage of the transmitter as the supply voltage is changed, so the modulation percentage remains about the same regardless of the power source used.

Amplitude modulation can be a tricky business with transistors, and quality and modulation percentage depend on many factors. With our operating conditions the best modulation was obtained with audio applied only to the collectors of the amplifier stage. Adequate modulation and best quality are obtained when the final collector circuit is detuned slightly on the high-

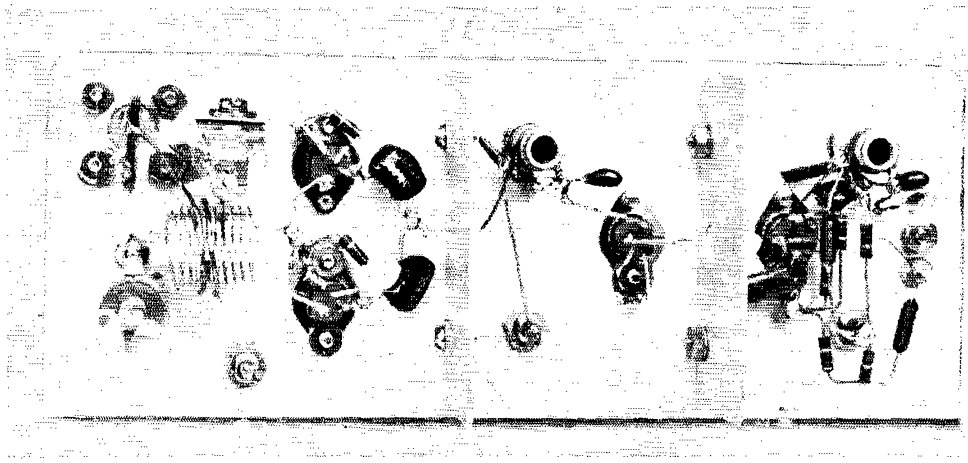


Fig. 5—Back view of the transmitter, with output stage at the left. Partitions isolate the three stages; crystal oscillator at the right, buffer at the middle.

frequency (low capacitance) side of resonance. When tuned for maximum output the stage shows little upward modulation, and when C_1 is detuned to the high-capacitance side the quality is poor and the modulation distinctly downward. The amount of detuning needed depends on the collector voltage, increasing with voltage level.

Output capability is about one watt at 9 volts and two watts at 13 volts, but the stage must be detuned to one-half and one watt, respectively, for good modulation. About 300 milliwatts output is possible, with good modulation, at 6 volts, so the transceiver has potential as a "Volkswagen Mobile." It would be desirable to juggle biasing in the receiver, if a 6-volt supply is used, to obtain optimum performance at that level.

Transmitter Adjustment

Tuneup is very simple. Checking individual stages for current drain is desirable, and checks can be made at lower than rated voltages initially. Operation at 6 volts is similar to that at higher voltages, and it may be safer in the check-out phase. Apply voltage through the oscillator feedthrough capacitor only, at first, and check the current drain. As the slug in L_1 is moved there will be a downward dip in collector current as the crystal begins oscillating, to around 10 ma. at 6 volts. At 9 volts the oscillator current is 15 to 20 ma. Output is enough to light a 2-volt 60-ma. pilot lamp dimly, if a loop of wire is soldered to its terminals and slipped over L_1. Set the slug in L_1 for the highest output at which the oscillator starts readily each time voltage is applied.

Now apply voltage to the buffer through RFC_3, and check current drawn by Q_2. It will rise as the oscillator is tuned toward maximum output, and the pilot lamp load should glow fairly brightly when coupled to L_3. Adjust the stud in L_3 for maximum output. Current drain will be 20 to 30 ma. with the stage working correctly.

Check the amplifier similarly, applying voltage through RFC_4. The current to this stage will be practically nil until drive is applied, after which it is proportional to the drive level. A 6-volt 150-ma. pilot lamp (brown bead, No. 40, 40A or 47) makes a good dummy load when the rig is intended to work into 50 ohms. Other lamps will light up, but they do not approximate 50 ohms at normal brilliance. Solder short wires to the base and plug these into the BNC fitting, or temporarily solder the lamp across the coax lead connected to L_6.

Tune C_1 and C_2 for maximum lamp brilliance, at first. Recheck the settings of L_1 and L_3 also. The lamp will light very brightly at 9 to 10 volts, indicating about one watt output. Peak C_2 for maximum output, and leave it that way. When modulation is to be applied, detune C_1 on the low-capacitance side while talking into the microphone, detuning only enough to get a good upward modulation indication in the lamp. Note the final collector current under these conditions. At full output it will be 150 to 200 ma., at 9 volts, with detuning to 125 to 150 ma. for best modulation. At 12 volts the best setting will be around 150 to 175 ma.

If you have several 2N706s, try various ones in the oscillator and buffer stages, selecting the ones that drive the final collector current to the highest value at the maximum-output tuning condition.

When the detuning procedure outlined is followed the resulting modulation characteristics are at least as good as those of any small pentode or tetrode tube transmitter for the v.h.f. bands. Voice quality is good and "talk power" is high, as there is some inherent clipping effect that tends to prevent excessive modulation and splatter. People you talk to will comment frequently on the high average readability, even at very low signal levels.

Part II, covering the receiver, packaging and operating details, will appear in an early issue. QST

HF Propagation Effects at High Latitudes

Or — Look North, Young Ham!

BY ROBERT D. HUNSUCKER,* WAØLCO, ex-KL7CYS

As any DXer knows, queer things can happen to signals that travel through the polar regions. From the considerable amount of propagation research going on in the auroral zone some facts and explanations are beginning to emerge. Here is an up-to-date resume.

THIS article presents some facts concerning the effects of the auroral and polar-cap ionosphere on propagation in the "bread-and-butter" bands — that is, 80 through 10 meters. Results of some fairly recent research will be presented along with some practical ham experience gleaned while the author pursued DX over the pole from Fairbanks, Alaska, during 1958 to 1964.

Historically, one of the first documented reports on auroral effects on h.f. propagation is to be found in *QST* (December 1929[1]). Paul Oscanyan reported the effects of various types of aurora on signals in the 15–30,000 kc. region received at Mt. Evans, Greenland.

Auroral effects on v.h.f.-u.h.f. propagation have been well outlined for the ham fraternity in previous articles in *QST*[2,3], but information on the behavior of h.f. propagation (3-30 Mc.) at high latitudes is not too readily available.

In this study, the auroral zone will be defined nominally as covering the geomagnetic latitude range 60–70 degrees North. Similarly, the polar zone will be defined statistically as covering the geomagnetic latitude range from 90 to 70 degrees North, although during great solar disturbances the southern limit may be considerably farther south. A word on geomagnetic latitude might be in order at this point. *Geographic* north latitude is measured from the equator to the north pole (0 to 90 degrees), while *geomagnetic* latitude is based on the location of the magnetic poles of the earth; that is, 0 degrees at the magnetic equator and 90 degrees at the north magnetic pole, which is located northwest of Thule, Greenland.

Fig. 1 illustrates the location of the northern "auroral zone" on a world map. The solid concentric lines labeled with numbers (100, 80, 60, etc.) are known as "auroral isochasms" and are simply a measure of the average occurrence of the aurora borealis based on many years' observation from a large number of stations. The numbers indicate the percentage of clear nights when aurora might be observed on that line (isochasm). Also shown in Fig. 1 are several typical DX great-circle paths which pass through the auroral zone. Many DX great-circle paths traverse the auroral zone or the polar zone and are thus influenced by the particular phenomena which we will discuss.

Auroral Zone Effects

Before taking up specific effects of auroral-zone phenomena on h.f. propagation, some remarks on the visual aurora might be in order. *Aurora polaris* is the general name used in scientific literature to describe this luminous atmospheric phenomenon. In the southern hemisphere it is called the *aurora australis*, while the corresponding phenomenon in the northern hemisphere is called the *aurora borealis* ("northern dawn") — more commonly referred to as the *northern lights*.

During the 20th century scientists have for the first time been able to describe the gross

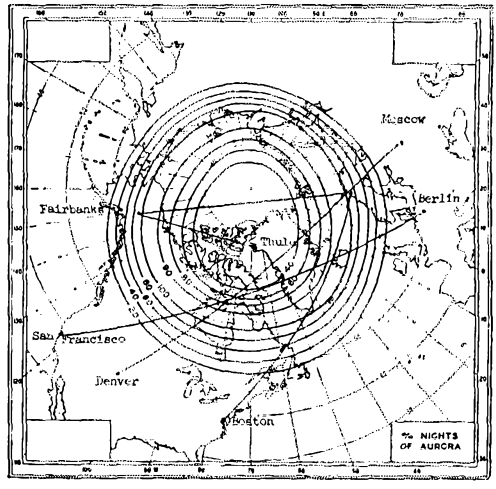


Fig. 1 — Polar projection map showing auroral isochasms and typical DX paths passing through the polar and auroral regions.

* Institute for Telecommunication Sciences and Aeronomy (Formerly the Central Radio Propagation Laboratory of the National Bureau of Standards), Environmental Science Services Administration, Boulder, Colorado 80302

[1] For this and subsequent references see list at end of article.

Fig. 2—Aurora Borealis photographed near Fairbanks, Alaska.

features of this complicated phenomenon. The basic principle involved in the production of the visual aurora is similar to that of the neon sign. An electric current passing through a gas-filled tube causes the gases to glow. The color of the discharge is determined by the type of gas, the gas pressure, and the strength of the electric current. Similarly, streams of charged particles from the sun are deflected toward the polar regions by the earth's magnetic field. By a mechanism not fully understood, these particles are accelerated and bombard the gases of the upper atmosphere, exciting the gas molecules which then radiate the characteristic auroral light spectrum. Just as neon gas in a sign glows with a red color, the rarefied oxygen in the upper atmosphere is luminescent with a yellow-green color.

Sometimes the stream of charged particles from the sun increases abruptly due to disturbances on the solar surface called "flares." These events are usually accompanied by brilliant auroral displays in the polar regions, such as the unusual red aurora of February 10, 1958, which was seen as far south as Mexico City. Some typical photographs of the aurora taken by the author in the vicinity of Fairbanks, Alaska, are shown in Figs. 2 and 3.

The average geographical distribution of the aurora borealis is shown by the "auroral isochasms" in Fig. 1. One of the most striking features of the geographical distribution is that it is dependent on the *geomagnetic* latitude. Thus in North America, a QTH in Saskatchewan or Manitoba at about 50 degrees N. *geographic* latitude would observe the aurora on an average of 20 per cent of the clear nights, whereas in Scandinavia one would have to go to a QTH near 65 degrees N. *geographic* latitude to observe aurora 20 percent of the time.

In addition to the variation of aurora with geographical location, there are also daily, seasonal, and sunspot-cycle variations. Careful analysis of many years of auroral observations indicates that the peak periods occur close to the equinoxes — that is, during the months of March-April and September-October — with minimum activity during the months of June-July and a smaller minimum in December. The *daily* period of maximum occurrence of aurora varies considerably with the location of the observer and the auroral form. In general, the brightest forms tend to occur during the period from 2300-0100 local time.

During the maximum of the 11-year sunspot cycle there seems to be a greater number of brilliant auroral displays; these auroral displays are more often observed south of the statistical auroral zone than during the minimum of the sunspot cycle. The peak of the current sunspot cycle (cycle 20) is expected some time in 1968, and there are some indications that it may be as large as or larger than the record breaking cycle 19[4] — so start thinking about those new quads and other exotic antennas for 15, 10, and 6 meters!

Non-Great-Circle Propagation

One of the most interesting and potentially important h.f. auroral-zone propagation effects is the non-great-circle (n.g.c.) phenomenon. Normally, an h.f. signal follows a great circle path from the transmitter to the receiver, but for signals traversing the auroral zone this is not always the case. In fact, the information presently available indicates that the n.g.c. mode is a relatively common occurrence at high latitudes during the winter afternoon and night. In a recent study[5], multi-frequency h.f. transmissions from California, Greenland, Norway, Okinawa, and Johnston Island were monitored at a site near Fairbanks, Alaska, and many n.g.c. modes were observed. It should be emphasized that these were not small angular deviations from the great-circle path, but in some cases approached 90 degrees off-path! The conclusions reported were that ionospheric sidescatter produced the n.g.c. modes and that this sidescatter took place close to the auroral belt. Occasionally, the maximum observed frequency on a high-latitude circuit is carried by the off-path mode;

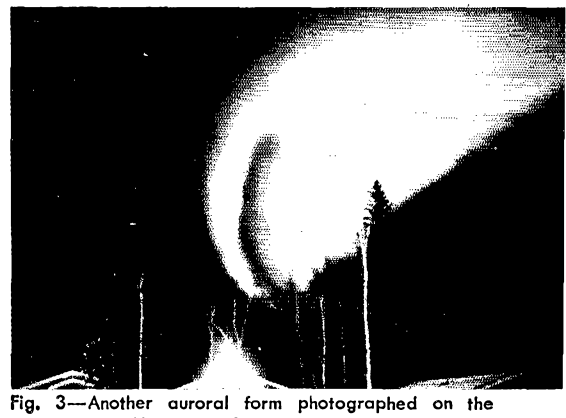


Fig. 3—Another auroral form photographed on the University of Alaska campus.

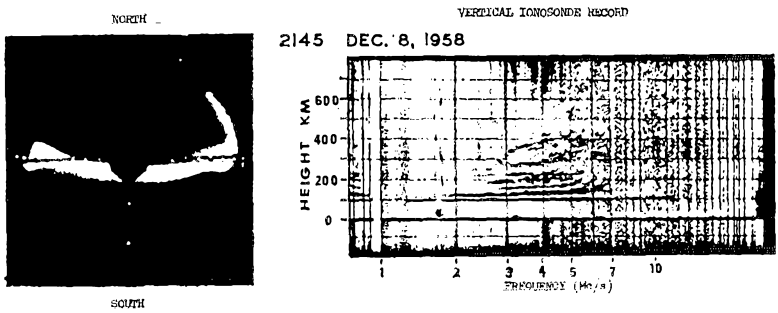


Fig. 4—Simultaneous all-sky-camera photograph of aurora, and vertical ionosonde record of sporadic *E*.

this suggests that during severe polar or auroral zone disturbances, it would be possible to maintain communications over long transpolar paths by utilizing the off-path signals.

Sporadic-E

At high latitudes, sporadic-*E* (E_s) ionization plays an important part in supporting h.f. propagation. In particular, for *winter-night sunspot minimum* conditions, a study[6] has shown that E_s occurs over 50 percent of the time; maximum observed frequencies as high as 46 Mc. with typical values of 18 Mc. were recorded on the path from Thule, Greenland, to College, Alaska. On a path from Norway to Alaska, frequencies as high as 32 Mc. with typical values of 16 Mc. were observed. Fig. 4 shows how the E_s *critical* frequency increases dramatically as an auroral form nears the radio reflection point[7]. The display on the left is an all-sky camera photograph which shows the region from directly overhead almost down to the horizon. The top of the photo is toward the north and the bottom toward the south. The frame on the right side of Fig. 4 is a "vertical ionosonde" photograph, which is a presentation of critical frequency on the horizontal scale and virtual height on the vertical scale. (The ionosonde is essentially a vertically directed sweep-frequency h.f. radar which is used to study the ionosphere).

Mainly, Fig. 4 shows that when the bright auroral forms are in the field of view of the vertical ionosonde the critical frequency increases dramatically. In this example, the critical frequency is approximately 11 Mc., which means that the oblique frequency (the one we're interested in!) *could* be as high as 55 Mc. — a 6-meter opening. This is representative of sunspot maximum conditions and guarantees only a one-hop mode.

Irregularities

The auroral-zone ionosphere is not, in general, smooth and well behaved, as is *usually* the case for the middle-latitude ionosphere. Irregularities of all sizes and shapes are quite often present at high latitudes and these irregularities can quite often degrade h.f. communications. Severe "garbling" of a.m. transmissions is a common occurrence in aurorally affected signals, because of destructive interference between the two sidebands. A considerable improvement is realized for the s.s.b. and c.w. modes of operation, but even they are sometimes unintelligible during severe auroral disturbances. A recent investigation[8] utilizing simultaneous soundings from the topside sounder satellite, Explorer XX, and ground-based h.f. radar has shown that these irregularities are sometimes very large, extending from the *E* region clear up to the height of the satellite near 1000 km. (about 600 miles). They seem to be in the form of relatively-thin "sheets" elongated in the geomagnetic east-west direction and thin in the geomagnetic north-sound direction. What effect these large sheets might have on high-latitude communication is not presently known.

Absorption

Another enhanced effect in the auroral zone is absorption of the h.f. signal in the *D* region of the ionosphere. Ionospheric absorption is, in general, inversely proportional to the square of the frequency, that is

$$A\,(\text{db.}) \propto \frac{1}{f^2}.$$

Aurorally-associated D-region absorption is characterized by its rapidly-varying intensity in time and space. For example, given two auroral-zone propagation paths, one path may show severe absorption effects and another path 200 miles away may show little or none. An average auroral-zone absorption event has a characteristic duration of about 10 minutes on a given path, so communications may be re-established after a relatively short interruption. It has been found that auroral absorption occurs rather systematically 1 to 2 degrees south of the visual auroral zone[9]. A typical example of 14-Mc. auroral absorption effects from the KL7CYS log is shown in Fig. 5. The upper plot shows the time when various DX stations were worked with the beam pointing north from the KL7CYS QTH at College, Alaska. The two plots below are auroral-zone data recorded near College by the Geophysical Institute of the University of Alaska. Specifically, the middle graph shows the time variation of auroral absorption measured at 30 Mc., and the bottom graph shows earth

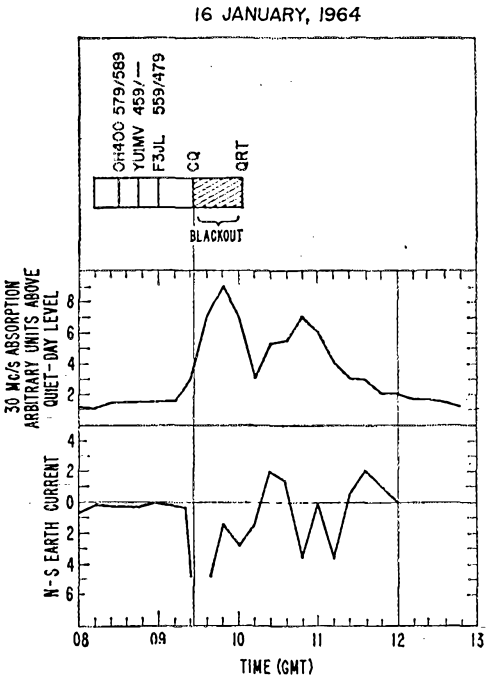


Fig. 5—Auroral effects on 20-meter c.w. DX contacts on transpolar paths.

current which is a measure of auroral activity in the ionospheric *E* region. As may be seen, good DX contacts were being made until about 0930 GMT when a complete blackout occurred coincident with the time when maximum auroral absorption and activity occurred at College. After going QRT at about 1000 GMT and stepping outside into the −30-degree temperature a strong visual aurora was observed in the north.

F_1-Layer Effects

At times, the F_1 layer instead of the F_2 layer controls the maximum usable frequency (m.u.f.) on an auroral path[10]. The effects of the F_1 layer at latitudes greater than 40 degrees have been incorporated in a high-latitude h.f. propagation prediction system recently reported by Canadian workers[10]. The serious DXer might do well to consult these references to take advantage of possible F_1-layer propagation at high latitudes.

Polar-Cap Effects

One of the most spectacular effects on high latitude h.f. propagation is the polar cap absorption (p.c.a.) event. During a p.c.a., relatively-high-energy protons from solar flare disturbances on the sun bombard the ionospheric *D* region, resulting in greatly enhanced absorption over most of the polar cap. This high absorption can black out h.f. transmissions for days in the polar regions, as shown in Fig. 6. The horizontal lines at the top of Fig. 6 indicate blackout conditions on 12- and 18 Mc. transmissions from Sweden to Alaska, and the lower plot is a measure of *D*-region absorption measured vertically near the path mid-point at Thule, Greenland. The absorption exceeded 13 db. at 30 Mc. over the normal quiet-day absorption, and blackout conditions lasted for almost two weeks on 12 Mc. for this unusually strong p.c.a. event. Applying the inverse-frequency relation and adding the effects of going obliquely through the *D* region twice, the absorption at 12 Mc. probably exceeded 100 db. From IGY and other data, there is considerable evidence that these strong p.c.a.s can extend from the geomagnetic pole as far south as 57 degrees geomagnetic latitude (Minneapolis) and that their maximum occurrence is near the peak of the sunspot cycle[12].

Conclusions

It is evident that h.f. transmissions traversing the auroral and polar zones experience a wide range of effects, some improving and some degrading the received signal. Auroral zone and polar-cap absorption, along with multipath components produced by scatter from irregularities, will in general degrade the signal-to-noise ratio, while sporadic-*E* ionization and low atmospheric noise levels at high latitudes will tend to improve the *S/N* ratio. Non-great-circle (n.g.c.) modes could produce garbling and echo if many modes were simultaneously received on a wide-beam-width antenna. The effects of "auroral flutter" and garbling can be reduced by using the s.s.b. and c.w. modes instead of a.m.

Some specific effects on the h.f. bands at high latitudes can be summarized as follows:

80 meters — Severely affected by auroral- and polar-zone absorption. N.g.c. modes are possible.

40 meters — Strongly affected by auroral and polar zone absorption. N.g.c. modes quite possible.

20 meters — Moderately affected by absorption. F_1 layer will sometimes control m.u.f. n.g.c. modes possible.

15 meters — Moderate absorption effects. Sporadic-*E* openings to the north. Some possibility of n.g.c. modes.

10 meters — Slight absorption effects. Sporadic-*E* openings to the north.

(*Continued on page 132*)

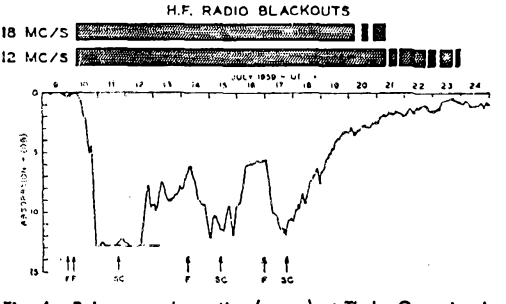
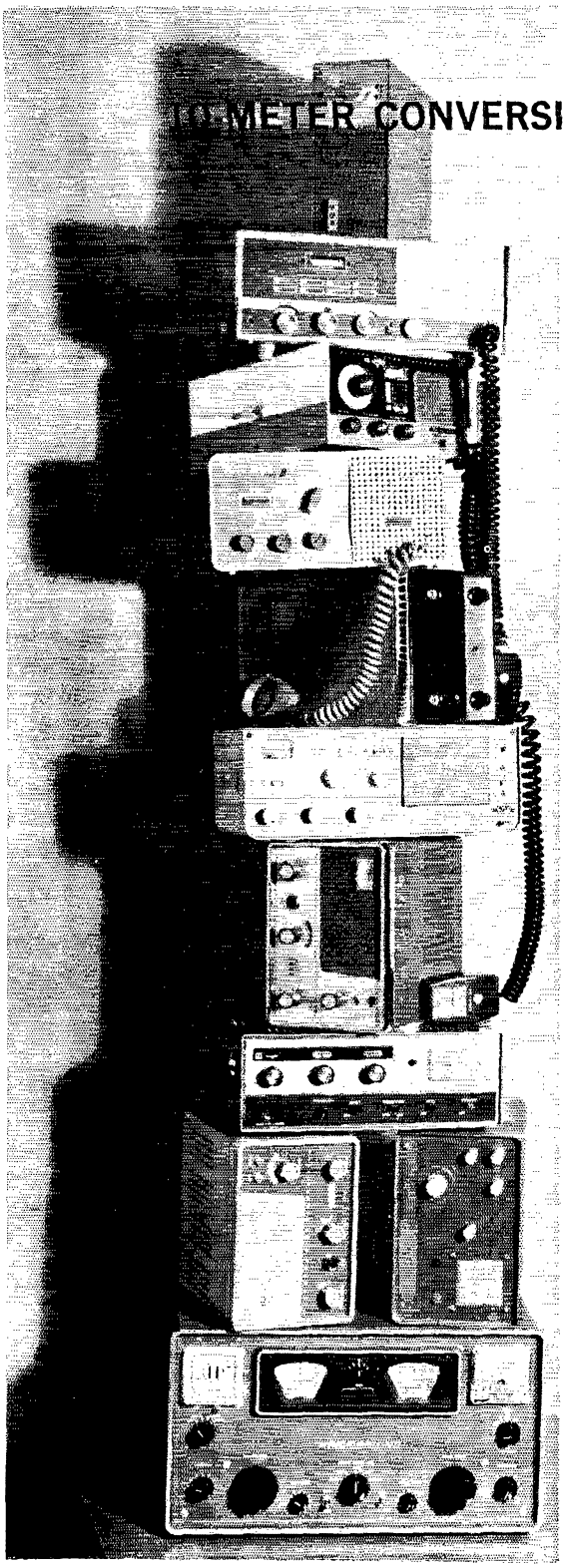


Fig. 6—Polar cap absorption (p.c.a.) at Thule, Greenland following the cosmic ray flares of July 10, 14, and 16, and blackout conditions on h.f. transpolar circuits between Alaska and Sweden.

10-METER CONVERSION OF CB TRANSCEIVERS



BY WALTER F. LANGE,* W1YDS

MANY of the fellows laughed. Some thought it was foolish and others said it was a waste of time and money. But when the call went out for volunteers to make on-the-air tests of twelve secondhand CB transceivers that had been converted to 10 meters, the demand for equipment exceeded the supply.

I suppose this is to be expected. Most of the converted transceivers are small and compact and can be set up with hardly any fuss or bother. There aren't any adjustments to make after the rigs are initially tuned. The transceivers are handy in an emergency as most of the units can be used with either batteries or a.c. Since external power supplies generally aren't needed and the power demands are low, the transceivers are ideal for mobile installations. Nearly all of the units have squelch, making spot frequency monitoring and net operation less fatiguing. Whatever the reason or reasons, the transceivers are still in service and the boys are having a good time.

Choosing a Transceiver

The 10-meter conversion of a traded-in bargain CB transceiver can take 15 minutes or several hours. A 29-Mc. crystal might be the only additional part needed, or several dollars worth of components may be required. The circuit configurations and physical layout employed by the manufacturer will determine the feasibility and economics of the conversion.

Two types of CB transceivers are available: walkie-talkies and table-top units. No attempt was made to convert the hand-held units, since most walkie-talkies, if not all, are fixed tuned; it was felt that nearly every ham who could make a choice would prefer a tunable receiver to a single- or multiple-channel type. A walkie-talkie receiver can be modified for tunable service, but the limited space available for a tuning capacitor and a dial makes the job somewhat difficult, if not impracticable.

If you have a choice of CB transceivers to convert, it's a good idea to pick the unit which has the best receiver. There is not much advantage in selecting a transceiver which has an r.f. output of 3 watts rather than one with an output of 1.5 watts, if the former has a serious image problem and the latter has none. And anyhow, the 3 db. difference between the two transmitters, when heard on a distant receiver, will hardly be noticed. The most potent transmitter that was converted had an output of almost

* Technical Staff, *QST*.

three times that of the weakest transceiver. Even though this is a more sizeable difference than the first case mentioned, it still would be unwise to pick the transceiver with the highest output, if its receiver was cluttered with spurious signals and the other receivers were not.

There are numerous factors to consider in selecting a suitable receiver. They include conversion feasibility, frequency coverage, tuning rate, sensitivity, selectivity and image rejection. Whether or not the receiver has a noise limiter or blanker, a spot switch and an S meter may also be important.

If the receiver is tunable, the conversion at best will involve realignment only; at worst, the conversion will also include the removal of components and their replacement with parts having smaller values. A 10-pf. capacitor might have to be replaced with a 5-pf. unit or a turn or two might have to be removed from a coil.

Most of the transceivers having tunable receivers have fixed-channel facilities also. However, this feature can be ignored since normally there will be no call to use it.

If the receiver to be converted is fixed tuned only, space will have to be found for a dial and a tuning capacitor. In many cases, space can be made available by removing the channel-selector switch. Of course, with such a modification, the receiver and possibly the transmitter will lose any crystal selection facilities it might have had. In addition, the fixed-tuned oscillator will probably require several part changes to convert it to a variable oscillator. Whether such a conversion should be attempted is chiefly a matter of space availability and cost.

Most CB transceivers cover the 290 kc. of the 23-channel Citizens Band, plus a few kilocycles on either side. Upon conversion to 10 meters by realignment only, these same transceivers tune on the average a range of about 350 kc. Several of the CB receivers as supplied have direct drive. This makes tuning touchy and tiring, even though a limited range of only 350 kc. is covered. In many cases, enough room will be present to add a vernier drive mechanism. If this can be done, it's well worth the extra effort and expense.

There was a wide variation in sensitivity among the twelve transceivers that were converted. In on-the-air tests, readable signals were copied on the best units that weren't even discernible on the poorest. As a group, the transistorized receivers performed best in the sensitivity derby.

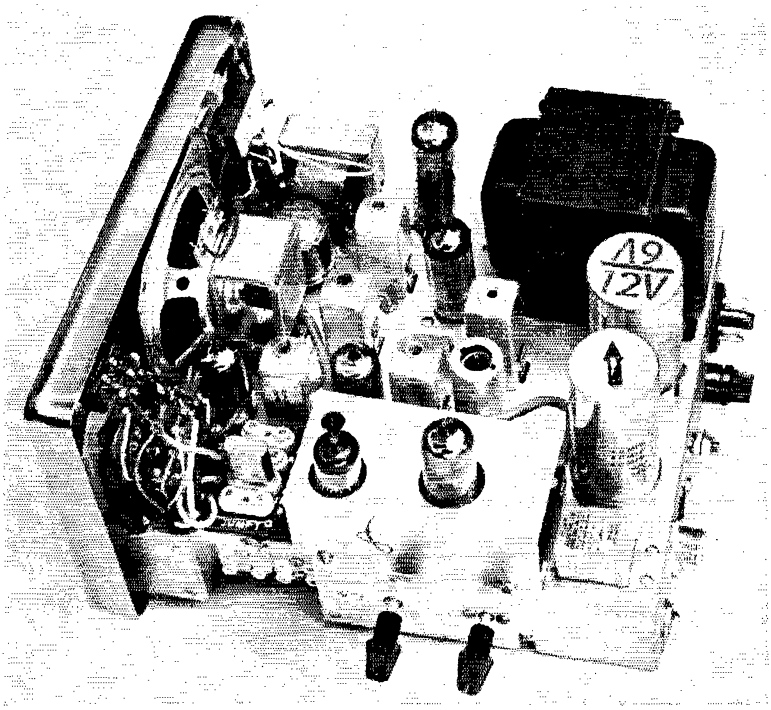
Need a second rig for emergency communications, mobile operation, or for making local contacts without running up the light bill? Why not convert a secondhand CB transceiver? In many cases, only realignment and a new transmitting crystal will be needed; in others, a few inexpensive components may also be required. Give it a try, and have some fun on 10 meters.

The selectivity of a receiver is determined by many factors: the intermediate frequency or frequencies, the number of i.f. stages, the number of conversions, the presence of a crystal or mechanical filter, and so forth. Because it would take many pages to adequately discuss this subject, the reader is referred to the *Handbook*. All of the converted transceivers had sufficient selectivity for useful 10-meter operation.

No matter how well the transceiver performs in other aspects, if the receiver has poor image rejection and is susceptible to spurious signals, the unit may be unusable on the air. The image problem is particularly apparent with a single-conversion superhet having an i.f. of 455 kc. The occurrence of images in such a unit can be minimized by putting the variable oscillator on that side of the signal where the image range is less likely to be occupied by signals. For instance, suppose you want to receive a 29.5-Mc. signal. The oscillator can be set at either 29.955 or 29.045 Mc. However, in this instance, the higher oscillator frequency is preferred, since its image, 30.410 Mc., is outside the 10-meter band, whereas the 28.590-Mc. image of the lower oscillator frequency is right in the most active part of the amateur phone band. This same line of reasoning calls for the oscillator to be on the low side of the signal if the frequency to be received is 28.5 Mc.

The other difficulty, susceptibility to spurious signals, can be built into the receiver by an unwise conversion. Such a conversion occurred when a fixed-tuned receiver with a 37-Mc. crystal oscillator was converted to a tunable receiver with an 18.6- to 19.0-Mc. variable oscillator. Since the receiver's 10.7-Mc. i.f. ruled out any image difficulties, it was felt that a tunable oscillator on the low-frequency side of the signal would be better than one on the high side, as it would be inherently more stable. Upon completion of the conversion, an antenna was attached to the transceiver and as expected, amateur signals were tuned in. But unexpectedly, droves of CB stations were heard right along with the ham signals.

What had happened? When the receiver was tuned to 29.6 Mc., the 29.6-Mc. signal beat against the 18.9-Mc. tunable-oscillator signal, producing a 10.7-Mc. difference frequency. However, at the same time, the oscillator's second harmonic, 37.8 Mc., beat against a 27.1-Mc. CB signal, producing the same 10.7 Mc. The end result was a receiver that simultaneously covered the 10-meter band and the Citizens Band, a most unsatisfactory arrangement. A second-harmonic trap was installed between the tunable oscillator and the mixer, but it proved to be of little value: the trap was good at only one frequency and even there it didn't provide enough suppression. Rebuilding the oscillator for the 39-Mc. range eliminated all problems with spurious signals; I'm sure the manufacturer knew



A typical CB transceiver using an all vacuum-tube lineup. The two-stage transmitter is in the foreground; the receiver, modulator and power supply occupy the remaining space. This unit can be operated from 115 volts a.c., 12 volts d.c. or 6 volts d.c.; only a few minor changes are necessary to go from one power source to another. A new transmitting crystal and realignment were all that was required to convert the transceiver to 10 meters.

what he was doing, when he placed the original crystal oscillator on the high side of the tuning range!

All twelve of the CB transceivers that were converted had some type of noise limiter or blanker. However, some circuits were considerably more effective than others in suppressing certain types of noise. The only sure way to determine the effectiveness of a limiter is to try it on the air.

A spotting switch was included in seven of the twelve transceivers. This feature made it a snap to locate the transmitter frequency on the receiver. Without the spotting feature, it's hard to find any specific frequency, as the tuning dials are difficult to read and calibrate, because of their small size and simple construction.

The S meter is probably the least important feature, but it does make spotting easier, and many hams wouldn't be without one.

Receiver Conversion

In most instances your CB transceiver will be either a single- or double-conversion superhet with one stage of r.f. amplification. In single conversion units, the oscillator will be operating either above or below the signal by an amount equal to the intermediate frequency. The tunable oscillator is most likely to be the first conversion oscillator in double-conversion superhets, although in some cases the number one oscillator is crystal controlled and the second conversion oscillator is variable. Except for the latter case, in which the crystal must be replaced by a higher frequency unit, the tunable oscillator will have to be increased in frequency, so that the difference between it and the desired 10-meter signal will be equal to the first i.f. For instance, if it is desired to copy a signal at 28.5 Mc., and the i.f. is 455 kc., the tunable oscillator must be retuned from its original frequency, 26.510 Mc. in the case of a receiver tuned to CB channel 1, to either 28.045 or 28.955 Mc. Of course, the 28.045 oscillator is preferred, as its image will be at a less populated frequency than the image of an oscillator on the high side of the signal. But before any changes can be made some equipment must be obtained to perform the task.

In order to realign the oscillator and the rest of the transceiver an alignment tool or two will be needed, as well as a general-coverage receiver, grid-dip meter, or signal generator. A General Cement No. 9302 3-in-1 hex core alignment tool was used to align most of the twelve transceivers that were converted. However, no commercial alignment tool could be found locally that would fit the smaller slugs in some of the transistorized units. A homemade alignment tool was fashioned from a soldering lug and a short polystyrene rod. The lug was filed down to the appropriate size, heated with a soldering iron, and forced into one end of the plastic shaft with a pair of pliers.

Throughout the entire alignment procedure, care should be taken not to damage the tuning slugs or coil forms. Many of the forms are filled with wax or other gunk which must be removed before any adjustments are made. If the cores won't rotate easily, do not force them. Most of the forms are made of pressed paper or cardboard; it doesn't take much torque before a core be-

comes frozen in the threaded grooves of the paper form. A little carelessness during alignment can lengthen a short tuning job considerably. I should know; I broke four slugs in converting the equipment described in this article!

Once the operating range for the tunable oscillator has been calculated, there are several methods of putting the oscillator on frequency. Probably the most precise way is to align the oscillator while listening to its output on a calibrated general-coverage receiver. A less accurate method is to resonate the oscillator coil to the appropriate frequency with a grid-dip meter. The oscillator coil can also be aligned by adjusting it until the output from a 10-meter signal generator can be copied on the transceiver: if this method is employed, the generator will have to be cranked up, as the transceiver's input stage will still be tuned to 27 Mc.

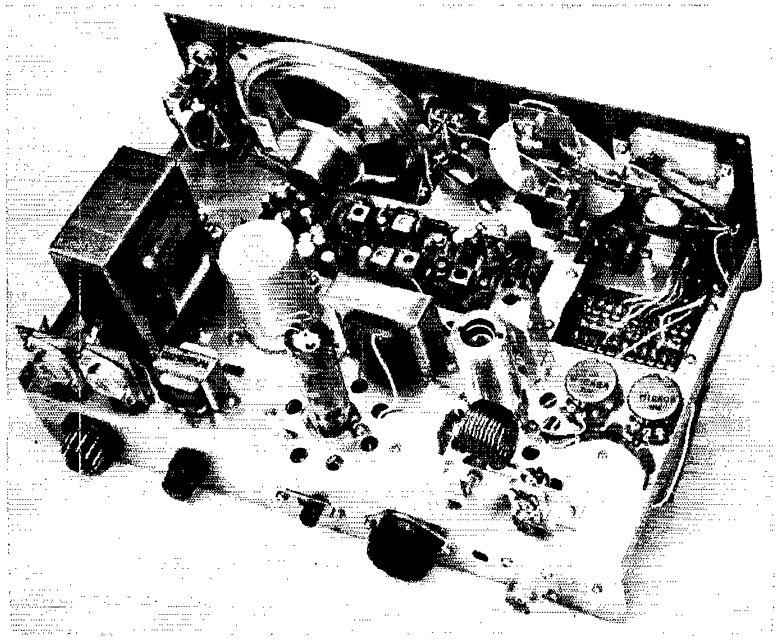
If it's impossible to tune the oscillator or any other part of the transceiver to the desired frequency, some coil(s) or capacitor(s) must be reduced in value. It will usually be easier to replace a fixed capacitor than to take turns off a coil, so this procedure is recommended normally. In those cases where a variable capacitor is the only capacitor in the circuit, as in some final-amplifier plate configurations, it's best to take turns off the inductor. Plates can be removed from the final amplifier tuning capacitor, but then the capacitor might not cover the entire band.

In order to cover more of the band than the usual 350 kc., two steps are necessary: the oscillator tuning capacitor must be replaced with one of greater capacitance, and any fixed capacitance in parallel with the tuning capacitor must be decreased. Normally such a change will not be entirely satisfactory for one or both of two reasons: most, if not all, units have no external controls for peaking the input stage, and many of the receiver dials tune much too fast to cover a 1.2-Mc. band. Since both sides of most 10-meter contacts are made on or near the same frequency, limited receiver coverage poses no real hardship. Just align the receiver to tune that portion of the band you are most interested in.

When converting a fixed-tuned receiver to a tunable unit, use the variable-oscillator configuration that is most similar to the crystal oscillator circuit employed in the unmodified transceiver. In this way, much of the original circuitry can probably be retained. Before modifying the crystal oscillator, measure with an r.f. probe the amount of oscillator injection at the mixer. Take another reading once the tunable oscillator has been completed. Change the oscillator circuitry if necessary so that the amount of injection is the same as from the crystal oscillator. By constructing the circuit in this fashion, there will be less chance of creating undesirable mixer products.

Upon completion of the oscillator alignment, apply a 10-meter signal to the input of the transceiver. Tune the grid and plate circuits of the r.f. amplifier stage for maximum response or best signal-to-noise ratio. Peak the mixer grid coil, if the set has one. Depending upon the tuning range of the receiver, it may be more desirable to stagger-tune the input circuits, rather than to peak them at one frequency. By so doing, a flatter but less sensitive response can be had across the dial.

This completes the conversion of the receiver. The i.f. amplifiers may be touched up, but this



A hybrid CB transceiver employing a transistorized receiver and a vacuum-tube transmitter. By changing power cables, this unit will operate on either 115 volts a.c. or 12 volts d.c. Besides installing a new transmitting crystal and realigning the transceiver, two other operations were performed to convert the unit to 10 meters: a fixed loading capacitor was replaced with one of smaller value and 1 turn was removed from the pi-network inductor.

Table I
Receiver Conversion Data

The part numbers given are the transceiver manufacturer's. Components listed in columns 6 through 9 are the only ones that need to be adjusted during the conversion. Alignment instructions are given in the text for the tuning range listed as well as for other portions of the band.

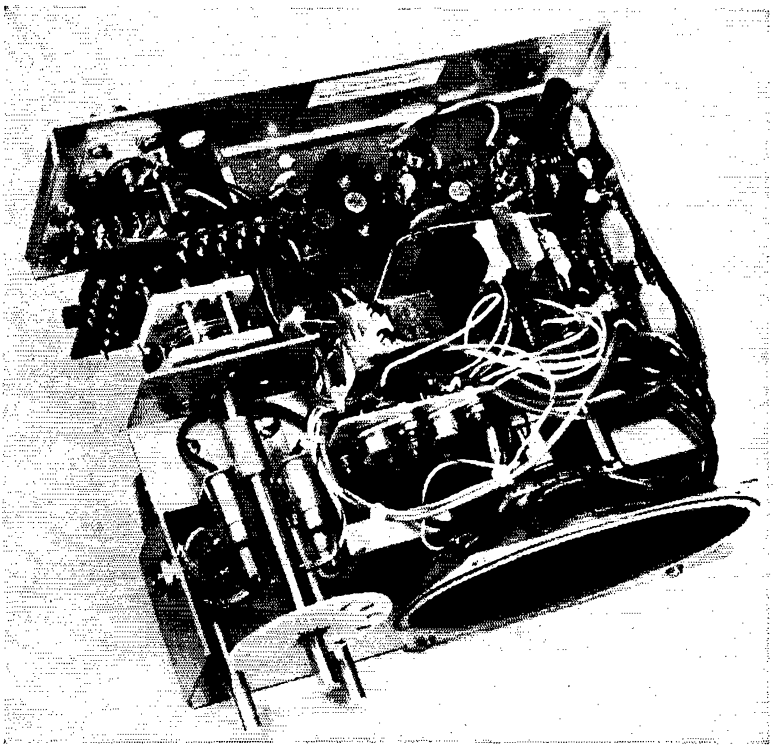
Transceiver	*First i.f. (kc.)*	*Second i.f. (kc.)*	*Converted tunable-oscillator range to cover 28.5 Mc. to 28.XXX Mc. (Mc.)*	*10-meter coverage (kc.)*	*Variable oscillator*	*R.f. amp. input*	*R.f. amp. output*	*Mixer input*	*Component Changes*
Eico 770	1750	—	26.750–26.960	210	*L*6	*L*4	*L*5	—	None.
Eico 777	1750	262	26.750–27.070	320	*L*6	*L*4	*L*5 (primary)	*L*5 (secondary)	None.
Hallicrafters CB-19	1650	262	26.850–27.210	360	*L*11	*T*1	*T*2 (primary)	*T*2 (secondary)	Remove 5-pf. capacitor, *C*13, from across *T*1.
Hammarlund HQ-105TR	455	—	Receiver covers entire 10-meter band. No conversion required.	1700	—	—	—	—	None.
Heath MW-34	455	—	28.045–28.490	445	*L*3, *C*18	*L*1	*L*2 (primary)	*L*2 (secondary)	None.
International 50AN	10,000	455	18.500–18.905	405	*L*14, *C*77	*L*1, *L*2	*L*3	—	Remove 18-pf. capacitor, *C*81, from across *L*14. Replace 18-pf. capacitor, *C*2, across *L*1 with a 10-pf. disc ceramic or mica capacitor.
Johnson Messenger Two	455	—	28.045–28.370	325	*L*113, *C*110	*L*1	*T*3 (primary)	*T*3 (secondary)	None.
Knight C-560	1650	—	30.150–30.470	320	*L*7	*L*3	*L*5	—	None.
Lafayette HB-500A	3580	455	24.920–25.285	365	*L*3	*L*1	*L*2	—	None.
Lafayette HE-20D	455	—	28.045–28.415	370	*L*4	*L*2	*L*3	—	None.
Raytheon TWR-3	1650	250	Replace front-end xtal with 30.27-Mc. unit. No var. osc. changes required.	270	—	*L*1	*L*2	—	Replace crystal in first conversion oscillator with a unit whose frequency is equal to the desired transmitting frequency plus 1650 kc. Receiver will tune from 135 kc. below to 135 kc. above transmitter frequency.

Squires-Sanders S5S	10,700	—	39.200–39.680	480	*L*201	*T*101	*T*102	—	Replace (on rec. osc. circuit board) *C*204 (22 pf.) with a 5-pf. silver mica unit and *C*205 (5000 pf.) with a 180-pf. silver mica capacitor. Add a 1-pf. silver mica capacitor between the collector of rec. osc. *Q*201 and circuit board ground. Remove the channel switch detent assembly and install a 15-pf. variable (Millen 21015MK) in the vacated area between the chassis and the circuit board. Connect the rotor of the variable to chassis ground. Wire a 2.5-pf. silver mica capacitor (two 5-pf. units in series) between the stator of the variable and the collector of *Q*201. Add a shaft coupler between the variable and the tuning shaft and use a large knob to tune the dial.

Table II
Transmitter Conversion Data

The part numbers given are the transceiver manufacturer's. Components listed in columns 4 through 7 are the only ones that need to be adjusted during the conversion. Alignment instructions are given in the text. Crystals are third-overtone types with the exception of the fundamental crystal used in the International transceiver.

Transceiver	*Crystal type*	*Crystal frequency*	*Oscillator*	*Driver*	*Amplifier*	*Trap*	*Component Changes*
Eico 770	FA-5	Xmtg. freq.	*L*1	—	*C*9, *C*10	—	None.
Eico 777	FA-5	Xmtg. freq.	*L*1	—	*C*11, *C*12	—	None.
Hallicrafters CB-19	FM-9	Xmtg. freq.	*L*1	—	*T*1, *L*5	*L*6	Remove 5-pf. capacitor, *C*13, from across *T*1 (may have been removed during receiver conversion since *C*13 and *T*1 are common to both the transmitter and the receiver).
Hammarlund HQ-105TR	FA-5	Xmtg. freq.	*L*8	—	*T*11	—	None.
Heath MW-34	FA-5	Xmtg. freq.	*L*5	*L*6	*L*7	—	Replace 2.2-pf. capacitor, *C*49, across *L*7 with a 1-pf. disc ceramic or mica capacitor.
International 50AN	FA-5	½ xmtg. freq.	*L*8, *L*11	—	*C*72, *C*73	—	None.
Johnson Messenger Two	FA-5	Xmtg. freq.	*L*7	—	*L*9, *C*49	—	None.
Knight C-560	FA-5	Xmtg. freq.	*L*1	—	*L*2	*L*4	None.
Lafayette HB-500A	FM-9	Xmtg. freq.	*L*7	*L*9	*L*11	*L*10	Remove 15-pf. capacitor, *C*70, from across *L*7. Replace 150-pf. capacitor, *C*76, across *L*9 with 100-pf. mica or disc ceramic unit. Tune *L*10 by spreading its turns apart or squeezing them together. If necessary, detune *L*11 on low-frequency side for upward modulation.
Lafayette HE-20D	FM-9	Xmtg. freq.	*L*6	—	*TC*-2, *TC*-3	—	Remove 1 turn from the amplifier pi coil, *L*8. Replace 200-pf. capacitor from across *TC*-3 with 120-pf. mica or disc ceramic capacitor.
Raytheon TWR-3	FA-5	Xmtg. freq. plus 1650 kc.	—	*L*7, *L*8 (primary)	*L*8 (secondary), *C*55B, *C*55A	—	None.
Squires-Sanders S5S	FM-9	Xmtg. freq.	*T*201	*T*202	*L*205	*L*206	If necessary, detune *L*205 on low-frequency side for upward modulation.



An example of an all-transistor CB transceiver. The receiver, which was originally crystal controlled, has been changed to a tunable unit. Part of the channel selector switch was removed and a variable capacitor was installed in its place. The switch shaft, with an appropriate knob and shaft coupler attached, is now used to tune the receiver. This unit, which is the most compact of all the transceivers converted, operates from 12 volts d.c.

will probably not be necessary unless the set has been banged around a bit. If the transceiver has fixed-channel facilities which haven't been modified to make way for a tunable oscillator, the set may be easily converted for 10-meter channelized operation. Calculate the frequency of the tunable oscillator when the receiver is tuned to the desired 10-meter frequency or channel. Substitute a crystal at the tunable oscillator frequency for one of the CB receiver channel crystals. If necessary, adjust the crystal oscillator coil so that the new crystal will start to oscillate.

Of the twelve receivers converted, four required component changes or additions. Only eleven sets had to be retuned, since one set as supplied covered both 10 meters and the Citizens Band. Table I shows what had to be done to each transceiver so that it would tune from 28.5 Mc. upward. The frequency range of the converted oscillators is given, along with the amount of 10-meter coverage. In addition the transceivers' i.f.s are listed. To cover other parts of the band, it's necessary to retune all circuits higher in frequency as described previously.

Transmitter Conversion

CB transmitters differ from amateur transmitters in that most CB units have all their stages on the same frequency. For the most part, there is no mixing or frequency multiplication. Usually the r.f. portion of the transmitter consists of either an overtone crystal oscillator and an amplifier or the same combination with a driver stage sandwiched in between. Of the twelve units converted, only two differed from the basic line-ups just mentioned: one unit employed a crystal at half the operating frequency, while the other transceiver used a frequency synthesizer to combine the signals from two crystal oscillators.

All CB transmitters in their original form are crystal-controlled and operate with a final amplifier input of 5 watts or less. Frequency tolerance is 0.005 per cent or better of the authorized frequency. These are technical requirements for the CB service. Once the transmitter is tampered with, it can not legally be retuned and used on the Citizens Band unless the adjustments are made by the holder of a first- or second-class radiotelephone license. This should be kept in mind, if the amateur ever intends to use the rig in the Citizens Band (with a CB license, of course).

The first step in converting a CB transmitter is to replace the crystal. As mentioned earlier, most transmitters call for a third-overtone crystal at the transmitting frequency. Two sizes of crystals were found in the twelve CB transmitters that were converted. The smaller type HC-25/U units were replaced with International Crystal FM-9 crystals, and the larger type HC-6/U units with FA-5 crystals.

Once a new crystal has been installed, attach to the antenna connector an output indicator, such as a Varimatcher, and a 50-ohm, 5-watt-or-more dummy load. If neither item is available, a No. 47 bulb can be used in place of the combination. Peak the oscillator coil for maximum output or adjust it to a point where the oscillator

(*Continued on page 142*)

Building a three-band cubical quad antenna is not the easiest task in the world. This article describes such an antenna which is the by-product of many hours of hard work and testing. W5HVV shows how to build the antenna, how to tune it up, and what kind of results to expect when it is put to use on 20, 15, and 10 meters.

Practical Consideration and Application in a Multielement Quad

BY RODERICK M. FITZ-RANDOLPH,* W5HVV/7

It has been the author's experience that the 3-db. gain increase for twice the number of parasitic elements applies to the quad as well as to the Yagi beams. When a director of the proper dimension is added to the normal radiator-and-reflector quad configuration, one may expect an approximate 3-db. increase in gain. By adding a second director, an increase on the order of 1.75 db. may be expected. More directors net a corresponding decrease in additional gain for each director added. For example, the theoretical increase in gain by adding a third director is 1.25 db. To achieve a 3-db. gain over a four-element quad, a seven-element quad would have to be constructed. The boom length required for such an antenna all but makes it impossible to construct. It is quite impractical for the amateur to seriously consider. The quad constructed by the author and herein described has four elements on 10 meters, four elements on 15 meters, and three elements on 20 meters. An additional element on 20 meters with the same boom length would have worked to disadvantage, because the directors would have been too closely spaced to operate properly and efficiently.

Spacing

Element spacing, in terms of wavelength, is perhaps not quite such a controversial subject. Most will agree that the wider the spacing, up to approximately one-quarter wavelength, the greater the gain and the higher will be the impedance at the feed point of the antenna. In the author's opinion, an optimum boom length for a tri-band quad would be about 24 feet. This would allow for a spacing of 0.2, 0.15, and 0.15 wavelength between the 15-meter elements. Again, however, practicality raises its ugly head.

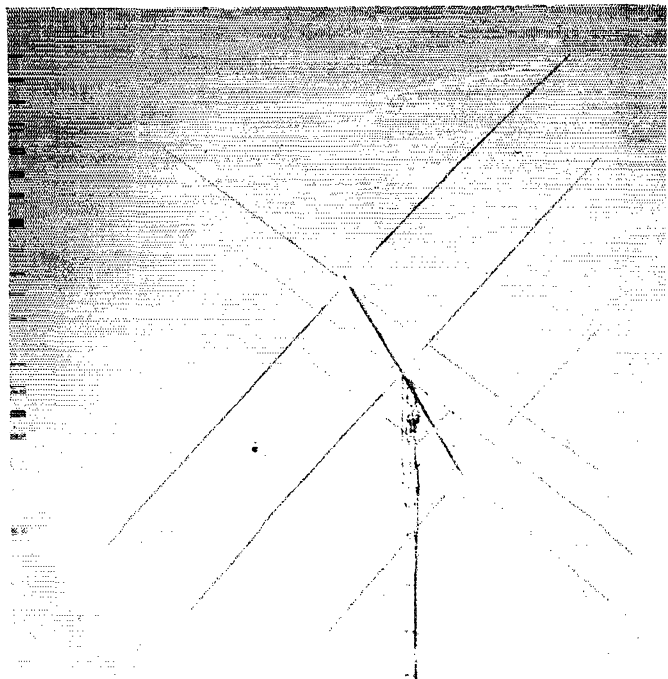
What price to pay for the slight increase in gain of a 24-foot boom over a 20-foot boom? With thin-walled steel conduit so readily available in 10-foot sections, the author decided to join two such sections for a practical and inexpensive 20-foot boom length. The author agrees that the spacing of the described quad represents a compromise, but it is felt that the gain did not suffer greatly from this 16 percent reduction in length. The actual gain reduction on 15 meters should only be on the order of 0.45 db. or about 4.3 percent — hardly an amount to lose sleep over.

Element Size

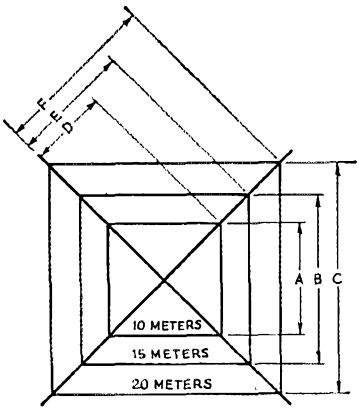
The radiating element is cut to the formula of $251/f(\text{Mc.}) = \text{Length in feet}$ for each side. This formula was determined while working with D. August Raspet, an associate, during laboratory experiments in 1958. It has been concurred with more recently by others who have been experimenting with quads.

It would appear that most quads have tuning stubs on the parasitic elements. After ten years of experimentation, the author has decided against this approach. A "bag of snakes" develops when trying to adjust eight parasitic elements for maximum forward gain. The concomitant change of feed-point impedance necessi-

*5301 East 19th St., Tucson, Arizona 85711.



The three-band quad shown in its completed form, installed and ready to use.



	A	B	C	D	E	F
REF.	8' 11½"	12' 0"	18' 3¼"	6' 4"	8' 6"	12' 9¼"
RAD.	8' 9⅞"	11' 9¾"	17' 8½"	6' 2½"	8' 4¼"	12' 6"
DIR.1	8' 7⅛"	11' 8"		6' ⅞"	8' 3"	
DIR.2	8' 4"	11' 5¼"	17' 3¼"	5' 10¾"	8' 1"	12' 3¼"

Fig. 1—Element dimensions in feet and inches for the three-band quad.

tates the repeaking of the matching device, and is frustrating, to say the least. Also, the extremely sensitive equipment required to determine when one particular element is peaked for maximum forward gain is not generally available to the amateur. With this in mind, the author developed a particular loop size for the parasitic elements, devoid of tuning stubs or capacitors. The results have been gratifying.

Factors that enter into the determination of the parasitic element's dimensions are (a) spacing between elements in terms of a wavelength, (b) the desired bandwidth to be covered, expressed in percentage of center frequency, and (c) whether the quad is constructed for maximum front-to-back ratio or maximum forward gain. The author's experiments indicated a reflector size 2.1 percent greater than that of the radiator

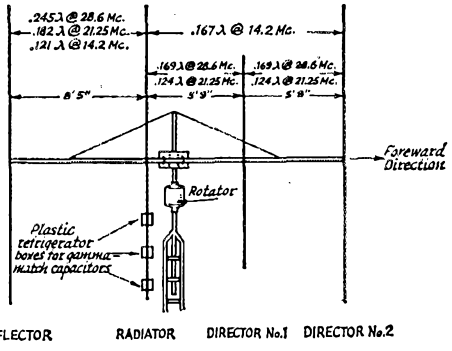


Fig. 2—Element layout and spacing in terms of feet and inches, and in wavelength. The plastic boxes that contain the gamma-match capacitors are shown adjacent to the tower.

for 10 and 20 meters, and a 1.67 percent greater size for 15 meters to be proper for this particular number of elements and spacing. The first director on 15 meters is 1.20 percent smaller, while on 10 meters it is 2.10 percent smaller. The second director varies from approximately 2.0 percent to 5.0 percent smaller than the radiator. Dimensions for these elements appear in Fig. 1.

Construction

The boom, as indicated earlier, is constructed of two 10-foot lengths of 1¼-inch, thin-walled steel conduit. They are joined together at the center by sliding them into a slightly larger (inside diameter) 2-foot length of galvanized pipe. Quarter-inch-diameter bolts are passed through holes that have been drilled through both diameters of pipe. This makes a rigid and secure joint.

The mast protrudes upward past the boom by 2½ feet, Fig. 2. From the top of the mast to approximately halfway out on each 10-foot boom section are turnbuckles and connecting rods to aid rigidity. They also help to keep the boom from flexing under the weight of the elements.

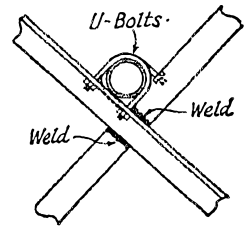


Fig. 3—Sketch of the spider and boom assembly technique. The spiders are made from sections of angle iron and are welded together as shown.

The boom-mast connection is a 3/16-inch thick, rectangular steel plate that measures 15 inches long by 10 inches wide, Fig. 2. U-bolts secure the mast vertically to one side of the plate, while the boom is attached horizontally to the opposite side. The author used 1¼-inch galvanized water pipe for the mast, between the rotator and boom. Larger pipe may, of course, be used.

The spiders are made of ⅞-inch, steel angle iron, measuring 18 inches from the center to the four ends. They are formed from two 36-inch pieces which are welded back-to-back at a 90-degree angle. They are drilled for the U bolts prior to welding. Each spider is connected to the boom as shown in Fig. 3, with appropriate-size U bolts. The inside holes for the U bolts are positioned slightly (¼ inch) on the downward leg so that the boom will rest flush against the angle iron. The U bolts and flat bearing surface of the angle iron make an altogether satisfactory mechanical connection that is simple to construct and is rugged. Four spiders are required for this antenna.

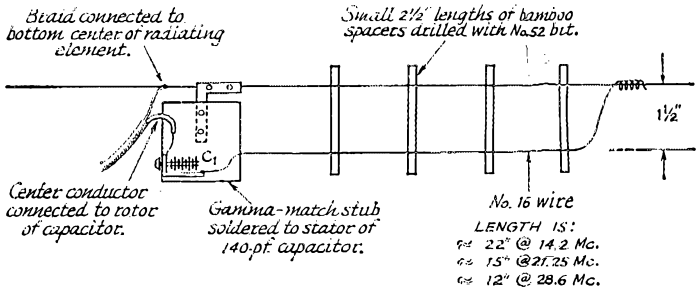


Fig. 4—Details of the gamma-matching section with dimensions for each band. Capacitor C_1 is a 140-pf. miniature variable. Close spacing of the plates in C_1 is possible because it is used at a low-impedance point in the system. A separate feed line is used for each band.

Adjustable hose clamps are used to hold the bamboo spreaders to the spiders. The bamboo is placed in the V of the angle iron, and two clamps are securely tightened around the angle iron and bamboo for each of the sixteen spreaders.

Holes are drilled through the bamboo with a No. 52 bit, in the plane of the element as shown in Fig. 5. No. 16 tinned solid copper bus wire was used for all of the elements and for the gamma-matching sections. If care is used in measuring the distance from the center of the spider to the appropriate place on the bamboo before drilling, the elements' sides will be neither too slack nor so taut that the bamboo is bowed. Approximately 550 feet of wire is used in this quad. It would be wise to secure 600 feet to allow for some waste.

The gamma match, Fig. 4, gives the advantage of having easy adjustment to achieve a match between the antenna and the three 52-ohm coax lines. A plastic refrigerator box houses the capacitor, C_1, and may be purchased at most supermarkets. The back, or bottom, of the box is attached to an L-shaped screen-door reinforcement that also attaches to the driven element. C_1 is attached to one wall of the box. The coax is brought into the box through a small hole which has been burned through the side with a small soldering iron.

Adjustment

Adjustments should be made at the height at which the antenna will be used. This is not difficult because the driven element is quite close to the tower, and the three gamma-match capacitors are easily reached while standing on the tower. *Use a safety belt.* Extra wire should be left on each matching section for adjustments of a longer or shorter stub than the author used, if needed

The transmitter should be tuned to the frequency at which the lowest s.w.r. is desired. The gamma-match stub should be a little longer than the anticipated length of Fig. 4. Different settings of the capacitor, C_1, will allow the adjuster to determine the lowest s.w.r. obtainable with that particular stub length. (*Note:* Adjustment to the stub length and capacitor settings should be made while the transmitter is *off.*) Experimentation with different gamma-stub lengths, in conjunction with different capacitor settings, should produce unity s.w.r. at the desired frequency. (It may be found that the capacitor setting is critical and "light-fingered" adjustments are necessary.) At this point, the end of the gamma-match stub should be soldered to the radiating element and any excess wire cut off.

It has been the author's experience that there is no detectable interaction between elements of a cubical quad on different bands. That is to say, when the last gamma match has been adjusted, a check will show the matching of the first-adjusted stub will not have varied while the second and third were adjusted. The author's quad has an s.w.r. on 20 meters of 1.2:1 at both band edges and unity at 14.200 Mc. The 15-meter section goes as high as 1.55:1 at both band edges and is 1.05:1 at band center. The 10-meter section displays an s.w.r. of 1.5:1 at 28.000 Mc., 1.1:1 at 28.700 Mc., and 1.7:1 at 29.300 Mc. These figures were lower than the writer had anticipated; needless to say, he was pleased.

Results

While checking with a local amateur (three miles distant), it was determined that the front-to-back ratio of the author's quad is very good on all three bands. Although a greater front-to-back ratio could have been achieved, it would have been at the sacrifice of forward gain. This compromise is quite satisfactory for most applications, with the possible exception of the coastal amateurs who wish to block as many of the remaining United States amateurs out of the picture as possible when working DX.

The gain of the W5HVV quad on 15 meters seems to exceed the figures noted in available

(*Continued on page 144*)

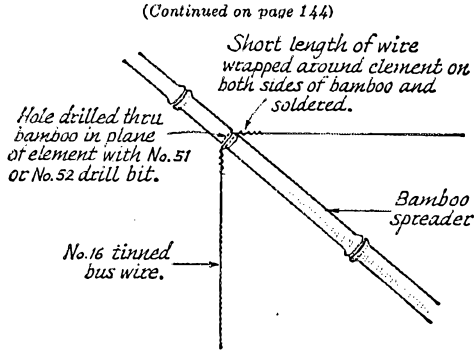
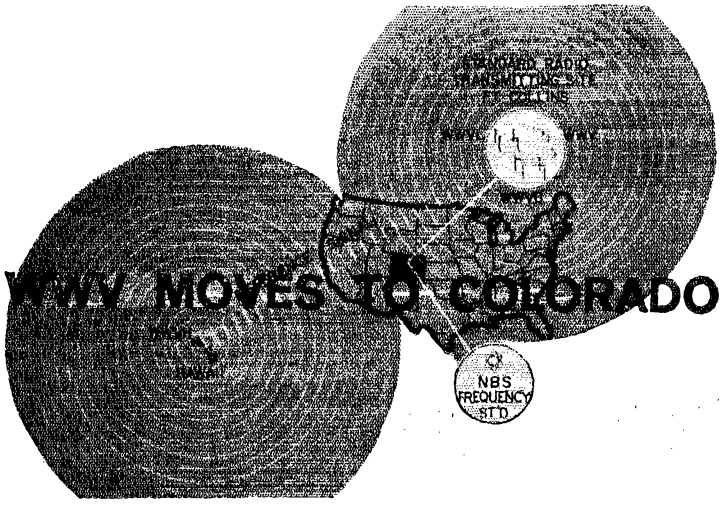


Fig. 5—Method by which the quad wire elements are attached to the bamboo spreaders.



In Two Parts

Part II

BY YARDLEY BEERS,* WØEXS

THE earliest function of WWV was to transmit standard carrier frequencies to provide frequency calibrations so that radio stations could stay on their assigned frequencies and avoid mutual interference, and to allow persons having receiving sets and wavemeters or frequency meters to calibrate them. Indeed, it is this feature of the broadcasts which is of chief interest to amateurs today. However, in the course of history the usefulness has been greatly increased by superimposing time markers and other information by a suitable program of modulation. In addition, mainly because of the needs of stations used for tracking of rockets and space vehicles, the present accuracy is far in excess of that required for the original purpose. However, for the moment, we shall confine our remarks to this original function.

Quite clearly, if the objective of avoiding interference between stations on adjacent channels is to be accomplished, all frequency measurements must be coordinated: that is, they must be referred to a single standard. Similar reasoning holds for countless other physical quantities: length, force, speed, voltage, current, resistance, power, to name a few. However, most of these are not independent. They may be related by definition. For example, if one measures the time necessary for an object to travel some previously-measured distance, he can determine the speed. Or they may be related by physical laws. For example, if a known current flows through a wire of known resistance, the voltage drop between its ends, as measured by a voltmeter, must agree with that computed by Ohm's Law.

Thus, to digress for a moment, we are led to the concept that all the physical measurements within the U. S. A. form the National Measurement System. This System is involved in essentially all activities of commercial and private life. It makes it possible to assure a housewife that when she pays for a pound of meat in a Denver supermarket she will receive the same amount of meat as when she shopped at her former market in Chicago. It makes it possible for the piston of an automobile motor made in Detroit to give proper performance when used in a cylinder block made in New Jersey. This System is something far greater than the National Bureau of Standards, but the Congress has given the Bureau the responsibility of providing "the basis for accurate and consistent measurements": that is, for providing standards and for leading the coordination of measurements within the System.

However, the coordination is not solely confined to measurements within the U. S. A. Frequency measurements must be consistent with those outside if international QRM is to be avoided, and manufactured goods on the international market must have specifications given in units which are internationally significant. Therefore, NBS is further given the responsibility of making international comparisons. As

Frequency and time are the primary business of WWV, and the physical facilities described in Part I of this article exist solely for the dissemination of highly accurate information about these two quantities. The article concludes with a description of the basic standards used for this purpose, how they are used to control the transmitters, a brief history of WWV and a description of the NBS organizational setup that is responsible.

*Chief, Radio Standards Physics Division, National Bureau of Standards, Boulder, Colorado, 80302.

part of its coordinating role, NBS must participate in the standardizing of the units and definitions of quantities. As the result of the recommendations of international committees to which NBS is a party, NBS has adopted for its own use the hertz as the unit of frequency, and it is encouraging others to do the same. For this reason, this unit is used in this article.

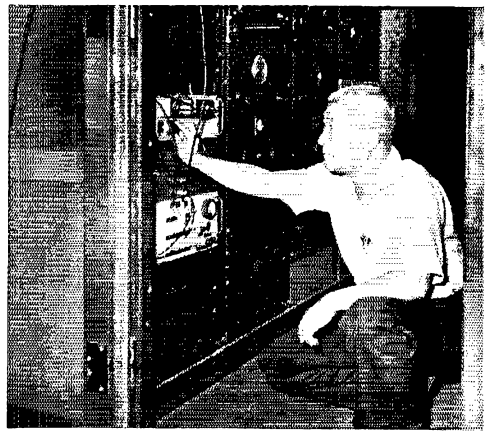
In the hierarchy of measurements, "frequency" and the very closely-associated quantity "time" collectively play a very important and unique role. It has been stated above that the measurements of many quantities are interrelated. In fact, the interrelations are so numerous that it can be shown that the system of measurements of physical quantities is based upon the units of just four quantities; frequency-time is one of these, the others being length, mass, and temperature. Also, it is the only unit for which the user can obtain instantaneously a virtually direct calibration against the NBS Standard in his laboratory, factory, or home. For this latter reason, there is an effort to convert measurements of other quantities into measurements of frequency by the use of suitable transducers.

Fundamental Considerations of Time and Frequency

If the reader is to appreciate fully the significance of the WWV broadcasts, it is necessary to review some fundamental concepts. The measurements of both time interval and frequency are based upon some physical phenomenon which ideally is perfectly repetitive — or which, if not exactly repetitive, is accurately predictable, such as the oscillations of a piano string, the motion of a pendulum, or the electrical oscillations of a resonant circuit composed of an inductor and capacitor. Until recently, the most accurately-predictable repetitive phenomenon available was the revolution of the moon around the earth (although the results are generally expressed in terms of the time-equivalent motions of the earth about the sun). Until recently all measurements of time and frequency have been referred to this. However, it is now generally believed that the electromagnetic radiation emitted by atoms and molecules is much more uniform, and that there is no physical reason to suppose that there should be any variation provided the atoms are either isolated or maintained under constant environmental conditions. Therefore, the best present standards of time and frequency are based upon these atomic radiations. Measurements of the motions of the earth and moon referred to them reveal nonuniformities in these motions which are quite trivial from the human point of view but which, scientifically speaking, are very significant.

A standard frequency is determined by the number of cycles of the reference phenomenon per second of time. Conversely, if one counts the number of cycles of standard frequency which occur between two events, he can ascertain the time interval between those events. Thus, a clock consists of (a) a physical configuration which gives rise to a repetitive phenomenon and (b) a device which counts oscillations. When one is counting the intervals between large numbers of events, it is convenient to refer measurements to one particular event, which is said to define the "epoch" of a time scale. For example, when we speak of the year 1966 A.D., we are speaking of a time scale for which the epoch is defined by the birth of Christ, and we are referring to some event occurring 1966 years later, approximately.

The unit of time used by scientists is the second, and at present this has two different definitions. One of these, called the "Ephemeris" second, is based upon astronomical measurements, and we shall not give the details here. The other, the "atomic" second, is the time interval required for exactly, 9,192,631,770 cycles of the radiation absorbed or emitted by a certain transition of isolated cesium atoms. This last statement is equivalent to saying that, by definition, the frequency of this radiation is exactly 9,192,631,770 hertz. These two definitions of the second are consistent; that is, if one were to refer any given time-interval measurement either to appropriate astronomical observations



Sadami Katahara, KH6DK, engineer-in-charge, makes adjustment to frequency control equipment at WWVH.

or to the cesium atom, he would obtain essentially the same result for the first several digits, but he would find the measurements relative to the cesium atom to be more precise: that is, more of the digits in his answer would be meaningful. Furthermore, if one has the proper apparatus, measurements relative to the cesium atom can be carried out much more conveniently than the astronomical ones. Mainly for the first of these two reasons, atomic measurements are preferred for accurate scientific work.

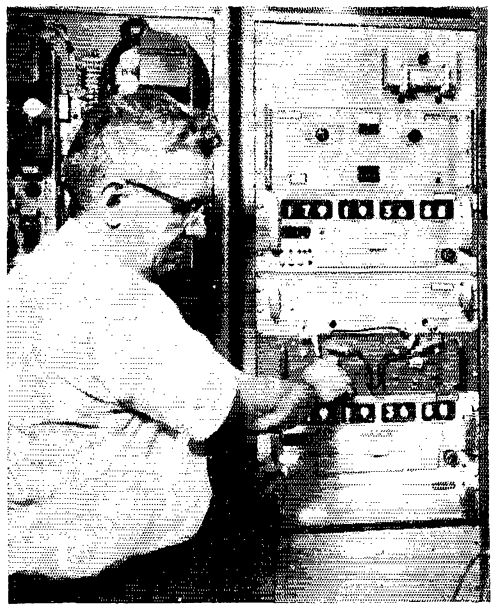
At the present, two types of time scales have been established for people who have need for accurate time measurements. One of these is Atomic Time, which does progress uniformly, in principle. The other is Universal Time, which progresses in synchronism with the slightly-irregular rotation of the earth; this is required for earth navigation. To generate Universal Time from Atomic Time, it is necessary to com-

pensate for the irregularities of rotation. The most widely-used type of compensation involves a combination of (a) offsetting the frequency of the oscillator in the clock by an amount determined by the International Time Bureau in Paris and (b) by making occasional step adjustments of 0.1 second, as determined by the International Time Bureau in consultation with astronomical observatories all over the world. At present, the frequency offset is three parts in a hundred million lower than specified by the definition of the second, an amount much too small to be noticeable by radio amateurs and many others, but large enough to be important to those who track satellites. This offset is held constant within any calendar year, but frequently it has been necessary to change it from year to year. Therefore, many people feel it would be better to eliminate offsets completely and use only step adjustments, even though there would be a few more of them. This subject received considerable attention at the 1966 meeting of the CCIR (International Consultative Committee on Radio) in Oslo, and as a result of agreements made there, the use of offsets, which has been mandatory in standard-frequency transmissions on certain frequencies, is now optional. It is likely that in the near future many standard frequency transmissions will eliminate them.

At the present time, however, the frequencies of WWV, WWVH, and WWVL are offset, and their time signals are on the so-called NBS-UA Time Scale, which is generated by an atomic standard but which is compensated by the offset and by step adjustments to agree with Universal Time within about 0.1 sec. On the other hand, 60 kHz is not one of the frequencies covered by this international agreement, and at the present time the frequency of WWVB is not offset; the time is broadcast in accordance with the so-called Stepped Atomic Time Scale (SAT), which uses 0.2 sec. step adjustments only to keep within approximately 0.1 sec. of Universal Time. The offset and step adjustments of the NBS-UA Scale are determined by the International Time Bureau on the basis of data supplied from many sources. Step adjustments of the SAT Scale are determined by NBS on the basis of data supplied by the U. S. Naval Observatory. When a step adjustment is made on either scale, it is made at the beginning of a month and announced in advance in the *Federal Register* and in publications of the IEEE.

While WWV, WWVH, and WWVL broadcast time on one scale and WWVB on another, Universal Time on either scale can be obtained from any broadcast by means of corrections partly coded in the broadcasts. The details of how this can be done, and much other information concerning the broadcasts, can be obtained from a booklet.[1]

[1] NBS Miscellaneous Publication 236, *NBS Standard Frequency and Time Services* (1966 Edition). For sale by Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402 — Price 15 cents.



Richard F. Carle KØLYM, *engineer-in-charge of* WWVB-WWVL, *with some of the frequency control equipment of that station.*

History and Accuracy of NBS Broadcasts

The first broadcasting conducted by NBS, in 1920, was on an experimental basis in order to gain technical competence. For a brief time entertainment and market reports were transmitted for the Department of Agriculture. Although speech and music were transmitted, code was used for the reports. After a short time, this work was discontinued. It should be noted, however, that these broadcasts preceded the much more publicized pioneering broadcasts of KDKA.[2]

Regular standard frequency broadcasts from WWV started on March 6, 1923, with the station originally located upon the grounds of NBS in Washington. (Some previous experimental tests had shown that wavemeters owned by some of the listeners were off by as much as seven percent!) Originally transmissions took place only a few hours a day, and spot frequencies were transmitted in accordance with a previously announced schedule. These frequencies ranged from below the a.m. broadcast band to considerably above.

After a brief interlude in College Park, Maryland, the station was moved in 1932 to a site near the now-discontinued station in Greenbelt, Maryland. In 1931 essentially continuous operation on 5 MHz was initiated and, while oscillators using quartz crystals had been used for reference for some time previously, at that time the frequency of the station became directly crystal controlled. Operation on various spot frequencies continued as before for a time,

[2] *Measures for Progress — A History of the National Bureau of Standards*, U. S. Department of Commerce, 1966.

but it tapered off while continous operation on 2.5 MHz and on integral multiples of 5 MHz were gradually added to the service. On November 6, 1940, the station was demolished by fire. By ingenuity and hard work, a new station was improvised and put on the air within a few days. On August 1, 1943, the station went on the air with improved "permanent" facilities in Greenbelt. In 1948, similar broadcasts were initiated from WWVH in Maui, Hawaii on some of the same frequencies (at present 2.5, 5, 10, and 15 MHz.)

The accuracy of the carrier frequencies of these broadcasts, as to be expected, increased with time by many orders of magnitude, as indicated by the solid curve of Fig. 1, which gives the accuracy of the ground-wave signal. This improvement was due to the innovation of improved reference standards and control methods, as noted on the figure. At present, the accuracy is of the order of a few parts in a million million (10^{12}), and the control system is so good that this closely approaches the accuracy of the NBS Atomic Standard. It is, of course, far in excess of that needed by radio amateurs and other services for keeping their transmitters on assigned frequencies. If an amateur can measure a 50-MHz signal with an accuracy to 50Hz, he would probably consider that his accuracy is far greater than he needs. Yet this would be only one part in a million (10^6). Needs for other transmitting services are hardly any greater; only the tracking of satellites and pure science require this extreme accuracy.

It is to be noted that a spectacular increase in accuracy resulted from the introduction of the use of a cesium atomic standard. The cesium atoms give a resonance which corresponds to a Q of about 100 to 1000 million, which exceeds that obtainable from quartz crystals and is far in excess of that obtainable from inductors and capacitors. Also, the cesium standard is far less vulnerable to environmental effects such as changes in temperature. At present, NBS and many other laboratories are continually improving atomic standards and investigating other types, such as the hydrogen maser, which many people feel is superior to the cesium standard. It is amusing to note that the quartz-controlled oscillator has passed from something which was *avante garde* for a primary standard to something which is a consumer item, as contained in walkie-talkies that can be purchased at many corner drugstores.

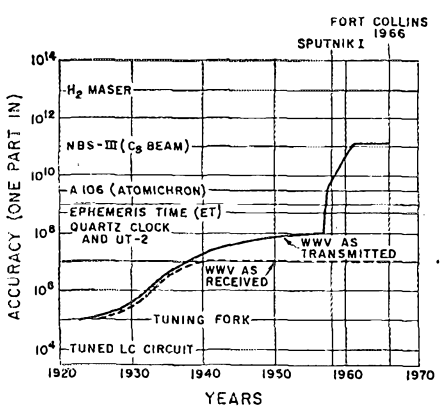


Fig. 1. Accuracy of WWV broadcasts as a function of time. Solid curve gives accuracy of the transmitted signal. Dashed curve gives accuracy of received signal at about 1,000 miles from transmitter. Degradation of accuracy is due to propagation effects. See text for information on present accuracy.

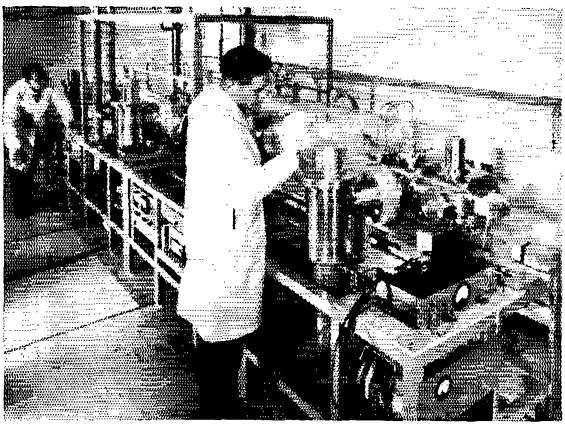
Unfortunately, the accuracy of the signal from WWV as received at some distant point, typically 1,000 miles away, is considerably poorer than that of the transmitted signal. This is indicated by the dashed curve in Fig. 1. This deterioration of accuracy is due to Doppler shifts resulting from motion of the ionosphere. The horizontal slope of the latter portion of this curve indicates that the accuracy of the received signals is ultimately limited by this effect. For distant users the present frequency control of the station is far better than it need be.

On the other hand, there are special users who require these high accuracies, and many of them are located at large distances. To satisfy their needs, other methods had to be sought. One method is to use radio stations with much lower frequencies, where propagation errors are far less serious. This approach led to the establishment of WWVB and WWVL. Another approach is physically to carry high-quality quartz clocks and small atomic clocks from NBS and other reference laboratories to field sites. NBS and other organizations are presently engaged in such an activity on a limited scale.

The establishment of WWVB and WWVL was indirectly assisted by the move of the principal radio work and some of the low temperature work of NBS from Washington to new laboratories at Boulder, Colorado, the home of the University of Colorado, during 1951–1954. At about that time the standards work and propagation work were separated organizationally into the Radio Standards Laboratory (RSL) and the Central Radio Propagation Laboratory (CRPL).[3]

A principal purpose of the move was to provide access to better sites for propagation studies, and in due time experimental standard-frequency transmissions with low power were commenced on 60 kHz from the Boulder site and on 20 kHz with an antenna strung across Sunset Canyon, a few miles to the west. It was shown that propagation errors at distances up to 2,000 miles were negligible at 60 kHz. The 20-kHz transmission gives poorer accuracy at these dis-

[3] In October, 1965, the organizational separation was made much more complete when CRPL, although not moved geographically, was removed from the jurisdiction of the National Bureau of Standards completely and joined to a new agency of the Department of Commerce called the Environmental Science Services Administration (ESSA). At that time CRPL was renamed the Institute for Telecommunication Sciences and Aeronomy (ITSA). It was joined by other organizations, either removed to Boulder from elsewhere or newly created, to form the Institutes of Environmental Research (IER) which is a major unit of ESSA.



The NBS cesium beam atomic frequency standard NBS-with C. J. Snider (left) and D. J. Glaze,WØYVZ

tances, but at distances above 2,000 miles its errors are less than those of 60 kHz. However, should the accuracy of the frequency standards improve by another factor of 10 greater than they are today, it is almost certain that propagation errors at these two frequencies will tend to limit the accuracy of the received signals, and the carrying of clocks will play an even more important role.

As the result of the success of this experimental work, the present stations WWVB and WWVL were constructed on a site approximately seven miles north of Fort Collins, Colorado, which is known as the home of Colorado State University. NASA provided the funds and sponsored the WWVL facility, and is the main potential user of its signals for sychronizing distant satellite stations. This site provided a large area of flat land of very high conductivity, which aided in improving the antenna efficiencies at these lower frequencies. Also, it was far enough away from Boulder (56 miles) to avoid serious interference to propagation studies from the high-powered transmitters.

The question arises: Why was it necessary to rebuild WWV if these lower frequency transmissions give greater accuracy? The answer is that it is a matter of convenience. This article is concerned with WWV, and it would be inappropriate to give a long discussion of the details of the construction of WWVB and WWVL and the methods of using their signals. It suffices to say that most commonly-available receivers cannot receive them at all, and if their signals are to be fully utilized, special and rather expensive receivers are required. The users who need the full accuracy, such as NASA, are very important but are few in number, and are of a type that usually can afford these special receivers. On the other hand, WWV and WWVH can be received on sets which are generally available either without modification or by the addition of a very simple converter. The number of users whose needs can be met with the accuracy of WWV, using simple receivers, is very large. Amateurs, of course, are in this group. Therefore, it is considered justified to maintain and improve the service offered to this larger group.

Modulation of WWV

Originally the WWV transmissions provided only standard radio frequencies, with the principal purpose of making it possible for radio stations to stay on their legally assigned frequencies. In 1935, the service was augmented by modulation of the carrier to provide time pulses at one second intervals and standard musical pitch. Later, other information — such as time, time-scale corrections, and propagation warnings — was added to the modulation program, as described in detail in Reference 1. Incidentally, signals from WWV and WWVH may be partially distinguished, even though they are on the same carrier frequencies, because the station announcements are staggered and they have different silent periods (15 to 19 minutes after the hour for WWVH and 45 to 49 minutes after the hour for WWV). Propagation forecasts (mainly relevant to North Atlantic paths) are given only by WWV, and are given after each station announcement at five-minute intervals. They consist of a letter ("N" for normal, "U" for unsettled, and "W" for disturbed) and a number from one to nine to indicate the quality. Audio tones of 440 and 600 Hz are transmitted on the schedule contained in Reference 1, where one can also find explanations of other features which are of less interest to most amateurs.

NBS Standards of Time and Frequency

The administration of WWV is related to the manner in which the frequency of the station is controlled. Administratively, the station comes under the jurisdiction of the Radio Standards Physics Division, which, with a full-time staff of slightly more than 100 people, is one of the two technical divisions of the Radio Standards Laboratory. About one-half of the Division's staff, distributed among three sections, is devoted to time and frequency matters (the other three sections deal with radio materials, quantum electronics, and plasma).

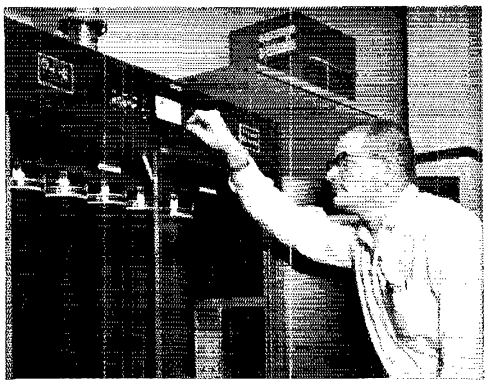
The Atomic Time and Frequency Section, headed by Dr. James A. Barnes, has the responsibility of operating the NBS Atomic Frequency Standards. The standard in use is a particular cesium atomic beam built by NBS and referred to as "NBS III." However, the cesium beam standard is a passive device, and the present one is not designed to give automatic calibrations twenty-four hours a day. Therefore, the Section also operates continuously five very stable oscillators, some controlled by quartz crystals and the others stabilized by atomic resonances. The frequencies of these oscillators are continuously compared with each other, and the data are recorded automatically. Also, once each working day they are compared to NBS III. The output of one of the five oscillators is fed to a correction device consisting of a driven phase shifter. The rate of drive of the phase shifter is adjusted to

(a) make output frequency correspond to the average of the five oscillators (or, automatically, to the average of four of them if the fifth one is in serious disagreement) and (b) to correct for the average drift through aging of the oscillators. The output of this correcting device is referred to as the Drift Controlled Oscillator (DCO), and this serves as the basis for the NBS time scales and for the control of the radio stations. Connected to the DCO is also a device for producing the frequency offset required by the NBS-UA Time Scale. Connected to these oscillators and other circuits are a number of devices which count cycles and thus become clocks for telling time on both the NBS-UA and NBS-A Time Scales. Originally the epoch of the NBS-A Scale, which, unlike the Stepped Atomic Time Scale (SAT) broadcast by WWVB, has never had any step adjustments, coincided with that of UT on approximately January 1, 1958. At the present time, NBS-UA, which has been adjusted to keep within close synchronization with the rotation of the earth, lags NBS-A by about five seconds due to the irregular motion of the earth, which during the immediate past has been slowing down.

Besides routine operation and maintenance of these devices, the Atomic Time and Frequency Section also does fundamental research and development of atomic frequency standards, and it possesses several others of various types, partly for backup for NBS III and partly for research purposes. An important part of this research is the study of very-low-frequency noise. Additional important work on atomic frequency standards is also carried out in the Quantum Electronics Section, headed by Dr. Donald A. Jennings.

Control of the Radio Stations

The NBS radio stations administratively are part of the Frequency and Time Broadcast Services Section, of which Mr. David H. Andrews is Chief. The headquarters of the Section is in Boulder.



Howard E. Michel, Jr., KØBPY, checks the standing wave ratio of the 15 MHz transmitter before turning on the power of the 10 kw. transmitter connected to the dummy load equipment shown here.

The stations are controlled by a system which makes direct reference to the NBS standards in Boulder, and at the same time provides each station with high-quality oscillators so that it can preserve a high approximation of synchronization with the NBS III in case the control link fails for a time. Furthermore, each station (counting WWVB-WWVL as one station for this purpose) is equipped with three oscillators. On the assumption that it is unlikely that more than one oscillator will fail or be in serious error at one time, it is assumed that should one disagree with the other two, those two can be considered as being correct. The new Fort Collins WWV has three new commercially-manufactured cesium-controlled oscillators.

The new WWV is located in a new building about one-quarter mile away from the building housing the WWVB-WWVL transmitters, but the two stations are integrally interconnected so that one person can monitor all of the transmitters on the site and observe and correct any equipment that malfunctions. Furthermore, although the WWV and WWVB-WWVL frequency-control systems are nominally independent, in the event of failure of one of them, switches can be thrown to allow the remaining operating system to control all transmitters. Also contained in the Fort Collins complex are spare devices for generating frequency offsets.

The synchronization with the NBS standards in Boulder is accomplished by the use of some monitoring receivers located in Boulder and operated continuously. The received signals are compared to a signal supplied from the DCO in the Atomic Time and Frequency Standards Section, as mentioned above. Electronic circuits determine the sign and magnitude of any frequency error, and these control the modulation of a 49.85-MHz transmitter which transmits the corrections to receivers at Fort Collins. Demodulating circuits connected to these receivers generate correction voltages which are applied to the oscillators that control the transmitters. Thus, the system forms a closed-loop electronic servo, which not only corrects for drifts in the oscillator, but also for changes in phase resulting from swaying of the antennas in the wind. Incidentally, local v.h.f. amateurs regularly use the signal from the 49.85-MHz transmitter to check their 50-MHz receivers. However, in the near future the 49.85-MHz link may be replaced by a microwave system.

Control of WWVH is accomplished primarily by monitoring the WWVB and WWVL signals and correcting the oscillators. A check upon the time synchronization is made occasionally by carrying portable clocks, partly by NBS personnel and partly by others. It is the aim of Mr. Andrews to have at least four clock-carrying trips made to WWVH each year.

The Frequency and Time Dissemination Section, headed by Mr. A. H. Morgan, does research on new ways of transmitting frequency and, especially, time calibrations — for example, by

(Continued on page 136)

More Problems—More Questions and Answers

BY LEWIS G. McCOY,* W1ICP

The answers to some of these questions may prove helpful to you, both in time and trouble. It's useful information, so read on.

SOME time back, we had a question-and-answer article[1] on problems that are common to many newcomers. Since then, a new batch of questions has been collected, and the answers may be of help to hams with similar problems.

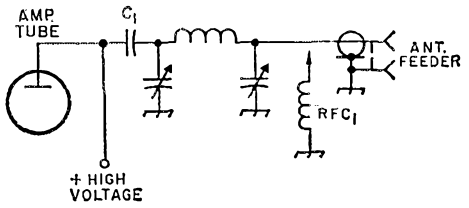
"I am using an 18-foot vertical antenna, ground-mounted on my front lawn where it is subject to being touched or contacted by children.

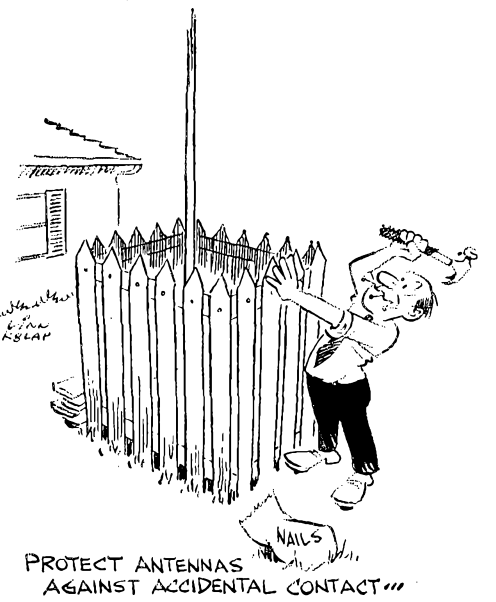
How much of a safety hazard is this if a person touches it while I am transmitting? What is the danger, if any, at 75-watts input against what it might be at one kilowatt, and are some bands less of a hazard than others?"

First and foremost, any antenna or feed line should be installed so as to be protected from any physical contact. The antenna or feed line can present a very serious hazard. There is always radio-frequency energy present on an antenna when transmitting. While r.f. is rarely present in a degree that could be considered lethal, even at a a kilowatt level, very severe r.f. burns can occur.

For the benefit of the newcomer to amateur radio, r.f. voltages will not give you an ordinary electrical shock but will cause a penetrating burn or actual "cooking" of the flesh. Such a burn is slow to heal. The greater the power the larger the amount of r.f. energy present on the antenna. However, it is possible to get a nasty r.f. burn even when running relatively low power, such as 50-watts input, and on any band.

Still another hazard is that of getting an electrical shock from the antenna. Fig. 1 shows the typical pi-network tank circuit which is common these days. C_1 is the blocking capacitor which permits r.f. to flow from the plate of the tube to the pi-network tank circuit and thence to the antenna. C_1 prevents the plus-B voltage from being on the antenna circuit. If C_1 should short out — and it is not a rare occurrence for capacitors to short — the plus-B voltage will flow out the feed line to the antenna. Anyone coming in contact with the antenna could be electrocuted.





One method of protecting against this is to install an r.f. choke between the output lead and ground, as suggested at RFC_1 in Fig. 1. If the blocking capacitor shorts, the plus B will be shorted to ground via the choke and the fuse in the transmitter power supply will blow.

* Beginner and Novice.

[1] McCoy, "Is One of These Your Problem?", *QST*, May, 1966.

Build a fence around your antenna or put the antenna up in the air where no one can touch it. If you are doing antenna work yourself, be sure the power is completely off in the rig. If you have insurance, such as the home-owner's type, be sure to read the fine print. Certain restrictions on amateur stations are laid down by the National Electrical Code and your insurance could be void if you don't comply with the code. Your local library or building inspector's office will have a copy of the wiring code so it would be a good idea to check. (Along the same lines, although not pertinent to the question, if you have a tower and *think* you have it insured, you had better check to make sure. In many homeowners' policies a separate rider is required for adequate coverage.)

"*None of the articles on transmatches I have read in* QST, *the* Handbook *or elsewhere, have ever mentioned shielding of such circuits. Photos invariably show a chassis and a front panel but no signs of an enclosure behind the panel. This is surprising since stress is usually placed on shielding transmitters, especially around the output circuits. Do transmatches require shielding or don't they?*"

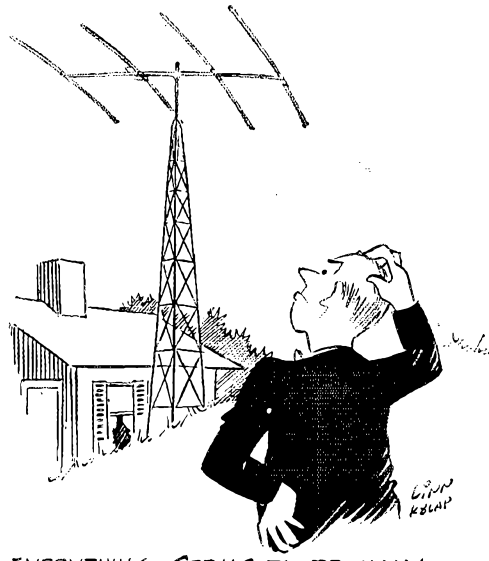
The answer is no, they don't. It is true that transmitters require extensive shielding to prevent radiation of harmonics that could cause TVI. Once the transmitter is shielded there is only one way for harmonics to get out, and that is via the antenna terminal. Any harmonics coming out of the transmitter should be attenuated by use of a low-pass filter. In such a case, it will make no difference if the transmatch is shielded. There are no harmonics reaching the transmatch so there is no point in unnecessary shielding. If you have harmonics that could cause TVI they must be kept enclosed within the transmitter and suppressed with a filter.

On the other hand, a transmatch is useful in suppressing the lower-frequency harmonics — those that can cause problems by interfering with other services than television. Because the transmatch is a selective circuit tuned to your operating frequency, it will present a load to the transmitter that is optimum for the operating frequency but is not optimum for the harmonics. Therefore, harmonics will be attenuated through the transmatch. But in either case, low-frequency or TVI harmonics, the transmatch doesn't require shielding.

"*My rig was working OK, as I was making contacts. Now, all of a sudden, I can't work out at all. Can you tell me what is wrong or what to check? The rig loads up into a light bulb OK and the antenna seems to be the same.*"

There are several possibilities in such a case. First and most important is to make sure that you are transmitting and listening on the same band. Believe it or not, many Novices *think* they are tuning up on the right band when actually the output is on another. You can spend a lot of frustrating time by calling on 40 while listening on 80!

One method of checking is to use a wavemeter to make sure that you are on the right band. A



EVERYTHING SEEMS TO BE OKAY...

recent *QST* article[2] had the construction details for a simple wavemeter and s.w.r./output-indicator combination, which leads us to another point.

Without such an indicator it is possible for a rig to be tuned up in what appears a normal manner when, in fact, there is no power going to the antenna. You could have an "open" or "short" in the feed line and not know it, if you have no means of checking. The simple device mentioned above contains a reflectometer which monitors both the standing-wave ratio and the output. If something goes wrong in the antenna or feeders, the s.w.r. should show a change from the normal reading. On the other hand, if something happens in the transmitter, this would show up as a change in the output, as indicated by the meter in the device. We highly recommend the use of a combination instrument that shows which band you are tuned to, the match in the system, and the output, because by simple elimination you can quickly pinpoint your troubles.

"*I recently passed my amateur exam. I have been a CBer and I was wondering if it is possible to use my CB beam on an amateur band. It is a 3-element job with the elements in a vertical plane.*"

While this isn't a common question, the answer is worth passing along to hams who may have an opportunity to pick up used (or new) CB antennas at a bargain price.

The CB frequency assignments are very close to the amateur 28-Mc. band, being centered around 27 Mc. As one goes higher in frequency, a half-wave antenna becomes shorter. In this case, 27 Mc. is lower in frequency than the 28-Mc. band so any CB antenna can be shortened to work on 28 Mc. The formula for figuring the dimensions of a 28-Mc. beam is quite simple.

[2] McCoy, "The Wavebridge," *QST*, July, 1966.

First decide on the portion of the band in which you plan to do the most operating. Let's say it is around 28.6 Mc. Divide 28.6 into 468 to give you the length in feet of the driven element. The director should be made 5 per cent shorter than the driven element and the reflector 6 per cent longer. The spacing between elements does not need to be changed but it is a good idea to make the elements horizontal to the earth. Most fixed stations on 28 Mc. use horizontally-polarized antennas and you'll probably get better results if you mount your antenna horizontally.

"I would like to build the Super-Duper 75-Watter described in . . . QST. *Please send me step-by-step wiring information and pictorial drawings of the unit. I am afraid to attempt to build the rig with only the schematic."*

Variations of this request keep popping up. Unless specified in an article, we have no pictorials, layout drawings, or step-by-step information. If you want to do that kind of construction it is better to buy a kit. Kits usually come complete with pictorials and step-by-step instructions.

Here is the important point: A Novice must acquire a certain amount of radio knowledge if he wants to stay in amateur radio. In order to pass the FCC exams he must acquire some "know-how" in radio circuitry. One of the best ways of acquiring this knowledge is by building a piece of gear, trouble-shooting it, and getting it working. Too many beginners are concerned about making "Chinese Copies" of equipment described, even down to the same placement of nuts and bolts. Don't be afraid to change the layout. Don't be afraid to make substitutions. And above all, don't be afraid to experiment. The worst that can happen is a burned-out component or a blown fuse. The important thing is that you will *learn.*

"I have an s.w.r. bridge and its dial is calibrated in watts along with s.w.r. I am completely confused because I am reading 70 watts output with 30 watts reflected, and I am only running 60 watts input. What goes on . . . will the 30 watts coming back damage my rig?"

No, the 30 watts won't damage the rig. This is a complicated thing to explain because a certain amount of knowledge is required about reactance, phase, and transmission-line and antenna theory. The subject is treated in detail in *The A.R.R.L. Antenna Book.*

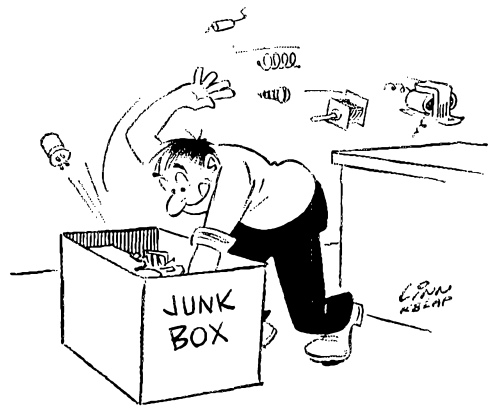
However, here's a simple analogy: If you go into a radio store to buy a four-dollar capacitor and hand the clerk a ten-dollar bill, you get six dollars back. The six dollars coming back doesn't hurt your pocketbook. It just hasn't been spent. The same thing is true of the reflected power in the above question. If you subtract the 30 watts from the 70 watts you'll find the remainder is 40 watts. This is the total power the transmitter is putting out and is actually going to the antenna to be radiated.

Still another way to look at it is that with 60 watts input it would be pretty darn difficult to get 100 watts output (70 forward, 30 reflected). The actual output is the difference between the two, 40 watts.

"I am building the two-band receiver described in last month's QST *and am having a difficult time locating all the necessary parts. None of the local radio stores seem to stock parts. Where do you suggest I look?"*

Without a doubt this question (or a variation of it) is the most common one. At one time, radio stores carried a fairly complete line of parts, or would order them for you. It has become increasingly difficult to obtain components, at least on a local basis. Not only do the stores not stock components, but the manufacturers who make the parts a ham would want have become less numerous.

If you like building, you will almost certainly have to order parts by mail. Although some distributors still stock a fairly wide range of components, no one distributor is likely to have everything you need. It is suggested you write to the large mail-order houses and obtain their catalogs. Take a current issue of *QST* and go through the index of advertisers and write those that have catalogs or flyers available. You can, of course, write to those closest to you, but if you want a complete "availability file" it is a good idea to write to them all. Some of these concerns have two catalogs, a general type and another larger one for industrial users. Also, nearly all manufacturers of amateur equipment and components have catalogs and usually, they are



DON'T BE AFRAID TO SUBSTITUTE "

happy to send them on request. If you cannot find a component in a distributor's catalog you can look it up in the manufacturer's catalog and write and find out who sells the item. In some cases, you'll find the manufacturer will sell direct.

We might add that at the ARRL, in any projects that are staff constructed, every effort is made to use parts that are readily available. However, even then it may be that a certain part is not easily obtained. That's why it is a good idea to have a stock of catalogs on hand. Also, as we stated in the previous question and answer, don't be afraid to substitute components. QST

The P Picker

BY MELVIN LEIBOWITZ,* W3KET

Most experimenters have an accumulation of mica, ceramic and variable capacitors whose values are unknown as a result of faded markings, strange color codes, or no markings at all. These capacitors can be measured with the aid of the Picofarad Picker — "P Picker," for short.

The P Picker is an inexpensive grid-dip-meter accessory that makes it possible to measure small values of capacitance with ease and accuracy. It is true that an accessory to the grid-dip meter is not required to measure capacitance, but the use of the P Picker can result in better accuracy and is a great deal more convenient than interpreting the capacitance-*vs.*-frequency chart of a coil of known inductance.

The principle of operation is simple. Consider the resonant circuit shown in Fig. 1. The resonant frequency is measured with the variable capacitor set at maximum. This is done once when the instrument is built, and the information is recorded for future use. If an unknown capacitor is connected across the output terminals, the variable capacitor will have to be reduced in capacitance in order to restore resonance as indicated by the g.d.o.; the value of the unknown can be read from the variable-capacitor dial assuming it has been calibrated ahead of time.

Construction and Calibration

Any coil and capacitor can be used as long as the combination resonates within one of the lower frequency ranges of the g.d.o. The components employed by the author resonate at an easy-to-remember figure of 5 Mc. A slug-tuned coil has been used so that the basic resonant frequency can be set to exactly this value. The variable capacitor should have semicircular plates if linear calibration is desired. The capacitor specified makes it possible to measure from 0 to 150 pf. A second unit containing a larger variable capacitor can be built if it is desired to measure higher values of capacitance. The low cost of these units makes this feasible. A metal box should be used to minimize hand-capacitance effects. The box shown in the photograph measures four inches cubed; it is large enough for a good-sized dial but yet not too bulky. The coil is mounted in a plastic pill-bottle cover on the outside of the box so that it lines up with the g.d.o. coil when both instruments are on a flat surface. The coil cover is the pill bottle itself.

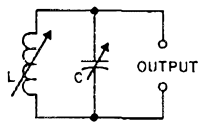
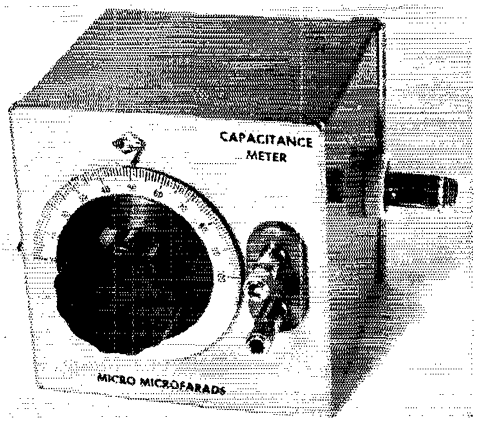


Fig. 1—Schematic of the P Picker.
C—140-pf. variable (Johnson 149-6).
L—5.0–9.0-μh. adjustable (Miller 4505).

Six capacitors are required for calibration: three 20 pf. and one each of 10, 33 and 47 pf. They should be either mica or silver mica with a tolerance of ±5 per cent or better. Ceramic capacitors are not satisfactory due to their loose tolerance. Before calibrating the P Picker, combine two 20-pf. capacitors in parallel to form a 40-pf. unit and connect the 33- and 47-pf. capacitors in parallel to make an 80-pf. unit. Then set the capacitor in the P Picker to maximum. Mark this point 0 on the dial. Measure the resonant frequency and adjust the coil slug until the circuit resonates at 5 Mc. Secure the slug in place with a lock nut or dab of glue. Now, without changing the frequency of the g.d.o., connect the 10-pf. capacitor to the output terminals and rotate the P Picker dial until the g.d.o. again indicates resonance. Mark this point 10 on the dial. Disconnect the 10-pf. capacitor and connect the 20-pf. unit. Rotate the dial until an indication of resonance is obtained and mark this point 20. In a like manner use the other capacitors to obtain calibration points. Calibration marks every 10 pf. from 10 to 150 pf. can be obtained by using the calibrating

* 1401 Philadelphia Pike, Wilmington, Delaware.



An LMB type 444EL Flanglock box is used to house the P Picker. The coil on the right side of the box is mounted in a plastic pill-bottle cover. By inserting the bottle in its cover, the coil is protected from possible damage.

capacitors either singly or in parallel. For example, 70 pf. would require the use of the 10-, 20-, and 40-pf. capacitors in parallel. 150 pf. requires the use of all capacitors in parallel. Following calibration the instrument is complete and ready for use.

Employ the lightest possible coupling between the P Picker and the g.d.o. that will give an indication on the meter. Set the P Picker dial to zero and resonate the g.d.o. to the P Picker frequency when starting a test. Do not change the frequency thereafter. Try to maintain the same degree of coupling throughout the tests. The P Picker will prove surprisingly accurate if these precautions are observed and will soon repay its modest cost in salvaged capacitors.

QST ——— QST ——— QST

The Custom Cab

WHETHER your circuit is built in a Minibox or on a regular chassis, the style of construction described in this article can be applied satisfactorily. The example given in the photos deals with a cover and panel mounted on a $1\frac{1}{8} \times 3\frac{1}{4} \times 2\frac{5}{8}$ inch Minibox.

The lid, panel, and back plate are made from No. 16 gauge aluminum. However, copper, brass, or galvanized-iron sheet could have been used. The important consideration is that the metal, after being cut and formed, must be of sufficient thickness to retain its rigidity during normal handling and use of the equipment. Once the metal work is completed, the stock can be thoroughly cleaned, then painted to suit the builder. If a two-tone finish is desired, the cabinet and panel can be painted in contrasting tones. A black cabinet and a white panel, or a dark-gray cabinet and a light-gray panel looks good.

The general idea of the layout work, prior to bending the metal, is shown in Fig. 2. The technique can be applied to any size box, and the amount of recessing for the panel will be a matter of personal choice. Allowance must be made for the thickness of the metal before the bends are started. If not, the cabinet will be too loose or too tight to fit snugly around the Minibox. A little practice will develop the skill necessary to do this. It's best to experiment first with some scrap metal.

A bench vise is useful for making the bends. Large sheets of stock can be clamped to the edge of the workbench, between two pieces of angle iron, and then bent to shape. The bend radius can be made sharper by laying a piece of wood along the bend and striking it a few times with a hammer. Always protect the metal with a piece of wood, as hammer marks spoil the appearance of the work.

The cabinet is held in place with No. 6 sheet-metal screws which go through holes that have been drilled to line up with the holes in the Mini-

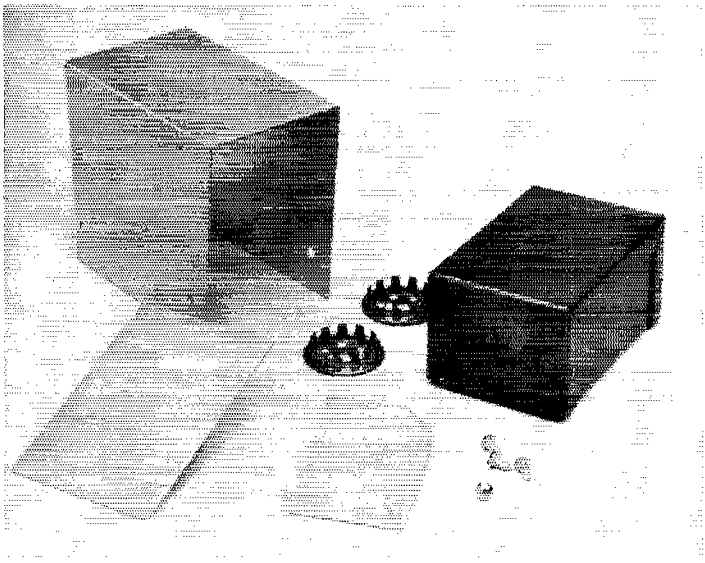


Fig. 1—A break-down view of the Custom Cab. The two 1-inch vent plugs can be installed on the walls of the cabinet if ventilation is necessary. To the left of the four sheet-metal screws is a plate which can be used to enclose the rear of the cabinet; it could be held in place with sheet-metal screws.

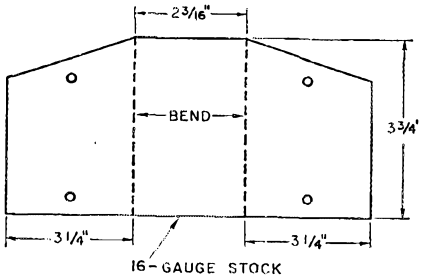


Fig. 2—A layout sketch of the cabinet used to enclose a 1⅝ × 3¼ × 2⅛ inch Minibox. The bend allowance for 16-gauge aluminum has been included in the dimensions.

box. The panel can be held in place with 4-40 or larger hardware. If ventilation is needed, vent plugs of the type shown in Fig. 2 can be installed in the top and sides of the cabinet. These plugs snap into 1-inch diameter holes. Alternatively, perforated aluminum sheeting or window screen can be used to cover ventilation holes that have been cut in the cabinet.

If r.f. shielding is important, the back of the cabinet can be enclosed with a bracket of the type shown in Fig. 1. A small angle bracket can be added inside the cabinet at the top front so the panel can butt against it for greater rigidity. This arrangement will also make a better ground connection between the panel and the case. A No. 6 sheet-metal screw can be used to pin the panel to the bracket.

The Custom Cab represents but one way of enclosing a Minibox or other small chassis. It shows how stereotyped cabinet styles can be avoided by forming your own. — W1CER

An Affair of the Heart

MR. Lyndon B. Johnson, President of the United states of America, . . . my husband and I are poor and we don't have the economic resources to take Eduardo to the United States for medical treatment, and it is for this reason that we ask you with all our heart assistance of any type to help regain the health of our dear son."

This letter was written in May, by Mrs. Austria Espinal who lives in Santiago de los Caballeros, Dominican Republic. Her six year old son, seemed condemned to an early death by a congenital heart malfunction until an exchange of letters and the assistance of James Jacobs, K1GHT, Chestnut Hill, Massachusetts led to a delicate heart operation which has given little Eduardo a new life.

Mr. Johnson referred the letter to Santo Domingo, where Lyle Copmann, a public affairs officer at the American Embassy, checked into the Espinal case. The family of six had only been able to save $170 for Eduardo's operation. That represents a lot of money on the strife-torn island, but not much towards major surgery in the United States. Copmann turned to a friend, K1GHT, saying he felt that not only could a life be saved, but that the Dominican Republic would be attentive to the response of Americans to the child's critical need.

K1GHT called a friend, Dr. Robert Wilson, and together they talked over Eduardo's case with Dr. Robert Gross at the Children's Medical Center in Boston. Dr. Gross said the Center would treat the boy. Jacobs contacted Howard Shoemake, HI8XHS, a Baptist Missionary in Santo Domingo and arrangements were made to fly Eduardo and his mother to Boston for the open heart surgery. United States troops of the 60th Support Group stationed in the Dominican Republic raised $215 towards the air fare and the Espinals were on their way.

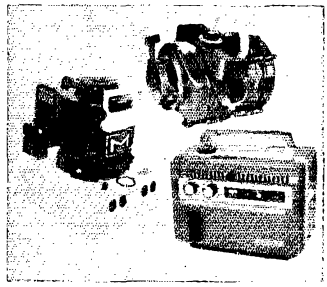
Eduardo Espinal, 6, is carried aboard plane for Dominican Republic in the arms of James Jacobs, K1GHT. At the right is Eduardo's mother, Austria.

After the successful operation, Eduardo's benefactor, K1GHT, was invited by the boy's family and grateful Dominican Republic officials in Santo Domingo to fly to the island. There, Jacobs was issued the honorary Dominican license, HI8GHT.

Brigadier General Robert R. Linville, Commander of U.S. Army Forces in the Dominican Republic, commended K1GHT for "having played the principal role in the great humanitarian project which presented the U.S. public in its true light to a great many suspecting Dominicans." QST

Recent Equipment

To acquaint you with the technical features of current amateur gear.



Lightweight Portable A.C. Generators

VETERANS of ARRL Field Day expeditions tend to think of a "portable generator" as a roaring gas-guzzling behemoth capable of supplying power for anything up to a dozen ham stations running simultaneously. Even the smaller a.c. generators commonly used for amateur radio purposes have continuous-duty ratings of 1000 watts or more. But of late people accustomed to the convenience of city a.c. power have been taking to the wide-open spaces in ever greater numbers, and these travelers and campers constitute a ready market for compact and convenient generators. Many manufacturers are aiming for this market, and hams who like to "work portable" with equipment of moderate power are benefiting from the trend.

The first two portable generators described here won't do much for a multiple-station Field Day setup, but the low-power enthusiast who likes to take his ham gear wherever he travels will find them useful. They require only a small amount of fuel, and they pack away in a modest space in the family car or camping vehicle. Even generators rated at 300 watts, maximum, continuous duty, provide plenty of power for most sideband transceivers and v.h.f. rigs now so widely used in home-station and mobile service. Some also generate 12 volts d.c., that can be used to recharge the car battery, in case it is run down by over-use of the mobile gear. The 2000-watt model will run any ham rig you're likely to want to carry with you, and it packs enough power to serve as an emergency system for home use, as well.

The Honda E-300

Here is a generator designed especially for the traveler, with attention paid to form factor, low center of gravity, safety and freedom from gas-leakage problems. Weighing but 40 pounds, ready to run, it delivers 300 watts a.c. or 12 to 13 volts d.c. at up to 8 amperes. It is completely enclosed in a handsome red and silver case, with rounded corners and a husky carrying handle. It carries like a piece of luggage, and can be stowed in a car's luggage compartment almost as readily and safely. With its gas supply shut off it is guaranteed not to leak, even when turned on its side.

Operation is simple and foolproof. Knob controls seen at the left side of the unit in the group photo and in Fig. 1 are for the combined throttle and choke, left, and the gasoline cock. The choke-throttle pulls out for choke action, and is rotated for speed control. There are two detent positions

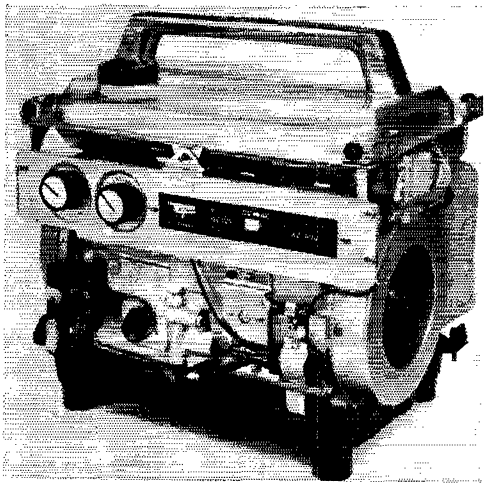
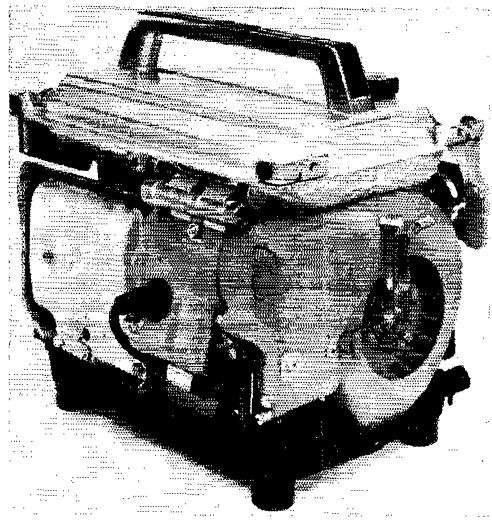


Fig. 1—Front view of the Honda generator, with case removed. Oil sump cap is just to the right of the starting rope handle.

Fig. 2—Rear of the generator. Wrench for removing spark plug is mounted in clips under the cover edge.



for setting the choke for starting and warmup, and it is pushed all the way in for running. The gas cock is "off" at the left and "on" at the right. The starting rope and handle are below the choke control. In the center of the recessed panel is a frequency meter. The throttle is adjusted to keep the frequency at 60 cycles, regardless of load, and when this is done the voltage is close to 115, kept so by an automatic speed governor. The generator is supplied with a spare spark plug, fuses, and a clip-equipped cable for use in charging a battery with the 12-volt outout.

The generator supplies either a.c. or d.c., at the flip of the slide switch visible as the white button in the black panel. At its left is a polarized 12-volt outlet, and to the right a slot-type a.c. outlet capable of taking up to three plugs at one time. A frequency meter shows when proper speed is being maintained under load. The generator cannot be damaged by overloading. With loads such as heaters, where operating voltage and frequency are not important, a 500-watt unit could be connected without any problems except that the heater will not deliver full output. A 500-watt transmitter is another story; it could suffer from low line voltage or frequency. Therefore, overloading the generator with a transmitter or receiver is not recommended.

The Honda 4-cycle engine runs more quietly and with less vibration than most such devices. The assembly sits calmly on its rubber feet, and does not "walk around" while in service. Connected at the other end of a 50-foot extension cord it does not interfere with ordinary conversation, and it is unlikely to be heard on the air via microphone pickup. A separation of 100 feet or more is necessary with the average generator, and even then an operator in the open may hear considerable racket.

Some electrical interference is evident, however. The writer operated portable gear on 50, 144 and 1215 Mc. using the Honda for power. On the two lower bands there was some ignition noise. This was radiated; line filters did not help, and noise pickup depended on the position of the v.h.f. beam. It was never serious, and was not noticeable with the receiver limiter on. American Honda confirms the presence of some electrical noise, and ascribes it to the wave shape of the generator output. They state that the loaded output of the E-300 is not a pure sine wave, but rather has two steep edges per cycle, introduced by the voltage control reactor. They recommend filtering at the equipment, should this be necessary, rather than at the generator. Our guess is that, in typical amateur radio applications, it will not be a problem of consequence.

There was also a buzzing sound in the receivers for 6 and 2, apparently the result of the spiky waveform of the a.c. power. Some 50-Mc. operators reported hearing the buzz on the transmitted signal, but on 144 it was observed only in receiving. It was not radiated from the generator; operation of the receiver on a commercial a.c. source, with the Honda running nearby, eliminated the buzz in the receiver. In working on 1215 Mc. with an APX-6 there was no noise in either transmitter or receiver. Neither type of noise was particularly troublesome, and the convenience of the Honda E-300 made it a delight for hilltop v.h.f. work. It runs for several hours on a quart of gas, and its leak-proof cap and gasoline line shut-off make it safe to carry with gas in the tank, ready for use.

Honda also makes the smallest a.c. generator we've ever seen, a 48-watt model that is about the size and shape of the famous Heath Twoer and Sixer. It has just about enough power to handle one of these "lunch-boxes," but it is unlikely that it would do for much else in the way of ham gear. At under $100, it might be worth the price just to make a light or two, and to run your regular home razor or toothbrush, if not your ham rig.

The Honda E-300 A.C. D.C. Generator

Height: 12 inches, including handle.
Width: 13 inches.
Depth: 9 inches.
Weight: 39 pounds.
Fuel: Regular or high-octane gasoline, lead-free preferred.
Lubricant: SAE 10W, 20, 20W or 30, depending on temperature.
Output: 300 watts, 115 volts, a.c., or 12 to 13 volts d.c., at 8 amperes.
Generator type: Flywheel-magneto.
Price Class: $180.
Manufacturer: Honda Motor Co., Tokyo, Japan.
U.S.: American Honda, 100 West Alondra Blvd., Gardena, Calif. Also Gould Enterprises, Inc. 811 Lynnway, Lynn, Mass. 01905, and other agents in larger cities.

The Zeus ZS500 Sportline

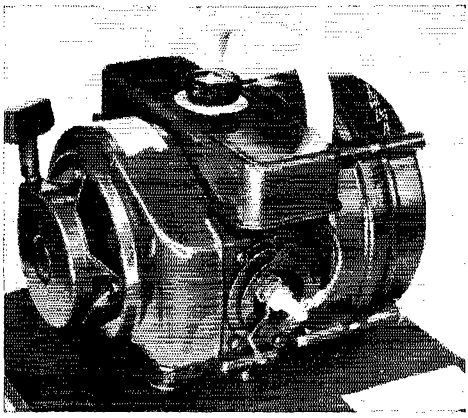


Fig. 4—The Zeus Sportline 500 Generator. Ignition is cut off to stop the engine by moving a small lever that shorts the spark plug terminal to ground. The plywood shipping base may be removed or left on the unit in use.

A somewhat heavier-duty generator of very different design is the Zeus 500-watt Sportline model shown in Fig. 4. Simplicity and rugged construction are featured in this 2-cycle engine job, equipped with a 500-watt alternator which has only one moving part. In shape, appearance and operating characteristics it is less a departure from conventional design than the Honda model described above. It "looks like a portable generator," and sounds like one, as well. The generator shown is the smallest of a family of models that also includes 1000, 1250, 1500, 2000 and 3000-watt units.

The Tecumseh 2-cycle engine in the ZS500 runs on a mixture of SAE-30 grade motor oil and regular gasoline, and requires no other fuel or lubrication. Like other 2-cycle engines it is very simple, and presumably trouble-free as well. The alternator is also mechanically simple in design. As may be seen from the photograph, the Zeus is shipped mounted on a plywood base. It can be used this way, if desired.

The ZS500 has the typical snarl of a 2-cycle engine, but the power it generates is clean and noise-free. Using it to power a phone rig operating out in the open calls for a good long extension cord, but it presents no electrical interference problems. From our observations, the 500-watt rating is a conservative one, and the Zeus handles this load with ease.

Operation is similar to any portable gas-engine device. The choke and throttle levers are conveniently located on the opposite side of the unit from that in the picture. The choke has three detent-marked positions, for starting, warmup and running. The throttle is continuously adjustable and is normally operated about three-quarters open, for near-maximum loads. The gas tank cap has a built-in fuel supply indicator.

Zeus ZS500 Sportline Generator

Height: 12 inches, including handle.
Width: 13 inches.
Depth: 13 inches.
Weight: 40 pounds.
Fuel: Regular gasoline, with oil mixed.
Lubricant: SAE-30, mixed with gas.
Price Class: $135
Manufacturer: Zeus Portable Generator Co. 12135 Euclid Ave., Cleveland, Ohio 44106.

The McCulloch MITE-E-Lite, Mark 2

When you've boosted this generator into the back of your station wagon you may question our classification of it as "lightweight," but the fact remains that on a watts-per-pound basis the MITE-E-LITE family does qualify. Others in the series are the Mark 1 (1500 watts, 61 pounds) the Mark 5-20 (2000 watts, 76 pounds) and the Mark 3 (3000 watts, 129 pounds), as well as the Mark II, the model to be described. The latter two large models deliver either 115 or 230 volts, a.c. Generators delivering 230 volts are available for all units, as are propane conversions.

These generators are all equipped with Briggs and Stratton 4-cycle engines, the Mark 2 having a 4-h.p. version. The strengths and weaknesses of these power sources will be well-known to users of power lawnmowers, tractors and all the other noisy fixtures of American Suburbia. You can count on your instruction book having been written about some slightly different model from the one used on your particular device, and therefor you'll never quite understand what to do when something goes wrong, but the chances are good that there is someone in town who will be able to bail you out. Qualified B & S servicemen are almost everywhere, but they are not needed too often as a rule.

The principal element of novelty in the MITE-

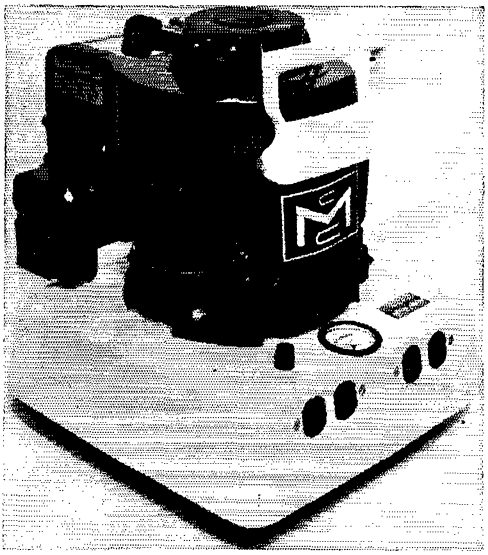


Fig. 5—The MITE-E-LITE Mark 2 2000-watt generator. Four a.c. outlets are mounted in the cast-aluminum base. Just above them is the a.c. voltage meter. Vertical mounting of the engine and flat pancake design of the alternator conserve space.

E-LITE models is the vertical mounting of the simple and compact generator unit. As with the Zeus, its flat coils are fixed in position, with permanent magnets rotating adjacent to them. There are no brushes or slip rings, and the common problems associated with these devices are eliminated. Extensive use of aluminum in place of cast iron and the vertical design of the equipment make for relatively light weight and economical use of carrying space. Note that the Mark 2 provides 2000 watts capacity, in 2½ cubic feet of space, yet it weighs in at 72 pounds, fueled.

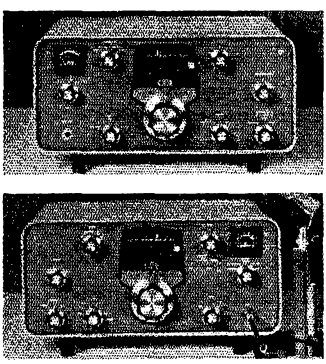
Probably nobody in America needs to be told what a Briggs and Stratton engine sounds like. This one is like the engine in your snow blower in this respect — but if the noise is keeping your refrigerator, oil burner and TV set going when the power lines are down the racket may have a rather comforting quality. If you like to go portable "loaded for bear" this generator has what it takes to put out a big signal from your favorite mountain top or hunting lodge.

Electrically, the MITE-E-LITE is quiet. Locate it on the far side of a high stone wall, or a thick hedge, and you can run your ham rig in peace, with power about as clean as that coming over your commercial lines. — *W1HDQ*

MITE-E-LITE Mark 2 Generator

Height: 17½ inches.
Width: 14 inches.
Depth: 15 inches.
Weight: 71 pounds.
Fuel: Regular gasoline.
Lubricant: SAE 30, 10W-30 or 5W-20, depending on temperature.
Price Class: $320
Manufacturer: McCulloch — MITE-E-LITE, Inc., Wellsville, N. Y. 14895

Next Month



Heathkit SB-401, SB-301

NEW BOOKS

Solid-State Communications, by the Engineering Staff of Texas Instruments Incorporated. Published by McGraw-Hill Book Company, 330 West 42nd St., New York, N. Y. 10036. 365 pages, including index, well illustrated with many drawings, cloth cover. Price, $12.50.

From the title, one might expect *Solid-State Communications* to be a conventionally laid-out text book, but it is not. Rather, it is a collection of more-or-less independent technical papers, dealing with a common subject but varying widely in the method of treatment. Some are thoroughly practical in orientation, not at all over the heads of amateurs with a technical interest but without formal education in the field. Others will appeal only to the professional. Throughout, however, the accent is on applications of actual semiconductor devices manufactured by Texas Instruments, including the latest developments.

The book is divided into twenty-two chapters ranging in subject matter from a discussion of temperature/parameter relationships to measuring procedures. There is much material on noise, a very readable discussion of the principles and characteristics of field-effect transistors, sections on the design on v.h.f. and u.h.f. amplifiers and oscillators, and a considerable number of practical circuits, some of them in or close to amateur bands.

The reader cannot educate himself in transistor communication by starting at page 1 and working continuously throughout the book, but he can glean much useful information from its pages, providing he knows something about transistors beforehand. Although the complete communications field is not covered — there is nothing about modulation, for example — the treatment of those subjects that are included is specific and can be usefully applied to actual equipment, a topic on which formal texts often leave much unsaid. — *W1DF*

Technical Correspondence

THE OPERATOR FACTOR

Technical Editor, *QST:*

I have been following the W3AFM articles on "Station Design for DX", and have found them very interesting. He mentioned some transmission-mode power relationships:

C.W. — 0 db
S.S.B. — 14 db
D.S.B. — 17 db

He gave as his source Technical Report No. 5, "Median Signal Power Required for Reception of Radio Transmissions in the Presence of Noise", U.S. Army Signal Radio Propogation Agency. I think it might be worth while if the following paragraph from this same Technical Report were also publicized:

"Experiments conducted by the Radio Propogation Unit at Baltimore Signal Depot during World War II indicate that the signal required for c.w. radiotelegraphy with 5 percent character errors is 20 db. below that of a.m. double-sideband, order-wire quality radiotelephony. Recent experiments conducted by Watt and others of the National Bureau of Standards indicate that for c.w. radiotelegraphy, 15 w.p.m., thermal noise, and a good operator, a signal-to-noise ratio in one kc. bandwidth of minus 1 db. is required for 10 percent character errors and plus 1 db is required for one percent character errors. The latter signal-to-noise ratio of 1 db. is equivalent to 22 db. below double-sideband, order-wire quality radiotelephony and agrees closely with the result obtained by the Radio Propogation Unit. It was decided to retain c.w. radiotelegraphy at the level of 17 db. below radiotelephony to take into consideration the difference between operators."

From the foregoing it can be seen, that the difference between 22 db. and 17 db. gives the good operator a 5-db. advantage over the mediocre operator. If this were more widely known, it might possibly act as an incentive for self improvement. — *C. E. Frederickson, W2VYA, 350 Richmond Terrace, Staten Island, New York, 10301*

FURTHER NOTES ON THE I-177 TUBE TESTER

Technical Editor, *QST:*

Recently I modified my I-177 tube tester in accordance with the article in the November, 1961 issue of *QST*, and I am very happy with the results.

There are one or two points of interest to those who plan to modify their tube testers. As indicated in the article, basic tube-tester circuits have not changed much over the years. The roll chart Mr. Bradley recommends is from the Hickok type 6005 tube tester. This tester differs from the I-177 in several ways. The significant differences include:

1) The a.c. signal imposed on the tube grid is only 2.5 volts as compared with 5 volts in the I-177.

2) Bias-voltage settings are modified somewhat to better complement the use of the lower signal voltage.

3) The various tests are made by a selector switch setting rather than by a multiplicity of pushbuttons.

One of the points made in the article is that TEST A indicated on the roll chart is the same as the AMPL. TEST provided by the I-177; no indication is given as to the nature of TEST B which is used for some amplifier tubes. I would like to report that TEST B is the same as TEST A except that the screen grid potential is considerably reduced. In the TEST A position the screen potential is the same as that applied to the plate.

Since I am using equipment that requires "acorn" tubes (types 954, 955, 956), I am happy to find that they are still covered on the roll chart; the test socket must be wired in accordance with the diagram of Fig. 1, however.

In closing, I would like to say that I have no instruction manual for my I-177 and I would certainly appreciate it if anyone would furnish me with a copy of either the schematic diagram, or the operating instructions. — *George Schleicher, W9NLT, 1535 Dartmouth Lane, Deerfield, Illinois 60015*

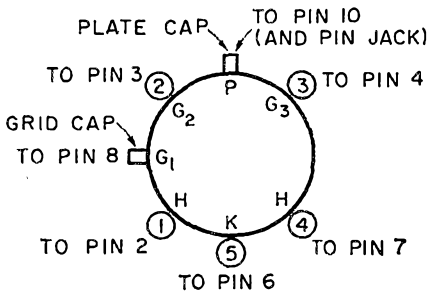


Fig. 1 — Wiring of acorn-tube socket to Compactron socket in the I-177 tube tester. For triodes, Pins 2 and 3 are plate and grid, respectively.

Technical Editor, *QST:*

In the I-177 tube tester, the basic circuit is exactly the same for measuring amplifier tubes (and almost the same for other tests) as the Hickok models 532, 533, 533DM, 534, 534A, 534B and the 600.

The standard test for setting the L dial is to apply a 50-volt r.m.s. a.c. signal through a 10,000-ohm resistor to Pins 3 and 8, as shown in Fig. 2, when A is set at 8 and B is set at 5. Then pressing AMP., you should read 1000 micromhos on all scales. It was found that on five units tested, the G_m setting did not vary by more than 2 divisions at the most. The knob was loosened and set to line up to the G_m marking. This established the correct setting for G_m.

The most important bias or R settings can then be established using a 0-100 dial plate and using the 532 settings, or by using the 0-82 range of the I-177, and setting the dial at 82 percent of the 532 chart value.

The finding of the G_m point and the newer bias settings are the most important data for updating this tester.

Another source of R settings is the data for the military type TV-7 series, for amplifiers. However, the data is only good for ranges "B" and "C" corresponding to the 0-3000- and 0-6000-micromho range. By the addition of three resistors in the signal line, as shown in Fig. 3, you can extend the range to 0-15,000 and 0-30,000 micromhos, using test data from the TV-7 series. However, tubes marked "Press

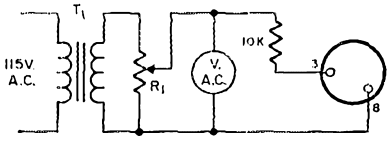


Fig. 2—G_m calibration setup. T_1 should deliver 50 volts or more. Voltage-adjusting control, R_1, should be 10,000 to 50,000 ohms.

diode and G_m button" use a lower 56-volt tap, and are not directly comparable in settings. However, many of these types are listed under the old tube-chart settings.

Additional data is as follows:

1) Set A to 8, B to 5, and R to 0.

2) Adjust line-voltage adjustment to correct setting.

3) Using a 1000-ohms-per-volt meter switched to a d.c. range above 150 volts, place minus meter terminal on 8 and positive on 3. Press AMP. and read +150 (±5) volts.

4) Place positive lead to Pin 4 and press AMP. to read +130 (±) 5 volts.

5) Place positive to 8 and negative to 5 and read 0 volts; then rotate R to maximum and read +40 (±2) volts.

6) Using the same pins as in (5), but reading a.c. at 1000 ohms per volt, with R at 0, read 5 (±0.3) volts a.c.

7) Same as (6), but press DIODE TEST and read 18 to 20 volts a.c.

8) Same as (6), but press RECTIFIER and read 170 (±5) volts a.c.

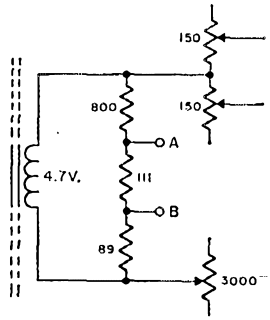


Fig. 3—Modification for increasing G_m range with TV-7 data. Reference is to the 4.7-volt winding on the tester power transformer. Tap A should be used on Range D, Tap B on Range E.

9) Same as (6), but press GAS 1 and read 170 (±5) volts a.c.

10) Same as (6), but press 024 TEST and read 330 (±15) volts a.c.

This covers all the calibration data. Additionally, I would like to mention that of five of these units tested, two showed a tendency to oscillate, particularly when using the MX-949/U adapter, when testing high-gain tubes. One caused TVI when testing 6L6s.

I am hoping that this information will settle once and for all the need for the calibration data for this unit. — *Thomas B. DeMeis, W2ZHN, ex-KZ5TD, 114 Colwick Drive, Somers Point, N. J. 08244.* QST

February 1942

. . . This issue is pretty full of dope concerning the role of the amateur in Civilian Defense. Some re-activating of amateurs has taken place for special services where local or state authorities have requested such service. By and large everything is in a state of confusion but there are signs that an orderly plan is being developed. OCD is issuing a special publication dealing with amateurs. Portable-mobile operation is stressed. The recent and continuing articles in *QST* on equipment for this service are timely. By special permission, W1AW is broadcasting up-to-the-minute dope.

. . . Byron Goodman, W1DX, describes antennas for 112-Mc. mobile work. These include quarter-wave jobs as well as half-wave doublets and even a four-element knock-down beam. The latter is the work of Bob Chapman, W1QV, presently New England director of ARRL.

. . . George Grammer, W1DF, has an article on modulators for CD gear and a carry-all table is described. The good old 6L6 plays a prominent part.

. . . The New Rochelle (N. Y.) defense net-control station is described by Walter Stiles, W2MBS. A feature of the operation is the continuous emission of a carrier on 116 Mc. This is made identifiable by the emission of a 400-cycle tone for five seconds every two minutes. 12 identical transceivers are located at strategic points. The procedure is for the "field" station to tune in the master control station and the switch to the operating frequency which is 50-kc. lower. The master station always has a receiver tuned to this frequency. Field stations must receive permission from the master station for communicating among themselves.

. . . George Bailey, W1KH, has been appointed assistant to the Chief of Communications for the District of Columbia. He was ARRL's president.

. . . America's farthest north ham station is described by Stanton Bennet, K7BUB, of Point Barrow, Alaska. The pictures show this to be a pretty bleak spot but comfortable enough inside. There is picture of K7ARG's owner, in his shirt sleeves.

. . . Another article on hamming the far north, by August Hiebert, K7CBF, describes the doings of the Arctic Amateur Radio Club. The pictures show twenty-four members, some decked out in parkas, and some of the individual members including Mrs. Mary Bramhall, K7IGG, complete with snow-white parka and winsome smile.

. . . Irving Vermilya, W1ZE recalls memories of old WCC at South Wellfleet, Cape Cod. He says that the 30-kw. rig was keyed in the high voltage secondary by means of a massive key along with a blast of air to blow out the resultant arcs. Primary was kept closed all the time! — *W1ANA*

Hints and Kinks For the Experimenter

IMPROVED LOADING FOR THE SB-34

On 3.5 Mc. the loading capacitor in my SB-34 transceiver had to be turned completely counterclockwise in order to fully load the transmitter. Changing C_{75} from 1100 pf. to 1300 pf. cured the problem. C_{75} is found mounted on the bandswitch, S_{7A}, inside the bottom of the final amplifier cage. — *Robert W. Lewis, K8KNI*

USING SCAFFOLDS FOR ANTENNA WORK

If you are planning to erect, tune or repair a beam, you might simplify the job by renting a plasterer's sectionalized scaffold to put up alongside your tower or mast. If the tower is one of the crank-up variety, a three-section scaffold will give a working platform area at the "collapsed" 20-foot level. This allows antenna work to be done at a more desirable height above ground than that afforded by a stepladder and also gives sufficient room to install the equipment necessary for tune-up.

In addition to the advantages listed above, a scaffold is easy to erect, provides safe working conditions, can be used in a variety of applications and is inexpensive to rent. One person working alone can put up a 20-foot scaffold, consisting of three "knock-down" cells or compartments, in about 15 minutes. The platform working area, a minimum of 3 by 5 feet, can be fenced in with guard rails. Working from such a platform is much safer than making antenna adjustments while balancing on a ladder or clutching a tower. The scaffold can be erected alongside the tower, or it can be put up so that the tower itself is inside the framework of the scaffold. If the tower is adjacent to your house or garage, you can lay planks from the scaffold to your roof to form a walkway. If your roof is too low, build it up with scaffolding astride the peak of the roof and then install the walk-way planks between the two scaffolds. This makes element adjusting a cinch.

Rental cost depends on what you use. A 3 × 5 × 6½-foot section rents for about $1.50 per month per section plus a dollar or so apiece for the planks used for the work area and walkway. This amounts to roughly $10 per month for a 20-foot scaffold. Compare this to *one* visit of a "cherry picker" which may cost $25 or so. There probably will be a delivery charge if the rental company transports the pieces to your house.

Certain precautions should be observed if you intend to use a scaffold. Be sure that the scaffold is either separately guyed or well secured to the tower, if the tower itself is perfectly stable. Guying of the scaffold is recommended by the rental people (mine did anyway) if the height gets to be much more than 20 feet or so. Ask the rental company for complete instructions and possibly assistance for erecting and guying their particular equipment in the arrangement you want. Also, it's advisable to check with your local building inspector concerning regulations on the erection of scaffolds.

Check the yellow pages of your telephone directory for the scaffold rental company nearest you. — *W6ISQ*

TILT-UP FEET

To give my older rigs a more modern look, I position two wedge-shaped rubber door stops under the front edge of each chassis. The new rubber feet help to tilt the controls upward, making the dials and meters more readable. — *Robert C. Mayne, WA8KRH*

JUMPER PLUG SWITCH

Low-level r.f. switching may be accomplished by using a standard octal socket and a jumper made from an old FA-9 type crystal holder or an equivalent plug. After wiring the socket as shown in Fig. 1 and marking the contacts as to coil tap, the undesired section of the coil can be shorted by inserting the shorted crystal holder in the desired contact and either of the two other possible alternates. Leaving the jumper out altogether will allow the entire coil to remain in the circuit. The coil should be mounted close to the socket so that short leads may be used to keep losses down. — *Clement Paskus, K1DBA*

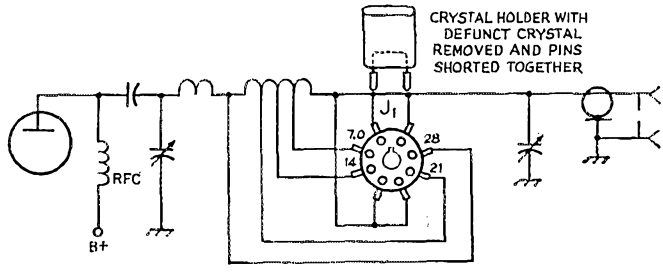


Fig. 1—K1DBA's inexpensive r.f. switch. J_1 is an octal socket and P_1 is made from a FA-9 or FT-243 crystal holder or an equivalent plug.

LIGHTWEIGHT INSULATORS

While recently working with "invisible" antennas, as described by W6RVQ in *QST* for November 1965, the use of porcelain insulators was found awkward because of their weight and size. The problem was solved by constructing insulators from expendable plastic bottles such as those used to contain bleach of liquid detergent. The bottles are cut lengthwise into strips of various lengths and widths, depending upon the desired use.

Fig. 2 shows two versions of the plastic insulators. The insulators required for an invisible antenna system do not have to support much weight, since the wire used is normally 28 gauge or smaller. A hole is drilled in both ends of each plastic strip and the wire looped through twice to prevent the antenna from cutting into the plastic. Larger insulators are reinforced on each end with an eyelet of the type commonly found in the XYL's sewing basket. Doubling the thickness of an insulator by paralleling two strips will give enough added strength to satisfy the requirements of most long-wire installations. — *H. A. Rideout, WA6IPD*

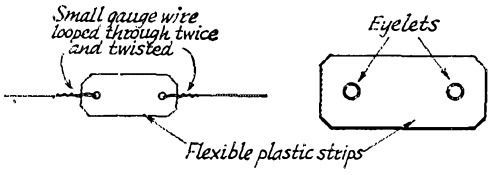


Fig. 2—Sketch showing antenna insulators made from discarded plastic bottles. The smaller insulator is employed in "invisible" antenna systems where the weight of the wire is not too great.

MOUNTING COMPONENTS ON PERFORATED BOARD

The following method of anchoring components to perforated circuit board has several advantages over the use of "flea clips." It eliminates the cost of clips, provides a tie point for several connections, and leaves component leads long enough for possible future reuse.

Pass the component lead through the perforated board, and coil the free end into a multiple-turn loop with the aid of a forked tool such as a small soldering aid. Tin the loop with solder. Insert the desired number of leads into the loop and solder the connection.

— *Melvin Leibowitz, W3KET*

IMPROVING THE HE 45-B RECEIVER

Improved receiver performance can be realized in the Lafayette HE 45-B six-meter transceiver by removing the 12BA6 r.f. amplifier stage and installing in its place a pair of 6CW4 Nuvistors in cascode. The modification takes about two hours to accomplish and should put "new life" into the receiver front end, both in noise figure and sensitivity. Fig. 3A shows the original r.f. amplifier circuit, and Fig. 3B shows the conversion.

Begin the modification by disconnecting the 10-pf. capacitor and 470,000-ohm resistor from Pin 1 of V_1. Do not remove these components, but just put them back out of the way as they will be used later. Unsolder from Pin 5 of V_1 the wire coming from the top of L_3. Remove both resistors connected to the cold end of L_3. Replace the 47000-ohm resistor with a 47,999-ohm unit. Unsolder the two heater leads from Pin 3 of V_1 and push these wires aside to be reconnected later. Clip the remaining leads going to V_1 and file down the rivets holding the socket until they are flush with the top of the chassis. Remove the socket, along with the components which are left on it. Save the parts for possible use in the new amplifier. Enlarge the socket hole with a one-inch chassis punch and make a small plate of $\frac{1}{16}$-inch aluminum to cover the opening. Mount two Nuvistor sockets as close together and as near the center of the plate as possible. After attaching the plate to the chassis, solder the two filament wires previously connected to Pin 3 of V_1 to Pin 10 of the second Nuvistor stage. Connect the loose ends of the 10-pf. capacitor and 470,000-ohm resistor formerly attached to Pin 1 of V_1 to Pin 4 of the first Nuvistor stage. The remaining wiring should be obvious from the diagram.

In my case, no adjustments to the receiver were necessary upon completion of the wiring, except to the "S" meter; it had to be zeroed again. However, depending upon the components used and their placement, it may be necessary to repeak both the input circuit and L_3. — *Shirley H. Davis, W2GOR*

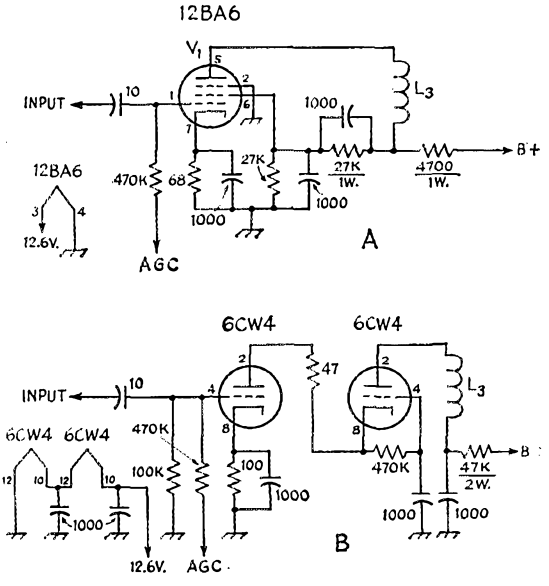


Fig. 3—Diagram of the receiver r.f. amplifier circuit of the Lafayette HE 45-B transceiver before modification (A) and after (B). All capacitances are in picofarads (pf. or μμf.); resistors are ½-watt composition unless otherwise spedified; resistances are in ohms (K-1000).

SOLDERING-IRON TEMPERATURE REDUCER

A ONE-AMPERE 200 p.i.v. diode, in series with one side of the a.c. line, will reduce the operating temperature of a small soldering iron for light work or standby service. In addition, the life of the tip will be markedly extended. The diode permits current to pass through to the iron during only one half of the a.c. cycle. As a result, the iron operates at approximately half power. The diode is connected across the contacts of a s.p.s.t. line-cord switch, as shown in Fig. 4. By closing the switch, the diode is shorted and the iron is brought to full heat.

— *W. P. Gearhiser, W5EPW*

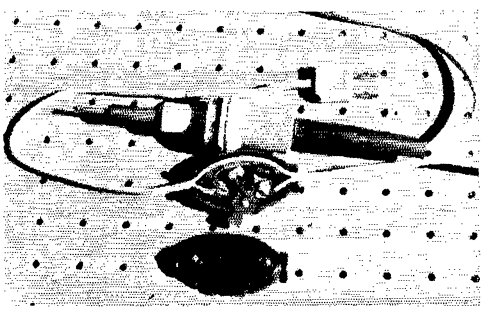


Fig. 4—The diode, shown mounted in the line-cord switch, will lengthen the life of the soldering-iron tip.

EQUIPMENT LABELING

MOST constructors of home-built equipment want to make their projects look somewhat commercial in appearance. One way of doing this is to use press-on letters to mark the various dials, meters and switches. The letters I employed were from sheets manufactured by the Datak Corporation of Guttenberg, New Jersey. Besides letters, this company makes sheets of numbers, punctuation marks, switch patterns, arcs and a variety of electronic symbols and titles. These markings are very neat in appearance, if applied with a little care.

Normally, press-on symbols are transferred by placing a lettering sheet over the desired area and rubbing the appropriate symbol with a ballpoint pen. However, titles are difficult to apply in crowded locations. Once attached to a panel, symbols can't be removed without being destroyed. If a press-on title hasn't been positioned in the desired fashion, another title must be used. I have found an easy method of applying these letters such that titles can be affixed to awkward locations on the equipment with relatively little difficulty and can be removed easily and reused, although not too many times.

The first step is to apply a piece of clear cellophane tape, with the adhesive side down, to a smooth surface such as a Formica table top or a piece of glass. Extend the tape over the edge of the table. The length of tape depends on the number of letters or titles required for the job.

By using guide lines, the letters can be applied evenly. The guide lines may be pressed on either the tape or the table top. I prefer to put the lines on the tape; then there is no need to scrape the lines off the table when the labeling has been completed. For a small job of a few letters, it may not be necessary to use the guide lines; however, this depends on the experience of the person doing the lettering.

After all the letters are transferred to the tape, put a second piece of tape over the first, keeping both lengths of tape parallel and smooth. Cut the second piece of tape an inch shorter than the first, being sure to cover all the titles. The result of this operation should be a lamination of the tape with the letters in the center. Loosen a few inches of the tape from the table by pulling upward that portion of the tape that is left extending over the edge of the table. It is best to handle only about four or five inches of the tape at a time; otherwise, the tape can get badly tangled. Cut off the titles as needed, leaving behind any excess tape or guide lines. After applying the titles, it isn't necessary to use any type of protective coating such as lacquer, since the letters are safeguarded by the cellophane tape. If desired, the titles can be removed and repositioned or used elsewhere by just peeling the tape and affixing it to the new location.

— *Jerome F. Pumo, WB2MDR*

TIGHTENING LOOSE SPRING-LOADED TELETYPE KEYS

SPRING-LOADED keys, commonly found on teletype machines, frequently become loose. By reforming the concave dimple on each side of the key, a tight fit can be made between the key and the key lever. As illustrated in Fig. 5, a small center punch should be used, the key being placed on its side on a table top and one or two light blows given with a hammer. Do not bend the bottom edge of the key in an effort to correct the looseness. An examination of the key will show that the key lever is grasped above the dimple and not by the bottom edge. When removing a key from the machine, push the key down and rotate it one-quarter turn before pulling the key off.

— *Ken Thompson, W5IFH*

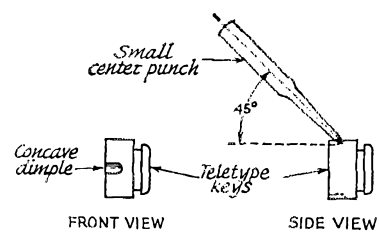


Fig. 5—A tighter fit can be had between a teletype key and a key lever by reforming the dimple on each side of the key.

Life In Mars

Some Facts About The Military Affiliate Radio System Part I

BY HERBERT W. GORDON,* W1IBY

THE history of MARS goes back to 1925 when the AARS -- Army Amateur system — was established at Fort Monmouth, N. J. It was discontinued in World War II years and reorganized as Military *Amateur* Radio System by both the Army and Air Force in 1948. Later on, the organization was changed to permit individuals who were not members of the military but who were at least 21 years of age, and who had been licensed as amateurs by the FCC, to participate in the program. A further modification permitted individuals 16 years of age, with their parents' permission, to join. The name of the organization was changed to reflect this nonmilitary recognition and it became known in 1952 as the Military *Affiliate* Radio System.

When the Department of the Air Force was created as a separate entity, the Air Force MARS organization came into being. In January of 1963, the Navy Department recognized the merit of the MARS program and authorized its own MARS so that today we have an Army, an Air Force, and a Navy MARS organization.

Purpose

Aall three agencies have common purposes: To create interest, promote study and experimentation, and further training in military radio communications. To coordinate practices and procedures of amateur radio operations with those of military radio communications. To provide an additional source of trained radio communications personnel. To provide a communications system able to handle communications in the event of a local disaster or national emergency. To maintain a flow of morale traffic between our servicemen and their homes.

Despite their common goals and substantial use of common procedural practices, there are differences in the administration of each organization and small differences in the daily operation of each group.

Because each of the branches of the military have their different primary purposes it follows logically that their respective MARS organizations are patterned administratively and operationally around their own particular need. Thus, for example, the Army MARS command in the United States, and amateurs in any given area, are responsible to the MARS Director of their respective Army command. In the Air Force, all of the individual members come under the control of the Air Force Communications Service (AFCS) which is the Communications branch of the Air Force similar to the Signal Corps in the Army. The Navy MARS would fall within the control of the respective Naval districts.

Differences Between MARS Organizations

The Army MARS Organization. The Army MARS program is controlled by a MARS Director at each continental army with headquarters in the respective army commands throughout the country. Each Army group has authority for a certain number of states or regions, and each state in turn has its own civilian State MARS Director — (SMD) — who establishes nets, appoints officers or net control stations (NCS), and net monitors, and arranges for the distribution of obsolete equipment. The individual member joining Army MARS will be assigned to a state net and his first obligation will be to that net. He may subsequently participate in area or regional nets provided his obligations to his state net have been met. In the Army program, each individual is required to maintain an account of his own activities and this is sent in monthly as an activity report card direct to Army Headquarters or Army Command MARS Director. (First Army members only send to State MARS Director.) This accountability includes the number of messages originated, relayed, and delivered with hours expended on the air, etc. Distribution of excess at the state level is usually done in accordance with the need of the individual involved and the degree of overall performance which that individual contributes to the program. The nets include c.w., RTTY, and h.f. and v.h.f. traffic nets, and there is a goodly amount of traffic passed. Basic assignment is made to an intra-state net. Occasionally, there are meetings at Army bases or hamfests where members can get together and meet one another. The principal frequencies used by Army MARS are just to the top of each of the various amateur bands; e.g. 4020, 4025, 4030, and 4035 kc. Army MARS has considerable sideband and v.h.f. activity. There are approximately 6400 Army members in the organization today.

Army conducts an R&D program with selected individuals who are given special consideration in the issue of sophisticated and unusual excess equipment in their R&D fields.

Army also offers members free enrollment in the electronic-communications courses of the Army Signal School at Fort Monmouth, New Jersey. These excellent courses range from basic

* Woodchuck Hill, Harvard, Mass. 01451

mathematics to pulse techniques and cover practically every phase of radio theory. Thousands of Army members have availed themselves of these courses. Current enrollment is in excess of 600 members.

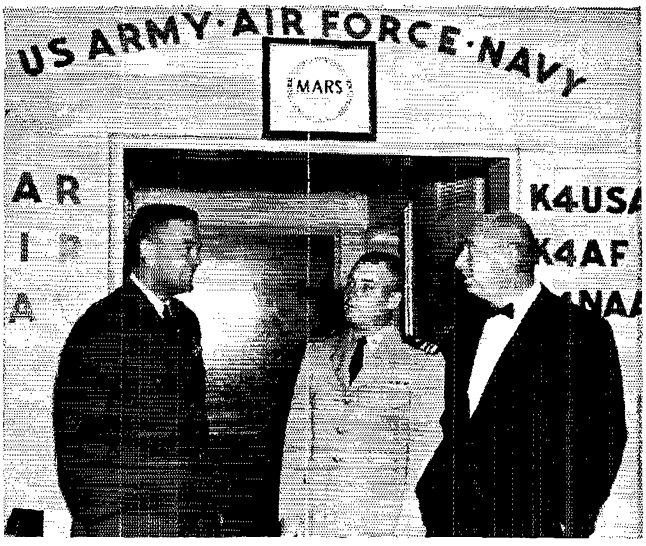
The Air Force MARS Organization. The individual member program of the Air Force is under the control of Air Force Communications Service (AFCS) with headquarters at Scott AFB, Illinois. The AFCS has divided its MARS responsibilities into three major continental areas — the Eastern Communications Region, the Central, and the Pacific. Each of these regions has its own MARS Command who in turn delegates authority through civilian state Directors who, like the Army, set up or initiate their own nets on both h.f. and v.h.f. Nets comprise RTTY, c.w., and high-frequency sideband. The frequencies generally available are likely to be some distance away from the amateur bands. Popular Air Force frequencies are 3183, 3295, 3347, 3365, 4560, 4595, 7540, 14405, and 15515 Mc., etc. Being military frequencies, they are likely to be shared with other military organizations and being discrete in frequency, they require closer tolerance operation than is normally required in the ham bands. Individuals going into the AF MARS organization usually take training in one form or another. This training is given on the air over a period varying from 6 to 10 weeks of 2 hours each, and when an individual is considered competent, he is awarded a certificate of proficiency and allowed to join a net of his choice. Basic net assignment is to an h.f. area net or a state v.h.f. net. These nets are not confined within the states but are regional and area-wide in scope. The Air Force has a very intricate system of h.f. and v.h.f. activities which provide for a widespread distribution of traffic. The emphasis in the Air Force is on traffic. While it attempts to achieve an order of procedural excellence, its first emphasis is on reliability, then accuracy, then speed. Like the Army, distribution of excess is generally made to those deserving of it for participating on an active basis. Both the Army and the Air Force require a minimum of participation credit which appears as hours per quarter of the year. Generally, within the Air Force, assignments are made for one-hour slots on v.h.f. twice a week, or two-hour slots on h.f. once a week. Unlike the Army, it is more generally possible for an individual to check into area or regional nets; *i.e.* certain nets exist each night between the hours of 7 and 11 P.M. and depending upon the time the individual has, he is free to check into any net of his choice. Accountability within the Air Force is done at the state level and presupposes that individual NCS or net managers will have kept a record of the participation in their respective nets. The most elite of the Air Force nets is the TRANSCON which operates daily and evenings for stations spanning the country. Only the best operators whose ability has been recognized are invited to join this net. Frequency tolerances are closer and each individual member is really a communications expert. The Air Force MARS organization including the various theaters of command comprises over 11,000 members and has a very extensive number of amateur stations located at different bases throughout the world who join in with the individual member program both day and evening. A vast amount of traffic is carried on by the Air Force. This third-party traffic is morale boosting and generally helpful but not otherwise to be considered as competitive to Western Union or American Telephone and Telegraph. Since July 1, 1966, all high-frequency nets have been exclusively sideband. V.h.f. nets will remain on a.m. or RTTY.

The Air Force MARS includes a MARS technical service furnishing various bulletins or newsletters, publications on training, and active liaison with the Air Force officers throughout the world. The AF MARS Technical Service and many of the individual members are not only working on today's USAF MARS, but are working toward tomorrow, too. They have designed and built miniature and subminiature parts, complex special circuits, experimented with u.h.f. and satellite tracking and moonbounce, and with high-speed narrow-shift teletype. A group in Texas is working on digital communications for MARS use. These aspects of the future of MARS are worthy of mention. There is also a MARS Youth Training Program.

The fact that a separate and distinct Air Force Regulation, AFR 102-4, has been published, which deals exclusively with amateur radio and urges all levels of USAF Command to support it, shows how much the Air Force appreciates the amateur service.

The Navy MARS Organization. The newest member to join the family was organized 2 January 1963 and has a membership of approximately 5500.

The organizational structures of Navy MARS is along the lines of Naval Districts. Naval Districts located within the continental United States consist of two or more states. The 6th, 8th, 9th, 11th, 12th, 13th, and 14th Naval Districts



Three MARS chiefs at the Pentagon installation K4USA/K4AF/K4NAA: Major Richard B. Wareing, K3AKK, Air Force; Lt. Comdr. Robert E. Mickley, Navy; and Edward S. Liscombe, K4KNV, newly-appointed Army MARS chief. Morale traffic with Viet Nam is a major activity at present.

each have an active duty Navy MARS Director assigned. In addition, one Director is assigned the responsibility of the 1st and 3rd Naval Districts and another Director has responsibility for the 4th and 5th Naval Districts. These Navy MARS Districts, headed by a District Director, are divided into Navy MARS areas which may be geographically composed of a state, a group of states or a portion of a state. Normally, boundary lines within a state follow county lines in order to facilitate delineation. Leadership responsibility for Navy MARS at the area level and below is on a volunteer basis. Area Coordinators are appointed by the Chief, Navy MARS. The Chief, Navy MARS is Lieutenant Commander Robert Mickley.

There are variations in the operation of the Navy MARS program. For example, Navy callsigns start with the prefix NØ and are prearranged according to a schedule made out in advance for each area. The following callsign blocks have been assigned for Navy MARS use:

NØAAA — NØAZZ
NØEAA — NØZZZ

Callsigns are assigned without regard to station location.

A typical Navy MARS frequency is 7301 kc., just outside of 40 meters. Other Navy frequencies are 49.692 Mc. just below the 6-meter band and their most popular frequency is 4015 kc. for c.w. and s.s.b. evenings and weekends, and 4012.5 kc. for c.w.

The individual Navy MARS member will not have to keep records himself, as does his counterpart in the Army MARS. His state coordinator files a report on his activities based on the report of the respective net control station.

Navy MARS messages are classified or unclassified, and the first word of each Naval message following the break is of necessity "classified" or "unclassified." Another distinct difference is that Navy MARS is not obligated to use the word "signed" and then the signature. They end the message, insert the signature, and then say the word "sends." The "signature" and the word "sends" are similar obligations. Navy MARS currently has v.h.f. and h.f. nets established throughout the continental United States with very little exception. In areas where Navy MARS membership is sparse, the use of MARS inter-service traffic transfer points is encouraged, that is, you may expect to find in certain areas, tie-ins from Navy members on the Air Force nets and vice versa in order that adequate coverage may be provided. In common with the Air Force and the Army, the Navy procedures are patterned after ACP 124, 125, and 126 and the Navy likewise uses the ICAO phonetic alphabet. Their manual is DNC-8 plus supplements issued by the Director of Naval Communications, and their orders of precedence are the same as the Army and the Air Force.

The Navy expects a minimum of 6 hours of participation per quarter. They likewise have one hour per week of basic assignment. Navy MARS broadcast originates from NAV (located at the site of the old Navy Radio Arlington, NAA) each Friday at 0100Z and 0300Z (Thursday evening local time) on frequencies 4015 kc., 7301 kc., and 14385 kc. RTTY transmission of broadcast is followed by c.w. transmission at 25 and 13 words per minute.

Their set-up per district or area is very similar to the Air Force and the Army. They do not yet have established training courses or experimenter's nets as do the Army and the Air Force.

Navy MARS nets use c.w. and s.s.b. although they will use RTTY very frequently.

Because Navy MARS is so relatively new, they are not completely organized in many parts of the country and are actively enlisting the support of their many amateur friends. If you are a typical American family with a broad sense of attachment to the Navy, you will try to strengthen their position by joining Navy MARS. (Part II will appear in a subsequent issue.) QST

A Visit With Soviet Hams

VU2TV At And Around UL7KAA

BY T. V. GEORGE,* VU2TV

The author with UL7GQ at the club station, UL7KAA, in Alma-ata, Kazakh, SSR.

It is indeed a very rare chance to explore the remote corners of U-land. I have been very fortunate to stay at the capital of UL7-land for some days. The capital city, Alma-ata, is a familiar QTH to all active DX hams, especially those who have worked the club station, UL7KAA. I faced a bit of difficulty to come across the local hams there, mainly because hams are few around the southern part of USSR. The local hams were extremely hospitable all through my short stay at the city. I was quite unfortunate as I could not spare time for many requests to visit the local shacks. Still I was able to collect many interesting bits of information about amateur radio there.

In the USSR, the term radio amateur has a much wider meaning than it does in other places. It includes not only hams, but also those who build or experiment with radio, TV, tape recorders and even record players. The amateur-radio activities are generally brought about within the country through the local radio club activities. In general, the clubs are of two different natures. The first type are club stations which are attached to schools, colleges, and institutions. These are quite similar to the types of clubs which could be found anywhere else.

The second variety of club is of an interesting nature. They are called the "Pioneer Schools." These schools cater to, teach, and assist the public in different hobbies. Even a small town has a Pioneer School with its own instructional and maintenance staff. Most of these schools have amateur radio clubs, also. The amateur radio club within the school is responsible for the training of new hams. There are no fees for becoming a student of the school, but as a ham, a fee of 30 kaupecks is paid to the Amateur Radio Society. This amount is mainly for QSLing. The amateur club at the Pioneer Schools provides all facilities to learn and practice code and other subjects required for the radio examination. They also have well-equipped workshops for the new ham to construct his own equipment. The club station runs the local QSL bureau for its members and it distributes free picture-QSL cards to members for their personal station use. That is the reason why we find a lot of the U-land QSL cards are similar. Also, surplus electronic equipment is received by the club from the government authorities for use at the club station and distributed among the active members.

These clubs also have their own stations which are very active on the air, mainly because one of the staff members is responsible for operating and maintaining the club station along with the assistance of local members. These clubs operate even around the clock during contest periods. The club stations have call signs with five letters and one region numeral, which is always followed by the letter K. For example UA3KAA is the Pioneer School club station near the Moscow University.

The personal calls of hams other than Novice class are comprised of four letters and one numeral, such as UL7GQ. These are for the General class and Advanced class of amateurs. But the Novice class of operators have their calls with five letters and one numeral, and they operate only on 10- and 2-meter bands.

During conversation with the local hams I learned that there are at least 2000 new hams licensed every year throughout the USSR. According to the Soviet Union *Call Book* of 1959, the total number of ham licenses were 5948 out of which about 1300 are club stations. I could not obtain the latest *Call Book* but I estimate that the total number now cannot be more than 15,000.

T.V. George, VU2TV, recently made a trip to the Soviet Union where he spent some of his time visiting with radio amateurs of that country. Here are some of his observations and experiences. We feel that part of the appeal of VU2TV's article is in its writing style and so we are reproducing the article just as he wrote it.

*3205 Sector 27-D Chandigarh, -2, India.

The exams are conducted for different grades of licenses by a committee of locally elected office bearers of the club at the Pioneer School. This committee in turn advises the local inspectorate of electrical communication for the issue of license. It is most surprising that the standard of code and operating procedure taught is much above the ham standards in most other countries. For example, a Novice should be able to receive and send 75 characters per minute before he could obtain a license for operating on 10 and 2 meters. This insures excellent operating speed and efficiency on the air. A Novice has to complete two years of experience before he is authorized to appear for the next general examination.

Once a candidate passes his examination, he is authorized by the local club to construct his complete rig before he is issued the license. It is almost compulsory for all the new hams to construct their transmitter with help from local clubs or from friends who could spare old disposal receivers. At present it is very difficult to find any disposal communications receivers for sale, and there is no communications equipment sold on the market. Some Novices try their hand at a few of the receiver kits which are meant originally for domestic purposes. A new constructor obtains maximum help from the local Pioneer School for constructing his equipment.

After the shack is ready to operate, the local club authorities visit the shack and confirm that the equipment is worthy enough for operating.

The author visited the shacks of several Soviet radio amateurs. Here he is shown with UL7GQ and his son.

Only after this the license is issued for operating the shack. There are no license fees paid by the holder to the government.

A typical shack around UL7 land consists of a receiver, usually war surplus. They are mostly AR-88s, BC-348s or their own U-land disposal receivers. Most of the hams prefer, and very much long, to own an AR-88. The personal ham station invariably includes a self-made transmitter. The workmanship adopted by most of them is excellent and quite professional to look at. Most of the s.s.b. rigs have fine features such as spotting, VOX, and even multiband operating capabilities. Only the club stations possess factory built transmitters, and most of them seem to be BC-610s.

Bugs or semi-automatic keyes are very rare among the Soviet hams. Electronic keyers are very popular, however. These are one hundred per cent home-brew jobs with valves or transistors. I found one of them at the shack of UL7GQ the armature of which was made from a flexible hacksaw blade.

Mostly all the U hams suffer from their shack accommodations. It is very rare to find a complete room spared for a ham shack and most of the equipment is rigged up in the corners of rooms with only one or two tables, since most of the people live in 2 or 3 room flats. I was surprised to find a Novice sharing the kitchen with his mother for his shack!

Around UL7 land, it is very rare to find a beam or an elaborate antenna system, as most of them fall short of space and difficulty for proper supports. They mostly use only a dipole, ground plane or a long wire. Feeders are coaxial or ribbon cables.

In the southern part of the USSR, the ham activity is mainly concentrated within the c.w.-h.f. bands. They are a bunch of enthusiastic hams for contest and DX operation. Another popular activity is the fox hunt or hidden transmitter hunt which is conducted in the summer. This has the status of a very legitimate and serious sport. This hunt is always conducted on foot so that physical fitness is as important as the direction-finding equipment which they carry on their backs.

In the southern part of the USSR they do not come across many foreign ham magazines. In fact, finding magazines, manuals, and other publications is difficult. I could find only one monthly magazine concerning amateur radio and electronics in general. This is named *Radio*, and had its first publication in August 1914, with the name *Radio Amateur*. This monthly magazine looks more like a general electronics experimenter's magazine than a ham publication. It contains some of the latest contest news, general articles, and some articles on construction. But most of the articles do not directly concern hams. There is a "Radio Amateur's Handbook," although it is not as extensive as the ARRL *Handbook*. This publication is not published every year. An interesting chapter in this Handbook deals with the common English words used on the ham bands. Here about 100 English words with their meaning in Russian and their English accent in Russian are given to assist the operator who does not know English.

My stay in the USSR was too short and I could not share much time in company of local hams. The hospitality and friendship of the Soviet hams were overwhelming and the experience of meeting many of them will not be forgotten. The memories of days passed along with the members of UL7KAA and, in particular, with UL7GQ, UL7GL, and UL7AVH, will linger forever in my memories. QST

TVI Committee Operation

BY DAVID L. HELLER,* K3HNP/W5NFJ

TVI is considered by most amateurs as a persistent obnoxious problem. It needn't be that at all. Interference can be turned our way to become a means of securing added publicity of the value and abilities of amateur radio operators. This is the basis of the Bucks Interference Committee.

The Bucks Interference Committee is operated by Penn Wireless Association, Inc. It serves the segment of Bucks County, Pennsylvania, between Trenton, N. J. and Philadelphia, centered on Levittown.

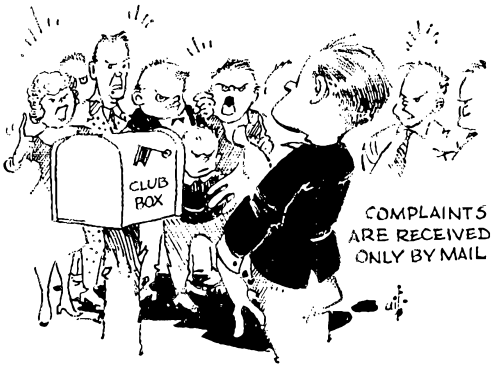
This area has two features which make it a true hotbed of TVI. First, the amateur and other radio population is well above average; in fact, it would seem to be near the saturation point. Second, all but one of the v.h.f. TV channels are occupied; channels 3, 6 and 10 are local, about 30 miles away; channels, 2, 4, 5, 7, 9, 11 and 13 are New York City, about 70 miles, and channel 12 is in Wilmington, Delaware, about 50 miles. Those New York channels are a bit too far for consistent decent reception. Nonetheless, everyone wants to get them with insufficient receiving antennas.

The Committee, headed by the writer, has evolved ground rules for both the transmitter operator and for the complainants. An amateur must refer complaints directly to the committee without attempting to service them himself. Otherwise, the Committee may decline to service his cases. Amateurs are instructed to tell any complaining neighbors only, "Write Box 311, Bristol, giving your name, address and phone number." They may add some comment about how help will be forthcoming if the complaint note is written — but that's all. They are not to enter into any discussions, regardless of how friendly the complainant's approach.

Interference complaints are received only by mail through the Club's post office box. Occasionally a complainant will obtain a Committee phone number and will call. Such calls are not recorded, and the individuals are instructed to enter a written complaint. The simplest procedure has been to maintain listed phones and publicize them, with the instructions as above. The obnoxious and anonymous calls don't come to the Committee — after all, it's the "disinterested third party that actually wants to help!"

* 14 Darkleaf Lane, Levittown, Pa. 19055

Actual committee operations for specific cases are routine. The complainant is phoned immediately on receipt of his letter and enough questions are asked to indicate there is interest in his case. An appointment to check things out is usually made at that time.



The complainant can usually give enough information on the initial phone call to enable the Committee to identify the source of the interference. Occasionally it is necessary to instruct him to log exact times, dates, calls heard and exact types of troubles on what channels. Ultimate identification problems have been very rare.

All data that can be obtained on the phone are entered on the case report form, 7.[1] This form 7 is a letter addressed to the District FCC Engineer describing the sets involved, the extent of interference, the condition of the receiver and antenna, the recommendations made, and listing other forms to be left with the complainant. The case number assigned by the Committee plus the FCC case number, if any, are maintained on form 7.

The first step in any case is the checkout of the transmitter. The TV set in the house with the transmitter is observed by the Committee during operation on all normally used bands. At the same time the complainant is requested to verify simultaneous interference. The transmitter check is recorded on form 12 in triplicate, with copies to FCC, the station operator and Com-

[1] A complete set of forms used by Bucks Interference Committee, presently 9 sheets, will be mailed for 25¢ coin or 30¢ stamps.

Here is the way one group has tackled the TVI problem. The methods outlined in this article will not necessarily work for every community, but they do show the basic operation of a typical interference committee. Some of the ideas may be of help to those starting a TVI committee or to those already in existence.

mittee files. The result of a voluntary check of licenses and logs is also entered on form 12.

If the transmitter is not clean at home on the channels involved in the complaint the operator is requested to make needed changes before the check can be continued. He may of course request advice or assistance from the Committee. If he apparently has troubles not concurrent with the complainant he is advised to clean up further but the check continues.

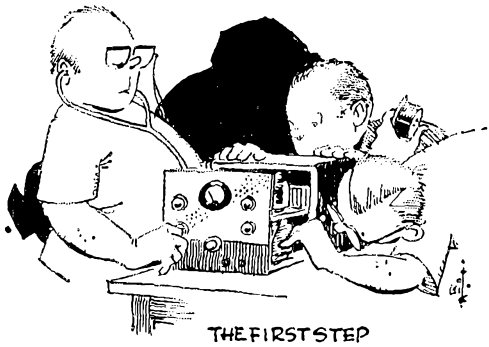
The complainant is then visited. Introductions are facilitated by form 9, a description of the background and operations of the Committee. The serial and model numbers of the affected sets are recorded and the apparent condition of antenna and sets is noted.

The transmitter operation is then directed by phone and the interference verified. Initial corrective measures will generally be obvious to the Committee representative. The receiver in decent usable condition can inevitably be de-TVI'ed by installing a Drake filter, replacing a defunct antenna, or both.

All recommendations are listed on the back of form 9, and additional forms are read to the complainant and left with him as indicated. Separate sheets describe filter installation (form 10), TV antennae and lead-in (form 18), audio rectification (form 11).

Where filters are indicated, filter request letters are completed and endorsed, and the complainant is given a list of manufacturers' addresses for obtaining free filters (form 8).

The entire process of verifying the interference and reading from the form letters needed for a particular case can be completed in fifteen minutes. Frequently, however, the ex-complainant will wish to know more about amateur radio. A short discussion followed by an invitation to the next Club meeting completes the conversion of an irate TV viewer to one aware of the rights, restrictions and community value of amateur radio.



THE FIRST STEP IS THE CHECKOUT OF THE TRANSMITTER

Many cases are followed up by phone about six weeks after servicing. Some will not bother following any of the committee recommendations, either through complete apathy or bad advice of servicemen. Most will have accepted the suggestions and will have found reception improved and interference either eliminated or greatly reduced. Where the complainant reports unsatisfactory results, the follow-up inspection normally shows the workmanship of repairs or filter installation to be grossly defective. QST

• New Apparatus

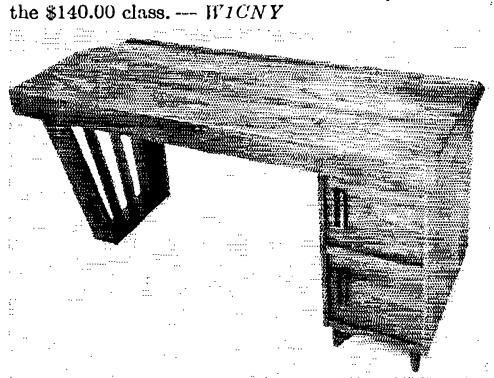
Design Industries "Diplomat" Operating Desk

Design Industries, Inc., of Dallas, Texas, manufactures a line of communications desks aimed at the amateur who wishes to have a good-looking piece of furniture for his home or office. The "Diplomat" model shown here is one such desk.

Finished in dark walnut and attractively styled, its features include a tilted top surface to keep your equipment at correct eye and operating angle; a deep cable trough to allow easy access to cables and connections; three drawers for plenty of storage space; and according to the manufacturer, it is "wife-approved."

Sold as a kit, the unit comes packaged in two pieces: the drawer cabinet and opposite leg in one, and the equipment surface in the second. Construction involves only the placement and tightening of five bolts, three for mounting the drawer cabinet to the equipment surface, and two for mounting the opposite leg. The only tool required for this construction is a screwdriver. From unpacking to completion, the total time involved is 30 minutes.

The "Diplomat" model communications desk measures 30 inches high, with a 28-inch top surface depth, and is available in either 48-inch or 60-inch widths. It "accommodates Collins, R. L. Drake, Galaxy, Hallicrafters and most other modern equipment," according to the manufacturer, Design Industries, Inc., P.O. Box 6825, Medical Center Station, Dallas, Texas 75219. It is available only through authorized distributors. The price is in the $140.00 class. — *W1CNY*



Serious DX men enter a DX contest generally for one of two reasons . . competing to win or in quest of new countries. This article is addressed to amateurs in either of these categories, not particularly to the casual operator who enters the DX contest for random contact with DX stations. While operating techniques for both the country seeker and the high scorer are parallel in many areas, they are sufficiently different to discuss independently.

It is simpler to advise the man looking for new countries, because here the techniques are more or less the same in all parts of the world. Part I will cover these techniques.

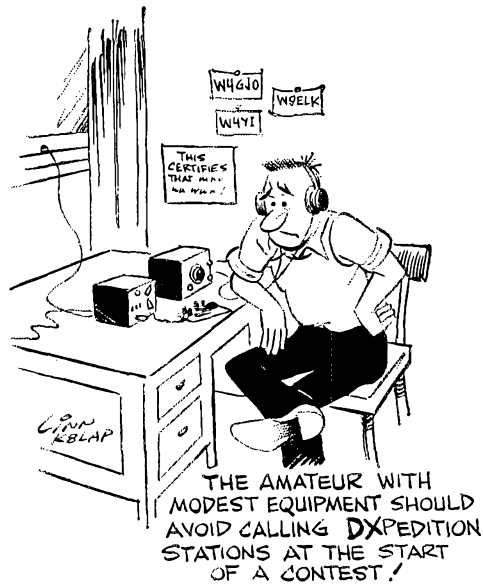
How to Operate in a DX Contest

In Two Parts—Part I

BY LAWRENCE Le KASHMAN,* W9IOP

THE easiest of the new countries to add in a DX contest are those represented by amateurs on a DX expedition for the purpose of putting that particular country on the air. These stations put in the maximum number of hours. They can be counted on to operate consistently and to select the band which is best at any particular hour assuring optimum propagation. If your station is represented by good antennas and/or reasonable power, you can go after these countries at any time with assurance that if you don't work them on the first call, you won't stand in line too long. The amateur with more modest equipment would do well to avoid calling DX expedition stations until the contest has already run some reasonable course of time. By then, the pile-ups have thinned out. Frequently, the rare DX station is looking in vain for additional contacts. Of course, there is the delicate matter of good timing. Sometimes you can wait too long and conditions will alter to the point where that rare DX station can no longer be heard. If you use CRPL forecasts, which indicate satisfactory band conditions, and if WWV is reporting stable band conditions, then waiting is a safe proposition and will avoid a great deal of needless effort prior to making a QSO.

Importantly, as a general rule if you can hear the DX station well, the chances are enhanced that he will hear you well. If a rare station is on the threshold of noise, unless you have a fine station, you are wasting your time to call him. In a DX contest where many stations operate over protracted periods of time, you are way ahead of the game by planning carefully and watching as the signal builds up. There is no question that propagation paths follow a preset pattern which is predictable. The Europeans on 14 megacycles and, indeed, on all bands work the East Coast first, skip gradually lengthens to the central portion of the United States and then moves on across. While there are conditions and hours that find much of the United States working into the same portions of Europe, when the East Coast is giving a European station an S9 report and receiving similar high signal



THE AMATEUR WITH MODEST EQUIPMENT SHOULD AVOID CALLING DXPEDITION STATIONS AT THE START OF A CONTEST!

*Electro-Voice, Buchanan, Michigan 49107

strength reports, it is very unlikely that the average stations in other parts of the country will break through this electronic wall. The reverse is equally true. Pacific stations are going to work the West Coast stations first . . . gradually skip lengthens. You can always anticipate the stations around the Gulf Coast to have an earlier shot at the Pacific than the stations in the north central portion of the United States. By playing the odds with just reasonable planning, your effectiveness in working a new country in the contest and particularly an expedition can be greatly increased.

But what about the rare DX station, representing a new country to you, who is not being operated by a DX expedition and where his hours of participation are questionable? In this general category, most DX stations fall. You can quickly arrive at a modus operandi depending upon the rarity of the station. If it is truly a one-of-a-kind station, you have little alternative but to slug it out with the masses. Is ZD5M currently the only station on the air in Swaziland? By the rarity of the call, you know there is not much activity from that country and you need him! Assuming an average station installation, it is an absolute waste of time to call ZD5M until he starts to work stations in your general part of the country. If all of his contacts are concentrated in the 8th and 9th call areas, it's obvious his signal is skipping over the East Coast and he is not yet hearing the Western part of the United States. Signals from these other parts of the country are not reaching him. You may be hearing him — but unless you're in the favored skip area, the difference in signal strength is so pronounced and the pile-ups so thick that the loud stations will work him and the loud stations are not in your part of the country. Save your electricity under these conditions and wait until skip alters. Sad, but true, if he is already working stations at a greater distance, the best bet is to note his frequency and try again another day. Except under unusual circumstances, skip rarely reverses itself during the same day. Console yourself, at least you have the advantage of knowing the station is on the air with a reasonable chance he will be on the following day. Remember you started to listen for him too late.

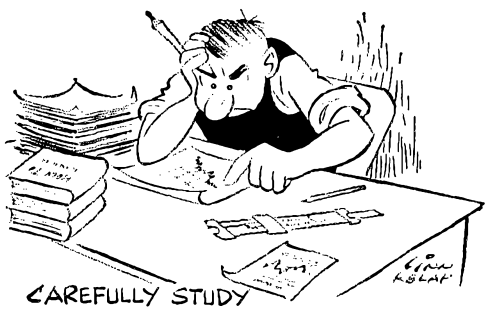
This underscores another important rule when looking for new countries in a DX contest. The first day of the contest is more important than the second day, because if you hear a station that you are not successful in working, it gives you a second opportunity. It also gives you an opportunity to study his operating techniques, to better prepare you for the onslaught.

Primarily this dissertation is addressed to the average DX man who is not yet in the "professional" category. On the assumption that the operator reading this material has not sharpened techniques to the point where he has experienced the full gamut of operators, it should be pointed out that hearing a DX station and calling him, even with a signal stronger than the stations he is working, is no assurance of a contact. If for example, the DX station is working "tail enders," to call him by the normal technique may deny you a contact. Remember that the DX station should always be in control of the situation. If he elects to work stations which are signing at the completion of his previous QSO, then you either follow this technique or you simply won't make a contact. Whatever the idiosyncrasy of the DX station's technique, you had better be wise to it or you're not going to make the contact. If you've done your homework well, and you have studied all of the variants on how to work a DX station, this will not be a problem to you. But if you're relatively new at the practice of working DX, spend some time listening before you call. It can be very rewarding.

A very important tip to remember is this. Conditions work against the average amateur on the low frequencies and work increasingly in his favor on the high frequencies. Let me give you a specific example to underscore this. On 7 Mc., the East Coast of the United States is frequently heard in Europe as early as 2100 GMT, or 3:00 P.M. Eastern Standard Time. European stations are occasionally heard in the Midwest as early as 2000 GMT, but the extent of their activity is limited to working the East Coast. Occasionally they might work an outstanding signal as far west as Ohio, Indiana, or Illinois; but this is the exception. As night falls and skip lengthens, QSOs beyond the East Coast are more common. But all the time the East Coast is heard in Europe with far greater signal strength, on an average, than any other part of the United States. This means that a relatively modest station on the East Coast is likely putting a better signal into Europe than a very excellent station from the Midwest. Assuming an average station in the United States, your chances of working a rare DX station on 80 or 40 during the contest is statistically enormously reduced compared to the odds on 20–15–10.

On the higher frequency band, particularly 15 and 10 meters, skip does not remain as widespread at all times. Naturally conditions

do not follow a precise pattern, but as a rule, skip conditions on the higher frequencies will change to a point where in many parts of the world they will be hearing only specific parts of the United States. When skip favors your region, that is the time to be calling the DX station. DX men who have operated on 15 and 10 meters during the better portions of the sunspot cycle can give testimony to the enormous signals which can be propagated with relatively low power and with relatively modest antennas. Fourteen megacycles, the most active of the DX bands, is a considerably more demanding band in terms of equipment. There are more, better equipped competitors on 20 meters than any other band. Propagation conditions, while competitively far superior to 7 megacycles, are still not as good for the average DX man as 15 and 10 when those bands are good. Again, let me give you a specific example. When I operated HV1CN in the 1965 DX contest, there were a number of excellent openings on 14 Mc. to the United States during which all U.S. call areas could be heard with fairly good signal strength. There were other openings on 14 Mc. which followed the traditional pattern, opening to the East Coast first and gradually moving westward. On 21 megacycles all of the openings followed the traditional pattern of moving from East to West. However, the openings were fairly sharp and there were times when, for example, only the 9th district could be heard. During this period of time, the QRM was not particularly excessive and virtually every W9 heard was worked. This included many stations of modest proportions who during this sharp opening had enormous signals at Vatican City. It is this type of opening particularly which favors the modest sized DX station and which must be sought after.



Another very important way to work DX easily, is to study carefully the CRPL forecasts. There are certain times of the day that certain paths are open with great predictability. Good DX men know it and are there at that time. But there are paths which open up predictably but at odd hours . . . very few stations are usually on at those hours. For example during the 1965 ARRL DX Test, the CRPL predictions showed a short, but sharp 28-Mc. opening to the Pacific at 0100 GMT. Few Americans bothered to study the prediction and as a consequence when VK2EO came booming through with a big signal, there were only a handful of stations there to work him. Anyone on 28 Mc. could have completed a successful QSO with VK2EO. Australia may not be rare but whether it was VK2EO or VK0MI or some other exotic prefix, the facts remain unchanged. In 1966 for example, the CRPL forecasts, as a rule, do not indicate that 14 megacycles during the late winter months is open all night. But during the DX contest, they did confirm that the band would be open all night to the Pacific. By going to 14 Mc. at the unlikely hour of 0600 GMT in the ARRL DX contest, it was only a few minutes activity to work a full quota of the more common Pacific stations. This is how you work DX the easy way . . . whether you have high power or low power, good antennas or average antennas.

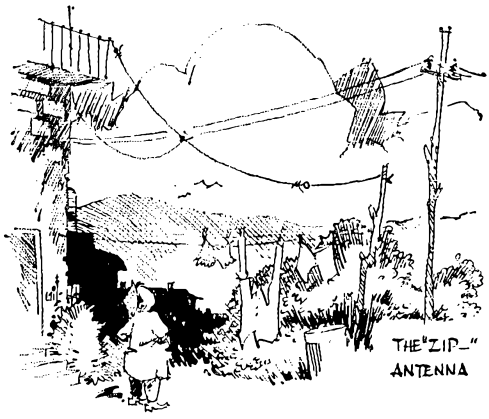
It is one thing to talk about rare and exotic DX where the prefixes are heard infrequently and where the competition is fantastic. But for many DX men the "medium rare" station still represents new countries and there is a technique to working these stations more quickly and more easily in a contest. If it is a contest with a specific country quota, your efforts can be directed indiscriminately to any station you hear in a country you have not worked. As the "big guns" fill their quotas, it becomes easier and easier to work these stations and the easiest of all are the foreigners with the best signals. They generally come through earlier in the day and stay longer, so they quickly help the Americans fill their quota. These stations are anxiously looking for contacts and are easy to work. On the other hand, if it is a no-quota contest, such as the popular WAE European DX contest, you are far better off concentrating *not* on the stations with the outstanding signals, but on the second echelon European. For example, in the AA contest, Asiatic signals who are good, but not the best, will have a much smaller clique calling them. It appreciably increases the odds of your making a contact. In addition, the second type DX stations generally are using more conventional operating techniques which are simpler for the less experienced DX men to cope with. The nice part about looking for new countries in a DX contest is that you can be fairly relaxed about it. You are not out to set a big score and if you spend a few minutes more or less on a station, it is worth the effort. But remember carefully what you have read in this article. You can spend needless hours calling a station that you are never going to raise if the adverse conditions discussed prevail. You may hear a particular wanted station with an excellent signal and you may have unbounded optimism, but you're going to miss an opportunity of working other new countries for which you have a better chance if you don't follow the ground rules outlined.

QST

(Part II will appear in an early issue of *QST*.)

Antenna PLACEMENT As The Key to Successful DXing

BY JACK BOCK,* WB6KDP



THE writer has been chasing DX off and on for over a quarter of a century. Never a high-power man (the biggest rig ran 200 watts to a pair of 811s), I early joined the school of antenna worshippers. The antenna, not the rig, is the crucial factor for serious DXing, I opined. Then followed the painful and tedious years of trial and error . . . long wires *vs.* V Beams, Yagis *vs.* quads, etc. Results proved inconclusive, fudge factors had to be cranked in for the period of the sun-spot cycle, and thousands of unreliable on the air reports were evaluated. Often a new skywire would give seemingly fabulous results only to fizzle out when a freak period of good propagation conditions had passed. The calculable gains, front to back ratios, and angles of radiation were difficult to prove in practice. Although some significant differences obviously existed between the various types of antennas, I began to suspect that some other factor than merely antenna *type* might prove more significant in the actual working of DX. All accumulated data and experience gave rise to the theory that antenna *placement* was the paramount factor. Eagerly I set out to prove it.

Proof, of course, can be obtained only through operational tests, so a program of on-the-air testing was undertaken. To eliminate any unfair weighting of results obtained, it was decided that a minimum of transmitter equipment . . . and even the type of antenna itself . . . would be employed. The *placement* of the antenna was to be the variable (and crucial) factor.

For the DX-target area, Asia, the most elusive DX-hunting area for most American hams, was chosen. The transmitter was a simple 807 affair running about 40 watts. It was crystal controlled and only two crystals were utilized, one at 14.052 and the other at 14.098 Mc. . . . the latter proved well nigh useless due to heavy s.s.b. clutter around 14.100. The test antenna itself was the acme of simplicity . . . a dipole made of plastic a.c.-zipcord, cut by formula and unpruned. It was fed with about seventy feet of the same zipcord with impedance and s.w.r. unknown. Suffice it to say that it took a fair load when link coupled to the 807 tank.

Drawing on past experience . . . plus some very interesting hints on antenna height and placement recently published in some of the TV-service magazines . . . the final arrangement wound up a horrible violation of all the standard rules of the thumb for antennas. It was not high, it was not in the clear. The dipole ran N.W. by S.E. (theoretical lobes, if any, N.E. by S.W. . . . to work Asia?). The N.W. end was tied to a twelve-foot high clothes pole and sloped up to about 15 feet on the other end where it was tied to the railing of a balcony on the second floor of the apartment building which housed the shack. Not only was the antenna itself low, but three steel clothes-line wires ran directly beneath it about six feet off the ground. The S.W. lobe ran smack into the apartment building while the N.E. lobe would have to fight its way up through a power line if it were to go anywhere.

A test period of from 24 April to 17 May 1966 was chosen to test out the antenna *placement* theory with all sights set on working that rare Asian DX.

Results were astonishing. The 807 and low slung dipole accounted for 380 DX QSOs during 21 operating days of the test period. Of these 215 were the sought after Asians, although 51 countries were worked on all continents. Included were such goodies as JT1, 4S7, 9M2, 9M6, 9M8, VS5, VS6, VS9, VQ9, UL7 and UH8. 134 JAs, 39 Russian Asians, and 19 VUs were worked among the easier stuff. Not bad for 40 watts to a dipole in less than a month of operating a few hours a night!

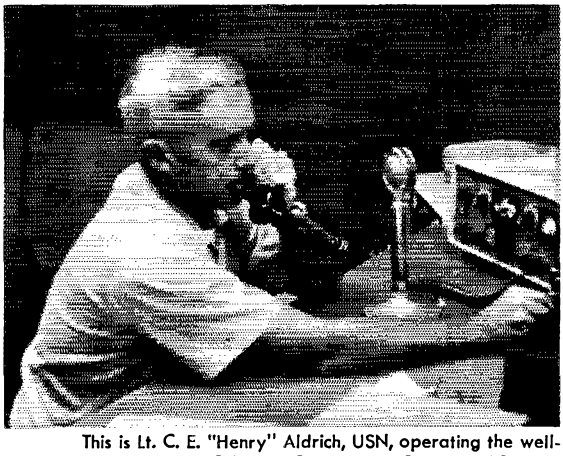
Needless to say the test results were more than gratifying and proved conclusively . . . to this DX man at least . . . that antenna *placement* is a far more important factor than power, v.f.o., fancy beams, or other gimmick approaches to working serious DX.

Perhaps it might also be mentioned, in conclusion, that the antenna placement factors detailed above were perhaps slightly augmented by one other factor in the Placement Equation. The test dipole was located in Ubon Rat Thani, Thailand . . . and I was signing HS1JB at the time. QST

* Box 8, SRF, FPO San Francisco, Cal. 96662

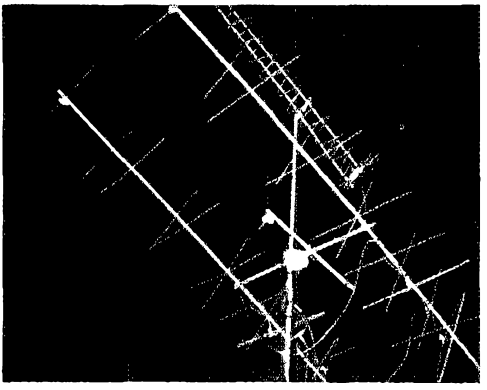
Strays

In April, 1964, young Beth Thompson, daughter of Mr. and Mrs. Stuart Thompson of Brandon, Manitoba, Canada, was taken to Boston by her mother and there was given a kidney transplanted from her mother. Then followed weeks of convalescence in the Boston hospital for the youngster and her mother. During all these weeks, Mr. Thompson, back in Brandon, was able to keep in daily contact through the efforts of Dr. James Hendry, VE4DQ, of Brandon, and Frank W. Horn, W1EUE, of Cape Cod, Massachusetts. Last summer, Beth and VE4DQ met W1EUE as he passed through Brandon on a vacation trip. Here the three are seen in VE4DQ's shack. Beth has made a complete recovery from the delicate operation.



This is Lt. C. E. "Henry" Aldrich, USN, operating the well-known station KG4AA at Guantanamo Bay Naval Station, Cuba. There are no telephone communications between the Guantanamo base and the United States. Base personnel have been completely dependent upon amateur radio channels for personal communications, including many messages of an emergency nature.

Under Henry's management, over 3000 personal messages have been handled over the past year from KG4AA. A good demonstration of the station's value to emergency communications occurred when they handled a large percentage of the individual assurance messages from survivors of the *Viking Princess* who were brought into Guantanamo Bay from the burning cruise ship.



This is the antenna used for Oscar IV by W4WNH. On 144 Mc., Shelby had a pair of 7-element crossed yagis with aluminum booms. For 432 Mc., he used a 12-turn helix made of cane poles and clothesline wire. The masts are hoe handles. Everything is fed with RG 8/U foam coax, and is mounted on an azimuth-elevation mount. The center boom pulls two sets of strings so that the helix tracks with the yagis in elevation.

Although the N.Y. World's Fair amateur radio station, K2US, closed some time ago, the job of QSLing is still in process. The Hudson Amateur Radio Council reports that visitors to K2US during the Fair in 1964 and 1965, may send self-addressed stamped envelopes to K2US QSL Manager Ernest Bressette, WA2TEK, 33 Roosevelt St., Pequannock, New Jersey for K2US souvenir QSL cards and log sheets.

—···—

Stolen Eqipment:

On Monday, December 5, thieves forced a window at the Germantown Radio Club and stole the following equipment. A *Galaxy 300* Transceiver. The serial number is not available but the unit can be identified by a screw-type mike connector in place of the usual phone jack connector on the rear apron, heat radiating caps have been placed on the final amplifier tubes, and heat radiating tube shields have been added to most tubes. A *SR-42* with *HA-26* v.f.o. The serial number is not available but the units can be identified by the use of heat radiating tube shields throughout, an additional hole has been drilled in the rear chassis apron for remote control leads, and the a.c. line cord is missing. A *Utica 650* 6-meter transceiver, serial No. IE-1952.

The Germantown radio club is offering a $100 reward for the return of the above equipment. Germantown Radio Club, 38 E. Clapier St., Philadelphia, Pa. 19144.

—···—

Feedback

The QSL address on page 89 of December 1966 *QST* for EA8AH was listed incorrectly. The listing should read: **EA8AH**, Jacinto E. Casariego, P.O. Box 215, S.C. De Tenerife, Canary Islands.

A few pointers to those hams and would-be hams of high-school and junior-high school age who attend school where a ham club and station have not as yet been organized.

Does Your High School Have A Ham Station?

BY ROGER W. HILL, JR.,* WA2QYE

OVER the past ten years I have organized ham clubs with stations at two high schools and one university. Each time I encountered certain obstacles which seem to be common to the founders of a school ham radio club that wishes to build and operate a station within the school.

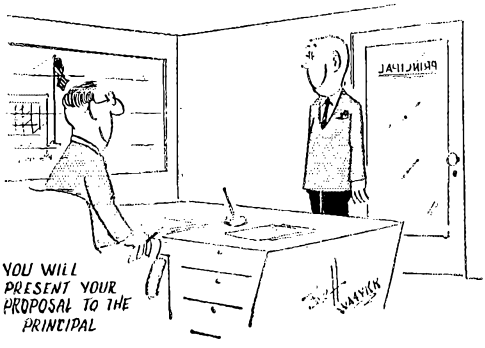
I will not dwell here on the benefits of having a ham station in your school. If you are reading *QST* you are undoubtedly a ham or a would-be ham and, with a little reflection, I'm sure that you can see many benefits that will accrue to you and your fellow hams if you could collectively build a station with capability that would far exceed that of the peanut whistle at your home QTH.

I begin this article, therefore, with the assumption that in your school there are at least three hams or would-be hams who wish to start a club with a station. The very existence of your club and station may well depend on the way in which you present ham radio to the principal of your school. Obviously, before you take even the first step toward the formation of your club and station you must have the principal's approval. Long before you ever enter his office, formulate your plan. This plan will include all of the reasons why he, the principal, should allow you to proceed with the formation of a ham club and station. Now read carefully; I said, why *he* should allow you — not why *you* want to form the club and station. The very important distinction which I am presenting to you is that your reasons must be based on sound educational objectives which the principal will readily understand and accept. The desire to work DX or to have a QRM-free QSO is not very meaningful to a non-ham principal. You must clearly show the principal how his school will benefit if you are allowed to form your club with station.

The principal is interested in the education of all of the students in his school. Ham radio can play a vital role in helping the teachers in his school to achieve established educational objectives. Ham radio transcends any one department; therefore, when you are compiling your list of reasons, think of how a ham radio station would be of benefit to the history department, the foreign-language department, the science department, the music department, etc. Traditionally, ham radio is a service activity. The principal wants to hear about the various kinds of service your club and station may render to the various departments within the school. To get you started with your "teacher-type thinking," I'll list a few things that other students have done before they went to the principal to talk about permission for the club and station. These suggestions are designed to muster support for your station by the department heads and teachers — to make ham radio a topic of faculty-room conversation.

1. Get a tape recorder (possibly you can borrow one from your school's Audio-Visual Center) and then tape record about 15 minutes of a Spanish speaking radio station in Mexico or South America. Since you don't have a school station yet, this will have to be done at someone's house — almost any little shortwave re-

* 142 Sandy Hollow Road, Northport, L. I., N. Y. 11768.



ceiver is good enough to get good copy on the Spanish-language stations around 6 Mc. Then, take your tape recording to a 3rd or 4th year Spanish teacher and ask him if he would like to listen to it — don't suggest that he use it in class — let that be his idea. As soon as a teacher of Spanish uses the tape, run out quickly and find the editor of your school newspaper — the headline should read: PODUNK HIGH SCHOOL HAMS BRING MEXICO INTO CLASSROOM. Don't be reluctant to "blow your own horn" — if you don't (as the saying goes) no one else will.

2. Once you've started taping shortwave broadcasts, keep going — wait until there is a big news event and then tape record Voice Of America, the BBC and Radio Moscow all reporting the same event. Leave this tape with the head of the Social Studies Department.
3. Stop around to your school's Audio-Visual Center and make your self known to the teacher who is the A-V Coordinator. This man is very important to your future plans — proceed cautiously — you must impress him with your technical competency. Go slow, offer to do small jobs such as testing the tubes in the P.A. system, replacing needles and cartridges in phonographs, cleaning and demagnetizing the heads on tape recorders or replacing broken plugs on language-laboratory headsets. Your objective here is to become established as the maintenance section of the A-V Squad.
4. Go to the football coach — find out if he ever has trouble at away games with communications between the assistant coach and the spotter (he often will). Borrow a pair of "walkie talkies." Now be careful — this can backfire — you're vulnerable to intercept. If your opposing school has an active ham club, assume intercept. This obstacle, however, can be circumvented by using interpreters (and you'll chalk up many points with your foreign language teachers). Find two pairs of brothers or sisters who speak fluently a not-too-common foreign language. In one big game we used Swedish during the first half and Polish during the second half. A word of caution, however: have your interpreters practice at a scrimmage — remember that certain words used in American football are not common in Swedish or Polish or whatever foreign language you use and your interpreters may have to make up certain words that they mutually understand.
5. It's quite likely that the Science Department in your school enters into some type of Science Fair each year. If so, enter a project that embodies ham radio. Project Oscar III offered us an excellent opportunity.

FIND OUT IF THE FOOTBALL COACH HAS TROUBLE WITH COMMUNICATIONS BETWEEN SPOTTER AND COACH

Enough for teacher-type suggestions. You should have the idea by now that you must justify your ham radio club and station by relating ham radio to the established educational activities of your school and that it is very desirable for you to perform a number of school/public service type activities so that the service qualities of ham radio are well known to your principal.

You are now approaching the time when you will present your proposal to the principal. Do it in a dignified fashion. Write out your proposal in considerable detail — induce a girl in an advanced typing class to type out both your proposal and an accompanying cover letter. In your cover letter, ask the principal for an appointment to discuss the matter further. Do not under any circumstances approach the principal while passing in the corridors. Ham radio is very complicated to the non-initiated. Quick or passing comments may well bring a hasty undesirable response. Get a formal appointment. When you show up for the appointment wear a coat and tie — it may be the first time all year that you've worn a coat and tie to school; but, do it now. If your principal knows you personally, you will be impressing him not only with the importance you place on this occasion but, also, with the fact that you are a competent and reliable person in whom he may have confidence and trust.

During the course of your interview you will be asked a number of difficult questions. — Be prepared with reasonable answers. Very likely, the first question will be, do you have a faculty sponsor? Remember that in almost every state the principal carries a heavy burden of legal liability for the proper supervision of all activities conducted within his school. You must have a faculty sponsor. Before your interview with the principal you should have contacted some member of your school's faculty and asked him to sponsor or co-sponsor your club. If there were any active hams on the faculty of your school, you probably would not be reading this article now. Therefore, I will assume that no teachers in your school have a ham ticket. Be very thoughtful in selecting your sponsor. A ham radio station that is going to be on the air one period a week

Hicksville Senior High School Amateur Radio Club Station WA2SCF during a pass by Oscar III satellite. Shown (l. to r.) Faculty Advisor WA2QYE, Robert Braun WB2PVO, and the Club's Chief Operator, Bob Zimmer, WB2AXH.

is hardly worth building. Set your long term objective toward a station that will be on the air three periods a day. This objective is going to cause you many difficulties and the biggest one is legal. In most states your sponsor would have to arrange a situation wherein you would be under proper legal supervision at all times. Don't fight the problem you can't win. Some schools have solved this difficulty by locating the station in a corner of a physics laboratory, or an industrial arts electronic shop. In this approach your faculty advisor must make an arrangement with each teacher using the room to assume responsibility for the supervision of the boys at the ham rig while conducting normal class activity. This solution has worked in some cases, but in others teachers have found the ham station to be too disruptive an influence on the regular class. I have a suggestion. If your school has an Audio-Visual Center supervised by a full time A-V Coordinator, he may well be your man. Educational electronics has descended rapidly on the schools during the past ten to fifteen years. Many A-V Coordinators have photographic backgrounds and appreciate all the honest help they can get from students who have some real electronic savoir faire. I suggested previously that you work your way into the A-V Squad and become its maintenance section. If you have favorably impressed the A-V Coordinator with your technical competency he may well be your best bet for your faculty sponsor and a corner of the A-V Center may well be an ideal location for the ham rig.

Well, back to your interview with the principal. You have solved the problem of faculty sponsor and station location. Now, a few other nice little questions are bound to follow. Isn't ham radio dangerous? Are there not lethal voltages in those radio transmitters? Be frank and honest. Yes, there are dangerous voltages present in a ham transmitter, but be quick to point out that much higher voltages are present in every home TV set. Explain that current kills and that many ordinary electrical appliances around the school offer a far higher lethal potential. On this question you stand or fall depending upon how successfully you have impressed your principal with the fact that you are a responsible and trustworthy group.

Now, for the real touchy one. Everybody knows that those darn hams can foul up TV — so does your principal. Meet the question head on. Explain that under no circumstances will your station be operated if it is responsible for TVI. Explain thoroughly that your transmitter will have a very special filter that will not let it interfere with TV; that the transmitter has been designed with special shielding so that only ham signals can get out; that you will gladly bring a TV set into school and demonstrate that your transmitter does not cause interference. Be forceful and aggressive on this point and he'll probably give you at least a temporary benefit of the doubt. Before you begin any regular operation, show your A-V Coordinator that section in the ARRL *Handbook* that tells about audio rectification and check your school PA system, record players, language laboratory, etc. to make sure you are not being inadvertently picked up. If your school has TV sets in the school get together with the A-V Coordinator and make sure they all have good high-pass filters properly installed. Be very sensitive and diplomatic about this TVI situation. Just remember, if you knock-out the favorite soap opera of the wife, sister, mother or friend of a School Board member, old buddy, you're through in short order unless you can get the situation squared away and fast.

Again, back to our principal — if you've survived the interview so far, you're in good shape. Before you leave expect to be asked how you are going to finance this venture of giving Podunk High School an ear and a voice to the world. As before, have a planned answer. Obviously you are going to have some kind of club dues. Secondly, approach the officers of your Student Government and if you've played your school

(*Continued on page 140*)

Developing Our Sources of Originated Traffic

HOW TO ORIGINATE MESSAGES

BY GEORGE HART,* W1NJM

Someone has to initiate all the traffic we handle on the amateur bands. Here is a summary and discussion of the various sources of amateur traffic and how they can be exploited.

THERE are all kinds of messages floating around the amateur bands these days, and yet a common complaint of the average traffic man is that there isn't enough traffic to keep him busy. As often as not, this complaint is made by the amateur who hardly ever originates any messages himself. The purpose of this article is not to go into the mechanics of handling procedure for message originations, but to explore the sources of such originations and how they can be exploited.

No traffic net or system can prosper without traffic to handle every time it meets, and the traffic should be of a type that can be considered worth while. True, as far as training is concerned the type of traffic makes no difference, and this applies also to counting of points toward BPL or the medallion. Nevertheless, we traffic-handling amateurs need to feel that we are doing something worthwhile with every message we handle, or we are not apt to keep on doing it for very long.

An actual count showed that 3,422 *different* stations reported traffic to their SCMs during 1965. If each of these had originated only one message per week during the year, there is a *minimum* of 177,944 messages — not message *handlings*, but actual messages. If you figure an average of ten points per message (just a wild estimate, but it ought to be about right), this approaches two million points, well over the point total for 1965. We know that there are quite a few stations which originate over a hundred, and some several thousand messages a year; therefore, there must be an appalling number that originate none.

If you are one of these, *don't* hang your head, just read on, then *do* something about it!

Self-Originations

There are a number of different types of originated messages. There are those which we initiate ourselves, there are others from various outside sources, there are "mass" originations, and there are "refiles" from other services (MARS, mostly).

By "self" originations we mean, of course, messages signed by the station operator himself. This is the most obvious and least valuable of the bunch. Some of them he makes up on the spot, addressed to the operator of the station he is in contact with. This is better than nothing, but it provides training and experience to only two people. You might call it "priming the pump," a procedure effective enough but which shouldn't be necessary in an efficient installation. Traffic usually has more training value if it involves a third party. What is a "third party"? Why, a person other than the operators of the two stations involved. It could be another amateur, as long as he is not one of the operators involved in a particular communication.

You can originate traffic to a lot of people. You can send messages in lieu of (or in addition to) mail reports of your traffic, net control operations, or just plain greetings of one kind or another. You can send birthday and holiday greetings to your friends and relatives. Just doing this much alone is enough to originate one message per week.

Regular Solicited Sources

But if you want to do more than this, or prefer to originate other peoples' messages rather than your own, you can start right in your own household. Brothers, sisters, mothers, fathers, sons and daughters have friends they might like to send greetings to occasionally. In my own family this was a little difficult because all except one member (W3NF) thought I was a complete nut. But they are sources of traffic, just the same, and can keep the originations going. Your own

*National Emergency Coordinator, ARRL.

family and friends, their families and friends, even friends of friends, can be regular sources of originated traffic. You have to keep after them, but if reminded from time to time that your service is available, they'll come through.

Your school or place of business is another regular source. My own school cronies used to edge away from me when I regaled them with stories of DX worked and messages handled. An indulgent science teacher once originated a message and was astonished when the addressee actually received it. (But she flunked me anyway.) Sometimes in school or college you can get permission to put a message box in the student union or some place frequented casually by both students and faculty — such as the library, perhaps. At work, you will find many people quite willing to save a nickel stamp by originating a message to wish someone a "novel" happy birthday or other greeting. You may have to take a little kidding once in a while, but if properly received this can make it all the more fun; in any case, this is what you might call an avocational hazard. There also will be skeptics and sneerers, but pay no attention to them; psychologically, they are envious of your willingness to do something for others.

There are lots of other sources, if you can develop them. Is there a veteran's hospital in your area? A great many patients are from out of the area and would welcome an opportunity to let the folks back home know how they are making out. Although local hospitals have mostly local patients, many of the staff are out-of-towners, so all hospitals can be considered sources to some extent. Then, of course, there are hotels and motels, full of transients every day, many of whom would utilize a free message service just out of curiosity. Management will usually be somewhat skeptical, but if the right approach is made will sometimes allow you to leave a box at the registration desk, or even agree to telephone messages to you as they are left.

Where else do transients and out-of-towners congregate? How about the YMCA and YWCA? Railroad stations and airports? Large business corporations with a big staff of traveling salesmen? Think about it a while, there are any number of possibilities. If you develop and utilize all of them, you'll be swamped with traffic.

So don't overdo it. Contact one source at a time; if the amount of traffic is infinitesimal, try to develop another one while still leaving the first one open. When you start getting the amount of traffic you want to handle, then stop developing more sources until it dwindles again. Remember, *once you accept a message it is your responsibility* to get it started on its way.

There are a number of other pitfalls and things to avoid that should be mentioned in soliciting traffic from outside sources. Let's call the above No. 1 and continue to enumerate them:

(2) Be sure to state *always* that this is an unguaranteed service run by volunteers for their own satisfaction and the public benefit. Don't let anybody get the impression that you are

Western Union or the equivalent of it. If you leave message boxes, a sign to go with them should make this plain.

(3) Set up and publicize some ground rules. After all, the originator doesn't know he is helping you, he thinks you are just helping him, so some simple rules will be accepted and generally abided by. Among these should be a suggested word limitation (20 words is a good one, because with spelled-out punctuation it will approach 25 by the time you put it on the air), a requirement for a complete address, including zip code and telephone number if known. He should also be asked to leave his own name and address so he can be advised if for any reason the message cannot be handled or delivered.

(4) Remember that the text of the message is a private communication between the originator and addressee. You have to read it to handle it, and so do the other handlers, but you do not have the right to make any changes or alterations whatever, except in form, or to cancel the message, or to take any overt action except to copy it exactly as transmitted and to deliver or transmit it exactly as received.

(5) Avoid business-type messages. While perhaps quite legal, they are bad medicine and ill-advised. If you get one that sounds like business being conducted, contact the person who left it with you for origination and explain that you prefer not to handle it for this reason. *This applies to the originating station only,* not to relaying or delivering stations.

(6) Be sure to solicit traffic only on days when you know you will be on the air that night — or have some arrangement whereby the traffic will be handled promptly after origination. It just doesn't do to have someone file a message with you one day, then have you delay putting it on the air until three days afterward. If you are a Wednesday-nighter, for example, solicit traffic *only* on Wednesdays; either that, or make sure all originators understand that the traffic will not go out *until* Wednesday.

(7) Don't leave too much to the imagination and understanding of the originating person, but at the same time make whatever instructions you leave as simple as possible. A tall order. A

pad of message forms, plus a sheet of simple written instructions (and a little propaganda) would seem to be in order. The instruction sheet might be headed AMATEUR RADIO MESSAGE SERVICE, and might read something like this: "Amateur Radio Station WAØXHH (or the Podunk Amateur Radio Club?) offers free personal message service to any point in the U. S. or possessions, or Canada, to the general public. Use one of the blanks provided, filling in *only* the complete address, text of what you want to say and signature, along with your own name and address on the line provided for that purpose. Please limit the text to 20 words, and do not write business-type messages. The accompanying sheet contains some standard texts; we would be glad to have you use one or more of them which expresses sufficiently what you wish to say. Just indicate the text number on the message form in place of the text. For further information about this service, see the bottom of the message form." The standard texts referred to are ARRL CD Form 3, of course.

(8) Whenever you get a message you simply cannot handle, don't just dump it. If the sender has included his name and address, as instructed, advise him (by message, if possible) that you weren't able to originate the message, and why. You, as the operator of the originating station, have the right to do this. Once you originate the message on the air, no handling station has the right to cancel it. So, don't put it on the air unless everything is in order; but if you cancel it, *do* advise the originator the reason, so he won't get a bad impression when his message doesn't arrive.

Mass Originations

Now this is a touchy subject, because emotions regarding mass originations vary widely among traffic-handling amateurs. There are several types of affairs and circumstances which may lend themselves to this kind of message origination. Unfortunately, as often as not the station originating the messages is operated by amateurs not familiar with traffic-handling rules or procedures, and as a result some of the messages are not of the highest quality when they get on the air — but once they do, we're stuck with them. Some education is needed, so that such traffic, originated for publicity more than public service, does not have the effect of making amateur radio look ridiculous, the opposite of what is intended.

A principal feature of amateur radio exhibit booths set up at fairs, expositions and hobby shows, is the "free" message-handling service. Frequently, large signs are erected, proclaiming to the public that messages can be handled free to any point in the globe, by amateur radio, with all and sundry being implicitly urged to file a message to someone, somewhere, saying anything at all. Out of such exhibits often come hundreds, sometimes thousands, of scribbled messages with disarranged or incomplete preambles, inaccurate and/or incomplete addresses, with texts too long and full of inanities. They come thick and fast for the two or three days of the particular event, sometimes overloading and confusing the nets, consequently causing delays and garbles, then suddenly cease as quickly as they started.

The way to prevent these difficulties, of course, is better to organize the origination of such traffic. In the first place, the "free message" aspect of the exhibit should be an incidental, not a principal, feature. The public is unimpressed, in these days of instant communication at negligible cost, and is apt to be leery of anything "free," so often is the term used by hucksters offering a product for anything but. Second, the exhibit station should be staffed with competent operators who know traffic handling and how to operate in traffic nets. If such are not available, some means should be set up beforehand to see that the traffic is placed in the hands of competent traffickers as quickly as it is filed at the amateur radio booth. RTTY? Excellent, if you can rig up the facilities. A local v.h.f. link can often serve this purpose. The point is, this should be set up beforehand, not arranged on the spur of the moment.

The ARL texts (ARRL CD Form 3) are very useful for mass originations. They should be posted at the exhibit station where all persons wishing to file a message can have access to them.

Exhibit station promoters are often prone to attempt to publicize both the exhibit and the station by insertion of extraneous material in the preamble or text of the message. For example, the place of origin, instead of being "Podunk, Mo.," may improperly be sent as "Podunk State Fair, Mo."; or a standard insertion in the text might be "Greetings from the Podunk State Fair." The place of origin of a message is the city and state or province, nothing more. As far as text insertions are concerned, this is highly unethical and no amateur should be a party to it.

"Morale" Messages

A treatise on message originations would be incomplete without a paragraph or two on this subject. Messages handled to and from our troops in foreign countries are perhaps the best kind of traffic we have, and we want to get 'hold of as much of it as possible. By the same token, we want to give it our best possible handling.

However, the facilities for handling it are limited. Except for a few isolated cases, the overseas handling of all such traffic has to go through the facilities of the Military Affiliate Radio Service, a military training service. Such overseas traffic originated domestically by amateurs is handled by the National Traffic System or other amateur-band routings to a jumping-off point, thence to its overseas destination by MARS. Coming the other way, it is originated on MARS to some point in the states, where it is either forwarded and delivered via MARS or "refiled" (originated) at an amateur station and relayed to its destination over regular amateur-band circuits. The "refiling" of a MARS message into an amateur circuit is simply an origination on the part of that amateur station, using standard amateur format.

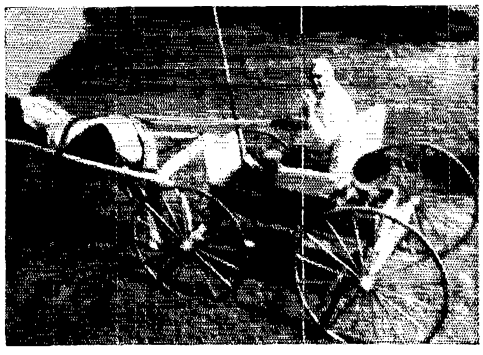
The facilities for handling such traffic into and out of areas where hostilities are occurring are limited, and this is why we do not include it as one of the sources to be solicited. Military authorities have asked us *not* to solicit such traffic. The potential is too great, and although MARS is setting up facilities as fast as possible to meet the demand, it is expected that enough traffic will be available to keep them busy without soliciting it. When one is received and delivered, it's okay to offer to handle a reply; if someone calls you and requests you originate such a message for them, this is all right too. But please, no highly-publicized campaigns to urge the public to file such messages via amateur radio. In the few cases where this has been done it has caused a lot of difficulty.

Originations Galore

If every traffic man fully develops the various methods of obtaining original messages explored above, obviously we'll have more traffic than we know what to do with. But just as obvious is the fact that we need more traffic than we are now handling if we expect to keep in trim for that emergency when or if it comes along. During the Simulated Emergency Test last October we were successful in "loading" some of the nets, but others complained of too little traffic. A happy traffic net is a busy one. You, the average amateur, can help by dropping in on your NTS Section net or other traffic net of your choice and originating a message, at least once a week. If most of us do just this much, we'll have traffic galore on all our nets — and *good* traffic, too.

QST

Strays



One horse mobile? That's Matt, WØLFJ (right) while working KØJFN. Matt claims when you work a Nebraska mobile, you never know what you will get!

Ham of the Year Award

The Federation of Eastern Massachusetts Amateur Radio Associations will once again present a cash award and a handsome plaque to an amateur in the first call district who has met one or more of the following qualifications:

1. Performed a meritorious public service to his community through the medium of amateur radio,
2. Made a major contribution to the science of amateur radio,
3. Helped greatly to stimulate interest in amateur radio in other persons,
4. Aided other radio amateurs to acquire a greater knowledge and skill in operating or building amateur radio equipment.

This award will be given at the divisional ARRL Convention on April 22, 1967 at the New Ocean House, Swampscott, Massachusetts.

Please send all nominations to Eli Nannis, W1HKG, Chairman of Awards Committee, 37 Lowell Street, Malden, Massachusetts. All nominations should be as complete as possible. The closing date for nominations is April 7, 1967.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

Silence Is Golden

A few years ago it was seriously proposed by a thinking amateur that the League issue Public Service Awards to those amateurs who, during an emergency operation, listened but did not transmit. This argument went something as follows: It is customary to issue PSAs to amateurs who take part in any operation involving a communications emergency provided they are reported as having participated; but the fact is that many of these are just stations who report in to ask if they can help, thus creating confusion and delays, or in other ways inject themselves into an operation in which they are neither needed nor wanted. Meanwhile, there are some stations which use their receivers to monitor and study the situation but, finding no "handle" which will enable them to be of assistance, prudently stay off the air; *these* stations deserve recognition far more than do the noise-makers who simply report in.

The philosophy makes sense, but it has no practical application. Simply stated, it means that they also serve who sit and listen. If more of us listened and forbore transmitting unless we were sure we could be of help, then made our transmissions brief and to the point, our overall public service would be greatly enhanced. The greatest asset, the biggest contribution many of us can make to most emergency operations, is our silence.

While the value of silence is great in an emergency operation, it is also useful in every day public service operation. We are thinking now of the ARRL National Calling and Emergency Frequencies, some of which took a terrible pasting during the recent Simulated Emergency Test by stations using them either improperly or imprudently, or both. The rules are clearly stated in Operating Aid 12, and are summarized in the box which appears monthly somewhere in this column. Despite this, we can understand how a casual amateur might happen to transmit a casual CQ on one of the full time NCEFs, even during the five-minute listening period. But for an ARPSC member to do so is almost unforgivable.

It has been suggested that stations monitoring these frequencies be authorized to make an occasional transmission on them to indicate the special status of the emergency channel and requesting all stations to refrain from using them except for calling purposes. In other words, monitoring stations are fine, but how many operators are you going to find who are willing to just sit and monitor, hour after hour? On the other hand, if you give them something to do you might find more "takers."

We would visualize such a transmission taking place in the last five minutes of the hour, perhaps a minute or so before the stroke of the hour. It would be brief and concise, something like this: "Calling all radio amateurs, this is W6 so-and-so, an ARRL Official Observer. This is a full time National Calling and Emergency frequency, with guard band from 3872 to 3878 kilocycles (or kilohertz, if you must). The five minute period starting at umpty-ump hours, GMT, is a listening period for emergency calls on this frequency. It is requested that during the next five minutes all stations refrain from transmitting except for an emergency call." The amateur making this suggestion felt that at the proper instant a time signal would also be in order.

This sounds like a practical procedure. It will serve to publicize the NCEFs as well as its main purpose of clearing them for emergency calls. Of course the full time NCEFs are supposed to be clear of casual operation *all* the time, but if we can make them effective the first five minutes of each hour, this is a good beginning.

Volunteers to make such transmissions may be in for some rough times. Many amateurs will take a dim view of such proceedings. However, anybody who wishes to maintain a schedule of NCEF transmissions for the above purpose, as well as a monitoring schedule, may send it in to us. Include days, times, frequencies, and how long you expect to continue making the trans-

At the Hudson Division Convention, held in Tarrytown, N. Y., on Oct. 15, RACES operators set up the communications van for demonstrations and inspection by the convention goers. Pictured here are: Bill Swain, K2LEQ (Chief of Communications), W2QGH (R.O.), Fred Marron (Maintenance Officer), K2UTB (R.O.), and (kneeling) Jan Gillian (radio operator).

* National Emergency Coordinator.

missions. We'll print the list somewhere in this column if possible.

RACES Items Needed

Why, we have been asked, now that RACES is a part of ARPSC, are not more RACES items included in the ARPSC column of *QST*? A good question. It also has a good answer: we don't get any to print. In a manner of speaking, we *favor* RACES items over AREC items, because the former are so scarce that we include them under RACES while similar AREC items may be omitted from the "Diary" because of space limitations.

But if we don't get 'em, we can't print 'em. First priority goes to emergency items, whether under AREC or RACES. After that, we use up any space available for non-emergency reports of activities. Usually we have a big backlog of these for AREC, and just as usually nothing at all on RACES. So, if you want to see more RACES items in this column, let's have 'em — — *W1NJM*.

Diary of the AREC

During the flood in Carlsbad, New Mexico, on Aug. 23, W6DLZ happened to be in the area and when he learned of the flood, contacted civil defense headquarters and offered assistance. He was immediately put to work and operated for nearly 24 hours straight. He participated in the emergency net and handled a considerable number of messages of all types and precedences. — *W6OA*.

— • • • —

On Oct. 2, VE8AH, Inuvik, N.W.T., checked into the Trans-Canada Net with an emergency message for a doctor in Winnipeg, Man. VE8AH and VE4SD were sent off frequency to clear the message and VE8AH waited for a reply. After several telephone calls on the part of VE4SD, the doctor was finally located and a series of questions and answers followed, regarding a little girl who had had an eye operation in Winnipeg and had been returned home to Inuvik. Some complications had developed and the doctor was able to prescribe the proper treatment. — *VE4OL, SEC Man.*

— • • • —

A combination of wind whipped ice and snow disrupted commercial communication in parts of Nebraska on Oct. 15. At the request of civil defense, the AREC net on 3982 kc. activated and provided what ever emergency communications were needed from 1543 GMT until 2030 GMT, when KØHPY/Ø, at c.d. headquarters, notified the net that communication had been restored and they were no longer needed. About fifty amateurs participated in this operation. — *KØJXN*.

— • • • —

Over the weekend of Oct. 28-30, amateurs in a multi-state area were active in attempting to head off a doctor driving on his honeymoon from his home in Iowa to somewhere on the east coast. The doctor had been bitten by a rabid animal and was in need of medical attention within 48 to 72 hours after the contact. WA8NRC, Portsmouth, Ohio, first learned of this from a local radio station and quickly originated messages, at the request of the Ohio State Police to notify the doctor of the situation. W3BP relayed one of the messages to the Mike Farad Net via WA2TEK. Within a short time, amateurs, local radio stations and police departments throughout Ohio, New Jersey, New York and Maryland were on the alert. On Oct. 30, the alert had been cancelled when the doctor was finally located in Indiana and notified of the need for medical treatment. — *K2SJN/K2UBG*.

— • • • —

While driving south from Bridgeport, Cal., on Nov. 5, WA6ZWV's vehicle stalled. He was unable to get the engine going again and with snow predicted, he broke into the West Coast Amateur Radio Service Net and requested help. His location and the nature of his trouble was relayed to W6JBA who put a teletype message on the California Highway Patrol circuit to Bridgeport. Within fifteen minutes of the initial call, a tow truck had arrived and WA6ZWV was able to continue on his way. — *W6VX*.

Wayne Smith, K5QQG, Southern Texas SEC, was the top ranking ARRL official at the ground-breaking ceremony for the Houston Amateur Radio Club's new meeting house.

— • • • —

A local rag chew session on 2-meters among hams near Eglin AFB and Fort Walton Beach, Fla., was interrupted by W4KWX. He advised that a search would be starting the next morning by the Civil Air Patrol for a missing aircraft, and amateurs were needed to provide communication. The next morning, eight amateurs were recruited to man the 2-, 10- and 75- meter stations. Mobile units were sent with each search party and communications links were maintained with the Panama City, Fla., airport, the base of operation for the search, through W4SRX. The 75-meter link was used between the airport and W4SRX, while the higher frequency equipment was used between mobile units and W4SRX. The search lasted for two days, unfortunately without success. — *W4RKH, SCM W. Fla.*

— • • • —

On the evening of Dec. 5, K8GMO/mobile checked into the Michigan Wolverine Net to request help in locating a source of type A negative blood that was needed in a Chicago, Ill., hospital for an emergency operation. Within short order, W8ICU located a source and W9IKB relayed the word to the hospital. — *K8GOU, SEC Mich.*

— • • • —

On Dec. 6, the Zion Park, Utah area was struck by a flash flood, wiping out telephone and electric services. W5GK/7 originated a message to the Arizona Highway Patrol to inform them that one of the tunnels in the area had been blocked by a mud and rock slide. W5GK/7 checked into the West Coast Amateur Radio Service Net and attempted to give the message to W7PCY. Propagation between the two was nil, so *W6s* AEV DZJ JNG and VX relayed the message to W7PCY. Communication was also made available to the telephone and power companies as they repaired downed lines and poles. — *W6VX*.

— • • • —

We are going to try to catch up on the long delayed reporting of non-emergency activities. These reports had to take a back seat for the emergency and alert items, and since some are so old, we will summarize them here:

Feb. 20 — AREC members in the San Diego Section held their own s.e.t., complete with sealed instructions and K6RVR operating from an airplane flying over the "disaster" area.

June 10-12 — AREC members from Brazoria Co., Texas, provided communication for a state guard simulated dis-

Dick Collins, K6ANN, is the RACES radio officer for Redwood City, California. He's shown here participating in a joint AREC/RACES operation during the Fourth of July Parade.

aster drill involving a neuclear device that was exploded over the Gulf of Mexico, and creating squalls, high winds and extremely high tides. Both local and long range communication were furnished by the amateurs.

June 11-12 — Owensboro, Ky., a.r.c. members, assisted by other Kentucky stations, provided safety and press release service for a 54 mile canoe race sponsored by the local Explorer Scout Troop. Twenty-three amateurs participated, handling over 500 messages.

June 26 — Six AREC members, the Monroe Co., Mich., provided communication for the arrival of delegates at the National Junior Chamber of Commerce convention. The location and progress of the various caravans were reported to the Detroit headquarters.

July 2-7 — AREC members in Richmond Co., Ga., provided communication during the Powder Puff Derby. Walkie-talkies were used at the airport; the control tower was the communications headquarters and units were stationed on the flight line, the pilots ready room, in the motel hospitality room or dispatched under direction of the control operator. Liaison was maintained with the 40 meter Powder Puff Derby net.

July 4 — A dozen amateurs from Redwood City, Cal., provided communication for the Fourth of July Parade. Mobile units were disbursed throughout the marching line and walkie-talkies were used for additional communication.

July 15-17 — Edmonton, Alta., amateurs took part in two exercises; providing communication for the annual White Water Canoe Race and an antique car race. In both cases, a combination of 75 and 2 meters was used with stations positioned along the course of the race and reports of participants progress and any accidents were relayed to communications headquarters.

Aug. 6-7/13-14 — The Arrowhead Radio Amateurs Club of Duluth, Minn., gave a demonstration of amateur radio by handling messages for the public. A booth was set up at the Port-O-Rama celebration and about 100 messages were handled over the two weekends.

Aug. 18 — During the United Cerebral Palsy Telethon held in Lafayette, La., amateurs relayed news of contributions from surrounding towns to the telethon headquarters. Approximately 30 amateurs participated.

Aug. 20 — K5WWR provided a communication link between National Guardsmen and their families while the men were participating in their two week training period.

Aug. 26 — W5LQV maintained regular contact with HR9EB and relayed messages from members of a workcamp group from the states who were helping the mission build a new school.

Aug. 22 — Seven AREC members from Macon Co., Ala., held a simulated emergency test in the form of a message handling service for the local communities. Portable and mobile stations were used to collect the traffic and relay it to a central coordination point where it was relayed into the regular traffic nets.

Aug. 27 — When officials of a sports car rally in Hudson, Que., requested communication for the race and parade, five AREC members under EC VE2ALE responded and provided the necessary links.

Sept. 17 — Seven AREC members from Canton, Ohio, provided communication for the National Professional Football Hall of Fame Parade. Two-meter f.m. equipment was used and portable stations were scattered over the 3-mile parade route and within the parade itself.

Sept. 17-18 — EC WØAIB and his crew provided routine communication for a go cart race sponsored by the Engineers Club of Kansas City, Mo.

Sept. 24 — AREC members in Vancouver, B. C., held an interesting exercise when they provided communication for the EMO. The test was for c.d. drivers to be given a street address or map reference and then see how long it took each driver to get to his destination. In some cases, AREC members would follow the c.d. vehicles and report their progress and in other cases, AREC members went to the particular address first to await the arrival of the EMO driver. The net result was that members of both groups weren't as familiar with the city streets as they thought they were and more exercises like this are to be planned for the future.

Sept. 24-25 — EC WØAIB and his Kansas City, Mo., AREC crew provided a communication link between CAP air craft and the Jackson County Sheriff's Patrol cars. Six meter equipment was used and was found to be most effective and easily installed in the aircraft.

Sept. 28 — Amateurs from Philadelphia, Pa., set up a message handling service at the American Production and Inventory Control Society conference.

Oct. 1 — Fourteen amateurs from the Montreal, Que., area provided communication for a sports car rally held in the Laurentian Mountains. Mobile units were set up at check points, at the rally official's desk and to relay information from distant points.

Oct. 15 — AREC members from Kansas City, Mo., provided communication for a parade and the police department by covering 22 intersections and maintaining liaison with police headquarters through the emergency operation center at the city hall.

—•••—

Forty-seven SEC reports were received for October, representing 18,686 AREC members. This is 2 more SEC reports and an increase of 1638 AREC members over last year. Those sections reporting are: Conn., E. Mass., Maine, N. H., N. Y. C.-L. I., N. N. J., S. N. J., E. Pa., W. Pa., Del., Ala., E. Fla., Ga., N. C., Va., Ark., Miss., Okla., S. Tex., E. Bay, Los A., Orange, S. C. V., S. F., S. V., Mont., Nev., Ore., Utah, Wash., Mich., Ohio, W. Va., Ill., Wis., Colo., Kans., Mo., S. Dak., Que., Ont., Man., Sask., Alta., B. C.

—•••—

Hurricane Inez

Inez may go down in history as being one of the most confused hurricanes ever. After churning up the Caribbean, clobbering Guadeloupe, taking a swipe at Saint Martin and a few other islands, she turned west for Cuba, Haiti and the Dominican Republic. While she was half way over Cuba, Inez abruptly turned north towards the Bahamas, changed her mind and headed southwest towards southern Florida. On her trip to the Bahamas, she dumped a fair amount of wind whipped rain on Miami and points south, including the Florida Keys. When she made the turn and headed southwest, she again clobbered Florida, hit Cuba again, and went dancing off into the Gulf of Mexico where she played tag with the Yucatan Peninsula, and then headed straight for Brownsville, Texas.

Back in Florida, the W4IYT/MLE AREC "machine" went into operation as soon as it became apparent that Florida was not to be spared a visit from this young lady. As she made her pass at southern Florida on Oct. 2, W4IYT established a stand-by condition for the AREC, and ARPSC Nets D and C were alerted. By Oct. 4, Inez was closing in, so a condition two (limited emergency) was established in the key cities of Miami, Orlando and Tampa. After her fancy loop-de-loop, she headed for the Keys, giving Miami a taste of her 80-m.p.h. winds. At 2315 GMT, Oct. 4, the eye headed for Key Largo and Marathon so condition three

(full emergency) was established with ARPSC Net C on full 24-hour operation and Net D on stand-by alert. Up to this point, all commercial landline and micro-wave communication circuits held. Reports of high wind and water were given along the Key chain by amateurs to the Miami Hurricane Warning Center in Coral Gables.

K4IWT, Miami Red Cross, was manned by K4JWM and WA4WIO and operated on Net D. WA4KJF was manned by K4YSN, WA4LHK and a crew of about 4 or 5 others at the North Miami Civil Defense Control Center on Net C. As Inez passed westward at the Keys, a Condition Four (mop-up) was established at 1200 GMT, Oct. 5. Some health and welfare traffic was handled into the Keys during and after the storm.

The Broward County AREC, under EC K4EVY, went into action on Oct. 4, when the three Broward Emergency Nets were activated and stations were given instructions to call other stations on the telephone and advise them of the activation. W4GDK, operating on emergency power, provided any long haul facilities that were needed. Telephone calls directed to c.d. headquarters were diverted to W4GDK and WA4VWJ who relayed the messages by radio to c.d., leaving the one telephone line free for outgoing calls from the c.d. director. K4YBL kept the crew advised of the latest hurricane warning information received via teletype links with the weather bureau and the Hurricane Warning Net. WB4CFM was busy checking out and equipping each station for mobile operation with 2-meter gear. WN4CBM was dispatched to the Red Cross office where he handled official traffic. A request was received regarding the arrival of medical supplies at the various shelters, so WA4VYP and K4EVY, both mobile, were dispatched to the information. Upon arrival at the Broward Junior College, K4EVY delivered the message and originated one back requesting additional food and communication. As other stations reported to headquarters, they were outfitted with 2-meter equipment and dispatched to various critical positions, including Red Cross, c.d., and the various shelters in the area. By mid-afternoon, the hurricane had sufficiently passed the area to eliminate the need for emergency communication and the net was closed down.

In Key West, EC WA4OXH was active with emergency power. K4KIC/4, from Miami, set up his mobile equipment at the Red Cross building in Key West. On 20 meters, the Hurricane Net was active with K4RHL and KZ5MM acting as NCSs. The net handled considerable amounts of health and welfare traffic and gave general hurricane reports.

Unfortunately, reports of amateur operation in Mexico are sketchy, but we do know that XE3LK maintained emergency communication with K9NBH, who relayed the information to officials in Yucatan. Local communication had been wiped out by Inez and this was the first word received regarding the safety of the villages in the coastal areas. As a result of these messages, evacuation of people from these areas was expedited.

As Inez worked her way up the east coast of Mexico, members of the Hurricane Industrial Net, which had been operating ever since Inez became a threat, were receiving weather information from Miami via teletype, and W5KTC was able to relay the necessary path predictions to the captain of the *S.S. Ingles*, so he could bring the ship into Galveston.

As Inez set a course for the Brownsville-Matamoroso-Port Isabel, Texas, area, RACES nets were quickly brought into operation under W5KR/5. The first contact was with W5KFI and shortly thereafter W5SC in San Antonio was ready to go. Late in the afternoon of Oct. 8, the FCC office in Houston declared frequencies in the 75- and 40-meter phone bands be voluntarily cleared by amateurs for emergency communication in the Brownsville area. This was lifted on Oct. 10, after Inez had passed.

At 0700 CST, Inez had everyone in Brownsville standing on their heads and W5KR/5, manned by WN5OOU and WA5OAU, went into full operation, receiving and relaying weather reports, delivering arrival reports from evacuees from coastal areas and generally maintaining radio communication throughout the storm.

K5MSQ/mobile at his home, W5KFI/mobile at the San Benito C.D. Headquarters, K5SJG/mobile at his home and W5DNT/mobile at the Missouri Pacific railroad station ran a net covering Corpus Christi and Houston as well as the local area.

In her later stages, Inez provided U.S. amateur with a real life emergency situation that could be used instead of the usual "paper" emergencies that most of the rest of us used during the Simulated Emergency Test held Oct. 8-9. — *W1BGD.*

NATIONAL CALLING AND ENERGENCY FREQUENCIES (kc)

FULL TIME

3550	7100	50,000
3875	29,640	145,350

PART TIME

7250	14,225	21,400
14,050	21,050	28,100

Full time frequencies are for use 24 hours per day but only for emergency and traffic calling purposes. No transmission for *any* purpose (except calling for emergency help) the first minutes of each hour.

Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become *full time* frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require us all to work together. Any amateur wishing to assist is invited to use ARRL notification cards to be sent to stations not observing the rules.

National Traffic System

Those of you familiar with the history of NTS know that it was built around an ideal, instead of the more usual procedure of building around existing facilities and personnel. It was most unorthodox, but it worked. Instead of building a system to fit the people, we sought to find the people to fit into the system. It was a long, hard struggle, but it paid off in the end. At least it worked to the extent that NTS is now considered the tightest and most efficient organization in amateur traffic-handling history. It consists of over a hundred nets, each performing a specific function at a specific level.

About half of these nets are phone nets. We have heard NTS characterized so many times as a c.w. system that we thought we'd better mention this. The phone NTS nets all operate at Local or Section level. Nets operating at Region and Area level are all c.w. The links connecting the three Area nets are all c.w. links, at present, known as the Transcontinental Corps. Procedure is standard throughout, traffic follows a prescribed routing, administrative lines are clear cut, everything is systematic, nothing is done by the seat of anyone's pants. The system can be and is described in detail in the Public Service Manual, the new OpMan, and the ARPSC slide collection, without mentioning any particular call or individual, except as example.

One of the doctrines of NTS has always been to "select the mode to suit the need." If we followed this strictly, we would probably wind up with all c.w. and RTTY, because these are "record" type modes, while voice is a "command" type mode. But there is a dearth of proficient c.w. operators and a surplus of voice operators, so we find it advantageous to utilize voice for some of the NTS functions. This modifies the above fine doctrine by adding "within availabilities." In other words, use what you have, but use it right.

So you see, even in a tight system such as NTS we find we have to make concessions for practical reasons. At Local and Section level coverage is local, participation is unlimited and the object is coverage; the phone nets can certainly give us both these while, generally speaking, c.w. nets cannot — or at least find it difficult. At Region, Area and TCC level coverage is medium or long haul, participation is limited and the object is representation. No matter how you slice it, c.w. is best suited to these objectives, with the possible exception of preference to use RTTY for the TCC jobs, which are mostly point-to-point as far as the TCC function is concerned.

(*Continued on page* 128)

Happenings of the Month

A. L. Budlong, W1BUD

It is with great regret we report the death on December 13 of Arthur L. Budlong, W1BUD, former Secretary and General Manager of ARRL. Bud, who was 65, had been plagued since his retirement in 1960 with a series of illnesses from each of which, until the last one, he bounced back, earning the nickname of "indestructible."

Bud had been a ham since the age of ten, starting with a crystal detector and spark coil in his native city of Washington, D. C. He worked as a reporter for the Technical News Service of Washington, D. C. and in the early twenties was several times a *QST* author.

W1BUD

He came to League headquarters in 1925 to manage a special press service, "Current Radio." He subsequently served briefly as assistant traffic manager, and was instrumental in developing the PRR Net, which provided backup communications for the Pennsylvania Railroad and set basic principles for other amateur emergency communications work. A lasting contribution of this group: the "amateur land SOS" signal, QRR (now QRRR) was first used by the PRR amateurs.

In 1926 Bud became assistant secretary of the League under Kenneth B. Warner, W1EH. Though he did all sorts of general administrative and writing chores, his special achievements were in the field of international radio frequency allocations. He had attended every international allocations conference from the mid-twenties until his retirement. In 1940 he was a member of the U. S. delegation to the Inter-American Radio Conference at Santiago, Chile. This background prepared him for duty during World War II as chief of the Frequency Allocations Section, U. S. Coast Guard, with the rank of Lieutenant Commander. He was a member of the allocations committees of the joint chiefs of staff and of the Interdepartment Radio Advisory Committee. (IRAC performs for government agencies functions similar to those which FCC provides for the rest of us.) In 1945 he served as Chairman of IRAC's Technical Subcommittee which prepared the basic postwar allocations table and laid the foundations for the Atlantic City (1947) Radio Regulations, including creation of the 15-meter band, 21.0–21.45 Mc. After the war, he returned to his post at headquarters, continuing to work in allocations on behalf of the amateur service.

Upon Warner's death in 1948, Bud became general manager and secretary of the League, editor of *QST* and secretary of the International Amateur Radio Union. During the next twelve years, the League grew from a membership of 50,000 to nearly double that figure.

The signals of W1BUD were often on the air, both phone and c.w., h.f. and v.h.f. He was president of the famous South Lyme Beer, Chowder and Propagation Society and trustee of its station W1EH, which call was held in memorium to his predecessor. He was a Mason, a member of St. Ann's Episcopal Church, the Off Soundings Club, the Old Lyme Grange and the Old Lyme Chamber of Commerce. He is survived by his wife, the former Nancy H. Woodward, and two brothers, Herbert N. Budlong of Washington, D. C. and Robert R. Budlong of San Francisco. The funeral was held at St. Ann's Church on December 16 with virtually all the senior Hq. staff in attendance.

A more-complete account of his career appears on page 11 of *QST* for January 1961.

HANDY RETIRES

Francis Edward Handy, W1BDI, Communications Manager of the League since 1925, retired on January 31, 1967. "FEH" needs no introduction to members of the ARRL field organization — and very little to anyone who has tapped a bug or breathed into a mike. For all this time, he has had the overall responsibility for ARRL operating matters. He has had to encourage the National Traffic Systems and other networks, to promote public service activities through the Amateur Radio Emergency Corps and the Radio Amateur Civil Emergency Service, to counsel and support the work of local radio clubs, to referee changes in award rules and see that contests run smoothly, to . . . well, we could go on and on but you get the general idea.

W1BDI

Often thought of as "Mr. Amateur Radio," Ed was elected a vice president of the League in 1951 and served 15 years in that office (continuing in retirement as Honorary Vice President). For forty years he was a member of the ARRL Executive Committee.

First licensed in Augusta, Maine, as 1BDI and later operating with the experimental-station call 1XAH, he built an enviable record of performance. In 1924, *QST* said of him, "This station is an example of what a poor location with a poor antenna can do when the man behind the key knows what he is doing and makes the best of circumstances."

Ed earned the E.E. degree from the University of Maine in 1924 and went to work for Westinghouse at Pittsburgh. (He holds a life membership in IEEE.) But Hiram Percy Maxim remembered him as one of New England's crack ops and organization men, and when Traffic Manager Fred Schnell (now W4CF) went to sea in 1925 to show the Navy the value of short waves, Ed was called to headquarters. Within a few months of his arrival here, he helped organize the Army Amateur Radio System, forerunner of today's Military Affiliate Radio System (MARS). Within a little more than a year, he had written the first edition of *The Radio Amateur's Handbook*. "Handy's Handy Handbook" (which after the first few editions became a group effort) has since then achieved sales of nearly four million copies in 43 editions with the 44th coming off the presses as you read this.

When World War II came along, Uncle Sam took advantage of Ed's ability and experience. He went on active duty as a major in the Directorate of Communications, Headquarters Army Air Forces at Washington. Later he saw service all over the U.S., in North Africa and Europe, earning the Legion of Merit and the eagles of a colonel.

After the war, he resumed his duties as our communications manager and his activities as W1BDI on the bands from 160 through two meters — a.m., c.w., s.s.b., and RTTY. He seldom misses a CD Party or League Officials (LO) night, swaps at least a few exchanges in every contest, holds DXCC *with 140 countries* recorded, and is a frequent QNI to the Connecticut nets. He's an active member of the Connecticut Wireless Association and has been its president, vice president, secretary, treasurer and communications manager. He's also trustee of the Headquarters Operators' Club stations, W1AW and W1INF.

Wherever he may go in retirement, he'll continue to publicize our organization — you see, his Connecticut auto registration plates bear the letters, "ARRL"!

HART NEW COMMS MANAGER

George Hart, W1NJM/W3AMR, becomes Communications Manager of the League on February 1. George was first licensed in 1930, and earned a reputation as a real traffic man at W8YA, on the campus of Pennsylvania State College, from which he graduated in 1936 with a Bachelor of Arts degree. The Master of Arts degree was completed in 1939 at the same school.

When the new headquarters station, W1AW, was dedicated in September, 1938, George came east to join its staff. In 1942 he became "chief operator," but there was not to be much operating: his principal task was to "mothball" the station for the wartime hiatus. That job finished, George became, in rapid succession, assistant to the communications manager, assistant communications manager and, by the end of 1942, acting C.M. In 1944 he joined the Army, won a shot at Officer Candidate School and spent the next two years as a lieutenant in the Army Airways Communications System.

W1NJM/W3AMR

In 1946, W1NJM returned to headquarters and the Communications Department, and was assigned the task of creating the ARRL Training Aids section, acquiring films, film strips and slides to assist local affiliated radio clubs in their own training programs. In 1948 he was assistant communications manager for c.w. and trunk line manager.

In 1949 George developed the National Traffic System, based on moderate participation of a

great many amateurs in section nets, reporting with through traffic to regional and then to area nets, with a transcontinental corps handling liaison between the latter. NTS gradually replaced the trunk lines which placed reliance on relatively-few "iron men"; NTS also provided organized opportunity for phone traffic handlers to take part in a national exchange of messages. Later in 1949, W1NJM became National Emergency Coordinator, a post he has held until the present. In 1964, George implimented the Board's desire that the Amateur Radio Emergency Corps and the National Traffic System be united into the Amateur Radio Public Service Corps for greater efficiency in times of emergency.

As ARRL communications manager, George now heads the field organization of 74 elected Section Communications Managers, 74 Section Emergency Coordinators, and thousands of volunteers holding appointments as route managers, phone activities managers, emergency coordinators, official phone stations, official relay stations, official observers, official bulletin stations and official v.h.f. stations. We wish him, and this volunteer army, the best of success in their joint efforts.

OTHER STAFF NOTES

William I. Dunkerley, WA2INB/KL7ELA, age 24 and a newlywed, has joined the staff as an assistant secretary for membership services. Bill was first licensed in 1956 as KN2UDII in East Paterson, N. J. He's a founder and past vice president of the Earbenders Radio Club; founder and past secretary of the Radio Press Association; past vice president of the East Coast VHF Society and a founder of its Space Communications Group (WA2WEB) which is active in Oscar and moonbounce work. He was chairman for the International VHF Convention held as a part of the 1964 ARRL National Convention, and served as v.h.f. chairman for the 1966 Hudson Division Convention. He represented the Society on the Hudson Amateur Radio Council and was a director of the latter. Bill has served as an assistant director of the ARRL Hudson Division and has been Communications Officer, East Paterson Civil Defense since 1963. He's also a member of the International Amateur Radio Club (4U1ITU), the Arctic Amateur Radio Club and the Englewood Amateur Radio Association. He's answering letters on licensing, etc., now, and will be on the club and convention circuit later on.

The Communications Club of New Rochelle conferred its 1966 Larry Kohlman Memorial Award to Gray and Cyndy Berry, K2SJN and WA2QEG, respectively, at its annual dinner. The award recognizes outstanding services either to the club or to amateur radio as a whole. Shown here making the award are Henry Wymbs, WB2GMN, CCNR president, at the left and Harry Dannals, W2TUK, ARRL Hudson Division Director, at the right.

(Photo courtesy of Westchester Rockland Newspaper Group).

The St. Louis Amateur Radio Club honored James M. Williford, WØPUS, as its Amateur of the Year. Making the presentation at a recent dinner was Sumner H. Foster, WØGQ, director from the ARRL Midwest Division, at left.

Gary L. Foskett, W1ECH, an assistant secretary since 1962, resigned from the Headquarters staff in August. He is now a technical writer with Pratt and Whitney Aircraft. An avid CD Party and contest participant, he'll be keeping in touch with many of the friends he made while he was at headquarters.

G. Peter Chamalian, W1BGD/K2UTV, has resigned from the staff effective January 27, 1967 to continue his education as a full-time student at the Central Connecticut State College. Pete has been George Hart's right hand man for traffic and emergency communications matters since December 1963. Like Gary, Pete is in practically every organized operating event (he was at PJ5ME last March for the DX Test) and will continue as his studies permit.

LICENSES FOR NATIONALS

In 1962 Congress amended the Communications Act of 1934 to provide for the licensing as amateurs of all qualified nationals of the U. S. as well as citizens. Effective December 6, 1966, the Federal Communications Commission has

(Continued on page 146)

Strays

COMING A.R.R.L. CONVENTIONS

January 21-22, 1967 — Florida State, Miami
April 22-23, 1967 — New England Division, Swampscott, Massachusetts
May 27-28, 1967 — Dakota Division, Minneapolis, Minnesota
June 30, July 1-2, 1967 — ARRL National, Montreal, Quebec
July 7-8, 1967 — Central Division, Milwaukee, Wisconsin

The Division of Occupational Health, U. S. Public Health Service, reporting on two recent poisoning deaths traced to improper use of silver solder containing cadmium, warned that this type of industrial material should be carefully used under safe working conditions.

The Division of Occupational Health emphasizes that all silver solders do not contain cadmium. However, when using any type of this material, the following precautions should be followed:

Warning labels, which should be on all packages, must be carefully read and followed.

The working area must be properly ventilated, preferably with specific exhaust systems.

Workers must avoid breathing emitted fumes.

The worker deaths occurred in California and Utah. A second non-fatal incident of cadmium poisoning was also discovered in California. In the Utah case, the worker told his physician that he had been working with ammonia and neglected to mention silver solder. His illness was consequently first diagnosed as "ammonia poisoning." It was not until after his death that tissue tests made at the suggestion of the State Health Department revealed cadmium poisoning.

Part of the problem, the Division of Occupational Health says, is that there are few requirements for labeling of hazardous industrial materials. In the case of the silver solder used in Utah, there was only a 1¼ × 2" loose tag which said: "Contains cadmium, emits dangerous fumes if overheated."

It is important that amateurs be aware of the possible danger, and tell their physicians of the types of materials they use. Some illnesses and diseases can be easily overlooked if physicians do not have this vital information.

—•••—

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

Back Copies and Photographs

Back copies of *QST* referred to in *QST* issues are available when in print from our Circulation Department. Please send cash, money order or check — 60c for each copy — with your order; we cannot bill small orders nor can we ship c.o.d.

Full size (8 by 10) glossy prints of equipment described in *QST* by staff members *(only)* can be furnished at $1.50 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order — we do not bill nor ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless *specifically* mentioned in the article.

First Slow-Scan Pictures from Antarctica!

Picture transmission via amateur radio from McMurdo Sound became a reality at 11:30 P.M. Pacific Time on November 28, 1966, when the pictures above were sent from KC4USV to W7FEN, Monroe, Washington. The two gents are Ernest Jordan (K5CLT) of Middletown, R. I., and Harold MacPherson, Jr., East Syracuse, N. Y. Conditions on 14 Mc. at the time were extremely poor, but in spite of weak signals, noise, and multipath distortion the photos are quite recognizable—indicating that really good quality can be expected with reasonably-normal propagation. The KC4USV picture equipment was furnished by WØNLQ and taken to the Antarctic base by Lt. Cdr. Ferrero, as described on page 20 of November QST.

HamQUEST '67

One Month To Go

February 28th is the official closing date for HamQuest 67

AMATEUR

On about the first of September we mailed HamQuest 67 kits to all affiliated clubs, and to many non-affiliated clubs as well. Ever since then we have been receiving a steady stream of new-member applications as a result of this campaign to increase the strength of amateur radio by increasing club and League membership.

Beaucoups booster lapel pins have been sent out to those responsible for the recruiting. Dozens and dozens of *Handbooks* have been sent out to those who signed three or more new members.

Brief cases and minute books have gone out to clubs for signing up five or more new members. Gavels have gone out to clubs signing up twenty-five new members.

Only a month is left — get *your* entries in before the deadline!

CLUB ARRL

Everybody wins!

Strays

A *Clergy & Religious Radio Operators* callbook has recently been published under the editorship of Rayner Small, O.F.M. Cap., WB2ANI/1. It contains calls, names, and addresses of clergymen, missionaries and members of religious orders of all faiths. Additional details may be obtained by writing: *Clergy and Religious Radio Operators*, Capuchin-Franciscans, St. Anthony Seminary, Hudson, New Hampshire 03051.

A conversation overheard between two men:

"It is a coincidence that we both like hunting and fishing. "Do you have any other hobbies?"

"Yes, I am a c.b.-er."

"C.b.-er, what's that?"

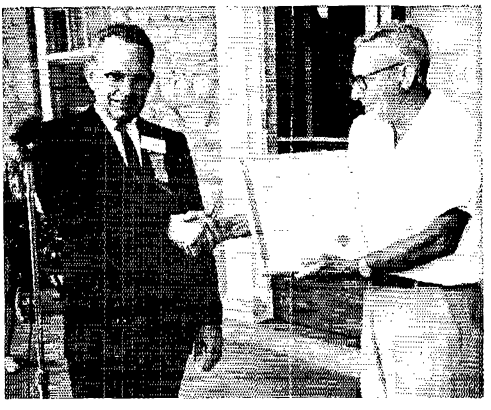
"You know, citizens band."

"Sounds interesting. Do you conduct or play an instrument?"

(Thanks to ex-W8NSQ)

Strays

Shown from l. to r. are WA5CYI, W5SDA, and W5EKP at the November 27, 1966, ground-breaking ceremony of the Houston Amateur Radio Club. The club is constructing an air-conditioned 40 × 90 ft. building. The building will feature a meeting room, lounge, radio shack, kitchen, study room, and museum containing old amateur radio articles.



Photographed at the West Virginia State Radio Convention, Jackson's Mill, West Virginia, July 3, 1966 is SCM Don Morris, W8JM, (left) presenting the State Radio Council's "Outstanding Amateur of the Year Award" to Bob Johnston, W8IRN, of South Charleston. *(Photo by WN3EFD)*

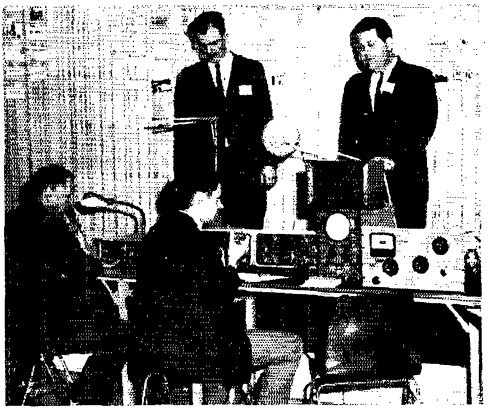
I would like to get in touch with . . .

. . . anyone interested in starting an 80 meter Novice net to meet evenings and weekends. WN3FNT

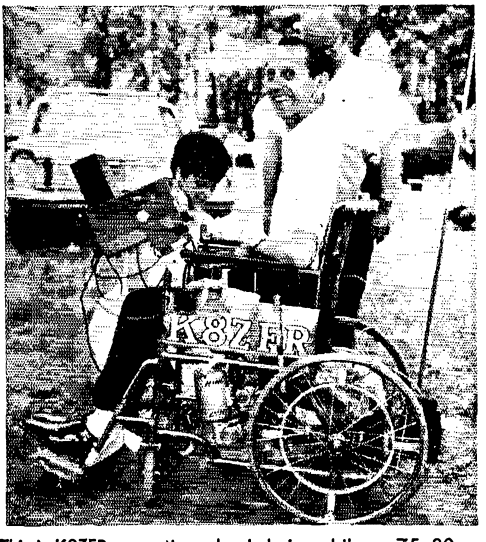
. . . Anyone interested in amateur rocketry. WA9QFT

. . . Amateurs who are also model airplane builders. WAØJPR

. . . College radio clubs interested in a nationwide "College Field Day" may contact the University of Colorado Amateur Radio Club, Room 511 U. M. C., University of Colorado, Boulder, Colorado.



Members of the Overlook Radio Society of Kingston, N. Y., held a public demonstration of amateur radio at a local department store. During the display they handled 18 messages and afterwards received several inquiries from people interested in obtaining their amateur license. Shown at the station are from l. to r., W2DAW, WA2UKS, WA2TIF and WB2LZJ. *(Freeman photo by Wagenfohr)*



This is K8ZFR operating wheel chair mobile on 75, 20, or 6 meters, powered from the wheel chair's storage batteries. He has a special photographic QSL for QSOs from the chair. Joe also puts in 6 to 8 hours a day from the club station at Cleveland Veterans Administration Hospital, including QNIs to the Eye Bank Net, Ohio SB Net, International Handicappers Net, and North American SB Net.

Making WAS by two-way work with *All Novice Contacts* has been done oftener than we thought. We goofed in saying (Dec. *QST*) that W4KN was No. 2. Both W5AX and W1AW hold earlier endorsed certificates, besides the No. 1 to W1WPO (Jan. 1954). K4RX and K4RHG/4 (now WØGQR) are substantiating earlier claims to this one, also.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

AMATEUR RADIO IN 9H1 AND OY

Two societies have recently been nominated for membership in the IARU. A look at amateur radio in these two countries seems timely.

The *Malta Amateur Radio Society* represents amateurs on the three islands in the Maltese group, Malta, Gozo and Comino. Forty-three of the 44 licensed 9H1 amateurs are members of MARS and 25 of the members have stations.

Maltese amateurs are allowed operation in the 1.8–2.0, 3.5–3.8, 7.0–7.15, 14.0–14.35, 21.0–21.45, 28.0–29.7 and 144.5–145.5 megacycle bands with a maximum power input of 150 watts. Malta hams voluntarily stick to the European Band Plan ("IARU News," November 1966 *QST*, page 86). No third-party traffic, amateur TV or mobile operation is allowed.

The Chief Wireless Inspector issues only one class of license. Applicants must be at least 18 years of age and successfully complete a written exam and a 12 word-per-minute code test. The license fee equals $5.60 in U.S. currency; Maltese citizenship is not required. The Maltese government is giving favorable consideration to aliens requesting 9H1 operating privileges. Application for permission should be made to Mr. Joe Galea, Office of the Prime Minister, Auberge d'Aragon, Valletta, Malta. He will provide the proper form which must be completed and returned with a fee amounting to about $11.25 in U.S. currency. At least one American recently applied for and was granted a 9H1 call.

Dr. Victor Borg Grech, 9H1C, is the MARS president. Other officers include vice-president Clifton Newman, 9H1Q; Joseph Vella, 9H1U, secretary; Ronald Meachen, 9H1R, treasurer and Lawrence Smith, SWL representative.

The Society address is 118 High Street, Sliema, Malta.

The second recent IARU nominee is the *Faroese Amateur-Radio Society*. On the 18 islands which make up the Faroes group, there are 79 members, 38 of whom are licensed.

Faroes hams are permitted 3.5–3.8, 7.0–7.1, 14.0–14.35, 21.0–21.45, 28.0–29.7 and 144.–146.0 megacycle privileges with phone sub-allocations following the European Band Plan.

Prospective licensees must be at least 16 years old and pass a written examination as well as a 12 word-per-minute code test. Three classes of licenses are issued: Class One is for 300 watts c.w. and 150 watts phone on all bands, Class Two allows 100 watts c.w. and 50 watts phone on all bands and Class Three permits only 10 watts c.w. on all bands. The Class Three ticket is similar to the U.S. Novice license. A five-year Faroes citizenship is required before a OY license will be granted. The license fee amounts to $1.30 in U.S. currency. The Faroes government does not allow third-party traffic but mobile operation and amateur TV is permitted without a special license. The OY licensing authority is the Telegraph Administration in Tórshavn.

The FRA president is Hans Egholm, OY2H, Johann Isholm, OY2J, is secretary and OY7ML, Martin Hassen, is the treasurer.

The society's address is FRA, Box 184, Tórshavn, Faroes Islands.

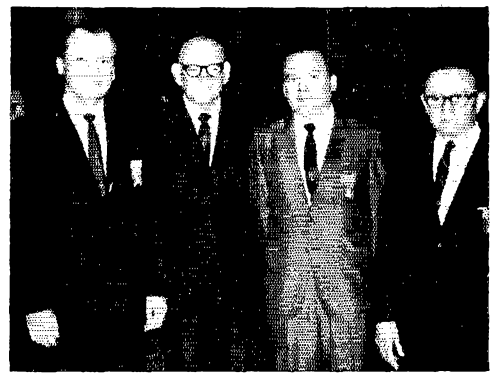
IMPORT DUTY OFF 6Y5 HAM GEAR

A resolution proposed by the *Jamaica Amateur Radio Association* (JARA) to allow amateur radio equipment to pass duty free into Jamaica has been approved by the Jamaican House of Representatives.

The equipment must be imported in the name of JARA for the sole use of JARA members who hold 6Y5 licenses.

FRENCH QSL BUREAU CHANGE

The new address for the French QSL Bureau effective January 1 is REF, Boite Postale 70, 75 Paris 12, France.



During the recent meeting in Nicaragua of the *Federacion de Aficionados de Central America y Panama* (FRACAP), Nicaragua President Dr. Lorenzo Guerrero Gutierrez (second from the left) held a reception for the Federation at the Presidential Palace. Pictured with President Gutierrez are (l. to r.) IARU President WØNWX; Max Najman, YN1NT, Secretary of FRACAP, and Armando Lanza, YN1LH, Secretary of the *Club de Radio Experimentadores de Nicaragua*.

PANAMA RECIPROCITY

Through the courtesy of Camilo Castillo, HP1AC, secretary of the *Liga Panamena de Radio-Aficionados* (LPRA) we have the information on how FCC-licensed amateurs apply for HP licenses.

The application for operating permission should be written on official stationary available from Panamanian government sources and addressed to the Ministro de Gobierno y Justicia, Panama City, Republic of Panama, and must be accompanied by the following documents:

a) A copy of the applicant's birth certificate.
b) Local police record.
c) Two photographs.
d) Certified copy of the FCC amateur license.

Further information may be obtained from the LPRA, Apartado 1622, Panama City 1, Republic of Panama.

The United States now has reciprocal operating agreements with 21 countries: Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, the Dominican Republic, Ecuador, France, Germany, India, Israel, Kuwait, Luxembourg, Nicaragua, Panama, Paraguay, Peru, Portugal, Sierra Leone and the United Kingdom. Other agreements are being negotiated.

AMATEUR GROWTH IN DOMINICAN REPUBLIC

Fred Laun, W9SZR/HI8XAL, describes amateur radio in the Dominican Republic as robust. OM Laun says new licenses are being issued at a relatively rapid rate, with close to 400 HI amateurs now licensed. Some amateurs' wives are permitted to operate their husbands' stations under certain conditions without having to take an examination.

HI8XAL traces the soundness of HI amateur radio in part to the actions of the first Director of Telecommunications of the present government. During the Trujillo regime only seven hams were licensed and these were periodically shut down at the whim of the government. The new Director expedited amateur licensing for several important personages who were interested in amateur radio, guaranteeing support for amateur radio in the "leadership class."

Four classes of licenses are available. The Novice Class is given without examination for one year, non-renewable except in special cases for limited periods. Novices are allowed to operate on 80, 40 and 15 meters, phone and c.w. The Technician Class has a five-w.p.m. code requirement and a written examination roughly comparable to the U.S. Technician test. Privileges are 300 watts on all bands 80 through 2 meters, phone and c.w. The General Class consists of a 10-w.p.m. code test and a written and oral theory examination falling between the U.S. General and Extra in degree of difficulty. Generals are permitted one kilowatt of phone and c.w. on all bands, 80 through 2 meters. The Special Class ticket is granted to foreign nationals based on reciprocal operating agreements. The privileges are the same as for the General Class. Operation on 160 meters is allowed with special permission, with no power or frequency limits being established.

Novices are issued three letter calls with the letter N immediately following the prefix; Technicians receive three letter calls of any combination except those beginning with N or X; Generals receive two letter calls, and the Specials are issued three letter calls beginning with the letter X following the prefix.

Licenses cost the equivalent of $10 U.S. annually; the fee is waived on reciprocal permits if the visitors' home government does not charge visiting HI amateurs for a permit.

U.S. amateurs seeking HI privileges should, after arriving in the Dominican Republic, make written application in Spanish to the Director of Telecommunications. A photocopy of the FCC license and three passport-size photographs are required. The applicant will have to also complete a simple form on which he should be able to cite the name and call of a Dominican ham who can vouch for him. Almost any Dominican amateur will be willing to do this. QST

Illinois — The fifth annual Wheaton Swap and Shop is being held at the DuPage County Fairgrounds, Wheaton, Illinois on Sunday, February 19. A cordial invitation is extended to all hams, CBers, electronic hobbyists, their friends, and commercial exhibitors. Hours: 9:00 A.M. to 5:00 P.M. $1.00 donation at the door. Refreshments, unlimited parking. Contact W9BJO for addition information.

New Jersey — The Central New Jersey VHF Society will hold its annual dinner at the Arbor Inn in Dunellen, N.J. on Saturday, February 11. Live music and a guest speaker will be featured. The price is $6.00 per person or $11.00 per couple. For more information and for tickets, contact WB2KLD, at 201-752-0182 or WB2TBA at 201-545-7283

Ohio — On Sunday, February 12, the Toledo Mobile Radio Association will conduct its 12th annual "Amateur Radio Auction," at the Lucas County Recreation Center, 2901 Key Street (just off Anthony Wayne Trail), starting at 10:00 A.M. and running all day. Refreshments will be made available. Manufacturers and distributors will display new amateur radio equipment. Tables may be rented for $1.00 to sell small parts and radio equipment valued under $10.00. Ample parking so come early and get your equipment on the block. For further information contact Paul B. Gillespie, K8KFO, 4648 Harbord Drive, Toledo, Ohio 43623.

Oklahoma — The Lawton-Fort Sill Amateur Radio Club will hold its 20th Anniversary Founders Day Hamfest on Sunday, February 12 at the Hotel Lawtonian, 501 South 4th Street, Lawton, Oklahoma. There will be a good program with many ARRL and MARS officials expected to attend. The preregistration fee is $4.00 and it should be sent to the Lawton-Ft. Sill ARC, Inc., Box 892, Lawton, Okla. Admission at the door will be $4.50.

Correspondence From Members-

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

MERITORIOUS MEMBERSHIPS

¶ The membership will have to recognize the need for increased dues in the face of increasing costs that burden the administration of our League. It is not sufficient to meet and break even, financially, with the excellent work our League is doing. There is need for further expansion of our programs, better facilitation of our current programs and provision must continue to be made to place the League squarely in the black-ink department so that it can be ready to meet any contingencies that may rear their ugly heads.

"HamQuest 67" is an excellent start, but how about going one better? Why not institute a program to make certain that any handicapped amateur — invalid, blind or otherwise deserving of help — does not remain a non-member due to lack of funds? The fact that these people have become amateurs testifies on behalf of their courage and determination to overcome tremendous obstacles, and I feel that they should have a voice and vote in the interests of amateur radio.

Charity? Not at all! Such "Meritorious Memberships" would be a clear cut recognition of the efforts of those to whom amateur licensing *really means something.*

Who will bear the costs? I will, and so will many other hams who realize what our League stands for: that it is to serve those who need to be served, as well as those of us who kick in $5.00 annually and receive back many times our investment.

Enclosed is a check to cover a Meritorious Membership for any fellow ham so nominated, whether he may be in a vet's hospital, confined at home or whatever circumstances may prevail. And I further pledge to renew this subscription so long as is necessary to include my fellow ham as a *participating* member of the ARRL. — *Jerry N. Ventre, WA6QKG, Orange, California*

¶ Your "HamQuest 67" editorial appealed to me so favorably that I have to do something — even though it may lead to administrative mayhem.

There must be hams who would like to belong to the League but cannot for financial reasons — handicapped, low source of income, etc. Accept, if you will, this check for a membership for a ham of your own choice. — [Name withheld on request] *W18 — Cincinnati, Ohio.*

[EDITOR'S NOTE: No "administrative mayhem" has been created; with the assistance of the International Handicappers Net, Box R, San Gabriel, California, deserving handicapped amateurs in Ohio and California have received "Meritorious Memberships," thanks to the writers of the two letters above. Further offers of assistance may be directed to Membership Services, ARRL, Newington, Conn., 06111, or to the address above.]

APPRECIATION

¶ I am financially unable to join the ARRL at this time. I do manage to read *QST* every month and I want you to know that I appreciate the League. Without the various helps from ARRL I could never have passed the General.

I know you receive much criticism from various loud-mouths, but so does everyone else who takes a public stand on any issue. I believe, though, you represent the thinking of the vast majority of amateur operators, many of whom are like me — sympathetic, but unenlisted.

Were it not for a large family and expensive schooling, I would be a member of the League this year. Perhaps later on my financial load will lighten and I can "put my money where my mouth is," — ha! In the meantime I will sit on the sidelines and lead the cheers. Thank you for fighting my battles and promoting my general welfare as an amateur operator. — [EDITOR'S NOTE: This letter comes from an amateur who is the minister of a country church in Tennessee; for obvious reasons, we have withheld his name.]

V.H.F. COLUMN

¶ The general format of "The World Above 50 Mc." has remained substantially unchanged since 1940, when it was called "On The Ultra Highs" and was conducted by E. P. Tilton, W1HDQ. Such durability cannot be overlooked, and it would seem that this column has served the v.h.f.-u.h.f. amateur well through the years.

In order to discuss intelligently the applicability of the column in its present form to the needs of the modern v.h.f.er, it is necessary to determine the aims of League management as to the purpose and scope of the column.

Presently "The World Above" is a place where the v.h.f. enthusiast may send a letter describing what he has done, seen or heard on the air and eventually see his call appear in print. It is to *QST* what the gossip column is to the local newspaper. This is a good builder of circulation and if that is the aim of the column, it is being admirably served.

If *QST's* aim is to serve the needs of the serious v.h.f.ers through the column, then more often than not it is falling short of its mark.

Being in constant contact with the many v.h.f.ers, it has become increasingly obvious to me that there is a tremendous need in amateur radio for a clearing house of ideas and projects of an advanced nature. This is to stimulate original thought and avoid wasteful duplication of effort among the relatively small number of amateurs in a position to make significant contributions to the state of the art in v.h.f. and u.h.f.

Certainly, extensive articles of a technical nature have no place in a v.h.f. column and should be left to the portion of the magazine normally given over to technical articles. However, brief descriptions of projects being worked on could help to stimulate thought of related projects and result in worthwhile dialogue among serious experimental workers.

The column could also stimulate v.h.f. interest by setting up goals such as a new distance record on 2300 Mc. with an appropriate certificate or plaque for the first ham to achieve it.

Surely operating news such as currently takes up most of the column should not be neglected. But, the space given over to it should be placed in perspective with its importance to all readers rather than to the ham who submitted the item. — *Sheldon Glick, WB2OIII, East Paterson, New Jersey.*

KEEP OES

¶ Along with the Official V.h.f. Station appointment, we should keep the Official Experimental Station appointment to encourage experimental work in such areas as microwave, pulse techniques, improved transmission lines, antennas, etc. I would suggest a set-up with a director of research and development over such areas. — *Francis Dill, Jr., Baltimore, Maryland.*

1921 TRANSATLANTICS

¶ . . . Every time I re-read the 1921 exploits of Paul Godley on the other side of the Atlantic, I wonder if any of those who were heard transmitting from this side are alive today. I am much alive at this moment and I wonder if with your resources you could trace the other fellows through the call books since that time. That too would make a wonderful story. — *James L. Russell, W8BU, Cleveland, Ohio.*

INCREASE DUES?

¶ . . . As a newly licensed amateur of eight months' standing, Novice and now General, I have profited enormously from your code practice sessions and the enlightening articles in *QST*.

So stop pussy-footing around. Increase your ARRL membership rate — it's too low right now. — *D. Samalin, WB2WJA, Flushing, New York.*

¶ I have been a ham for a little under 2 years and an ARRL member just about all the way. I am against the raising of the dues, and I'm sure I speak for many hams who are around my age (14). I know that we represent a minority of ARRL members, but we should receive some sort of consideration in this dues business. — *Ray Lange, WB2SJH, Sparta, New Jersey.*

AIR CUSHION MOBILE

¶ After reading the article on page 54 of *QST* for November, 1966, I checked the date of the magazine to see that it was not the April issue. According to my interpretation of FCC rules § 97.87 mobile operation is just mobile operation without regard to the vehicle involved except as explained in § 97.87(e). In addition to that, if the Air Cushion Vehicle is a ground effects machine, the Federal Aviation Agency does not regard it as an aircraft.

Many people will read that article and be sure that the common use of "aeronautical mobile" is proper. ARRL could do a service to us by explaining some of the rules and regulations.

I enjoyed the article that caused this letter, but is it really accurate in detail? Thank you. — *Bob Park, KØKRX, Harper, Kansas.*

[EDITOR'S NOTE: OM Park is correct; the item on the air cushion vehicle was run tongue-in-cheek for its humorous effect. An amateur station installed on any sort of vehicle — car, boat, aircraft, bicycle, etc. — is just "mobile" while it is within the United States and its territorial waters. The term "aeronautical mobile" and "maritime mobile" apply only on or over international waters.]

PINK RIGS?

¶ . . . We amateur operators think these gray boxes called "rigs" are beautiful. But I have been thinking. Perhaps if all manufacturers of ham gear would get together and make these "rigs" in pastel colors of pink, blue and lavender it would match the XYL's color scheme. Then there would not be so much conflict between XYLs and OMs. — *Velma Sayer, WA0GHZ, Cambridge, Nebraska.*

TECHNICAL STUDY GROUPS?

¶ In order to satisfy the diverse interest of its members the IEEE has resorted to the formation of various technical groups. These groups are financially assisted by the IEEE. . . The advantages are manifold and most importantly, the system seems to work well.

As a method of increasing ARRL membership and service to the radio amateur, a similar type of organization might be considered. At present, the ARRL is made up of individual members and affiliated radio clubs. These clubs are generally geographically located in a particular region. A number of specialty clubs have a unifying theme such as SSB, QRP, QCWA, CHC, VHF, etc. These are national or even international in scope, as opposed to the regional clubs.

Statistics as to how many members of these specialty clubs are also members of the ARRL are not available. In any case, the prospect of affiliating these clubs with the league should be considered as a means of increasing League membership and permitting ARRL representation for these clubs. Of course, affiliation is a two-way street and it would have to be attractive to the specialty club. Probably a good deal of independence would have to be maintained. The benefit to the club might consist of added publicity in *QST*, hence an increase in its membership also. Perhaps the League could print the club's newsletter either as a part of *QST* or a separate sheet.

Undoubtedly there are many facets which have not been covered in this note. However, consideration of the matter could lead to the improvement of the ARRL position in the amateur community. Whether the specialty clubs are amenable to affiliation or not, the ARRL should consider the formation of such a structure. — *Alan L. Kirsch, W3QOT, Dresher, Pennsylvania.*

CORRESPONDENCE COLUMN

¶ For the past several years I have been reading the correspondence column of *QST* with great interest. Not only because of the new ideas and suggestions presented, not only to see what views others have of these ideas and suggestions, but for terrific comic enjoyment. The fierce combat of contester vs. non-contester, RM-499 vs. non-RM-499, etc., is one of the truly funny things that I see nowdays.

I have a message to all of the fellows out there in ham land: Keep those letters coming! Laughs are hard to come by these days. — *S. D. Andrews, WA5IJNN, Little Rock, Arkansas.*

OPERATING MANUAL

¶ Have received a copy of the *Operating Manual* and even with the very cursory glance I have been able to give it, it is the finest manual I have seen and I will certainly recommend it to the boys in the Manitoba Section. — *J. Thomas Stacey, VE4JT, Manitoba, Canada.*

¶ Thought you might be interested in the Willimantic Radio Club's promotion of the new Operating Manual. Twenty-two of our 26 members now have a copy. — *Vern Dawson, W1BKC, Storrs, Connecticut.*

SPEAK UP!

¶ As an active Exchange Club member, I am sometimes asked to provide the evening program. As you probably know, the Exchange Club is a service club composed of men in the forty to fifty year age bracket, from all walks of the business world. We generally have a weekly attendance of 35 men.

Does the League have suggestions for a suitable program? — *William F. Alexander, W3GFZ, Newtown, Pennsylvania.*

[EDITOR'S NOTE: Indeed it does. A sample speech, some magazine reprints suitable for his audience and a list of three public-relations films have been sent to W3GFZ. Anyone else with a similar opportunity?]

TWO HUNDRED METERS AND DOWN

¶ At the ARRL Hudson Division Convention, for only one dollar, I "stole" a masterpiece of hamdom: the late Clinton B. DeSoto's ageless thesis, *Two Hundred Meters and Down*. What a fantastic book!

Several histories of this mania we call amateur radio have crossed my path during the almost fifteen years I've been pounding brass under my own call sign, but none has ever been so enchanting, so enriching, so heartwarming and, I daresay, so very well written, as DeSoto's masterpiece. He was quite a master with words and the turn of a phrase. What William H. Prescott was for Hernando Cortes, what Charles Darwin was for the ape, what James Boswell was for Samuel Johnson, so also was DeSoto for all of us. He told the story that had to be told and did it in such a manner that no reader could deny his genius.

I am now more proud than ever to have been a League member since 1952 and am most grateful to the League for making reprints of this 1936 classic available to all for so small a levy. It is well within the budget capability of the poorest ham and I therefore see no reason why every ham (especially every League member) does not own a copy. We would all benefit by it. — *A. P. LaPlaca, K2DDK, Manhasset, New York.*

¶ Please send five copies of *Two Hundred Meters and Down*. I was really entranced by the book. Plan on using these five as presents to other amateurs who do not have one . . .

Age here is 75. I served part time on signal detail in a horse drawn field artillery in World War I, but we had no wireless equipment. — *Harold S. Walker, K2LQY, Ghent, New York.*

HELLO TEST . . .

¶ I earnestly request the League to formulate a proposal for a change in the wording of Part 97 Subpart D, such change to compel all stations to employ dummy load antenna for all tests of one minute or more duration.

The practice of prolonged on-the-air testing has grown alarmingly recently, and somehow seems related to the huge increase in the use of linear amplifiers.

As an Official Observer I have had occasion to tabulate some findings based on six months of fairly consistent monitoring, principally on 14 Mc., and the following are my figures:

A. Prolonged on-the-air testing (5 minutes to 1 hour or more)	216
B. No identification or insufficient ID during such testing	159
C. Unwarranted and flagrant interference with stations already using the frequencies chosen for such testing	112

I believe that the lack of time specification in § 97.93 is an open door through which violators may seek to escape responsibility. If the allowable time were actually spelled out it would tend to minimize this problem.

I hope the League will act on this for it is eminently clear that the violators constitute a negligible minority who do not display the true spirit of amateur radio. — *David Mann, K2AGZ/K3WOO, Kinnelon, New Jersey.*

¶ I am in various nets every day. Without fail, we always have some "testers" or other QRM sources even when the NCS requests these stations to QSY or join the net.

I think when the FCC gives tests to new applicants, it would be a good idea for the examiners to distribute a copy of "The Amateur Code" given in every copy of the Handbook. — *Gene Gillespie, W2EAF, Mt. Vernon, New York.*

Strays

QST **Congratulates . . .**

Donald L. Schliesser, WA6UFW, who has been named to the Vice President's Club of Connecticut General Life Insurance Company.

Murray Grimshaw Crosby, W2CSY, who is recipient of the 1966 Mervin J. Kelly Award of the I.E.E.E.

Professor Martin Ryle, G3CY, Fellow of the Royal Society (scientific), upon receiving Knighthood. Sir Martin is in charge of the Mullard Observatory, Cambridge, England.

James J. Lamb, W1AL, who has received the Meritorious Civilian Service award of the U. S. Army (the second highest Army Civilian Award). Mr. Lamb, now a scientist at Fort Huachuca, Arizona, was formerly *QST* Technical Editor and Research Engineer on the staff of ARRL.

Lawrence T. Fadner, W3MSR, upon publication of his book, *Fort Wilkins 1844, and the U. S. Mineral Land Agency 1848.*

Brigadier General Douglas E. Williams, W3AWX, retiring Air Force Communications Chief of Staff, upon receiving the Oak Leaf Cluster (second award) to the Legion of Merit.

Glen Gronland, WB2PWS, who was elected New Jersey State Governor of Key (junior Kiwanis) Club International. Glen is 16, and a junior at Oakdrest (N. J.) High School.

Russell W. McFall, W3JAB, president of the Western Union Telegraph Co. who was presented the Manhattan Kiwanis Foundation "Man-of-the-Year" award at a ceremony Dec. 6, in New York City.

The award is in "recognition of outstanding business and civic leadership." The recent presentation was the fourth made by the foundation since it was established nine years ago.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Which:

February's here — ARRL DX Contest month with sunspots a-poppin'! . . . Say, curious newcomers ask a question occasionally, this reasonable inquiry: How come separate phone and c.w. activity week ends?

Well, young fellers, twin-type test tradition originated 'way back when there were Phone Men and C.W. Men. Around the early 1930s never the twain would meet. Egged on by sporty demagogues, old-time phone enthusiasts hollered that c.w. per se was passé, while veteran c.w. adherents screamed that phone was for s.w.l.s and sissies. These extreme generalizations settled nothing but made lively conversation for years.

Uttering dire threats and claims, a mike booster wouldn't be caught dead with a key in hand, and a code hound's worst fear was to be photographed near a microphone. Honestly! Oh, this may seem comical now, but in those days it was a shootin' matter. So serious that almost everything in amateur radio had to be done double. There had to be a phone this and a phone that, a c.w. this and a c.w. that. Hazy mass reasoning must have been that since the radio spectrum is necessarily divided and subdivided for mode compatibility, people should be, too.

Anyway, like so much of all tradition and custom, this has worked out just fine. We still have those "double" activities. But instead of a bunch of strictly-phone operators in the phone divisions and a bunch of c.w.-only operators in the c.w. halves, we now have essentially the same batch of hams greatly enjoying both deals. Fun and training times two! Sure, each of us may lean toward phone, or c.w., or RTTY, etc., but those demagogues apparently have departed to raise hob in some other hobby.

What makes hamdom's DXers such capable all-around communicators is their self-developed ability to establish contact, adverse conditions notwithstanding, using any propitious available gear and mode. To communicate is the thing; if the guy at the rare end chooses to answer voice, code, RTTY, smoke signals, wigwag or telepathy our DX diggers will give it a feasible try for that QSO. The payoff is the pasteboard.

See you there on the 4th-5th (phone) *and* 18th-19th (c.w.) of this month, OM. Don't forget — 10 is back!

—•••—

Laurence Harbor, N. J.

Dear OM:

Regarding Grommethead's troubles in November *QST*. Just when did you visit my shack — or do you have a spy around here?

When I had my Novice ticket I was using a zepp and a spring which *did* snap loose. From a mulberry tree, though, not an elm. Shot from the back of the house into the front yard.

Oh, what I went through to get that antenna up on a snowy December day. Back to the vertical!

— *Schultz, WA2BXD*

NR 9 R W4JXD CK 11 ALEXANDRIA VA FEB 1
JEEVES, *QST*
INFORM GROMMETHEAD BIG SENDER
SEVEN FELL IN PEAT BOG NEAR HERE
— ALEXANDRIA RADIO CLUB

What:

Man, Jeeves had a horrible nightmare the other night. He dreamed that the current budding sunspot prosperity suddenly peaked out and abysmally declined like the midget 1928 pip pictured on the cover of your December '66 *QST*. Yyyyyick — maybe we'll have to settle for a low double-topper like that of 1905-'07. Or would you believe an abortive spike like 1884's? Sorry about that outburst of pessimistic thinking, but it's a fact that this solar upswing already is in the maxima region of half the preceding eight upturns. Not only that; the last three peaks were the highest since 1870. Can we really count on another short-wave whopper so soon? Better not pass up the '67 ARRL International DX Competition, OMs. . . . Time for a core sample of recent 20-meter DX doings. Remember that the figures in parentheses represent kilocycles above the lower band edge, and unparenthesized numerals go for Greenwich Mean Time in whole hours. Now then. . . .

20 phone's turn to lead, our "How's" Bandwagon yanked off and away by correspondents **Ws** 2DY 3LE 4YOK 8YGR 9LNQ, K9UCR, **WAs** 8GGN 8PKG 9SXQ, **WB2RSS**, **VE8AG**, C. Durnavich and W. Kilroy who dig the sigs of **CRs** 4AJ (202) 22, 5SP 22, 6DX 6, 6GO (196) 1, 6GQ (275) 7, 6HH (140) 7, 6ID 21, 6IK (215) 22, 6IV 7-22, 7AP (216) 12, 7CD 20, 7CO (204) 19, 9AH (190) 15, **CT1s** BH 3-12, CV PK, **CX9AAN** (255) 0, **DKØAA**, **DU1s** BA (108) 12, BSP, **EA8AH** (124) 12-18, **EIs** 4AI 21, 9Q 21, **EL2s** AH AK 22, AT (215) 22, J (140) 8, R 13-18, **EPs** 2AX (213) 13, 2BQ 3AM (210) 13-14, **ET3s** AC WH (255) 2, **FB8s** WW (116) 16, XX (221) 16, YY (130) 16, **FH8CD** (113) 16, **FK8s** BG (205) 6, BK (201) 8, **FL8AC** (195) 20, **FO8s** AS (222) 4, BL (257) 9, **FR7ZD** (245) 15, **FY7s** YL 10, YM, **GBs** 2USA 3HH, **GCs** 2FMV (110) 9, 3POG (213) 3, **GD3s** RFK (135) 13, TIU (110) 9, **GM5ABG/KP4BRY**, **HA5FE** 17-18, **HCs** 2SB (115) 6, 5CR, **HH9DL** 21-3, **HIs** 7XTM 8LC 12, 8XFS, **HKs** 4DF 7, 5ACI 6, **ØAVK** (109) 12, **HM2BD** 11, **HPs** 1JC (135) 5, 9FC/mm (108) 23, **HRs** 1JAP 13, 1KS (123) 8, 2GR (123) 14, taboo **HS4AK**, **HV3SJ** (240) 20-21, **IS1EP** (229) 16, **JA8s** AU (135) 12, EL 11, K3FOY/**OX5** 1, KA9MF, **KB6CZ** (213) 9, **KC4s** AAD 2-4, USB 9, USH 4, USJ USN (307) 4-5, USV, **KG6s** ALW (250) 20, IF 11, NAA (280) 12, KH6CH/**KW6**, **KJ6BZ**, **KR6s** JS (265) 12, LL (213) 12, UL, **KS6s** BA 11, BT 12, **KV4AA** 2-3, **KW6EJ** (240) 2, **KX6BQ** (265) 12, **KZ5AG** (120) 7, **LU1ZA** (200) 23, **LX1DB** 16, **LZ1KKE** (212) 16, **M1B** (225) 13, **MP4s** QAI (150) 22-23, TBO (147) 16, **OA4PQ**, **OD5FA** (103) 16, **OHØNI** (221) 16, **OX5s** AC AN (310), AR 20, **OY7ML** (265) 13, **PE2EVO** 19-20, **PJs** 2CE (127) 12, 2CR 2MI (150) 14-15, 3CD (135) 21, **PZ1AX** 21, **PYs** 1CK 1AS 7ACQ 8OL, **SLØs** AX (115) 17, DF, **SMs** 2BJI ØAVC ØAZU (128) 16, ØCZY, **SPs** 5AKG 6AAT (221) 14, **ST2SA** (195) 8, **SVØWU** (250) 0, **TFs** 2WJN 15, 2WJX 3EA, **TGs** 5HC 0, 9EP, **TN8s** AA (140) 20, AD (195) 21, **TR8AG** (110) 20, **TU2s** AS 20-21, BA (230) 22-23, **UAs** 1KAE/6 1KED (133) 22, 2KBB 2KBD (225) 15, 9EU 9VH 3, 9AI (217) 4, ØBP ØSK (220) 12-13, **UC2BF** (234) 12, **UD6s** BV (208) 14, KEA 3, **UF6s** AS (200) 16, FE (219) 15-16, **UG6SG** (210)13, **UH8AY** (213) 14, **UI8MN** (210) 14, **UL7s** BF FA AZ (231) 12, JA 2-13, **UN1BK** 14, **UO5PG** (200) 14, **UP2s** AM OK, **UQ2KFG** (220) 14, **UR2s** AR 14, KAW (201) 15, **UWØAA** (230) 2, **VEs** 3EJZ/**SU** (140) 17-18, 6QG/**SU** (144) 18, 8RCS, **VKs** 6BE 6EZ (255) 23, 6KK 6RU 7CK 8AD 8KK 9AG 13, 9DJ 14, 9DR 9MK (254) 14, 9RH (110) 23, 9XI (211) 17, **VPs** 1PV (130) 6, 2AA 2AC 2AP (122) 12, 2SY (210) 23, 5AR (122) 11, 6KL

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

CPs 8AB and 5AJ, left and right, are Maryknoll missionaries at Riberalta and Cochabamba. The latter also operates CP5EA regularly. Cas and Leo are very popular with the 14-Mc. s.s.b. clan (Photos via W1MD)

(113) 11, 6WR 22, 7NA (108) 12, 7NS (110) 12, 8CW (230) 0, 9BDA 7, 9BM (108) 23, 9FC 10, 9KR, VQs 8AX (243) 17, 9EF (192) 16, 9TC (154) 7, VRs 2DI (154) 19, 2FF 12, 6TC (216) 7, VSs 5MH (200) 13, 6AJ 13, 6FS (213) 0, 9AJC (331) 15, 9ARV (203) 22-23, 9OC (146) 16, VU2s KTZ (209) 3, PJ (205) 13-14, TX (235) 16, Ws 4TRB/XW8 (115) 13, 5HWR/VP9 17-18, ØGTA/8F4 13, WB2VJD/CEØ (212) 3, XE1CE, XP1AA, XT1AC (250) 1, XW8s AX BJ (212) 12-13, BQ BS (203) 0, CA (212) 13-14, YAs 1AN (210) 14, 1HD (240) 14, 5RG, YK1AA (230) 15, YO3GY (127) 21, YSs 1MCG 2MSI 23, 2RU (203) 3-4, YUs 1LH 13, 3BC, YVs 9AA 9AV 23, ZC4s CI 5, HI RM (295) 15, ZDs 5D (110) 14, 8CN (210) 2-3, 8DX (145) 28, 8WK (130) 8, 8WO 1, 9BE (240) 15, ZEs 1JE 1, 2JE (294) 2, ZF1GC 0-1, ZL4CH (261) 7, ZP5KT, ZSs 2MI (170) 14, 8L (220) 5, 3A2MJC (212) 14-15, 4S7s NE (198) 1, YL (145) 15, 4X4s AS (215) 16, IB 20, HQ FV (236), TP VD, 5As 2TR (100) 16, 2TZ 17, 3TN 14, 4TR 5TJ 14, 5TW (110) 19, 5H3JR 21-22, 5N2s AAB AAW AAX (137) 23, ABF ABH 22, ABI (211) 1-0, 5U7AK (237) 20, 5W1AZ (215) 4, 5Z4JW (218) 21, 6Os 1GB (202) 20, 6BW 22, 6Y5GG (225) 0, 7Q7s EC (242) 15, PBD (127) 19, 7XØAH (127) 15, 7Z3AB (210) 14, 8Rs 1P (127) 12, 2I 12, 9G1s BU EZ (220) 0, MJ (165) 22, TS TV 23, 9H1AB (125) 20-22, 9J2s AB (237) 22, FK, 9L1s HX 16, TL, 9M2DQ (217) 14, 9Q5s COD 18, HD HF (242) 21, PI 23, SS (225) 21, 9U5s BB (147) 14, DP 20, 9V1NY (206) 15 and 9Y4LF (202) 12. No need for asterisks this month. Not a single non-s.s.b. station shows up in your 14-Mc. voice reports.

20 c.w. is very generous with Ws 2JBL 3DPR 3HNK 4YOK 8YGR 9LNQ 9NN ØCVZ ØKAW, Ks 3FKU 3UXY 4TWJ 6TXA 8GGN 8MMZ/8 9UCR ØDEQ ØRWL, ex-K2QJM, WAs 6JDT 6SLU 8GGN 8MCQ 9MQI 9SXQ ØGQI, WB2RSS and VE8AG, providing music by BY9SX (5) 8, CE9s AO 5, AT 4, CN8s FF (44) 19, FV (2) 20-21, MZ (46) 19, CO2RL, CRs 4AE (20) 18-19, 6AI (17) 18,

WV4EY, one of those rare Virgin Islands Novices, should be signing KV4EY by now. Say, has anyone worked a Novice in each possible DXCC country? If so, we'd be interested in a clear picture of the QSL collection. (Photo via WB2RSS)

6CK (10) 19-20, 6DA 7, 6DX (17) 6, 6HH (51) 22, 7CD 21, 7CO 2, 9AH (50) 20, CT1s CB (57) 13, HT (76) 20, OI (13) 21, CXs 1OP 2CO (60) 7, 3BBD (8) 6-7, DU1s CL 14, OR (50) 12, EAs 6BH (10) 14, 8EO (25) 12, 8FE (50) 8, 9EO (8) 20, EIs 5BH (47) 13, 9N, EL2s D (17) 20, J (55) 22, EP2BQ (42) 14-15, FB8s XX (28) 18, YY (8) 18-19, ZZ (43) 15, FG7s TD XX (55) 13, FL8s IIM (50) 18, RA (42) 20, FM7WD (4) 20, FO8BQ (53) 4, FR7ZD (105) 15-16, FW8RC (18) 10, GC4LI (65) 19, GD3AIM (96) 16, HA1KSA 18, HC2CI, HI8s LC (14) 18, XAL (14) 4, HKs 1QQ/TJ8 (20) 17, 3RQ (57) 3, 4BQ (31) 3, 5YC (30) 12, 7AMP (69) 3, ØAI (65) 16, HL9US 10, HM9AB (50) 12, HP1BR (23) 19, HRs 1AT (45) 22, 5SN (57) 2, banned HS1JB (65) 16, HZ3TYQ (40) 20, IS1FIC (77) 19, gobs of JA1s, JAs 2CMD 2HO 3BN 3EGE 3IG 3KEM 6AD 6PN 8CKC 8KB all 11-13, JXs 1CI (1) 23, 2CI (73) 14, 5CI 23, 5VI 0, KB6CZ (56) 7, KC4USG (40) 5, KGs 4CX (21) 19, 6AV (12) 17, 6IF 11, 6IG (16), KL7s CEX CWY FSX (58) 23, KR6s CO (77) 0, JS (47) 13, KS4CC 0, KV4EX, LUs 1ZA (49) 0, 1ZG (71) 7, 6ZC (23) 5, LX1TP (80) 19, MP4s BDF (45) 1, BFX 19, MAW, OA4VE (5) 10, OD5s EJ (55) 10-11, EL (21) 19, OH2KH/OHØ (58) 12, OYs 2AA 2H 2J (30) 22, 8P (67) 14, PE2EVO (10) 18, PJs 2AQ (80) 7, 2CZ (30) 1, 3CD (85) 7, 3CL, PYs 1MCC 4OD 4ZG 7AHO 7APS, SMØKY (60), SUIs AR (18) 7, DL (12) 17, IM (70) 5, TAs 1AV (47) 6, 2AC (20) 18, 2JX (50) 7, TFs 2WJN (15) 6, 2WJU (9) 22, 3KB (9) 23, TR8AG 22, TU2BK (14) 22, TY3ATB (39) 15, UAs 1KED of F.J.L. 17, 2AC (57) 3, 2DN (77), 2KAW (48) 13-18, 9BG (45) 3, 9DN (21) 7, 9FN (42) 4, 9HL (20) 2, 9OK (3) 1, 9PP 9WC (40) 3, 9YO (30) 3, ØDY (51) 4, ØEQ ØIL (31) 3, ØIM (40) 12, ØKAE (53) 16, ØKFF (54) 3, ØKIA (19) 23, ØKKB (3) 23, ØKYS (40) 3, ØKZB (15) 1, ØKZD ØRC 2, ØTD (50) 2, ØYD (1) 11, UB5s KAB (21) 7, KNF (16) 15-16, KYC (16) 17, UC2s KAB (7) 17, KAC (56) 13, UD6s BZ (6) 7, CE (46) 7, UF6s AM 16, KAR (18) 16, KAT (60) 16, UN, UG6s AD (28) 21, LR (25) 18, UH8s AW (52) 17, BO (12) 6, CA (59) 3, DH (15) 4, DR EI 1-2, UI8s AG (30) 2, AI (2) 6, AX CD (61) 12, CQ (60) 6, LC MF (14) 2, KID 2, MG (50) 5, MU (55) 5, ZE 2, UJ8s AC (20) 11, AV (4) 8, KAF 13, MC (70) 20, UL7s AF (13) 5, BF (50) 2, BX (4) 4, FM GR 13, KAA (30) 4, KBB (31) 3, KCB (17) 6, KDW KKB (40) 3, KKG (40) 4, LA (27) 7, UM8s AP (25) 3, CD (30) 19, FZ (59) 4, IE (15) 3-4, KAA (40) 7, KAI (70) 11-12, UO5KAA, UPOL-15 (31) 0-5 on arctic ice, UP2s BZ (16) 17, NX (19) 8, UQ2AB (20) 16, UR2DZ (62) 13, UV9s UT (27) 23, UW, UWs 1KAZ 14, 3AX 9CQ 23, 9CS 23, 9EA (51) 4, 9OU (30) 2-13, ØFK (10) 3, ØIN (49) 21, ØIQ (35) 7, ØIX (21) 23, ØNB (35) 7, VEs 8AG 8AI (5), 8BB 8CC (52) 4, ØMC, VK9XI 15 of Christmas, VPs 2AZ (60) 3-15, 2GLE (55) 21, 2SC (55) 20, 6FC (50) 19-20, 6PJ (15) 21, 6YF (23) 22, 7DJ 8BQ (5) 17, 8HJ (20) 21, 8IQ (45) 19, 8IY (50) 4, 8JD (29) 1-3, 9FW (20) 19, VQs 8AI 14, 8AR 14, 8BG (30) 15, 9AR (48) 17, 9BC 23-0, VRs 2DK (55) 10-11, 4CR (20) 5, VS9s ADF (5) 21-20, APW (70) 17, VS5JC 12, VU2s CK (29) 15, DIA (34) 0-1, GW (60) 13, GX (75), LE (17) 16, RA (65) 2, Ws 5VWU/KJ6 (45) 7, 6MQT/OX (37) 16, 7AIE/KG6, XEs 1NL 2PMK (80) 5-13, XT1C (50) 22, XW8BJ (20) 13, YJ8BW (19) 9-10, YN1SL (50) 18, YO8MG, YS2RC, YUs 2OH 13, 4OB 4VBB, YV3IY (50) 22, ZC4s GB (15) 18, PC (50) 19, ZDs 7IP (45) 18, 8AM (40) 19, 8CX (75) 19, 8J (42) 19, 8RB (2) 0, 8WZ 21, ZEs 1BF 21, 8JO (5) 18, ZS3BQ (40) 18, 4S7EC (3) 16, 4U1ITU (12) 19, 4Z4s AG (68) 17, HQ (30) 6, 5H3KF 19, 5J4RCA 23, 5N2s AAH (55) 18, ABF (38) 22, 5R8s AM (65) 4, AW (24) 3-4, 5U7AK 21, 5X5SR

23, 5W1AZ, 5Z4s DW (73) 20, SS (80) 19, 6W8s DD (50) 8, DQ (30) 22, 7G1AC (40) 18, 7Xs 3UJ (80) 11, ØAH ØAP (40) 19, 7Z3AB (28) 14, 9G1FY (20) 0-2, 9Hls AE (40) 21, AP (55) 21, 9J2s BC W (38) 21, IE (65) 3-4, 9M2s AV 16-17 OV (15) 16, 9Q5s AC (7) 21, QR (15) 21, RD (20) 16, 9V1s JY (30) 1, LK (2) 17, ML 15, 9Y4s LT and VU (23) 22.

160 evidenced little shortage of long-haul openings in early weeks of the 1966-67 season. Catchin' your share top-band Gs? Transatlantic Test week ends are slated for the 5th and 19th of this month — check last November's "How's" for details . . . . . W1BB reports by mail from Japan after crossing the Pacific aboard SS *President Wilson* with an ear on 160 via an R4-A and quarter-wave wire. Stew logged Ws 6HRG ØVXO, VE7AKI and KL7FRY before reaching Hawaii in November. Near Japan JA1OP was heard testing c.w. on 1909 kc. WCC's 2-Mc. signal dropped out shortly after departure but KPH rolled in all the way across the pond on 2045 kc. Ship radioman W6WGB, travelers WB6s DWI and DWJ were shipmates of W1BB. "Almost made me want to go to sea again. While in Hawaii I phoned KH6IJ who is not on 160 at present. I look forward to meeting the JA boys. Sure do miss the weekly DX activities back home!" Stew says our east coast's chances of working into the far east look slim, indeed. Sheets of commercial crud cover 1800-1804 kc. over there. W1BB will be home soon to bear down on the tail end of this season's 1.8-Mc. DX — if he can climb over his accumulated mailbox overflow.

— • • • —

Next month we hope to inspect other DX bands with the help of (15 c.w.) Ws 2JBL 3DPR 3HNK, Ks 8MMZ/8 ØDEQ, ex-K2QJM, WAs 3DSD 6JDT 8GGN 9MQI 9QBM, WB2s LBJ PAZ, WNs 6TIF 9QWX; (15 phone) Ws 3HNK 8MLX Ks 8MMZ/8 9UVK, WAs 6JDT 8GGN 8PKG 9MQI, WB2LBJ; (40 c.w.) Ws 1APU 3DPR 3HNK, ex-K2QJM, WA8s GGN MCQ RQQ, WB2PAZ, WN9QWX; (10 c.w.) W3DPR, K9UVK, ex-K2QJM, WAs 8GGN 9MQI, WB2PAZ; (10 phone) WAs 8GGN 9MQI; (80 c.w.) Ws 1APU 1SWX 3DPR; and tuner C. Durnavich. Any items *in your* log worth listing? Feed our mill!

WA8RWU didn't quite complete DXCC as a Novice but he turned the trick before his 15th birthday. Terry found the going easier when he moved up from a dipole to a rotary beam after 47 countries. (Photo via W1WPO)

Where:

OCEANIA — "I've just caught up on a big backlog of QSLs which have now been posted out," announces 5W1AZ, closing down in Apia. "Those with self-addressed envelopes went direct, others via bureaus. There were about 25 cards for which I couldn't find log entries. If any chaps missed out on QSLs for my ZK1BV activity from August, 1961, to February, '64, or for my 5W1AZ stint from May, 1964, to January, '67, they will be able to catch up with me via the ZL bureau. There will be some delay while I'm getting resettled but all cards received for which log entries appear will be answered." . . . . . "The usual s.a.s.e. apply for my handling of QSLs for ZL3AB's North American QSOs," declares K6GMA, giving the starting date as December 1, 1966. Walt also performs as QSL agent for VP8HO and VS6AZ . . . . . W5VA-W5AI assures, "We'll continue to handle VS5JC QSLs on a world-wide basis as long as he is in Brunei. In fact wherever he may move as long as he wants our help." VS5JC may show from 9M2-land soon.

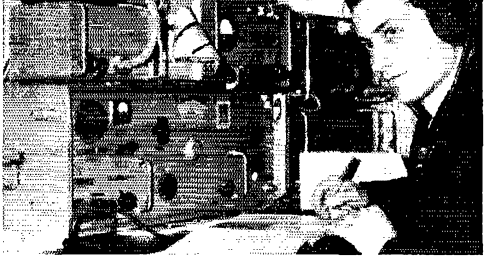
ASIA — AP2AD, anticipating early resurgence of Pakistan's amateur radio after a long prohibition, avers, "We expect to have a properly organized QSL bureau service." . . . . . "Anyone needing a QSL from club station VS9OSC can drop me a self-addressed stamped envelope for details on how to get it," offers W6OAQ, specifying QSOs over the past two years, as noted in Northern California DX Club's fine *DXer* . . . . . Long Island DX Association's equally informative *DX Bulletin* stresses that

DU1FP, 19-year-old University of the Philippines student, is widely worked on 10 through 40 meters with this set-up in Quezon City. The DX-60 feeds a multiband dipole. (Photo via W1TS)

although WA2DIG distributes occasional batches of Hegde's *QSLs*, he is *not VU2DIA's* QSL manager . . . . . WA8PKG says, "XW8AX, now coming through with cards, explains that he was on leave and is finally catching up." . . . . . K2UTC points out that YA5RG's QSLing is handled by DL6ME, not DL6MB.

AFRICA — "CR6AI has done a fine job of QSLing from Angola for many years," acknowledges W7VRO, "but the load is getting pretty heavy. So I started doing QSL chores for John commencing about August 5, 1966. If anyone needs confirmation of QSO before that date I'll try to oblige." . . . . . "I'm acting as QSL manager for ZD3G (WA6LBP)," advises K6ENX. "Cards will be forthcoming as soon as they can be printed and as soon as logs arrive from Gambia." Otto's QTH changed in mid-'65, so refer to a later *Callbook* . . . . . W3HNK finds that some 5A3TX-bound QSLs dallied at the Libya bureau while Carl was getting organized Stateside. An s.a.s.e. request to W3HNK will expedite things.

EUROPE — Note that some eastern bloc nations employ variant prefixes on 1.8 and 28 Mc. Examples are Czech OLs on 160, Hungary's HGs on 10. The tags usually designate lower grades of license . . . . . ARRL Assistant Secretary W1UED reminds us that the French QSL bureau address has changed: REF, Boite Postale 70, 75 Paris 12, France . . . . . OY7ML says OZ3Y knows nothing about spurious OY3Y. Judging from receipts at the Faroes bureau, OY pirates proliferate. New legit OYs are 2AJ 2X and 5NS . . . . . W7MKW, K3KMO and International Short Wave League's *Monitor* demonstrate further that suffixes are geographical keys in Russian calls: *UA1-UW1-UW1* A-D F-I L-NN KA-KD, Leningrad; NO-QK KE-KH, Archangelsk; QL-TI KI-KL, Vologda; TJ-WG KM-KP, Novgorod; WH-YE KQ-KT, Pskov; YF-ZZ KU-KZ, Murmansk; KAE, Antarctica; KED, Franz Josef Land; *UA2*, Kaliningrad; *UA3-UW3-UW3* A-EM F-IQ KA-KD KP KR, Moscow; EQ-EZ KZ, Orlov; IR-JQ KE, Kalinin; JR-LP KF, Smolensk; LQ-ML KG, Lipetsk, MN-NS KH, Yarosloval; NT-OM KI, Kostroma; P KK, Tula, Q-RJ KL, Voronezh; RK-SD KM, Tambov; SE-SZ KN, Ryazan;



YO2BI, licensed since 1958, hopes to complete WAS soon on 20-meter sideband and c.w. from Timisoara. Costi recommends the homebrew approach to hamming. (Photo via K8VBS)

LU6s ACS and ACU, sister and brother, hit the DX trail from a hilly spot near Buenos Aires with an 80-meter portable. At the home station they enjoy the 28-Mc. revival.

T-UI KO KT, Gorkv; UJ-VJ KQ, Ivanovo; VK-WP KS, Vladimir; WQ-XK KU-KV, Kursk; XL-YI KW, Kaluga; YK-YZ KY, Bryansk; Z KX, Belgorod; *UA4-UV4-UW4* A-B KA-KB, Volgograd; C-D KC-KD, Saratov; F-G KE-KG, Penza; H-J KH-KJ, Kuibyshev; L-M KK-KM, Ulyanov; N-O KN-KO, Kirov; P-R KP-KR, Talar; S-T KS-KT, Mari; U-V KU-KV, Morjov; W-X KW-KX, Udmurt; Y-Z KY-KZ, Chuvash; *UA6-UV6-UW6* A-B KA-KB, Krasnodar; F-I KE-KI, Stavropol; J KV, North Osetin; L-O KJ-KO, Rostov; P-R KP-KR, Chechen-Ingush; U-V KT-KU, Astrakhan; W KW, Dagestan; and X KX, Kabarjin-Balkar.

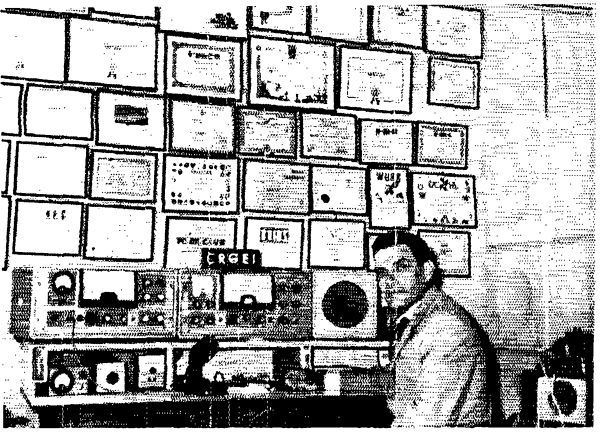
WHEREABOUTS — "If any of my KS4CA Swan island contacts failed to receive QSLs I'd be pleased to send cards upon receipt of QSO information and s.a.s.e.s," invites WA4HIE, now active from the address in the list to follow . . . . . WA2FQG notifies, "I have all VP2KJ logs for Ken's home operation on Nevis. QSL requests should therefore be directed to me, no longer to Flathush Radio Club." . . . . . Editorial comment in Florida DX Club's perceptive *DX Report* brings up a painful point re QSL bureau operation: "Most people agree that if an operator is not interested enough to send an envelope he doesn't deserve his cards. As true as this may be, what about the one who sends the card? Doesn't he deserve consideration? If he does not receive his QSL back he should assume that it reached its intended destination. If he does not receive a reply he naturally assumes that the guy is a poor QSLer." This angle has been a toughie for years, fraught with the necessity of arbitrary time limits, postage financing, etc. It's no cinch to run a QSL bureau . . . . . W8GIU takes on FG7XJ QSL labors for QSOs dating from July 29, 1966. Gil still has trouble with 9Y4VT liaison but he's hopeful that things will work out eventually. Meanwhile he's trying to be patient with a few impatient zealots wielding toxic ballpoints . . . . . Another new *Callbook* bonus not to be overlooked is a "stop-press" batch of post-deadline addresses in the Foreign issues. This, plus a special section of QSL managers, indicates the publication's effort to keep up with our fast-moving world of DX . . . . . WA9MQI is another enthusiastic user of W2SAW's foreign mint postage supply. "His method of QSLing with those stamps enclosed really works." . . . . . Your 4"QSLers of the Month" include CP6FV, G3SR, GM3OOK, HC1EL, HKs 3ASJ 0AI, HR1KS, JA3IG, SMs 6CAW 0BDS, TT2CJV, VK6EZ, XW8AX, YA1DAN, ZC1PC, 9Q5SS and QSL aide W9WHM, all nominated for commendation in correspondence from W3DPR, WAs 8GGN 8PKG 9MQI and 9QBM. Any especially swift pasteboard pushers in *your* log and mailbox lately? . . . . . 'Alp! W3HNK seeks a tip toward confirming contact with EA8ER of last year's ARRL DX Contest, and WA9MQI could use some clews on CP5EZ, PZ1CL '65, ZP5MI and 7Q7LC . . . . . K2MYR, K8MMZ/8 now at 3980-D Andrus Ct., Columbus 27, O., and WA9MQI stand ready to serve as QSL tenders for DX stations in need of stenoclerical assistance.

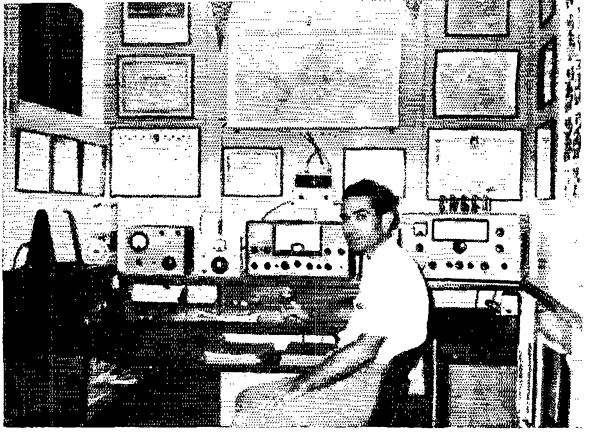
SOUTH AMERICA — VERON'S knowledgeable *DX-Press* has it that LU antarctic and subantarctic suffixes ZA ZB ZC ZE ZF ZH ZI ZL ZM ZO ZP ZQ ZR ZS and ZT can be QSLd via Sub. de Pral Aldo Veneria, Estado Mayor General Naval Communicaciones, Ministerio de Marina, Canzallo 66, Buenos Aires, Argentina. LU calls ending in ZD ZJ ZU ZV ZW and ZX may go via Sub. de Mayor Carlos E. Cejos, Red. Sirne-Sec. Communicaciones, Comando en Veje Ejercitio, Cabildo 65, Buenos Aires, Argentina . . . . . Guyana's 8R1-2-3 amateur prefix appears official, VP3s AA and JR becoming 8Rs 1P and 2I, respectively . . . . . Here come the individual specifications of the month, but remember that each entry is necessarily neither complete, accurate nor "official". Just might swing a thing for you, though, so help yourself:

AP2AD, Ahmed Ebrahim, Senior Telecomms Engr., Sui-Northern Gas Pipelines, P.O. Box 94, Lyallpur, W. Pakistan
CR4AJ, J. M. da Silva Barros, Box 8, Mindelo, Cape Verde Islands
CR6AI (via W7VRO; see preceding text)
CX9AAN (via W2CTN)
DL5LN, G. Love, 552nd Sig. Co., APO, New York, N. Y., 09164
FM7WD, Box 152, Fort de France, Martinique
FR7ZP (via W4ECI)
HI7JMP, Box 604, San Pedro, D.R.
HK2KL, J. Agudelo B., Aptdo Postal 2311, Medellin, Colombia
JX5CI, % Norwegian Embassy, Reykjavik, Iceland
K5QFH/KH6 (to K5QFH)
ex-KP4RA, H. Agostini, P.O. Box 896, Kissimmee, Fla., 32741
ex-KS4CA, P. Holbrook, WA4HIE, 5761 SW 47th St., Miami, Fla., 33155
KS6BV, E. Perry, P.O. Box 986, Pago Pago, Samoa
KZ5CV, C. Cravaack, W6CUC, Box 1007, Sioux Falls, S. Dak., 57101
LU5DGQ, via D. Siddall, WA1FEO, P.O. Box 44, Hyannis, Mass., 02601
PJ3CJ, P.O. Box 2146, Curacao
PX1RK (to DL1RK)
PY5BZC, A. Sartori, Box 5020, Curitiba, Parana, Brazil
ST2SA P.O. Box 244, Port Sudan, Sudan
SV0WU, P.O. Box 66, Rhodes, Greece
TF2WKB (to WB2GHR)
TJ1CC (via W4DQS)
TU2BD, Box 172, Abidjan, Ivory Coast
VP2KJ (via WA2FQG)
VP8HJ (via W2CTN)
VP8HO (via K6GMA)
VS6AZ (via K6GMA)
VP8IV, N. McLaren, % British Antarctic Survey, Port Stanley, Falkland Islands
VQ8BG, D. Hutchin (5A3TT), 58th ARRS, Box 2143, APO, New York, N. Y., 09231 (or via 5A bureau)
VQ9AR, A. Rogozinski, Box 191, Mahe, Seychelles
ex-VR4JB, 19 Oberwyl Rd., Burwood, Vic., Australia
VR6 Bureau (via J. E. Maddox, W4TAJ, P.O. Box M (C.R.S.) Johnson City, Tennessee.
W5HWR/VP9, M. Castillo, jr., 1604 Svc. Sqdn., Box 3077, APO, New York, N. Y., 09856
W6PEU/KS4 (via K6QPG)
XE0MHV (to G3MHV)
YA5RG, W. Renner, P.O. Box 279, Kabul, Afghanistan (or via DL6ME)
YJ8BW, Post Office, Vila, New Hebrides
YN1AA, J. Parker, Box 3023, Managua, Nicaragua
YNs 1LB 4DAH (via YN4EB)
YN1PC, S. Cole, Box 227, Managua, Nicaragua
YN4EB, Edith Bacon, Bluefields, Nicaragua
ex-YN4PC (to YN1PC)
ZD3G (via K6ENX; see preceding text)
ex-ZK1BV-5W1AZ (via ZL2LB)
ex-ZD8WZ (via W4HKJ)
ex-ZD8WR, Dick Duane, Box 92, Long Valley, New Jersey, 07853
ZL3AB (North America via K6GMA)
ZS 1AB 3AB (via WA2FQG)
1G5A (via W4ECI)
3A0AV (to I1ZBS)
4L7A (via U.S.S.R. bureau)
4M0AB (via RCV of Venezuela)
4X4VO (via RSGB)
6O6BW (via W4HKJ)
6W8DS (to 5A3TT; see VQ8BG)
6Y5GG (via VE4XN)
8R1P (ex-VP3AA; see preceding text)
9Q5QR, T. Jenken, Box 10061, Kinshasa, R.C.

HK2DP, also well known as HK4DP, has been catching plenty of DX with this Santa Maria installation. Frank, licensed in '48, holds DXCC memberships on voice and code, and has his WAS.

QST for





CR6s EI and EO of Benguela, left and right, typify contemporary ham shack styling in Angola. CR6EO likes s.s.b., 10 through 80 meters, with cubical quad and vee antennas, Viceroy transmitter, modified S-40A and homemade 13-tube double-conversion receivers. Jose and Carlos now find 14, 21 and 28 Mc. in best DX condition at 2300–0200, 1700–1900 and 1600–1700 GMT, respectively. (Photos via W8GIU)

Samaritans supplying the preceding: **Ws** 1APU 1SWX 2JBL 3DPR 6FB 8GIU, **Ks** 2UTC 8MMZ/8, **WAs** 4WAO 8GGN 9MQI, C. Durnavich, DARC's *DX-MB* (DLs 1EP 3RK), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4MVB), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WA2EFN), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Ontario DX Association *Long Skip* (VE3EWY; see "Whence") and VERON's *DXpress* (PAØs FX LOU TO VDV WWP). Is *your* club on this team? Well, then, how about you?

Whence:

AFRICA — "I expect to be in Mauritius again from time to time," states 5A3TT (WØDII) who signed VQ8BG for a spell last November. "I also operate in Dakar as 6W8DS. I like c.w. on 14,095, 21,095 and 28,095 kc., sideband on 14,103–14,205, 21,340 and 29,550 kc., using a KWM-1." Don is particularly active 48 hours prior to Apollo manned space shots till splashdown . . . . . W4HKJ expects 606BW to be active for another month or so, but ZD8WZ knocked off for Florida and W4IIR . . . . . "My Peace Corps friend WA6LBP just received his Gambia license and signs ZD3G," reports K6ENX. "Ray operates s.s.b. just below the 20-meter U. S. phone subband, listening on 14,205–14,210 kc. At present ZD3G uses sixty watts and a dipole but hopes to be on later with more power and a beam, also c.w. He expects to be there for about a year." G3BID is mentioned in connection with ZD3F radiations . . . . . WA8PKG credits W8KYY and friends with keeping 5U7AK workable under heavy phone pile-up pressures. There's another school of thought that feels it should be every station for himself. If it means the difference between a DX station working people *vs.* shutting down in dismay we'll have to go along with the emcee system . . . . . Africana courtesy literature of clubs and groups: Rumored Rio de Oro action by EA9EJ on 15 a.m. panicked the pack in December. . . . ST2SA fired up on c.w. in ST2BSS's enforced absence. . . . W9WNV, after late-'66 successes from Aldabra (VQ9AA/a), the Glorieuses (FR7ZP/g) and Geyser reef (1G5A), made a December pit stop in Mombassa to collect replacement paraphernalia shipped from W4ECI before raising the curtain on more Indian Ocean goodies. Tromelin, Chagos, a reef called Titue, the Laccadives and a possible 1G5A encore are objectives mentioned.

ASIA — "AP amateurs hope to be back on the air in the next few months when operating privileges are expected to be restored," cheers AP2AD. "We hope to be more active than ever." . . . . . I'm probably the most active station in Afghanistan at present," figures YA1DAN in QSL comment to WA8GGN. "You'll also hear me operating portable and mobile. My location is a few miles south of the U.S.S.R. border." Ed says he often uses 14,225 kc. at 0130–0230, Thursday through Sunday . . . . . NEDXA hears that VS9ARV's gear got a corrosive dunking en route to the Kuria Murias, delaying VS9KRV's appearance . . . . . DXCPR reporters find ex-SVØWF somewhat lonesome on 20 s.s.b. as HS1WF, a region still under ITU/FCC ban.

OCEANIA — W6FB, who made a host of Philippines friends while signing pi3AA from 1916 to '33, took in a peppy PARA meeting at Manila in November. Col. Fred, USA ret., also signs W6ANM and W7OX. And who can forget those FB sigs from old KA2DX and TA3GVU? . . . . . "I expect to be finished at Apia by February," estimates 5W1AZ. "Doubt there will be much 5W1 activity until the middle of the year when another fairly active ham will start a three-year Samoa tour. I enjoyed my islands activities and am sorry to leave." George formerly signed ZK1BV. Where next, OC? . . . . . VKØs AH and CR are mentioned as VKØMI's possible Macquarie replacements . . . . . ZL1AI, according to the vine, can provide Kermadecs QSOs on 14,120–14,130 kc., transmitting straight a.m.

EUROPE — "Thanks to G8KS, W5AI, K8s LSG NZD and RTW, I'm again active with a new transmitter and 2B receiver, all DX bands, c.w. or s.s.b.," says OY7ML. "OYs 3H and 9IM are very busy on the air lately. OY2GHK is on sporadically, mostly in contests, and club station OY6FRA works several bands regularly." . . . . . Ex-K2QJM, whose New England call eluded us, finds TF3KB doing brisk DX business with a 9-watt transistor rig on the low edge of 20 c.w. . . . . WN1GUD's friend G3URN passed the 100-country and 40-state marks after eighteen months of hamming . . . . . 4L7A, manned by UP2s visiting Georgia, gave fast UF6-type contacts to all comers in November. Last minute rules for the French Contest indicate the c.w. weekend to be 1400 GMT January 28 to 2100 GMT January 29, phone 1400 GMT February 25 to 2100 GMT February 26. A change this year permits contacts with France, French possessions, Switzerland and Belgium (not Belgian provinces). Exchange reports and QSO numbers. Score three points per QSO multiplied by the total of all multipliers (French Departments, Swiss Cantons and Belgian Provinces). Mail your entry promptly to the R.E.F., B.P. 42-01, Paris R.P., France.

HEREABOUTS — North Alabama DX Club, W4BRE and WA4WAO chairman and vice-chairman, is a new entry among long-haul outfits. WA4WAO writes, "We feel we're getting off to a good start. Most of our members are newcomers to this space research area. Our membership will be 100-per-cent ARRL with more than half of us over the 200-country level. K4IKR, who assists W4ECI with

(*Continued on page 146*)

ZS1XR has one of South Africa's most consistent signals with 100 watts and a quad in Cape Town. Edgar specializes in W/K contacts, c.w. preferred. (Photo via W7VRO).

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

Australia to New Jersey on 144 Mc.

THINGS that happen late in the month may end up as *QST* "Strays," regardless of their historical significance. This happened to the VK3ATN-K2MWA/2 144-Mc. moonbounce *QSO* of November 28, 1966. You may have missed the paragraph in January *QST*, or the bulletin on W1AW, so here is the full story.

Ray Naughton, VK3ATN, Birchipp, Australia, has been working on his 144-Mc. moonbounce project since early 1965. His equipment and 4-stack rhombic were described in this space in July, 1966, *QST*, p. 84. He has received his own echoes with good strength on numerous occasions, and has copied K6MYC well. But with the 150-watt VK power limit, getting through to U.S. stations would take some doing.

The trick was finally turned by the Crawford Hill V.h.f. Club, Colts Neck, N. J. Using a 60-foot commercial-experimental dish, K2MWA/2 maintained communication with VK3ATN for six minutes, beginning at 1010 GMT, November 28. Signals from VK3ATN were just about at the noise level, in a 300-cycle bandwidth. Running a kilowatt input to a 6183 amplifier, K2MWA/2 had 650 watts going into 1⅝-inch coax, feeding the 60-foot dish, and their signal peaked at 18 db. over the noise at VK3ATN. They were audible for three minutes before and after the 6-minute period of reception at K2MWA/2.

The receiver at K2MWA is a 417A converter with low-noise transistor preamplifier, working into a 51J4 receiver, with 300-cycle filter. The antenna has switchable-sense circularly-polarized feed. System temperature is estimated at 600° K or more. The antenna feed had somehow gotten out of alignment, and an aiming error of up to 1.5 degrees resulted. Though the dish has a 3-db. beamwidth of 9 degrees, it was found that aiming had to be very precisely controlled to receive the VK signal.

Moon radar echoes on 144 Mc. were first obtained at K2MWA/2 Nov. 27, and were observed again just prior to the test with VK3ATN. Signal-to-noise ratio was 1 on the best returns. New Jersey weather was dismal: heavy fog, raining and cold. VK3ATN had a clear bright sky, with the full moon seen clearly.

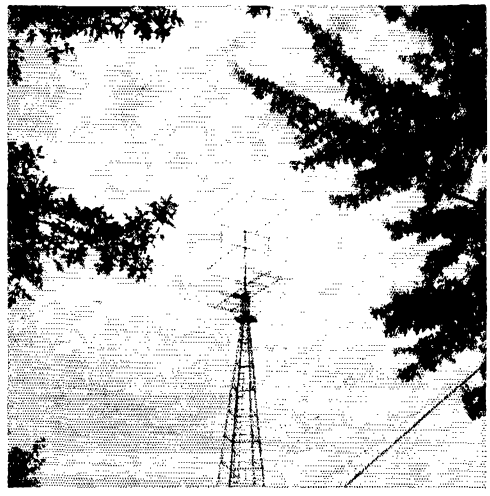
The Crawford Hill V.h.f. Club crew are no newcomers to the moonbounce scene. Their booming signal on 432 Mc. has resulted in contacts with KP4BPZ, WA6LET, W3SDZ and W1BU. On hand at the time of the VK3ATN QSO were Ed Chinnock, W2FZY, Bill Shafer, W2JIB, Dick Turrin, W2IMU, and Roger Abson.

Congratulations are in order all around, for a fine effort at both ends. Next: a WAS on 144 Mc. from VK? Could take a while: Ray says: "If you think procrastination is the thief of time, you should try moonbouncing!"

Records

Another record was broken on October 15, 1966. This was on 5650 Mc. and the perpetrators of the deed were Jack Trollman (WB6JZY) and Glenn Tomlin (WA6KKK). The contact was made between Mt. Diablo and Mt. Lassen, a distance of 179 miles. "Contact was made on m.c.w. with no difficulty, 5-5-9 signal reports were exchanged both ways. After this we conversed on two meters and then decided to try t.m. phone on 5650 Mc. Signals were only fair copy but good enough to finish the contact and make a schedule for the next day at Mt. Shasta. That effort proved to be unsuccessful." The systems used by the boys were enclosed for greater thermal stability and 3-foot dishes were used on each end.

Speaking of records, I wonder how many of you noted that among the many changes in the "2-Meter Standings" recently, one that reads: "W5UGO-40-10-1401." That means 40 states worked, 10 call areas worked and greatest distance worked 1401 miles. Now there are a few stations that have worked more states, and a few that have worked a greater distance *but* W5UGO/5 is the first station to work all ten call areas on 144 Mc. The finale occurred for Larry during the Perseids in August when he worked K6HMS on August 12 for his ninth area worked and then four and a half hours later worked W3BYF for the tenth and last call area. Belated congratulations to all hands.



Two-meter beam used at WØBFB, top station in the 2-Meter Standings with 44 states worked on 144 Mc.

*P.O. Box 1738, Arecibo, Puerto Rico 00612. Send future reports and correspondence to Bill Smith, W1DVE, % ARRL, 225 Main St., Newington, Conn. 06111.

WØBFB is another of the boys to be congratulated. During the Leonids in November John made good on skeds kept for two years with California stations when he worked K6HAA. This makes John the second 2-meter man to work all ten call areas and brings his states worked up to 44.

V.h.f. DX

50-Mc. enthusiasts should start looking up Greenland way where K8REG hopes to acquire an OX call and operate on 50 Mc. Vince expects to be on the air from Sandrestrom by the time you read this and will also be operating on the low end of 20 meters for those who would like to make 50-Mc. skeds. "I expect to be running primarily s.s.b. or c.w. on 50.11 and 50.10 respectively with approximately 175 watts input. I hope 50-Mc. enthusiasts will keep me in mind during occurrences of auroral disturbance." Good luck, Vince! Sounds like a very worth-while project for all concerned.

We learn from W6ORG that ZL2TAX in New Zealand is one of the major instigators of u.h.f. down there and will be one of the first on ATV in ZL land. Ted says there are about 12 on 432 and only a few on 1250 Mc. because of a lack of surplus gear in New Zealand. Those boys will be using 440 Mc. as their video frequency and as Tom, W6ORG, sez: "If we ever get an ATV repeater in orbit, you can bet we will hear and see Ted!"

70 Mc.-Beacon Station at Gibraltar, ZB2VHF

A beacon station has been established on the top of the Rock of Gibraltar on 70,260 Mc. using f.s.k. keying and radiating automatically its own call sign. Frequency shift on keying is 850 c.p.s. i.f. of 70.260 Mc.

To date there are at least 300 active G stations on 70 Mc., many with muted receivers monitoring the frequency continuously. In addition there are at least 100 Gs and also about 50 GIs on 70-Mc. mobile. Another beacon station to have been established in early December is 9H1MB from Malta on 70.1 Mc.

The above information was received from G3JHM who goes on to say: "May I request offers of skeds and tests with stations in Southern Africa on v.h.f. via Trans-equatorial scatter propagation. I believe it should be possible for ZB2AP (who operates the Gibraltar station) to work stations in ZS, ZE and CR6 if interest were aroused. I have already heard the beacon at S5 via sporadic meteors and am hoping to get better results in the coming showers. Another beacon operating is GB3LER on 70.305 from the Shetland Isles to the north of Scotland. This station has also been heard via m.s. and tropo. Reports on any of the above stations especially from DX stations would be most welcome. I am hoping to interest ZD7IP in the project also."

V.h.f. Code Practice

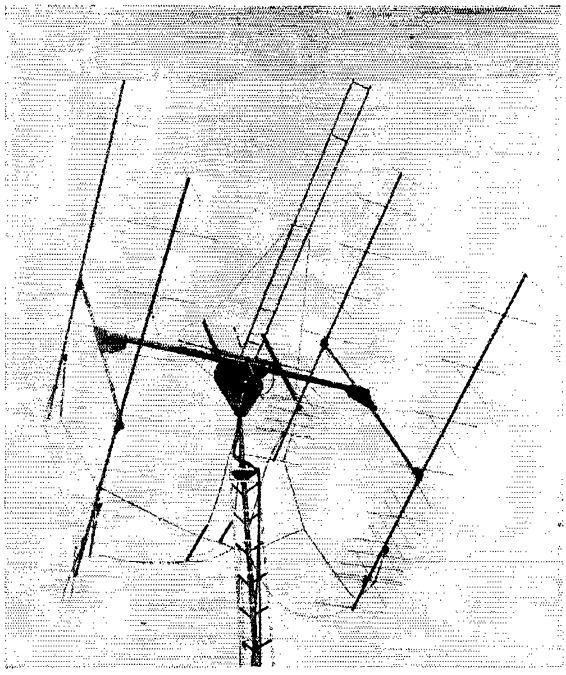
V.h.f. operators in the Louisville area, southeastern Indiana and southwestern Ohio have a reliable source of code practice transmissions, thanks to Joe Rice, W4RHZ, Florence, Kentucky. This station has been transmitting code practice on 51, 145.6 and 220.14 Mc. three nights per week for nearly four years, and has an audience of several hundred listeners.

Transmissions are made with tone (A2), so that the many users of receivers having no b.f.o. can make use of them. Joe transmits for approximately one hour, Monday, Wednesday and Friday nights, beginning at 2100 EST. Explanation of the transmissions is made on voice, for those who have not yet learned to copy the code, and the first practice is at 5 w.p.m.

Directional antennas aimed NNE are used, in order to make the practice available to the greatest number of people. W4RHZ is about 16 miles south of Cincinnati, at an elevation of 940 feet, giving him strong-signal coverage of a considerable area of high population density. He can record the code-practice transmissions of W1AW, and then use the tape to sound-key his v.h.f. rigs. This is done part of the time, for people who want to make use of W1AW-type code practice, without the QRM that is experienced on the bands where the Headquarters station is receivable in this area.

More Reports on the November Leonids

W3BDP, Wilmington, Del. — Worked W9WDD, W4CKB. "You didn't need skeds for this one!"



Circularly-polarized 144–432 array erected by Howard Shepherd, Jr., W6QJW, for work with Oscar IV. At the center is an 18-turn helix with plane reflector for 432. Its supporting structure is bamboo. The four 2-meter "Moon-bouncers" permit operation with vertical, horizontal or circular polarization.

Elevation of the antenna is controlled with a wing-flap actuator. Rotation in the horizontal plane is by means of a prop-pitch gear train driven by a variable-speed motor. This permits fine adjustment, and may be slowed down to provide approximate tracking of a satellite.

K3CFA, Lemont, Penna. — Worked W4MNT.* Heard KØMQS, W4CKB, K4IXC, W5UGO/5.

K4EJQ, Bristol, Tennessee — Worked K1HTV, W4CKB, K2HLA, W1JSM and K4IXC. Heard WØLER, WØNXF, W5UGO, K5WXZ and K9AAJ.

W5RCI, Marks, Mississippi — Worked WØEOZ* and W3LML.*

W5UKQ, Baton Rouge, Louisiana — Worked WØDQY,* K9SCG, W4CKB, W4VHH, KØIJN, K5GEV. Heard K4IXC, K5WXZ.

K6UMV, Don Etheredge, Sun Valley, Calif. "Many 5s, 7s and 9s coming in like 20-meter s.s.b."

K7ICW, Las Vegas, Nevada — Worked WØNXF* in Lincoln, Nebraska for the first Nebraska-Nevada 144 Mc. QSO.

W9AAG, Dallas Johnston, Woodhull, Ill. — Worked Louisiana (W5UKQ), New Mexico and Colorado. Heard W1HDQ, W7JRG and K7NII.

WØNXF, Bob Berk, Lincoln, Nebraska — Worked Nevada,* Virginia,* Florida,* Mass.,* N. Car.,* S. Car.* "All new ones."

WØBFB, Mitchellville, Iowa. — Worked K6HAA.* Among the many heard were W1AZK, W2SFK and W2AZL.

WØMOX, Boulder, Colo. — Worked VE3DIR, W9AAG (s.s.b.), WØNXF, WA9DOT, W9QXP, WØLER.* Heard W4WNH, W6GDO, W8PT.

* New state for reporting operator.

144 Mc. and Up

In Massachusetts the 420-Mc. band is acquiring a growing membership. Among the many is a group of five, W1PYT,

K1JLW, W1JBA, W1WNK and K1OWM who are working on 420-Mc. transceivers. The group met for the first time during November when parts on hand and parts to be obtained were listed, and progress to date was checked at a meeting on November 30.

WB2OUK, WB2RVE and K8ZES are all working on 420-Mc. TV rigs. Bob, WB2RVE, tells of a u.h.f. opening on November 27 to Scranton and Wilkes-Barre, Pennsylvania and to Washington D. C. and Virginia when he was able to receive commercial stations in color. Sid, K8ZES, sez that new equipment construction in his area, particularly on 144, 420 and ATV, is moving at a fast pace. Sid has moved his u.h.f. TV converter to 440 Mc. and is receiving fair signals from W8DMR (50 miles).

In Miami WA4YBY is working on a 420-Mc. converter; while in other sections of the country K2RDX, K3CFA and WB6UPH are all working on antennas for that band. K3CFA sez: "The new antenna will consist of 24 4-element Yagis set in an array 6 high by 4 wide. The completed array will be 4-wavelengths high by 3 wide and will be steerable in both azimuth and elevation. The driven elements will be fed at their high-impedance end similar to the collinear techniques. At Collierville, Tennessee, W4HHK is still waiting to give his dish a good work out on 432 aurora.

From the northeast our 220-Mc. reporter, K1YON, writes that activity is picking up in the New York City area with W2SEU, K2IPC, WB2CNK, K2GHU, W2IRA, W2ITE and W1NOC all being active.

More 220 news received from WA4GHK to the effect that activity is slowly growing in Brevard county on 220 Mc., with five stations on the air and two more almost there. K4IXC is getting ready to try meteor scatter with a kw. final. He'd like skeds with others in Florida, also, or along the Gulf coast of Alabama, Mississippi, Louisiana and Texas. As John sez: "The path from Florida to Texas has been made on 432, now how about 220?" Seems those boys are also very interested in 1296 Mc. Sez WA4GHK: "I believe it will be possible to work into Texas on 1296 Mc. K4NTD, WA4BYR and myself are all on 1296 with 2 to 8 watts a.m. and c.w. with WA4BYR on s.s.b. as well. When conditions are good on 432 they are often better on 1296. I would like to hear from others interested in 1296 in Florida or Texas."

A most interesting letter, with two weather maps enclosed, was received from K1HTV. The maps were for November 17, 1965 and November 17, 1966. Both days produced a tropo-m.s. opening on 144 Mc. from New York to Texas. A query from Rich. "I wonder how many of these fall inversions get by and produce nothing because nobody is listening or CQing on what seems like a dead band. I received a letter from K5TQP who mentioned putting a beacon on 144.1 for the purpose of catching openings, and I'm wondering whether some v.h.f. clubs might consider this project." Sounds like a very good idea Rich. Let's hope it blossoms!

144-Mc. operators are certainly having themselves a time these days, what with meteor showers, back scatter, aurora and tropo openings. K8PBA and W8PT in Michigan advise us of tropo openings during November on the 6th, 13th (Iowa, Missouri and Ontario heard) or worked), and the 15th when signals from W8RQI, W8ZTU and WA8RMC were S9 plus. W8PT also heard W3RUE on 432 Mc. on the 13th and W9FZD on 432 on the 15th. S.s.b. activity on 144 seems to be increasing in 8 land, too. W8PT, WA8TDY, WA8GKK and K3HFL are all now active on 144-Mc. s.s.b.

WA4FJO and W9IPO both mention tropo conditions good on November 25. Fred (WA4FJO) was hearing stations in Georgia, Alabama and Louisiana and Ed, W9IPO, sez that WØDQY was S9 plus in downtown Chicago. From WA4BMC we learn that the big project down Lake Worth way is to get as many stations active on RTTY on 144 Mc. as is possible.

W8CVQ writes that: "Unidentified carriers apparently for test purposes are becoming of some concern on the 144 and 420-Mc. bands in the southwest Michigan area. Operators should be urged to identify their signals at frequent intervals when conducting tests." All we can say to that is "Amen!"

Along building lines on 144 Mc. we learn that WA2IPC/1 is gathering parts to finish the two-meter 4X250 amplifier; and that WAØITU and WAØJRP are both working on antennas.

At the recent Great Lakes Division ARRL Convention at Muskegon, Michigan, one of the v.h.f. fraternity was honored. K8PBA was awarded the first Wolverine Award to be given to a v.h.f. operator. Bob earned the award by working 60 of Michigan's eighty-three counties on 144 Mc. Congratulations, Bob! Let us know when you get the rest of 'em.

2-METER STANDINGS

W1JSM	32	8	1390	W5AJG	33	9	1360
W1AZK	32	8	1384	W5FYZ	33	9	1275
W1REZ	32	8	1300	W5JWL	33	7	1150
KA1BR	25	8	1330	K5WXZ	30	8	1225
K1HTV	25	7	1226	W5DFU	29	9	1300
W1AJR	25	7	1130	W5UKQ	29	8	1150
W1KCS	24	7	1150	W5PZ	28	8	1300
W1HDQ	24	7	1040	K5TQP	27	7	1250
W1MEH	24	6	1000	W5SWV	20	5	960
W1MMN	22	8	1200	W5WAX	18	7	1310
K1WHT	22	7	1030	W5ML	17	6	700
K1WHS	19	7	1030	W5BEP	16	5	1000
W1AFO	19	6	920	W5KFU	15	5	1360
K1CRQ	19	6	800	W5EDZ	8	5	1375
K1UGQ	18	6	1250	W5YYO	7	4	1330
K1JIX	17	6	800				
K1AFR	17	6	675	W6W8Q	16	6	1390
K1MTJ	16	5	1225	W6GDO	15	4	1325
K1OYB	16	5	1225	W6NLZ	12	5	2540
				WB6KAP	12	4	1120
W2NLY	37	8	1390	K6HMS	11	5	1240
W2CXY	37	8	1380	W6DNG	9	5	5250
W2ORI	37	8	1320	W6AJF	6	3	800
W2BLV	36	8	1020	K6HCP	4	2	690
K2GGI	35	8	1365	W6MMU	3	2	950
K2LMG	32	9	1710				
W2AZL	29	8	1050	W7JRG	24	6	
K2HLA	27	8	1300	K7NII	23	5	1275
W7PUA/2	26	8	1150	K7ICW	15	4	1246
K2CEH	25	8	1200	W7LHL	10	4	1170
W2AMJ	25	5	960	K7ZIR	8	5	1130
W2ALR	24	8	1100				
WA2FGK	24	7	1340	W8PT	41	9	1260
WA2PZE	23	7	1200	W8KAY	39	9	1210
W2LWI	24	7	1050	W8IFX	39	8	1225
W2ESX	21	6	750	W8QOH	38	8	1370
WB2FXB	20	7	1025	W8SDJ	37	8	1220
W2UYH	20	7	880	W8YIO	36	9	1250
WA2EMA	19	6	1010	K8AXU	34	9	1275
WA2PMW	18	6	1000	W8LOF	34	8	1060
WA2LTM	17	7	730	W8MVE	33	9	1155
WA2YXS	17	6	720	K1CRQ/8	31	9	850
WA2JAM	17	6	670	W8NOH	31	8	1090
K2OEI	16	6	1010	W8EHW	31	8	860
WB2GCO	16	6	780	W8WNM	25	8	900
WA2RAT	16	5	700				
K2JWT	16	6	550	W9WOK	42	9	1170
WA2UDT	16	5	550	K9SGD	41	9	1230
				K9UIF	41	9	1150
W3RUE	36	8	1100	W9WDD	40	9	1300
W3GKP	32	8	1108	K9AAJ	36	9	1200
W3SGA	32	8	1080	W9AAG	36	9	1050
W3TDF	30	8	1125	W9GAB	34	9	1075
W3BYF	30	8	1125	WA9DOT	33	8	1140
W3KCA	28	8	1110	W9QIL	32	8	1090
W3LBT	22	6	800	W9IFA	31	8	1050
W3LNA	21	7	720	W9PBP	28	8	820
K3OBU	20	7	930	W9QJI	27	9	910
K3CFA	19	6	870	W9CUX	24	7	1000
W3MFT	19	6	600				
W3HHC	16	6	550	WØBFB	44	10	1350
				WØLFE	33	9	1040
W4HJQ	39	9	1150	WØEYE	32	8	1380
W4WNH	38	9	1350	WAØFDY	29	8	1050
W4HHK	38	9	1280	WØNXF	28	9	1325
W4LTU	37	8	1220	WØENC	28	7	1250
K4IXC	36	8	1423	WØDQY	27	8	1100
W4MKJ	34	8	1149	WØMOX	26	7	1300
W4ZXI	34	8	954	WØLER	22	8	1100
W4FJ	33	8	1050	WØIDY	22	8	1050
W4MNT	32	8	1225	WØIC	22	7	1360
K4QIF	32	8	1000	KØTTF	21	6	940
W4VHH	30	8		KØEMO	20	7	1100
W4CKB	28	8	1300	WØJAS	19	7	1130
W4AWS	26	8	1350	KØJXI	19	7	750
K4EJQ	25	8	1100				
W4RFR	24	9	820	KH6UK	2	2	2540
W4TLV	23	7	1000	VE1CL	8	5	800
K4MHS	22	7	1000	VE3DIR	37	9	1300
W4RMU	21	7	1080	VE3AIB	29	8	1340
W4OLK	20	6	720	VE3BPR	24	7	950
K4YYJ	20	6	720	VE3BQN	23	7	1180
W4LNG	19	7	1080	VE3AQG	18	8	1300
K4VWH	18	6	590	VE3HW	17	7	1350
				VE6HO	1	1	915
W5RCL	41	9	1280				
W5UGO	40	10	1401	OH1NL	1	1	5250

The figures after each call refer to states, call area and mileage of best DX.

50 Mc.

W1CHF writes us that narrow-band f.m. is becoming very popular on 50 Mc. in eastern Massachusetts. Seems that W1QIB paved the way by locating inexpensive surplus-f.m. transmitters and designed an effective, narrow-banding network for them. Phil sez: "Many six-meter

operators are unaware of n.f.m.'s existence and make the mistake of tuning with their S meters to the center of the carrier. We wish that more people would tune their a.m. receivers by ear for the best-sounding signal and use their S meters for the purpose of giving a signal report. N.f.m. activity is concentrated around 50.6 and 51.0 Mc.

Skip reports during November were received from five call areas. WA1BFD sez that on the 17th he heard 2, 4, 8 and 9 call areas and worked into 7 land; WA4WZZ sez that K9NIX checked into the area net on the 9th, 5s and 7s heard on the 15th; Tennessee, Alabama and Missouri on the 26th and Texas and Ohio on the 29th. W6NZX, WB6PHO and WA6WKF all noted sporadic E on November 17 with double-hop signals from 2, 3, 4, 8 and 9 lands on s.s.b. The 5s were heard with good signals at W6NZX on November 20, 22 and 24. Gary (WB6PHO) heard or worked a number of 7 land stations in Washington, Oregon and Idaho. WA6WKF worked stations in Maryland and Washington. Tom has been working on his RTTY for 50 Mc. and recently has had contacts with K6IOW and WA6NLG via RTTY. WA6HXW sends word that the peak m.u.f. was apparently reached on November 12 when east coast commercial stations were observed up to 42 Mc. Since the 12th the average peak has been about 37 to 38 Mc. K7ICW, K8AQA and WA8KRH all observed a number of skip sessions during the month. Al, K7ICW, heard and worked stations in all call areas except 1, 2, and 3 lands. These contacts were made on the 17th of the month, although the entire week including the 13th to the 20th was good. Other reporters who caught the opening of November 17 include: WA3ELA (also worked VP7NA on the 29th), K4FPW, WA4GHQ, WA4DBQ and WA9FIH.

Several of the boys also observed that ground wave was good. WA1EFN noted the 26th as a good night. K1FWF noted the 28th, with stations in Maine and New York heard. WB6NMT sez it was good for about two-thirds of the month, and W8MBH sez the 20th, 23rd and 30th were the nights he caught good conditions.

NEW CONDUCTOR FOR THE V.H.F. COLUMN

In 1960, when Sam Harris, W1FZJ, took over "The World Above 50 Mc.," the move was made to allow V.h.f. Editor Ed Tilton, W1HDQ, to devote more time to the overall v.h.f. program of ARRL. At that time, Ed was the only true v.h.f. enthusiast at Headquarters. There are now at least five. Doug DeMaw, W8HHS/W1CER, creator of *The VHFER*, is a *QST* Assistant Technical Editor. Stan Israel, WA2BAH/WA1FPS, an outstanding v.h.f. contest man, works in the Communications Department. Bill Smith, KØCER/W1DVE, long-time v.h.f. DX enthusiast, became an ARRL Assistant Secretary last October. And just last month, Bill Dunkerley, KL7ELA/WA2INB, joined him in a similar capacity. Bill has been a prime mover in the fine work of the East Coast V.h.f. Society, WA2WEB, in the Oscar program.

This group now serves, with W1HDQ as chairman, as an informal v.h.f. steering committee for ARRL. It is logical, therefore, to return the conducting of the *QST* v.h.f. column to a staff operation. Beginning with the April issue, "The World Above 50 Mc." will be the responsibility of Bill Smith, W1DVE.

Bill comes to this job well-equipped. He started on 50 Mc. in Iowa, as KØCER, in 1956, amassing a total of 48 states and several countries on 6. Between 1960 and 1962 he operated on 6 from Arizona as K7RIA. From early 1962 until last October, as KØCER, Bill provided South Dakota contacts for many 6- and 2-meter men. He has long been interested in propagation phenomena that make v.h.f. DX possible, as his 19 states on 144 Mc., mostly by keeping meteor skeds, will testify. Professionally, he has had extensive experience in news reporting and documentary work. He solicits your cooperation in maintaining a high caliber of coverage of the v.h.f. scene in *QST*.

We acknowledge herewith our debt of gratitude to Sam and Helen Harris, W1FZJ and W1HOY, for their nearly seven years' faithful performance of what the undersigned well knows can be a difficult and often tedious task. They have provided a column every month — on time — which is no small achievement in itself. In addition, they brought to the job a wealth of experience in the v.h.f. field, and a boundless enthusiasm for it. Sam has been a true leader; a *doer* of genuine stature in several categories dear to v.h.f. men. We wish Sam and Helen all the best in their subtropical life in Puerto Rico, as we express, for v.h.f. enthusiasts around the world, thanks for a job well done.

— *W1HDQ*

K6MYC — VK3ATN QSO ON 144 MC.

Following nine months of partial successes, K6MYC and VK3ATN completed a two-way exchange via the moon between 1146 and 1210 GMT on December 29. K6MYC reports Ray's signals were 3 to 6 db above the noise and were receivable almost constantly throughout the period. VK3ATN reported K6MYC's signals as much as 18 db over the noise! The signals were so good that Ray was able to ask for a 7 Mc. schedule following the test.

The California end was 320 elements in a 70 by 25 foot colinear array fed with 500 watts out of a 32S1/HA2/3CX1000A7 transmitting chain. For receiving, a TIXMO6 transistor preamp was fed into the HA2 and then into a pair of R-390's. Ray's station was essentially the same 150 watts used in the QSO with K2MWA/2 except for a slightly reduced apex angle in his 4-wire rhombic array. K6MYC says signals from the lower angle were much stronger than from the higher angle.

The tests between K6MYC and VK3ATN will continue, and additional tests between F8DO and K6MYC are scheduled for February or March. W6DNG is currently testing with F8DO. K6MYC was assisted in the Australian effort by K6CLM and W6UGL. There will be a full report next month.

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

WA2GPT — Bea Dietz

BEA is one of those busy women who manage to find time for family, home, community activity, service for others, and who really enjoy doing it. A native New Yorker, Bea grew up in Detroit, Michigan, returned to New York, married and settled down to being a very busy lady.

While their two children were growing up, Bea was naturally interested in PTA, but not as an "Aye" and "No" member. Rather, she became involved in all the activities from kitchen committee to finance chairman, and was a willing delegate to all outside events including the Greater New York Police Department Coordinating Council for Youth Activities.

Because working with young people was her deep interest, she moved from PTA into volunteer Police Dept. work. Among her other activities in this function, she was Hobby Show chairman where she was briefly introduced to amateur radio as one of the many exhibits. Her many contributions to youth activity included offering her services at track meets, and picnics where as many as 1000 children participated. She assisted at teen-age dances, morning movies, and Christmas parties for underprivileged children.

Community work did not occupy all of Bea's time. She was equally active as secretary of the Coordinating Council and member of the School Board of the Temple, as well as president of the Parents Association, and her contributions were of such value that she was drafted to be a trustee of the Temple, the only woman to have held such a position. She was also involved with the Jewish Community Council, organized after World War 2 to assist the needy throughout the world.

Many of her functions were relinquished when the family moved to Valley Stream, New York. They did, that is, until the PTA, and the Temple found her and then it started all over again.

One day her son brought home an old radio that apparently didn't work. Bea considered it nothing but a dust catching piece of junk until he hooked a piece of wire to a coat hanger, nailed that to the roof, and turned it on. Then Bea knew the answer to "What do you do with your spare time?" First, fascinated by the amateurs talking, she became an avid s.w.l., but not for long. OM Harry was talked into a Hammarlund HQ-110, so she could hear them better. The ARRL publications on how to get started followed. She built her own code-practice buzzer and started in. No one in the family was a ham, or knew any, so Bea called one of the OMs she had heard on the air, K2YSK, and he gave her the necessary help that resulted in her Novice license in 1959, and a year later Bea passed her General.

Bea Dietz, WA2GPT

Inactivity and casual participation are not in Bea's make up, and she could no more operate as an idle hobbiest, than she could be a non-participant in her other affiliations. The many public service functions that are available in the amateur service were exactly what this YL, who can't do anything but give, wanted. Her record is remarkable. WA2GPT is well known in traffic circles, and the operators who have not handled her call in the preamble of the hundreds of messages she has originated are hard to find. In public service alone, she has helped find a missing Peace Corps girl in Honduras; worked actively getting blood, and with the Eye Bank Nets; helped with the Alaska earthquake; and handled a tremendous amount of traffic. In traffic operation Bea's most amusing experience came when a man, infuriated because his message was not delivered within an hour after it was originated, bawled Bea out, and demanded to "talk to the manager." He simmered down quickly when she told him he was talking to the manager, and explained amateur traffic operation.

While her greatest reward comes from helping others, Bea's contributions have not gone un-

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena Calif. 91001

noticed. ARRL, American Red Cross, U.S. Embassy, and the Peace Corps in Monrovia, Liberia have all sent letters of appreciation. Two Public Service Awards, over 50 BPL, and the Traffic Medallion are some of the tangible evidence of her work. She also has received the U.S. Navy Recruiting Certificate of appreciation. An A-1 Operator, Bea has also been named Operator of the Month in *QST*, and holds an Official Phone Station appointment. She is a member of the Mike Farad Net, North American s.s.b. Net, NCS of the All Service Net, Ass't Manager of the NYC LI Emergency and Traffic Net, AREC, RACES, and Navy MARS. But Bea is not restricted to one part of amateur radio alone. She is a member of YLRL, and served as 2nd District Chairman for two years. She was also Vice President of the NYC-YLRL. Bea holds YLCC (250 plus) and has just become interested in CHC, and FHC.

Bea's family, OM Harry, and two children, Suzanne and Steve, are not licensed. There is a possibility that some day one of the grandchildren may share her interest.

27th YL Anniversary Party Results

This Year's Anniversary Party brought an almost "clean-sweep" by the VE-gals for "Win" and "Place" in both the c.w. and phone contests. VE3BII, again took first place in the c.w., then was second in phone. VE3EZI was first in phone and second in the c.w. section. K4RNS maintained her record of being among the top three by making third place in the phone contest. WA8EKQ was the third place c.w. score.

Jan Burgess, VE3BII won both the Corcoran Award and the DX-YL Awards.

TOP THREE PHONE SCORES

VE3EZI	10,220*
VE3BII	9,655*
K4RNS	9,180*

TOP THREE C.W. SCORES

VE3BII	2,593*
VE3EZI	2,015*
WA8EKQ	1,450*

CUP AWARDS

CORCORAN AWARD — VE3BII — 12,248*
NORTH DX YL AWARD — VE3BII — 12,248
TOP c.w. SCORE — VE3BII — 2,593*
TOP PHONE SCORE — VE3EZI — 10,220*

PHONE SCORES

WA1FOJ	3,915	K7RAM	6,360*
W1UKR	825*	W7RAX	2,040*
K1UOR	5,580*	W7RVM	6,480*
WA2GPT	4,738	WA8ARJ	6,698*
WB2OQU	1,350*	WA8ENW	3,276
W2OWL	3,015*	K8ITF	5,625*
WA3ATQ	3,949*	K8PXX	4,183
K3HZY	2,755*	K8RZI	6,003*
W3MDJ	4,464	K8TVX	3,800*
K3NVF	1,550	K8VCB	5,200
W4EHN	3,198	WA9FRS	3,600*
WA4HOM	6,228*	WA9MIR	5,733
W4KYI	4,343	K9QGR	4,305*
K4RNS	9,180*	KØEPE	6,820
W4ZDK	2,911	KØEVG	3,690
K4RHU/4	2,714*	WAØEXX	5,408
K5BTM	3,281*	WAØFSK	3,461*
WA5IFL	5,119*	WAØKER	3,772
K5JFJ	163*	KØZPX	2,914*
K5LUZ	3,949*	KL7FJW	220*
W5NQQ	1,820*	KL7FQQ	263*
K5OPT	5,763	KP4CL	2,920
WA2WBA/5	4,450*	KZ5TT	1,400*
WA6AOE	4,590*	VE1AQI	2,257
WB6CGA	6,528	VE3BII	9,655*
K6DLL	6,660*	VE3EZI	10,220*
K6KCI	8,869*	VE7ADR	1,939*
K6TQO	3,956	VE7NW	3,344
WA6UBU	1,268*	DJ2YL	2,900*
W7DNJ	560*	DL3LS	384
W7GGV	3,003	OH5SM	45
K7KSF	5,341	PY2SO	1,664
K7MRX	6,630	ZS6GH	1,980*
W7NJS	3,690		

c.w. SCORES

K1QFD	440*	K7RAM	309
K1UOR	1,134*	WA8EKQ	1,450*
K2CEP	1,188	WA8ENW	609*
WB2OQU	244*	K8ITF	930
WB2PYI	770	WA8KMT	720*
W3UTR	9	K8PXX	816
WA4HOM	1,156*	WA9HLW	891
W4ZDK	315*	WA9MIR	504*
K4RHU/4	775*	W9MLE	1,378
W9GHO/4	1,250*	WAØEXX	1,120*
K5LUZ	853*	VE1AQI	1,189
WA2WBA/5	743*	VE3BII	2,593
WA6AOE	682	VE3EZI	2,015*
WB6CGA	563*	VE7ADR	1,125*
K6DLL	88*	OH2YL	60*
K6QPG	1,181*	SP6AZY	50
W7NOB	330	UA3KBO	35*
			*

COMBINED SCORES

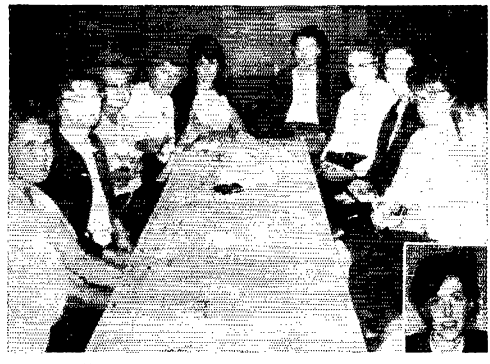
K1UOR	6,714*	K7RAM	6,669*
WB2OQU	1,594*	WA8ENW	3,885
WA4HOM	7,384*	K8ITF	6,555*
W4ZDK	3,226	K8PXX	4,999
K4RHU/4	3,489*	WA9MIR	6,237
K5LUZ	4,802*	WAØEXX	6,528
WA2WBA/5	5,193*	VE1AQI	3,446
WA6AOE	5,272	VE3BII	12,248*
WB6CGA	7,091	VE3EZI	12,235*
K6DLL	6,748*	VE7ADR	3,064

* Low power multiplier

Confirmation Logs submitted by:
W7NOB, and W8ETT.

Bertha Eggert WA4BMC

Very few of the members of the large amateur population have not heard about WA4BMC. Her achievements cover



Maritime "Sparkettes." An on-the-air YL Club of 25 members from Nova Scotia, New Brunswick, and Prince Edward Island, meets each Thursday at 1330 GMT, and the last Thursday of the month at 1730 GMT. Most of the gals are XYLs and their purpose of organization is just to be able to talk informally to each other. Eleven of them met together at the Maritime Campfest, Labor weekend, and VE1ADP took the picture. They are, left to right: Eileen, VE1AML; Ann, VE1TK; Dot, VE1PA; Christine, VE1AKO; Janet, VE1ARB; Marion, VE1ARW; Dot, VE1ARU; Mildred VE1AQI; Jeanne, VE1YX; Bonnie, VE1TY, and inset, Helen, VE1ADP.

an all around picture of amateur activity, and begin, unlike most of us, during her Novice year.

Bertha's interest in amateur radio came from Hurricane "Donna." For five days she listened to traffic being passed and decided to start studying so she could join this interesting work. By May 1961, she had her Novice call, and her first BPL a month later. This came from organizing a traffic net on 2 meters. In December of that year she passed Technician, and one year later had her General license. A member of eleven traffic nets, WA4BMC is a regular call on the BPL list each month. In fact she has missed making that list only three times since the first one. Her official appointments include ORS (c.w. and RTTY), OPS, VHF-PAM East Florida Section, and OBS. She is also assistant EC for Palm Beach county AREC.

Despite her love for Emergency Nets, Hurricane Watch periods, and handling traffic, Bertha has a second "love" — hunting counties, and has contacted almost 2000 so far. She has never officially applied for many certificates because of the possibility of losing her QSLs in the mail, but she has DXCC 107/96; WAC, all on 14-Mc. s.s.b.; WAS, all on 14-Mc. s.s.b.; WAZ 29/27. Her QSL file includes a total of 6147 cards.

Bertha is a member of the Florida RTTY Society; Florida DX Club; Florida SSB Association, and is a member of the oldest phone net in Amateur Radio, the Knights of the Kilocycle. As Sunshine Chairman for YLRL, she is "doin' what comes naturally" for, long before amateur radio entered her life, Bertha's hobby (and pleasure) was sending greetings to friends and members of her family on birthdays and anniversaries. Her list has increased with her friends on the air until it fills three notebooks, and her familiar "ARL Numbered Text" is almost a tradition in the traffic nets.

Bertha is married to Slim, WA4AZZ. They have 8 children, and 11 grandchildren.

YL/OM Contest

Phone — Saturday, February 25, and Sunday February 26, 1300 EST (1800 GMT)
C.W. Saturday, March 11, and Sunday March 12, 1300 EST, (1800 GMT)
Note: Of special importance is the change in time for the 1967 Contest. This has been done at the request of the contestants in Europe and Asia, so that all participants will have the equal opportunity of working one daylight and one nighttime period.

Feedback

Apologies to the Ontario Trilliums, and in particular to VE3CLT, VE3BBO, VE3EUV, VE3BII, and VE3DGG for the error in the caption of the picture of December *QST*. The correct wording should have been VE3TOT/3, the Ontario Trilliums Field Day group in 1966, the first VE YLs to hold Field Day activity, according to VE3BII, President TOT.

—•••—

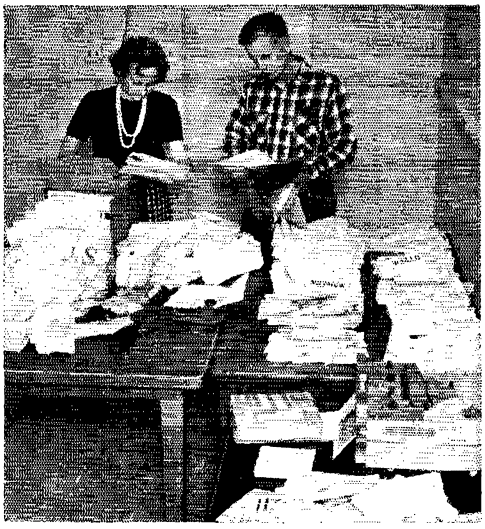
WA6KWV, Val, is a "Leap Year Baby" and wonders how many others can celebrate their birthdays only once in four years. QST

Strays

The Central Indiana Mobile Radio Club provided communications for the Muscular Dystrophy Association during their annual drive on November 13, 1966. Mobile communications were carried out on 146.94 Mc. using a 448 Mc. link from the headquarters to the club station. Operators involved were: WA9EED, WA9JYB, WA9BHV, K9VPE, K9MZV, W9MHP, W9FZW, W9UYM, W9JDN, and W9NPV.

WA8IQZ's car with amateur license plates on it attracted the attention of DK1AA, Peter Stanitzeck, radio officer of the German Ship MV-Posidien, who left a note on the windshield.

Peter was totally unaware that a hamfest was in progress in the community. However, with the help of the Port of Muskegon authorities and WA8DNM, Peter was found in the radio room of the large ocean vessel, and made a welcome guest at the convention.



"We expected between 4500 and 5000 responses," remarked David H. Andrews (r.), Chief of the National Bureau of Standards' Frequency-Time Broadcast Services, as he and Mrs. G. H. Hicks worked their way through more than 8500 replies, including 84 magnetic tapes and one phonograph recording. As of December 8, this was the number of replies from radio amateurs acknowledging receipt of NBS radio station WWV signals on November 30, the first day of broadcast from Fort Collins, Colorado. Andrews went on to say, "But this flood is fantastic; it will take several weeks to accurately count and catalogue the replies according to date and time of WWV reception, location of the receiver, agency with whom the receiver is associated, and verification of the voice code."

Recipients of the WWV broadcast, who wished to qualify for the First Day QSL Card, which is bordered in gold and depicts the new WWV site at Fort Collins, were required to correctly quote the new WWV voice announcement and have their reports postmarked before midnight December 2, 1966, local time (See *QST*, November 1966, page 53).

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ROBERT L. WHITE, W1WPO, DXCC Awards
GERALD PINARD, Club Training Aids
GEORGE HART, W1NJM, National Emergency Coordinator
ELLEN WHITE, W1YYM, Ass't. Communications Mgr.
PETER CHAMALIAN, W1BGD, Communications Asst.

Consideration. Consideration for other people is a prime requirement, if we wish consideration for ourselves and decent operating conditions in the bands. We share all these bands for radio communication. Have you listened across each of the different bands lately? There are wide variations in the behavior of operators and groups. You will find disciplined operation in the nets, respect for others and fraternalism in the rag chewing, also sometimes a lack of respect, careless operation, selfish greed and 'elbowing treatment' instead of patience and courtesy. This can be in any group but is more common in some of the less sporting fishing for DX or other objectives. Then we also have contests like the recent "SS" and exercises like the Field Day and SET. In these, for the most part, the rules (FCC and ARRL) *are* closely observed. The play may get rough and fast but there's a good spirit, and general observance by all.

The minority that engage in foul practices and carelessly (or otherwise) interfere with or jam legitimate amateur efforts, such as net operations, FMTs, and public service efforts and tests, must feel small and at times be ashamed. Some do meet with FCC trouble. Our regs provide for license suspensions, necessary citations for signal defects, and warnings for lesser deviations from the rule book!

Things We Can Do. Let's each in daily hamming express consideration for other amateurs as they mostly do for us. We can do this whatever our class of license. There are many ways. (1) By *working some Novices*, for a new experience, when they are on for a tryout in the NOVICE ROUNDUP this February, 4–19. (2) By keeping our personal signals as clean as possible, free from chirps, clicks or splatter. (3) We should help the prospective amateur too, with advice and a friendly hand: he will value your background and suggestions for antennas, equipment, and how to operate to get the most from amateur radio. (4) Listen *before* calling. (5) Monitor some disciplined operation in *nets*. Feel free to report in as you see how this is done after the NCS gives the net call. (6) In voice work *hold down the gain*. Don't allow or aim at having your meters kick upward excessively when this can create those byproducts (emission or radiation *outside* the channel your signal rightfully should occupy). You don't want other operators to compare your work in the bands to the behavior of inconsiderate car drivers who weave around in the center of the highway. Our bands are our highways. Also your sharp signal rates a keen operator who knows and follows the best operating procedure.

Try the FMT? On Thursday evening Feb. 9, W1AW schedules another over-the-air Frequency Measuring Test. Open to all amateurs, this is a chance, if you have special measurement gear, to try your ability at measuring. For Official Observers it is an exercise to brush up on individual proficiency. 'Tis the first chance of 1967 to make one of the two (required) annual tests to hold a frequency measuring OO classification by meeting a stated standard. The "approximate" frequency spots and times to look are given in the announcement, see page 98.

Goals. Goal No. 1 in amateur radio is the government license which is a gateway to use of all the amateur bands. What goals *beyond* this one have you attempted? New licensees have often made a goal of winning an ARRL Code Proficiency certificate at 10, 15, or even 20 w.p.m. on the way to the license qualification. But no need to stop with the FCC or DOT license goal! Most amateurs aspire to conquer milestones such as Worked-All-States or 100 countries for DXCC.

Operating know-how should be made an end in itself as a goal. This is done by studying the booklet *Operating an Amateur Radio Station*, by reference and study of the new Op Man, by making it a point to handle some traffic and to enjoy the

Metro Mayor Chuck Hall presents a certificate of appreciation to W4IYT, on behalf of the Board of County Commissioners. Although resigning due to health reasons after a superb performance as SEC, Andy will carry on as chairman of the Red Cross Communications Commission and will continue publishing *Florida Skip*. (Miami-Metro News Bureau Photo)

fellowship and procedure discipline that come only with *net operation*. Have you tried the November Sweepstakes, kept on for CP-30 or CP-35, made operating activities a point *in your club*, added v.h.f. know-how, AREC-RACES participation or leadership (if there's little or none now) as a goal? Few of us can hit all the objectives at one time — but we can add to the sum total of our results and to our enjoyment (and status) if, from time to time, we will fix on new and different objectives, including some of the above as goals.

SCM-Appointment as a Goal. Appointment to a STATION POST along the lines of your natural bent by your elected Section Communications Manager (address page 6) is a good way to earn and receive personal-station recognition of your operating results. If you are actively on the air you *can* be appointed, if you qualify. You don't *have* to have *high power*. Consistent, dependable, station operations, observance of high standards of procedure, operating ethics and the desire to fulfill some responsibilities in a certain capacity can justify an SCM appointment. Look into it, won't you?

The Basic Posts. Thousands of amateurs enjoy the prestige and fun of holding SCM appointment. Some serve other amateurs as Official Observers or by sending bulletins. More are in ARRL's Field Organization as OVS, OPS or ORS, as appropriate along the lines of their interest. Member operators in the h.f. bands (mostly 40 or 80) have qualified for *Official Relay Station* (ORS) or if voice operators, *Official Phone Station* (OPS) posts. As mentioned in October '66 *QST*, the *Official VHF Station* appointment is for those experimenters and operators who specialize in v.h.f., whether developing-maintaining net operations, or pioneering in building or reporting their results and propagation data. Here's a brief on these posts — see the operating booklet or your SCM for application blanks or more information:

ORS **Official Relay Station.** Provides traffic service, operates schedules and traffic nets, c.w. or RTTY. Noted for 15 w.p.m. and procedure ability and dependable deliveries.

OPS **Official Phone Station.** Furthers phone nets and traffic. Sets and exemplifies high standards of voice operating, procedure, and dependability.

OVS **Official VHF Station.** Works on 50 Mc. and/or bands above. Takes part in v.h.f. skeds and traffic netting or developing experimental projects, or propagation information. Observes and reports station operation along the stipulated lines. Is known for high standards of procedure and v.h.f. performance.

OO **Official Observer.** Sends cooperative notices to amateurs to assist in high quality of transmitter adjustment, and observance of FCC/DOT rules. Helps amateurs avoid citations or penalties from government monitoring. Assists general frequency observance and promotes good band conditions for all users.

OBS **Official Bulletin Station.** Transmits ARRL and FCC bulletin information addressed to all amateurs.

Report what you are doing or prepared to do in your station on-the-air activities. Ask your SCM about *any one* of the above posts, especially the first three which are less subject to SCM quotas related to an SCMs own minimum within-Section service objectives. Official appointees who warrant SCM-appointment each receive (quarterly) a CD Bulletin and may on their own option take part in the quarterly (fraternal) radio operation known as the CD Party.

SCM-Planned Meetings Fruitful. Around 250 meetings are attended annually by the elected Section Communications Managers, under the Board policy permitting them to arrange major meetings of netters, emergency communications groups and Section leaders and personnel in the furtherance of League *operating* organization. Any club or group may invite the SCM or the

FREQUENCY MEASURING TEST FEBRUARY 10 (GMT)

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0230 GMT, Feb. 10. *CAUTION:* Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting 0230 GMT Feb. 10 becomes 2130 EST Feb. 9. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3557, 7035 and 14,109 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0236. It is suggested that frequencies be measured *in the order listed*. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0530 GMT, February 10, W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3570, 7092 and 14,152 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointments by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on over-all *average* accuracy, as compared with readings made by a professional lab.

SEC to appear, which they can do, if given a proper opportunity to speak on their ARRL fields and if their other obligations permit. Almost every ARRL section has remote areas. This type of personal contact helps in explaining League matters, as well as furthering participation on the air, and new appointments and leadership in such areas.

The following from a routine report by the SCM of Utah (W7VSS) illustrates the point: "W7OCX our RM and Vice Director spoke on ARRL generally while my portion of the program dealt with the Section's organization, and practical needs and plans for the AREC. . . . The showing of a slide collection, SC-6, was a great success. Other SCMs might well consider use of these visual means to stimulate a lively open-forum discussion. The feasibility of a v.h.f. net was discussed. At Brigham City we got a good candidate for EC from such a meeting."

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Nov. Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPI	4575	2539	2371	168	9653
KØONK	144	3020	2893	39	6096
W3CUL	352	2284	2221	49	4906
K5TEY	25	1326	1323	3	2677
K6EPT	3	895	872	23	1793
WØLGG	18	778	688	25	1509
W1PEX	241	661	569	30	1501
W7BA	12	658	595	59	1324
WA4SCK	26	493	510	9	1038
W7HMA	18	451	436	9	914
W3EML	42	471	383	0	896
K7TCY	19	432	365	64	880
WA4DXJ	73	355	426	16	870
W8UPH	16	412	348	61	837
WB6QXY	41	396	345	49	831
WB6BBO	42	375	296	57	770
W3VR	79	347	322	16	764
W6RSY	138	344	206	63	751
K6IOV	2	396	314	0	712
K3MYB	18	359	310	22	709
W9LCX	17	342	336	7	702
WØZWL	1	131	1	269	702
W7ZIW	14	337	326	7	684
WA4RQR	8	337	302	16	663
K9IVG	18	368	268	8	662
W1EFW	37	328	202	68	635
WB6PCQ	31	295	225	56	607
W6EOT	1	280	272	2	555
W5GHP	27	256	244	10	537
W5OBD	19	256	255	1	531
W6WPF	216	156	88	68	528
WA4DYL	6	273	188	49	516
W6VNQ	22	260	225	1	508
WB2OHK	16	246	241	3	506

More-Than-One-Operator Station

K6MCA	15	600	600	20	1235

BPL for 100 or more *originations-plus-deliveries*

WA4TWD 367	WA8PII 127	WA9GJU 105
WA4BMC 208	W2OE 125	W6TXJ 104
WA9CCP 183	W4ILE 125	WB6KIL 103
WA4FLK 175	WA8HTR 125	W8DAE 102
WAØBYO 171	W2UBG 124	WAØMOB 101
WAPQP 168	KA7CFN 120	Late Reports:
WA3ATQ 162	WA8QND 120	WA4BMC (Oct) 306
WA5NTI 152	WA2GPT 114	K4HJX (Oct.) 292
W8IV 152	WA6TWS 113	WA8PZA (Sept) 136
WA8SHP 140	KØRPH 111	WA9CCP (Oct) 134
W3TN 139	K7CTP 110	WAØKGD (Sept) 109
K1PNB 133	WA4MTG 106	WA9GJU (Oct.) 108

More-Than-One-Operator Station

K4CG 195	K9IU 120	Late Report:
WØZLN 180	W2SZ 111	K4CG (Sept) 369
WØEEE 159	W1AW 106	WB4ABF (Oct) 163

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: WB2HZY, W4ILE, WA4PDM, W6BGF, W6IDY, WAØGSA/1

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM, a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Phonetics and Order of Giving Calls. Phonetics can be used to assist station identification but *not to replace* the use of a call, when identifying. Phonetics, of course are not necessary for the most part and should be used only in instances where readability is a problem. FCC has cited stations that recite phonetics, never giving the call letters. . . .

The prescribed order for calls is to give the other station's call sign first and *your call last.* Under tough conditions one can use the call *and* the phonetic. When calling another station it is foolish and unnecessary to spell out phonetically the other fellow's call. He knows it already! But the phonetic on your own call, especially for certain letters is sometimes helpful, as a repeat of the stated call letters without the phonetic, just prior to standing by for replies. Follow the FCC's specifications on transmission of call signs (Section 97.87) and you can hardly go wrong. Please remember that *your own call* should be the *last* used, after a transmission.

More on Club Licensing Classes. We haven't exhausted this subject of licensing classes (page 89, Jan. '67, *QST*). February is an *excellent* time to start, if your club hasn't a class going already. Besides helping to develop new amateurs to be in your club there's no finer service for amateurs (inside or still *outside* the local club). Many will feel an obligation to the club if you can help get a better license class, with new privileges to work the full limit of all amateur frequencies. We also think every club should recommend its active qualified operators to the SCM of each Section for operating appointments. Each club owes it to itself to get some local recognition by identifying with constructive programs and services. What can do a club's reputation and influence with amateurs *more* good than an announcement in the local paper that it is going to set up a study group and invites registrations from all in the community who can use instruction in amateur radio technique?

Some clubs survey their own membership and unearth unexpected interest in a class group. KL7FKO reports that the *Northland Amateur Radio Club (Alaska)* last year successfully programmed *three* Novice and *three* General Class 16-week groups. In the *LERC Amateur Radio Club (Calif.)*, which runs superlative classes, it is customary to limit advance registrations to the number that can be accommodated. Late comers are put over to "the next class" which is never too far to the future. Get your club going on this.

Ask for Materiel and ARRL's Reference Guide. Clubs starting class groups that *do not yet* have "Licensing Classes," the excellent data by W6DDB, are invited to report the class aims and nr. enrolled, and *ask ARRL for this publication.* The League will send a copy, no charge, one to a club, with the League's Suggestions for a Radio Course (outline). Bill Welsh, W6DDB, will send any licensing-class amateur radio club instructor (not individual hams) a typical exam quiz (as for Novice, General or Extra) if

the postage and a 10" × 12" manila envelope, self-addressed, is supplied. His notebook package of the full nine exams and handouts costs $2 to mail, he reports. It might be better to ask for the one kind of exam your group sets as its study objective. A typical mailing for one exam, such as the extra-class quiz costs 20c first class or 32¢ for air mail. Clubs can write W6DDB, Care LERC Amateur Radio Club, 2814 Empire Ave., Burbank, California. But enclose SASE.

About the Image We Project When We Operate. *"The Ragchewer"* bulletin of the Carolina VHF Society (North Carolina) has a discussion on one subject worthy of some thought. It is brought out that the all important basic reason for our being amateurs is operational — to communicate. Our fist, our procedures, communicatingexperience, our inflexion, attitudes our words and a good or poor signal all convey an image of ourselves to others, as we operate, and whether we wish it or not. The author, WA4EIG, points out that to communicate and have others see us as to attitudes and words in the best light we need to watch our words. He writes:

"As ham radio operators we are constantly on guard that the quality of the *signal* that we put on the air is the best our ability and equipment can achieve. We are so concerned with the impression that our on the air signal makes that audible and visual monitors are used. . . . The first information we want from a receiving station often is the signal report.

On Watching our Words. "If all this is so important to communications why then should the words we choose to say and the manner in which we phrase them be *less* important? Shouldn't we attempt to guide and govern our words likewise, perhaps monitor them before we even utter them? . . . How well does one communicate his true personality? *Do we project a truly good image of ourselves and Amateur Radio as we operate?*

—•••—

We hope all our readers gave their v.h.f. equipment a good workout in the annual VHF SS in early January; also we hope every active v.h.f. operator will make some v.h.f. netting or experimentation a regular thing, and apply for ARRL's OVS appointment. Operating attention this month turns to the annual DX Competition and the Novice Roundup. See the rules for these (in full) in January 1967 *QST*. Best luck and DX.

— *F. E. H.*

DX CENTURY CLUB AWARDS

From October 1 through November 30, 1966, DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

Endorsements issued for submissions received from November 1 through November 30, 1966, will appear in next month's issue.

New Members

K9KYF....312	HB9NY....129	K5OLJ....111	WA0CPX...105	W9CJK....102	WB2MTM..101
K9LUI....309	K9YPW....126	YU1YG....111	K0AXU....104	WA8RWU...102	WB6MLG..101
K1YZW....272	W2MXN....123	JA2BHG....110	VE6ABR....104	WB2HZH...102	AP2AR....100
K0BLT....242	DJ7LD....122	PA0PO....110	VE6PL....104	YU3PO....102	DL5JJ....100
W1SXQ....237	SP6AEG...121	PY7GV....110	W6AEM....104	9M2JJ....102	JA8JL....100
VE3BTI...235	WB2HHZ...120	W4CRW....110	WA4TTF...104	CP5AQ....101	K1CBV....100
K3HHV....229	W9CBD....120	W5NLP....110	YU2NFJ....104	F9CZ....101	K1IJV....100
W2GRY....222	PA0PAN...120	WA4ICB....110	DJ6TS....103	K1SLZ....101	K3FQR....100
VE3NE....211	WA0HVR...119	PY2BNX...109	K9AXE....103	VE5DP....101	K8TBR....100
K4ET....208	UA6LL....118	DJ3GG....109	KL7FEF...103	VE6AKV...101	K9JKO....100
XE2YP....206	WA4WUD...118	JA6HW....109	VE7ACS....103	YU1PCF...101	K9YHB....100
I1EVK....190	LU2CF....116	W7HRH....108	W4MOJ....103	W1WFZ....101	OK2DB....100
K2DXV....181	DL7EL....115	W0CQC....108	W9FNX....103	W6KHS....101	UA4LN....100
I1LGR....169	UB5JR....115	W5OER....107	WA2BVU...103	W8TBZ....101	W4FPW....100
ZD8HL....159	WB2NXL...115	YU1EXY...107	WA6811....103	W8WVE....101	W4KAT....100
W4BRE....154	WA5JSI...114	K2DNL....106	DL9EZ....102	W0BVV....101	W4WRH....100
ON4OR....145	K8UDJ....113	K2UFT....106	JA1NLX....102	W0EXS....101	W7KOI....100
DJ1PK....142	W6MZH....113	OZ3PO....106	MP4TBO...102	W0KAW....101	W8LAU....100
WA8NYB...140	GI3RXV....112	PI1KM....106	OH3VL....102	WA2LOR...101	WA4SRS...100
DL1RA....139	K6ZDL....112	W4JJX....106	OK1AFN...102	WA3BHB...101	WA0GFW...100
K2KTK....135	W1DHL....112	K1RQE....105	W8IWF....102	WA4QPV...101	WB2UKP...100
KH6BJ....131	DL9PE....111	DL4OP....105	W8TJQ....102	WA6HAE...101	WB6CPE...100

Radiotelephone

W1SNQ....234	LA7JH....143	W2SSC....120	K5OLJ....109	W4HVD....104	W2ORA....102
DJ2YL....206	W6CCB....143	KH6BJ....120	WA8LSO...109	F2EX....103	WA8GKW...102
XE2YP....206	6W8AE....134	ZL3MN....120	K6SVQ....108	K8VCB....103	HB9VJ....101
M1B....200	WA4LUG...128	PY2DSQ...119	WA4ICB....108	SM5ZO....103	K4DJW....101
K4ET....187	DL2AB....127	SM0FE....119	I1APV....106	VE6AHR...103	WA6HAE...101
W7WLL....185	I1LCT....127	5N2AAW...119	K4YKW....106	W1DHL....103	WA9IYG...101
I1EVK....170	JA1BWA...126	JA6MS....118	W8TWA....106	W4FPQ....103	KR6MF....100
I1PEG....164	PY4AIR...124	VE3NE....114	K6YUI....105	W4FRQ....103	W6IBU/KG6
JA6AD....158	WA4WTG...124	WB2NXL...114	OD5CA....105	W0PAN/KH6....100	
ZD8HL....158	DJ6VM....123	DL7EL....113	W2EYB....105	103	WA1CJR...100
I1PLH....155	JA1FHX...123	I1BVG....113	W8JSU....105	WA8MQP...103	WA4SWW...100
G3KZQ....151	K9JTD....121	LU2CF....113	WB6CCV...105	ZS6AUZ...103	WA8RSL...100
W1YCH....146	W4BRE....121	W4TUC....113	K4NKI....104	VE3AHQ...102	WB2CGW...100
		CX9CO....109	VE4XN....104	VE3ELA....102	9M2JJ....100

1966 ARRL SWEEPSTAKES

High-Claimed Scores

Following are the high-claimed scores for the 1966 ARRL Sweepstakes Contest held last November. Included are only those claimed scores over 70,000 points (without bonus) *received* at Headquarters by December 15, our copy deadline. *QST* will carry the full official SS results as soon as the checking is completed. The following figures show the score claimed, number of contacts and number of different sections worked. *QRX!*

— *W1YYM*

C. W.

W6CUF.....149,467-822-73
WA6SBO (W6EGP, opr.)
141,201-796-71
W6RW (K9ELT, opr.)
137,969-749-75
W9IOP.....134,325-900-75
W4KFC.....132,468-708-75
W1BGD.....129,188-689-75
W2VJN.....126,844-678-75
K5OCX.....121,637-666-74
K2EIU/5.....119,081-654-73
K4GSU/3.....118,260-667-72
K7RAJ.....112,785-625-73
WB2CON.....112,000-642-70
K4VFY.....111,655-621-72
W9LKJ.....109,200-630-70
W8NBK.....106,575-609-70
W3EIS.....105,120-585-72
K2AJA.....104,213-596-70
W0TDR.....103,500-575-72
W4USM.....102,675-556-74
K6AEH.....102,595-630-71
W0JPH/5.....102,288-586-70
VE5US (VE5UF, opr.)
100,725-603-68
W9RCJ.....99,068-536-74
W7QDM.....98,153-579-69
K1ZND.....97,470-542-72
W0YFT.....96,660-537-72
K4RIN.....95,174-525-73
W8VPC.....94,808-520-73
W3GAU.....94,781-509-75
W2NNL.....94,127-532-71
W4PTR.....93,275-533-70
W9DOB/9.....93,013-534-70
W3MSR.....92,736-645-72
W2MEL.....92,565-548-68
W8AEB.....90,502-549-66
W1ECH.....90,132-610-74
W8DQL.....87,962-501-70
K9GDF.....87,635-513-68
W0ISJ.....87,550-517-68
W7CAL.....85,838-499-70
W0HZC.....85,000-500-68
K3KMO.....84,046-474-71
K7UKC.....83,970-481-72
W4YZC.....83,780-472-71
W4DVT.....83,713-453-74
W1CSM.....82,555-462-72
W0SMV.....82,417-569-73
W2DMJ.....82,239-470-69
K8YSO.....81,030-447-73
W6EIF.....78,725-481-67
WA3BLE.....77,656-442-71
K5LWL.....76,500-452-68
W3AEL.....76,375-470-65
W4WLC.....76,320-427-72
K2ZYR.....75,970-535-71
KZ5FX.....75,880-546-70
WA4HGY.....75,878-452-67
W1BIH.....75,816-527-72
W5NML.....75,652-460-66
W3BIP.....75,600-428-72
W6GEB.....75,600-433-70
W2MTA.....74,638-428-70
WB2NZU.....74,275-431-69
WA8OCG.....73,755-459-66
W8OQH.....73,219-413-71
W0CUC.....72,576-506-72
W4ZM.....72,540-403-72
W8CRD.....72,420-408-71
W3AZD (K3OAE, opr.)
72,380-517-70
W4DKU.....72,191-419-69
K6QEZ (WA6AMW, opr.)
72,154-410-71
W1DYE/1.....72,093-403-72
W1WLZ.....71,759-410-70
WB2RKK.....71,207-451-63
W3BR8.....70,403-444-64
KH6IJ.....70,361-496-71
WA3EPT (6 oprs.)
96,900-649-75
W0YC (K0s OTH UXQ, WA0BPU).....81,428-517-53
W0EEE (5 oprs.) 78,242-553-71
WA2HSP (WA2s EMB HSP)
81,293-458-71
W9HHX (6 oprs.)
70,293-498-71

PHONE

W7ESK.....202,050-906-75
K8DOC (K8TAH, opr.)
165,165-796-70
WA0MOB.....144,504-674-72
W6EIF.....139,889-657-72
W4KFC.....137,250-611-75
W2BIU.....132,408-614-72
K2EIU/5.....129,101-591-73
K0GJD/6.....125,325-557-75
K2AJA.....124,712-588-71
W3AZD.....122,175-575-71
K0LGZ.....112,200-551-68
K3KMO.....111,573-540-69
W4ETO.....109,917-535-69
K7RAJ.....109,056-517-71
WA0HSX.....107,843-555-66
W3ZKH.....105,525-705-75
W9DOR/9.....104,572-504-70
W1BGD.....102,200-700-73
WA3COJ.....99,756-489-68
W1HQV.....97,696-697-71
K0REV.....96,000-503-64
K5FPO.....94,806-460-69
K1THQ.....94,369-471-67
W3TOO.....93,827-441-71
W8AEB.....92,400-440-70
K1NWE.....90,072-834-72
W6KPM.....89,936-430-73
K5IIN.....89,625-600-75
W3TYK.....89,556-439-68
WA8MCR.....88,182-621-71
WA0JOA.....87,720-430-68
WA6TBY (WA8KHP, opr.)
85,960-625-70
W5DQV.....85,524-449-64
W5ZBC.....84,600-470-60
WA8FKD.....85,200-403-71
WA2QEB.....84,456-406-69
W3MVB.....82,800-450-62
W4PTR.....82,309-410-67
WA0CPX.....80,380-379-70
W0CUC.....79,094-542-74
K7AQB.....78,000-400-65
K7PXI.....77,544-360-72
W4USM.....77,319-366-71
K0IUZ.....75,600-360-70
WA8LEO.....74,830-551-68
W3KON.....73,926-335-74
WA1AWX.....72,030-515-70
W6VNH.....72,030-345-70
K3BXI (WA0EMS, opr.)
71,409-341-70
W1DYE/1.....70,488-360-66
W0HSC (multiopr.)
104,142-549-68
W0EEE (6 oprs.)
100,764-469-72
WA7BKW (4 oprs.)
93,984-451-68
W9HHX (5 oprs.)
85,626-614-71
K6LY (5 oprs.)
77,429-567-70
WA2HSP (WA2s EMB HSP)
76,527-385-66
WA8FMA (WA8s FMA KQX)
71,175-367-65

ARRL ACTIVITIES CALENDAR

(Dates are shown in GMT)

Feb. 3: CP Qualifying Run — W6OWP
Feb. 4–5: DX Competition (phone)
Feb. 4–19: Novice Roundup
Feb. 10: Frequency Measuring Test
Feb. 15: CP Qualifying Run — W1AW
Feb. 18–19: DX Competition (c.w.)
Mar. 2: CP Qualifying Run — W6OWP
Mar. 4–5: DX Competition (phone)
Mar. 16: CP Qualifying Run — W1AW
Mar. 18–19: DX Competition (c.w.)
June 10–11: VHF QSO Party
June 24–25: Field Day

OTHER ACTIVITIES

The following lists dates, name and page reference of *QST* issue in which more details appear.

Jan. 28–29, Feb. 25–26: French Contest (p. 89, this issue).

Jan. 28–29: Arizona QSO Party (p. 124, last issue).

Jan. 28–29: Louisiana QSO Party (p. 100, last issue).

Feb. 5, 9: 160 Meter Tests (p. 101, Nov. *QST*).

Feb. 10–12: QCWA QSO Party (p. 71, last issue).

Feb. 11–12: Maine QSO Party (p. 108, last issue).

Feb. 11–12: Wisconsin QSO Party (p. 105, this issue).

Feb. 25–26: YL/OM Phone (p. 81, last issue).

Feb. 25–26: Vermont QSO Party (p. 110, this issue).

Feb. 26: Tennessee QSO Party (p. 106, this issue).

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Northern New Jersey	Louis J. Amoroso, W2LQP	Dec. 9, 1966
Colorado	Richard Hoppe, KØFDH	Feb. 14, 1967
Eastern Florida	Jesse H. Morris, W4MVB	Feb. 25, 1967
Orange	Roy R. Maxson, W6DEY	Mar. 1, 1967

In the Maryland-District of Columbia Section of the Atlantic Division, Mr. Carl E. Andersen, K3JYZ, and Mrs. Shirley Freeman, W3CMS, were nominated. Mr. Andersen received 548 votes and Mrs. Freeman received 303 votes. Mr. Andersen's term of office began Dec. 19, 1966.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 p.m. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given

herewith. The complete name, address, *zip code* and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the .....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— *F. E. Handy, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
Santa Barbara	Feb. 10, 1967	Cecil D. Hinson	Aug. 10, 1966
North Carolina	Feb. 10, 1967	Barnett S. Dodd	Apr. 10, 1967
Michigan	Feb. 10, 1967	Ralph P. Thetreau	Apr. 10, 1967
British Columbia	Feb. 10, 1967	H. E. Savage	Apr. 10, 1967
Alberta	Feb. 10, 1967	Harry Harrold	Apr. 10, 1967
Washington	Feb. 10, 1967	Everett E. Young	May 3, 1967
Los Angeles	Mar. 10, 1967	H. G. Garman	May 18, 1967
Nebraska	Apr. 10, 1967	Frank Allen	June 10, 1967
Oregon	Apr. 10, 1967	Everett H. France	June 10, 1967
Eastern Pennsylvania	Apr. 10, 1967	Allen Breiner	June 15, 1967
Manitoba	Apr. 10, 1967	John Thomas Stacey	July 1, 1967
South Dakota	Apr. 10, 1967	Seward P. Holt	July 3, 1967

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Feb. 15 at 0230 GMT. Identical texts will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Feb. 3 at 0500 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given per Greenwich Mean Time. Code Proficiency Qualifying Runs in the United States and Canada actually fall in the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 15 becomes 2130 EST Feb. 14.

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

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

Date	Subject of Practice Text from Dec. *QST*
Feb. 1:	*It Seems to Us*, p. 9
Feb. 7:	*Evolution of a Grounded-Grid Amplifier*, p. 29
Feb. 17:	*TVI Is Still With Us*, p. 50
Feb. 20:	*Red Wire To Post Three*, p. 52

Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Feb. 24:	*Audio Amplifiers*, p. 61
Feb. 27:	*A.G.C. Voltage*, p. 61

W1AW SCHEDULE, FEBRUARY 1967

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn. about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed February 22, Washington's Birthday.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY OBS[3,7]	.....	.....
0030		**Code Practice Daily[1] 10-13 and 15 w.p.m.**					
0100	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0120-0200[4]	.....	.....	7.080	3.555	7.080[6]	3.555[6]	7.080
0200	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0205-0230[4]	.....	.....	3.945	50.7	145.6	1.82	3.945
0230		**Code Practice Daily[1] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**					
0330-0100[4]	.....	.....	3.555	7.080	1.805	7.080	3.555
0100	RTTY OBS[3]	.....	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]
0410-0430[4]	.....	.....	3.625	14.095	7.015	14.095	3.625
0430	Phone OBS[2]	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0435-0500[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS[1]	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0530-0600[4]	.....	.....	3.555[6]	7.080[6]	3.555	7.255	3.555
0600-0700	.....	.....	7.080	3.945	3.555	7.255	7.080
0700-0800	.....	.....	3.945	7.255	3.945	3.555	3.945
2000-2100	.....	14.280	21/28[5]	14.095	21/28[5]	14.280	.....
2100-2200	.....	14.100	14.280	14.100	14.280	14.100	.....
2300-2345	.....	7.255	21/28[5]	21.1[6]	21/28[5]	7.255	.....

[1] C.W.OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.015 and 14.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operation period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
[7] Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.

Maintenance Staff: W1s QIS WPR NPG. *Times/days in GMT. General operating frequencies approximate.

Station Activities

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

ATLANTIC DIVISION

DELAWARE—SCM, Roy A. Belair, W3IYE—SEC: K3NYG. RM: W3EEB.

Net	*Freq.*	*Local Time*	*Day*
DEPN	3950 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
DOVER 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

Applications for WDEL certificates should be sent to Jack Wilson, K3AMC, 1005 Greentree Rd., Newark, Del. SASE please. W3EEB had a traffic count of 55 from 1900 to 2145, a 20 % increase over his best previous one-night count. WA3DUM was on both phone and c. w. in the recent SS. W3HGA and W3HC scheduled W3WLO signing TF2WJZ. K3GKF, W3RDZ and WA3DYG have been very active OOs. I want to thank all appointees for their cooperation during the past two years and hope you continue to support W3HC. Best of luck, John. Traffic: W3EEB 282, WA3DUM 4, W3HC 2, WA3-DYG 1, W3HKS 1, W3IYE 1.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: K3YVG, K3MVO. W3EML, W3CBH. PAMs: W3FGQ, W3SAO. K3FOB is the new York County EC and W3PST is the new Philadelphia County EC. EPA C.W. Net had QNI 428 with QTC 468. PTTN Training Net had QTC of 327, which breaks all previous records. EPA Emergency Phone & Traffic Net had a QNI of 759 and QTC of 251. W3EML has noted the good band conditions and has moved PAN-TCC to 80 meters for skeds. K3MVO got in some golf while visiting his daughter in Alabama. WA3BSV now has 8 other amateur stations within 800 feet of his QTH. W3ELI and K3WEU have worked out a deal with the Philadelphia Visitors Bureau for the handling of traffic via conventions and visitors in general. K3VBA, a new addition to the PTTN Training Net, finds traffic an intriguing phase of amateur radio. W3ID had a streak of receiver troubles. K3HLN is looking forward to getting on 6 meters early in 1967. W3NNL is using a v.f.o. built by W3JKX in 1946. WA3CFU added a new 24-hour clock to the shack. W3KGN, AREC member in Adams County, has a new emergency generator. WN3FWM is working DX on 15 meters. W3RV acquired an SB-200. WA3EEC, WA3EYU and WA3DMH are now General Class operators. The Lehigh University Radio Society operated a radio guard net for protection and vandalism during the period of traditional rivalry between Lehigh and Lafayette U. WA3ERA is now on s.s.b. and using an 80-meter folded dipole antenna. W3HWC, former EC for Bucks County, has been in 10 countries from Turkey to England and is now in France. All licensed amateurs and clubs are welcome to send me material for this column. Please print your call plainly and if a reply is requested supply me with your return address. Traffic: (Nov.) W3-CUL 4906, W3EML 986, W3VR 764, K3MYS 709, K3-PIE 390, WA3ATQ 340, W3AEQ 287, K3MVO 213, K3-YVG 208, K3RTX 164, WA3CTP 152, WA3IZ 145, W3-MPX 119, W3CBH 108, W3FGQ 106, W3OY 102, WA3AFI 97, W3KJJ 72, WA3BFR 67, WA3BSV 62, W3ZRQ 56, K3WEU 53, K3TNL 52, W3VAP 48, W3RV 45, WA3AIB 44, K3KTH 44, WA3EXW 28, K3VBA 26, K3YQL 23, K3MDG 22, K3KKO 18, K3HKW 17, WA3FWT 15, W3-JKX 13, WA3CFU 12, W3BUR 11, K3HLN 11, WA3BBI 10, WA3EMY 8, W3NNL 8, W3BFF 6, WA3ERA 4, W3-FAF 4, W3FLP 4, W3PVY 4, WA3EXB 3, W3ID 3, WA3ADE 2, WA3BJQ 2, W3ELI 2, K3NZD 2, W3OML 2, WA3EEC 1, K3SWZ 1. (Sept.) W3RV 43.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, K3-OAE, W3PRC, W3ZNW, W3UE. PAMs: W3JZY, K3LFD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*Avg.*
MDD	3643	0000Z	Daily	30	339	11.3
MDDS	3643	0130Z	Daily	30	49	1.6
MEPN	3820	2200Z	M-W-F	23	39	1.7
MEPN	3820	1700Z	S-S			

WA3EOP is searching for MSTN from W3EAX in College Park. Sorry, Page, MSTN is no longer operating. K3LLR, who divides his time between v.h.f. and Top Band (160), found no action on 220 Mc. after a week's careful listening. It takes schedules to get things moving on those unoccupied bands. W3ELA reports good luck with 6-meter skip including working a VP7. K3LFD has built an automatic keyer to compete with the other speed merchants in TCC. WN3GOS, a new Novice in Washington, D.C., is taking the modern approach with an all solid-state, 1-watt transmitter on 40 meters. Schoolwork and an SB-401 kit pulled WA3CFK's traffic total down to a low (?) of 124. K3QDD will have W1DVH for a call while attending MIT. K3QDC will keep the home (traffic) fires burning by applying for an ORS appointment. K3ZSX has moved to New Jersey. W3TN made the BPL in Aug., Oct. and Nov. W3PQT, Patuxent NAS, and K3WBJ, Walter Reed Hospital, stations are being reconditioned. KN3GHV is looking for a local net in the Novice bands to build up his code speed. W3CJT spent some time in the hospital and is now convalescing at home. Traffic: W3TN 246, K3LFD 181, WA3EEQ 153, K3JYZ 148, WA3CFK 124, W3LBC 98, K3OAE 65, K8MZY/3 50, WA3ERL 42, K3GZK 41, W3MCG 41, W3ZNW 36, W3PRC 35, W3PQT 33, W3EOV 24, W3ECP 19, K3QDC 17, WA3CEK 14, K3QDD 12, K3LLR 10, K3NCM 6, WA3ECT 5, WA3EOP 4.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV, W2RG. PAM: W2ZI and NJPN Net Mgr. NJN reports a QNI of 487 and 287 traffic. NJ Phone Net reports QNI of 847 and 380 traffic. Lots of SS reports were received via radio from SNJ. SEC W2BZJ recently returned from a vacation in Florida. The QCWA Del. Valley Chapter elected W3BFH, pres.; W3ELI, vice-pres.; W2HX, secy.; W3-LYP, treas. W2RVD a new member of the DVRA, operates aeronautical mobile on 2 and 6 meters. WB2-MOQ, a new station in Somerdale, applied for ORS appointment. W2ZI and W2HX copied the WWV first message from Ft. Collins, Col. W2VU is in Walter Reed hospital. Hope you are out soon, Sam, old-timer. The new net roster for NJPN has been sent out to all members by W2YPZ. Congrats to WA2UPC, who received a BPL medallion. WN2UVB is a new active station in Moorestown. K2BG sent in a very nice OO report. During his trip down the Mississippi River to New Orleans W2ZI was met at the dock by W5RU, W5AU and ex-5BP and also met ARRL Vice-Pres. W5NW among the group. W2CKF, formerly W3DW, sends in a report from Pleasantville. Recently-visited K2SHE/W2RGU stations sure have a beautiful set-up. W2ZI passed the exam for U.S. Merchant Marine Radio Officer and received his certificate from U.S. Coast Guard, Customs House, Philadelphia. He also has a radio-telegraph 1st-class ticket. WB2YCI has a bad case of TVI, which has kept him off NJN. W2ZEW is a new station checking in from Bordentown. Traffic: (Nov.) WA2KIP 128, WA2UPC 87, W2ZI 68, WA2BLV 60, W2-YPZ 56, W2RG 54, K2SHE 53, WB2CYI 52, WB2TEN 49, W2ZEW 23, W2CKF 19, WB2MOQ 18, W2EWR 9, WA2DVU 7, WA2KAP 7, W2HDW 5, WB2SBD 3, W2-BZJ 2, K2BG 1. (Oct.) WA2UPC 231, WA2BLV 214, WB2GTE 3, WB2FJE 2.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800; NYSPTEN on 3925 kc. at 2200 GMT; NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed.; TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT; NYS County Net on 3510 kc. Sun. at 1400 and 2345 GMT on Mon. Congratulations to W2OE on making the BPL. W2WS has been appointed EC for Cayuga County. WB2-NZA has been endorsed as OPS and WB2NNA/WA2PZD as OO. Anyone interested in an AREC training net in order to learn how to handle emergency traffic, please contact W2RUF, 435 Best St., Buffalo, N.Y. 14208. The

net will start this spring on Sat. afternoon at 1400 on either 40 or 80 meters. Let Clara know your preference. This will be a slow-speed training net. K2HUK gave a talk at ARATS on the ARRL, etc. Erie County RACES is supplying communications for an area ski patrol on an experimental basis. WB2GAL has a 4- kw. generator installed at home. WA2UIF/4 has a new SB-301 receiver. W2SEI is alt. EAN NCS. He has all-band verticals installed and he is now working on a phasing system for 4 bands. WA2AWK, the new EC for Onadaga, reports 10 members for the AREC so far and a net has started on 28.625-Mc. a.m. WB2NZA has a new Ham M and **TA-33 beam; also a newtronics 80-40** rotating dipole. WA2KND gave a talk on RTTY to the Squaw Island ARC. Monroe County RACES and the RARA cooperated with a local radio station on a penny drive to collect funds for Christmas toys. Mobile units were used to pick up donations. We are sorry to report that W2AFN (8AFN) has joined the Silent Keys. **WB2 LFR spoke at a recent RARA meeting.** Rochester area 432-MC. stations include K2YCO, W2UTH, WA2-KND, W2ALL, W2FDI, W2CNS and WA2HWC. All ARRL appointments should be renewed yearly to remain in effect. Check the date on your certificate. Regular monthly reports also are a requirement. If you are inactive let your SCM know so that the records can be maintained on a current basis. Traffic: (Nov. W3SEI 461, W2OE 457, WA2UFI/4 213, K2RYH 154, WB2GAL 142, W2RUF 119, K2SSX 100, K2QDT 81, W2-HYM 61, WB2OYE 52, K2OFV 44, W2FEB 34, W2RQF 34, K2IMI 22, W2MTA 19, K2MQN 17, W2FCG 12, K2DNN 9, W2PNW 6, WA2GLA 3, WB2NZA 3, WB2-SMD 2. (Oct.) WA2UFI/4 475, W2PNW 89, K2QDT 46, W2MTA 14.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO. PAM: K3VPI (v.h.f.). RMs: W3KUN, K3SOH, W3MFB, W3UHN. Traffic nets: WPA, 3585 kc. daily 0000 GMT and KSSN, 3585 kc. Mon. through Fri. 2330 GMT. This column records with regret the passing of W3WSU and K3DZC. The Two Rivers ARC reports via *Spark Gap* that W3OC gave an address entitled "Fifty Years Of Ham Radio" at its Nov. meeting; the Western Pennsylvania Mobileers now meet at 8 P.M. the 2nd Mon. of the month in the cafeteria at the Westinghouse Atomic Power Div. at Forest Hills; W3RSB is resting at home after several weeks in the hospital. The South Hills Brass Pounders and Modulators report via *The Radial* that W3BWU took Western Pennsylvania honors in the recent V.H.F. Contest; W3LKV now has a beam on his tower. The Nittany Amateur Radio Club reports via *QST de K3-HKK* that the club SS aggregate score is 367,701; K3CFA extended his 144-Mc. DX record recently by working W4MNT in Florida via meteor scatter; K3CFA also worked W2EFB on 2 meters via high-flying jet aircraft reflections; K3CLX now has his Extra Class license and 35-w.p.m. seal; W3SMV received his 1st-class commercial phone license; K3KMO now has a full kw. on 80 through 10. K3FFJ made over 200 contacts during a two-day 12-county expedition. W3MTK, active in the Pittsburgh area since 1934, has moved to Pocomoke City, Md. W3RUK is back on the air with a new Mosley beam. K3JCC has returned from Germany, where he operated as DL4DN. W8TSB and W8KGI are new transfers from Ohio to the Cumberland Valley. W3GJY now has 314/312 for DXCC. Traffic: (Nov.) W3NEM 287, WA3AKB 99, K3HKK/85, (W2KAT op.) W3LOS 59, K3RZE 36, W3SMV 31, W3LOD 14, W4ZAU/3 11, WA3BGE 7, W3GJY 5, W3YA 2. (Oct.) W3MFB 115, K4VNG/3 13.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM. PAMs: W9VWJ, WA9CCP, W9KLB and WA9RLA (v.h.f). Cook County EC: W9-HPG. Net reports:

Net	*Freq.*	*Time*	*Days*	*Tfc.*
IEN	3940	1400Z	Sun.	22
ILN	3760	0000Z	Daily	200
NCPN	3915	1300Z	Mon.-Sat.	324
NCPN	3915	1800Z	Mon.-Sat.	318
Ill PON	3925	2300Z	Mon.-Fri.	370
Ill PON	50.28 Mc.	0200Z	Mon. & Thurs.	6
Ill PON	145.5 Mc.	0200Z	M-W-F	235
TNT	145.36	2100Z	Sun.-Fri.	163

New officers of the Cenois Amateur Radio Club (Decatur) are WA9NHT, WA9IQK, WA9KHG and K9OVM. W9NWK reports that the 75-Meter Interstate Sideband Net had a traffic count of 599 for Nov. and 383 for Oct. W9NWK also has been elected as an officer of the Firebird Amateur Radio Club. (Members are employees of Divisions of General Motors Corp). WA9RVY and WA9SBD have built Heathkits SB-401 and SB-301. The Chicago F.M. Amateur Repeater is now operated by the Society of Radio Operators (SRO). New officers of the Kishwaukee Radio Club are K9OEH, WA9MBJ, K9CZX and K9HHK. The League's Executive Committee has approved application of the Worth Township Amateur Radio Club, Inc., as a duly affiliated club. WA9NGB is net control of the club's net, which meets Mon. at 0200Z on 145.170 Mc. New officers of the AARC are K9IEI, W9QVK, WA9KQD and WA9-UHO. The Ninth Regional Net reports a traffic count of 413 for Nov. WA9NIP received membership in the Old Timers Club. WA9AFO passed the General Class exam and is now working on an auto-start for RTTY. W9BOD and K9BDJ are hard at work on ham TV. The Near North Radio Club (of Chicago) station K9-JAM has been reactivated. W9FCV and his XYL have returned from a trip to Europe. A new Novice heard was WN9THM. This column's deepest sympathy is extended to the family and friends of K9VMS, who recently passed away. W9MKS reminds the gang that the Starved Rock Radio Club's Annual Hamfest will be held the first Sun. in June. W9BRD and W9GFF were winners of the First Homebrew Contest sponsored by the Chicago Area Radio Club Council. W9HJM is building a Heathkit SB-401. K9AXS has received his Phone DXCC certificate. K9YMZ has a TR-3 to work DX. WA9RLA is starting a 2-meter RTTY net and those interested should contact him. WA9CCP is the only recipient of the BPL award this month. Traffic: (Nov.) WA9CCP 386, WA9SEO 380, WA9MHU 340, K9-KZB 334, W9AXR 312, W9EVJ 187, W9JXV 177, W9DOQ 124, WA9NFS 102, WA9GUM 98, W9ELL 87, W9HOT 87, WN9SPA 77, K9CYZ 76, W9NXG 76, W9YCH 68, WA9PPA 66, K9AVQ 42, WN9RSN 38, W9GFF 37, W9IDY 23, WA9RLA 22, W9PRN 20, W9QXT 20, W9-UHD 17, W9HJM 11, WA9LDC 10, K9HSK 7, W9LNQ 6, WA9FIH 4, WA9HSZ 4, K9RAS 1, W9VBV 1. (Oct.) WA9CCP 287, WA9QXT 13.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols. W9YYX. SEC: K9WET.

Net	*Freq.*	*Time*	*Nov. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300 M-F	270	K9IVG
ISN	3910	0000Z Daily 2130 M-S	743	K9CRS
QIN	3656	0000Z Daily	147	W9HRY

W9PMT, mgr. of the Hoosier V.H.F. Nets, reports Nov. traffic of 109. K9DHC, mgr. of RFN, reports Nov. traffic of 41. QIN Honor Roll: K9VHY 29, K9HYV 23, K9WWJ 23, K9DHC 20, W9QLW 20, WA9FDQ 19, W9HRY 16, W9ZYK 16, WA9OYI 15. W9QLW, RM for 9RN, reports Indiana was represented 100% in Nov. New officers of the Evansville ARC are W9LXA, pres.; W9MWM, vice-pres.; W9DGA, secy.; K9LAU, treas. W9EDO received an Al Operator award and 55-w.p.m. plaque in the c.w. contest. Congratulations to new Generals WA9QLP, WA9EAA and WA9TNQ, and to new Novices WN9RZY and WN9TDW. W9TVV has homebrewed an s.s.b. transmitter. Sounds good, too. K9HIS has built a transceiver. Welcome to WØUSL/9, now in Lafayette. W9FWH is enjoying a new TR4 and W9YB is back on the air with new Collins equipment. K9EFY is well prepared for emergencies with a 21/2-kw. generator. K9MAF now has a second call, W2CJC. K9IVG is back on 40 meters, thanks to W9HW and W9VBJ. *Amateur radio exists because of the service it renders.* BPL certificates went to K9IU and K9IVG. A Happy New Year to all. Traffic: (Nov.) K9IVG 662, W9QLW 266, W9ZYK 266, K9FZX 184, W9IHRY 160, W9MM 160, K9IU 120, WA9OYI 120, K9HYV 98, W9JVV 95, WA1-DAG/9 92, WA9FDQ 86, W9DZC 70, K9VHY 69, W8UR 58, W9SNQ 56, K9CRS 50, W9YYX 43, WA9BGI 36, W9CLY 35, K9EFY 33, WA9GNA 32, K9RWQ 29, W9CC 27, WA4RBQ/9 26, WA9RNT 25, WA9LUG 23, K9FUJ 22, W9FWH 21, W9DOK 20, W9EJW 20, WA9GJZ 20, WA9CFW 16, W9PMT 16, W9RTH 15, W9BUQ 12, WA9-AOS 11, WA9AXF 11, WA9BWY 11, K9ILK 11, WA9BNX 10, W9LG 9, K9BSL 7, K9JQY 6, WA9NGN 6, K9UEO 6, WA9CHY 5, K9EFY 5, WA9JIX 5, W9UOZ 5, K9LMG 3, W9BDP 2, K9LZJ/9 2, WA9QXM 2, WA9QMW 1. (Oct.) WA9GNA 14, WA9BWY 3.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. RM: WA9MIO. PAMs: W9NRP, K9IMR and WA9QKP.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*ONI*	*OTC*	*Mgr.*
BEN	3985 kc.	1300Z	Mon-Sat.	26	314	150	W9NRP
BEN	3985 kc.	1800Z	Daily				K9HJS
WSBN	3985 kc.	2315Z	Daily	30	1046	319	K9IMR
WIN	3662 kc.	0115Z	Daily				WA9MIO
SWRN	50.4 Mc.	0300Z	Mon-Sat.	25	365	3	W9JZD

Net certificates: W9KBT and W9DMH for the WSBN. Renewed appointments: W9NGT as EC and K9LGU

as OPS. WN9RTH has 25 states worked towards his WAS. The Assumption Radio Club, Wisconsin Rapids, is now affiliated with the ARRL. New officers of the Lacrosse ARC are WA9HCZ, pres.; K9KTG, vice-pres.; K9EGQ, secy.; K9VQR, treas.; W9GGY, K9CUT and W9MNG, board of directors. W9IND received a 9RN net certificate. West Allis ARC officers are WA9-KRF, pres.; W9TPO, vice-pres.; WA9IAT, secy.; K9-BTQ, treas.; K9TWE, sergeant-at-arms. The Milwaukee AREC assisted with the UW-Milwaukee Homecoming Parade. BPL certificates went to WA9GJU for Oct. and Nov. traffic. K9GDF led the OOs with 57 notices sent. Traffic: (Nov.) W9CXY 267, WA9GJU 194, K9IMR 189, W9DYG 170, WA9NPB 158, K9UTQ 82, WA9QNI 78, W9YT 78, WA9QKP 72, W9DNI 70, K9GDF 68, K9FHI 67, WA9NDV 66, W9IFS 61, W9KQB 57, WA9NFG 57, W9NRP 55, W9JKM 54, W9AYK 51, W9SUF 49, W9CRE 43, K9GSC 38, WA9OMO 32, WA9IZK 28, WA9KFL 24, W9OTL 24, K9LGU 20, K9QKU 17, W9HQT 12, WA9LIY 12, WA9NVY 12, W9KRO 10, WA9PKM 10, WA9NBU 6, W9QQQ 1. (Oct.) WA9GJU 185, W9RTP 59, W9IRZ 6.

WISCONSIN QSO PARTY

(Wisconsin Amateurs Only)

February 11-12, 1967

The Wisconsin SCM forwards information about the first Wisconsin QSO Party, sponsored by the Wisconsin Nets Association. *Rules:* 1) Times are February 11 and 12, between 1600 and 2300 GMT both dates. 2) Categories are phone 160-10 meters, phone 6 meters and up and c.w. 160 meters and up. 3) Exchange consecutive QSO numbers, starting with number one, RS(T) and county. You may work each station only once in each category and separate logs for separate categories are required. C.w. to phone is permitted, cross-brand is *not* allowed, nor are multiple transmitters. Contacts are not permitted on nets in session. Logs must show time, station worked, reports exchanged, band, emission, input, numbers exchanged and county names. No power limit. 4) Score one point for each contact, add the message credit if applicable and multiply by the number of counties worked. 5) 25 points can be added to the contact points, before multiplier, if a message is sent in correct ARRL form to the SCM stating the category, county and input. This must be sent within two days after the contest ends. A copy with handling data must accompany the log for credit. 6) Suitable trophies (for first place winners) and certificates with ribbons will be awarded. 7) Suggested approximate operating frequencies: 3662 3985 50,400 145,350 and 146,940 kc. 8) Logs must be postmarked no later than March 13, 1967 and sent to Wm. Wachholz, K9-HJS, 918 N. Third Ave., Wausau, Wisconsin. ANY violation of the contest or FCC rules may result in disqualification. Decisions of the contest committee are final.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØ-TCK—SEC: WAØIEF. RMs: WØISJ, WAØEPX. PAMs: KØQBI, WAØJKT, WØHEN; WAØDWM. MSN meets daily on 3595 kc. at 0030Z. MJN (slow-speed c.w.) meets Tue.-Sun. on 3595 kc. at 0100Z. Noon MSPN meets M-S on 3820 kc. at 1805Z and Sun. at 1500Z. Evening MSPN meets daily on 3820 kc. at 2300Z. MSTN meets Tue.-Sat. on 50.4 Mc. at 0430Z and Sun. at 0200Z. Congrats to newly-appointed ECs, WAØFFU for Lake and Cook Cos. and WAØMMV for Wadena Co. Appointments renewed: WØFIT as EC and KØAKM as ORS. OO WØTIV sent 17 reminders in Nov. Jim comments that a common "out-of-band" operation results from a station moving out of the band to work a foreign station. The call of WAØQFS was issued to the Albert Lea ARC. The club is establishing a 6-meter emergency net on 51.4 Mc. Piconet members elected KØPSH, pres.; WØAZR, 1st vice-pres.; KØAKM, 2nd vice-pres.; and KØZRD, secy.; at its annual meeting. WØRHT showed movies and gave details of s.s.b. operation from a boat on Lake Athabaska trips at the QCWA meeting. WØTIV has a new vertical on 40 and 80 meters. 110 people registered for the midwinter hamfest at Rochester. Guest speaker KØHFU gave an interesting and informative account of his experiences in setting up and operating his mobile TR3 barefoot into a ½-wave antenna strung between a remaining tree stump and a building at the Belmond emergency. Bob urged traffic nets to operate in a formal manner to give operators needed training for emergency work. WAØBYO qualified for the BPL award for Nov. traffic. Traffic: (Nov.) WAØEPX 339, WØYC 250, WAØBYO 228, WAØJKT 113, WAØIAW 95, WØTCK 57, KØQBI 41, KØICG 38, WØHEN 33, WØISJ 31, WAØJPR 26, KØZRD 26, KØQQS 20, WØ-BUO 19, WAØDFT 19, WAØIKP 19, WAØEDN 17, KØIGZ 17, KØFLT 17, KØFLT 16, WØATO 15, WØ-UMX 15, KØSRK 14, WAØLMK 12, WAØMMV 10, WØ-SZJ 10, WØKLG 9, WAØLVK 9, WØEQO 8, WAØEZQ 6, WAØQAK 4, WAØKQU 1. (Oct.) WAØIKP 38, WAØ-EZQ 8.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. OBS: KØSPH. WAØAYL made the trip to Texas with the U.N.D. football team for the Pecan Bowl Game. WAØKSB is back in the traffic business again and needs some c.w. operators to help. The new Eico is working and he has an Eico keyer on the way. WØKON is leaving for Montana for five months so will be out of the NTS C.W. Net from N.D. WAØOAT was in Grand Forks for Thanksgiving. WNØOVW has passed the code test for Conditional Class. On Nov. 30 a C.D. alert was called for the RACES Net and was handled well by all who participated. 90% of the messages filed were sent and received as directed. WØTXQ, from Detroit Lakes, spent a week end as WØDM's guest. WAØOVT is on with a Pacemaker. WØNVK lets us know that he is among the living. The N.D. PO Net held 8 sessions, 103 check-ins, 65 pieces of traffic and 29 stations participating. The N.D. RACES Net reports 31 sessions, 1169 check-ins, 268 messages. Traffic: KØITK 105, WØPQW 36, KØSPH 30, WAØAYL 24, WAØEWW 21, WØDM 20, WØGFE 16, WØCGM 15, WØEFJ 14, WAØOVT 12, WAØKSB 9, WAØBJV 5, WØACK 4, WØRHT 4, WØDNJ 4, WAØDLB 3, WØ-CBM 2, WØECX 2, WAØMND 2.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WAØAOY. PAM: WAØDEM. WØIGG has returned from the hospital and is able to operate from his wheelchair. WØNZA and his XYL have purchased a home west of Custer, so he will be able to get his "antenna farm" up permanently. So. Dak C.W. Net report for Nov.: 11 sessions, 55 QNI, 12 QTC in 296 min. The Weather Net report for Nov. shows a daily average of 20.8 QNI, 83% of QNI gave weather reports. KØPDW is now /7 from Nevada. WØ-NIW has moved to Yankton. Traffic: WØZWL 702, WAØ-AOY 137, KØVYY 65, KØAIE 50, WØSCT 31, KI-CAU/Ø 26, KØBMQ 26, KØYGZ 21, WØDJO 18, WAØ-BZD 11, WAØCKH 8, WØBQS 4, WAØBMG 3, WAØ-MWN 3, KØKOY 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: WA5KTX. PAM: WA5GPO. RM: K5TYW. NMs: WA5-PPD, WA5HNN, W5MJO, K5ABE. WA5PPD has succeeded WA5ITS as net manager of the Razorback Net and K5ABE has suddeeded K5IPS as net manager of the Arkansas Fone Net. The Arkansas C.W. Net, OZK, is now publishing a bulletin with W5DTR as bulletin editor. OZK operates every evening on 3790 kc. at 0100 GMT. The U. of A. club station, W5YM, with WA5KQU as chief op., has a new SB-401 and SB-301. As an OBS W5YM has transmitted 9 Official Bulletins. I regret to announce the resignation of K5TYW as RM effective Dec. 31, 1966. WA5LUW is the new EC for Jefferson County. Net reports for Nov.

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*QNI*	*Net Time*
RN	3815 kc.	0001Z	Daily	30	59	709	626
AFN	3885 kc.	1200Z	Mon.-Sat.	?	?	?	?
OZK	3790 kc.	0100Z	Daily	30	90	199	626
APON	3825	2130Z	Mon.-Fri.	22	165	405	660

Traffic: W5OBD 531, W5MJO 234, W5NND 166, W5CAF 119, WA5KEF 88, W5DTR 80, W5YM 56, K5TYW 48, K5EDH 19, W5OXU 17, W5RIT 5.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—RM: W5CEZ. V.H.F. PAMs: W5UQR, WA5DXA.

Net	*Freq.*	*Days*	*Time*	*Net Mgr.*
LAN	3615	Daily	0030Z	W5GHP
LAPON	3870	Sun.	1300Z	W5KC
Delta75	3900	Sun.	1330Z	WA5EVU

WA5FNB has stepped out as LAN Net Mgr. after three long years of devotion and untiring effort. W5GHP takes over Jerry's duties. W5BUK is now over the 300 mark DX-wise. W5NW is spending some time in New Orleans. W5LDH is pushing HamQuest 67. The Slidell ARC heard a discussion on how to snag DX by yours truly. K5SGK and his XYL went on an extended tour of Europe and the near East. The Lafayette Annual Banquet was a huge success with awards going to W5IQH, W5YUY, K5EVZ, K5EUW, WA5NTT, W5HWB, W5RV, K5SGH, WA5BIM, W5GKT, K5JKN and W5NQR. The BARC held its Annual Supper Nov. 19. W5IOU has a new

harmonic! The Atchafalaya ARC has been organized in Morgan City under the leadership of WA5AOE. WA5JVL is acting chief engineer for WTUL at Tulane. WA4KWZ is a newcomer to the Monroe area. The GNO-ARC heard WA5DXA give a presentation on message-handling and net operations. W5AXD has retired. W5JBK is starting a group interested in radio at Buckeye High in Deville. W5CZ holds the oldest amateur license in Louisiana. Yours truly joined the ranks of 40 years on Dec. 23. WN5QWV and WN5QWZ are recent additions to our ranks. W5MBC's activities are limited. W5UQR reports W5ABD now is available to copy all in local nets and outlying areas. WA5KLF and WN5PRM made a trip to Georgia. W5GHP has been bitten by the RTTY bug. WA5DXA now has a Drake T-4 and reports two c.d. nets 50.54 Mc. Mon. and 146.94 Mc. Wed. K5VJZ is NCS of the Lafayette RC Net which meets Sun. at 2000Z on 3860. WA5LQZ has a new 50-ft. tower going up for special use on 15. K5OKR vacationed in Texas. W5CEZ has his 200V back in service. W5BV still haunts 3990 mornings. Traffic: W5GHP 537, W5KRX 267, W5CEZ 130, K5OKR 126, W5MXQ 121, K5VJZ 86, WA5FNB 75, WA5LQZ 48, W5PM 22, W5MBC 19, WA5LGO 10, WA5HGX 9, WA5QVN 7, WA5KLF 5, WA5DXA 4, W5EA 2, W5KC 2.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. WA5IXC is a new father. Look for W5ESC daily 3900-3930 kc. K5HN made 89,625 points on phone and 65, 340 on c.w. in the Sweepstakes. WA5BAP/Ø still checks in with the Mississippi group. Jackson ARC has a net on 52.525 Mc. f.m. Tue. at 7 P.M. WA5FCS and WA5JDH are NCSs. WA4MHP/5 is doing well in Louisville and has a large junk box. W5WZ has a new DX-60 and 14 AVC vertical. WA2WBA/5 handles lots of traffic and now has her 1st-class phone ticket. K2DEM/5 has a new 75A-4 now and is doing a fine job as OO. WA2-HDY/5 is new in Meridian. W5WMQ has been doing a fine job with MSSB as WA5JWD has been tied up lately. I would like to congratulate WN5RAX, WN5QQT, WN5ZXK and WN5QYC on being with us. Everyone enjoys W5HHQ and his QSOs. W5EHZ is back on the air after rig trouble. WAØMPY, in Tupelo, puts out a fine signal as does W5LCK. K5IOG is a very regular net member. Traffic: WA2WBA 194, W5JDF 123, W5WZ 91, W5BW 38, WA5OKT 32.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: K4RCT. PAMs: WA4EWW, W4PFP. RM: K4-UWH.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
TN	3635 kc.	Daily	0100Z 0230Z	60	340	154
TSSB	3980 kc.	Tue.-Sun.	0030Z	24	1357	159
ETPN	3980 kc.	M-F	1140Z	22	462	42
TPN	3980 kc.	M-Sat.	1245Z	30	1307	281
		Sun.	1400Z			

W4HZD has returned to Knoxville after three years in Minneapolis. Congrats to W4PQP, who continues making the BPL on more than 100 originations per month. W4HHK reports 4.1-db. noise for Nov. sunnoise. Delta RC officers are W4OGG, pres.; WA4GQM, vice-pres.; W4GEF, secy.; W4ZDK, treas. WA4FZT is headed for ON4-Land. Sorry to report that W4DMM is a Silent Key. W4HSQ has returned to Oak Ridge after six years in New York. The Mid-South V.H.F. Club officers are W4NCH, pres.; WA4LWP, vice-pres.; WA4MSO, secy.; K4PPZ, treas. K4EJQ reports 100% results on Leonid meteor shower skeds in 4 states on 144 Mc. The Frye RC reports more 5" x 9" envelopes are needed for unclaimed cards by W4s and K4s. W4PQP is circulation manager for *Tenn. Ham*. Traffic: (Nov.) W4OGG 314, W4FX 237, W4PQP 214, K4UWH 193, W4RUW 160, WA4-YEM 119, W4SQE 110, WA4YDT 66, W4MXF 62, W4CXY 44, W4UVP 42, W4KAT 41, W4PFP 38, K4COT 31, WA4-EWW 17, W4DIY 11, WA4NEC 9, WA4ZBC 5, W4TZB 4, WA4FLW 2. (Oct.) W4SGI 55, W4CXY 36.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Appointments: K4TXJ as OO. Endorsements: W4BAZ as RM and K4DZM as ORS.

Net	*Freq.*	*Days*	*EST*	*Sess.*	*QNI*	*QTC*	*Mgr.*
EMKPN	3960	M-F	0630	21	429	97	K4KIS
MKPN	3960	Daily	0830	30	459	135	WA4KFO
KTN	3960	Daily	1900	30	885	290	WA4AGH
KYN/K8N	3600	Daily	1900/1700	46	426	678	W4BAZ
KPON	3945	Sat.	1300	4	114	20	WA4AVV

K4FPW reports progress on RTTY equipment for v.h.f. and keeps up with OBS activities. Six-meter groundwave work has been good in Kentucky with WA4GHQ working into Ohio and Indiana with 22 watts and W4-BAZ and W4RHZ QSO on c.w. K4LOA is trying for 6-meter skeds with the Central Kentucky nets. WA4OMH has been on Navy training duty. WB4AFH should be on the v.h.f. bands by early 1967. WN4ETE is a new Novice in Fleming County. St. Marys College, WB4ABF, continues to be the leader in traffic originations. WB4AIN now has an HT-37 rig. K4UDZ and W4MMY operated W4YOQ during the recent nationwide civil defense exercise. New officers of the Owensboro Club are WA4MXD, pres.; K4URX, vice-pres.; WA4TTE, secy./treas. Traffic: (Nov.) WA4DYL 516, W4BAZ 393, WA4AGH 389, WA4VUE 324, WA4WWT 283, WA4KFO 173, K4DZM 140, WB4BTM 72, WA4TPB/4 70, WA4IIJAI 62, WA4GMA 61, WA4IBG 59, WA4ZIR 58, WA4VEC 52, WA4GHQ 50, WB4CIY 43, W4KJP 42, K4NHY 34, W4CDA 30, W4BTA 29, W4NBZ 24, K4HOE 21, K4UMN 21, W4OYI 12, K4LOA 10, W4RHZ 8, W4KKG 7, WA4UAZ 7, K4TQZ 6, WB4AIN 4, K4FPW 4. (Oct.) WB4ABF 180, WA4-TPB/4 147, K4TXJ 6.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—Asst. SCM: K. E. Stecker, W8SS. SEC: K8GOU. RMs: W8ELW, K8QLL, W8EU, K8KMQ. PAMs: W8CQU, K8LQA, K8JED, V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8FAW, WA8PIM, W8SH as ORSs; K8-JED as OPS and OBS. W8DCT as EC. Net reports:

Net	*Freq.*	*Time*	*Day*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300Z	Daily	950	659	60	W8ELW-RM
WSSB	3935	0000Z	Daily	690	127	30	K8LQA-PAM K8VDA
U.P.N.	3920	2230Z	Daily	900	112	30	W8OQH
PON	3515	0000Z	M. to Sat.	161	68	25	VE3DPO
PON	3860	1600Z	M. to Sat.	627	555	26	W8HH
Mich. 6	50.7	0000Z	M. to Sat.		226	26	W8YAN/PAM
PON	50.7	0900Z	M. to Sat.	no information			
B/R	3930	2230Z	M. to F.	853	77	22	K8JED-PAM
Genesee		0100	Wed.	125	154	5	W8RTN
M.E.N.	3930	1400Z	Sun.	206	6	4	K8JED-PAM

W8OQH reports great work was done by UPN during the recent blizzard. K8PNA and her OM were found dead in the snow after the blizzard. Other Silent Keys: K8DCS, W8LKV and WA8PTE. WA8DAP reports 85 messages were handled for hospitalized veterans Nov. 21/22 by W8ADR/8 during the Veteran's Hospital project. W8CVQ says QRM on 145 in the Kazoo area sounds like the 75 band. New officers: Hiawatha ARC- W8JXJ,

TENNESSEE QSO PARTY

February 26, 1967

All amateurs are invited to participate in the Fourth Annual Tennessee QSO Party, sponsored by the Radio Amateur Transmitting Society.

Rules: 1) Contacts may be made during the 24 hour period starting at 0000 GMT and ending 2400 GMT February 26. 2) No power or time limitations. 3) The same station may be worked on different bands and modes. 4) The general call is CQ Tenn. C.w. and phone will be considered separate contests, requiring separate logs. 5) Exchange QSO number, report and county (Tennessee stations) or state, province or country (non-Tennessee stations). 6) Tennessee stations will be classified as single or multiple operator stations for the purpose of awards. If operation is in a county other than their own, they shall use a multiplier of 1.5 in computing final scores. Tennessee stations within their own county count one point for each complete contact, multiplied by the number of states, provinces, countries and Tennessee counties. Out of state stations multiply QSO points by the number of different Tennessee counties worked. 7) Certificate awards for the first three places per state, province or country and for the first five places within Tennessee. All amateurs contacting 10 separate Tennessee stations during the contest will be awarded a "Certificate of Achievement." 8) Suggested frequencies: 3530 3900 7030 7250 14070 14275 21050 21325 28300 28900. 9) Any station disrupting a working Tennessee traffic net for the purpose of contest contacts will be automatically disqualified from any award.

Logs showing date, time, stations contacted, band, mode, location and computed final scores must be received no later than March 27, 1967. Tennessee stations must in addition show category (single or multiple operator plus portable operation). Send logs to the club station WA4-NZE, 612 Hogan Road, Nashville, Tennessee 37220.

pres.; WA8SLP, secy.; W8IOC, treas.; WA8RZJ, W8-ZUL, board. Twin Soo RC—WA8IXD, pres.; K8ILN, secy.; K8ZSM, treas. WA8FQE, WA8HFU, WA8HFH, K8MQH and K8LNE are in Florida. The MCRC is working on next May's OT Nite. The HVARA had its usual Christmas potluck. WA8SIQ held a small hamfest at his open house with W8YFQ, WA8OKQ, K8DYI, W8-NXT, W8RX, WA8KYK, WA8IIV, WA8SJX, W8OHS, WA8NYK, W8KAZ, WA8RQI, WA8OLN, WA8EMJ and W8HID present. K8AQA, WA8GRI and WA8MWS went to Chicago and came back loaded—with gear. The "County Cousins" (Flint Area) have a ball on 29.480. The CMARC 29ers Net is doing well. BPLers: WA8PII, WA8FLK and W8IV. Traffic: (Nov.) K8KMQ 486, WA8-LRC 309, WA8IAQ 276, W8IWF 274, WA8PII 270, WA8-OGR 264, WA8FLK 190, K8HLR 165, W8IV 160, W8YAN 140, W8IUC 128, WA8IML 122, WA8MCQ 121, W8HQL 119, W8EU 117, WA8MAM 108, K8JED 106, K8PBA 93, K8HPS 89, W8FX 72, WA8PIM 72, WA8CZJ 71, K8ZJU 70, WA8QAF 64, W8RTN 60, W8CQB 56, K8VDA 37, K8YQC 37, WA8LXY 34, W8ACW 32, WA8GTM 32, K8-YGH 32, K8QLL 28, W8BEZ 27, K3KRX/8 26, K8GOU 25, W8IBB 25, W8UFS 25, K8HNN 24, K8KBN 23, K8-HSJ 22, W8FWQ 21, WA8MGM 20, WA8BQP 16, WN8-YTL 13, W8DSE 11, W8SWF 10, K8YEK 10, WA8ORC 9, WA8PWF 9, W8TBP 9, W8AUD 7, WA8KME 5, W8AAM 2, K8AQA 2, W8TDA 2, W8WVL 2. (Oct.) W8IV 292, W8UM 43, WA8AXF 24, K8TBP 22, K8JJC 19, WA8GBN 16, W8MRM 16.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE, K8LGB. PAMs: W8VZ, K8UBK. All appointees and prospective appointees are asked to please let me have your Zip Code number. Babcock & Wilcox ARC toured the FAA Air Route Traffic Control Center along with the Medina County RC. Mt. Vernon ARC's *K8-EEN Newsletter* says the club presented specially printed Old Timers certificates to W8GB, W8PEN, W8EOH, W8CPU, W8TAJ, W8ISM, W8IST, W8KYY, W8WWU, W8OUZ, W8DMM, W8KDU, W3JIW/8 and your SCM. WA8POW enlisted in the Navy. W8QHV gave a talk on electro-thermal refrigeration to the Piqua RC. Massillon ARC saw a series of Western Electric movies about electronics. Westpark's Radiops informs us W8BF underwent surgery. Inter-City RC's *IRC Bulletin* announces that WN8UGH and WN8UQZ are new Novices and WA8-RAF is General Class. From Kettering ARC's *4-Ø* we learn the club heard a talk about communications in relation to the human relationships, and the science of psychology. Columbus ARA's *Carascope* says WØPXE spoke on antennas for amateurs, W8IBX is now W3DPR, W8BKO/OD5EE visited his home, W8LT held an auction and swap shop, K8DDG has a KWS-1, W8ERD and K8EHE are on s.s.b. and W8ELE is on s.s.b. with an HT-37. From the Six Meter Nomads' *The Amateur Extra* we learn that K8SYJ is running a Shawnee mobile, W8CWL has a Gonset 3 and W8CWL, K8s, AJG, JSE, PXR, SYJ, VGF, VIL, VJB, VMC, YPV, YTW, WA8s GEO, PIW, TTB and VEW held a Goblin Patrol to help police in Broadview Heights and Seven Hills. North East Ohio's v.h.f. group sent a bulletin. Lima Area ARC visited WA8DEF's shack. W8QCU was on active duty at Ft. Meade. K8BXT says ex-K8AUY has a new Swan 350, K8WJB vacationed in Florida and WA8-PDG was in the hospital. W8GVB joined the Silent Keys. The Canton Chapter of the QCWA elected W8ZA, pres.; K8UBK, vice-pres.; W8NAL secy.-treas.; W8IHR and W8NBK, trustees. W8HR has a new TR-4 and RV-4. W8GXQ has a new S/Line, TA3040 and Telrex rotor. W8NAL has a new R4A. There are two 2-meter nets in Cuyahoga County on 146.94 and 146.70 Mc. and W8BBB can assist those interested. The Nitwit network has started code practice on 146.88 Mc. at 2100. Lancaster & Fairfield County ARC's *The Rag Chewer* says the club's 1967 officers are WA8IBT, pres.; WA8SSI, vice-pres.; WA8CUI, secy.; WA8SSJ, treas.; WA8EVL, act. mgr. At its Annual Steak Dinner WA8IJE showed slides of his trip to Hawaii, WN8VCV received his Novice license and WA8RTH is in Dayton VA Hospital. Chippewa ARC's 1967 officers are WA8PKG, pres.; WA8KHL, vice-pres.; W8DRP, secy.-treas. The club paid tribute to W8GLX, ex-1ATZ. Parma RC's *P.R.C. Bulletin* tells us the club heard K8AXC discuss the legal aspects of local tower ordinances and K8NBV discuss the amateur operator in Red Cross activities. The club has started code and theory classes with WA8OYP, WA8-SVX and K8NQW as instructors. W8DAE, W8UPH, WA8-HTR and WA8SHP made the BPL in Nov. and WA8-PZA in Sept. WA8TDK says WN8VDO is a new Novice. and WA8TDK and WA8TXT are General Class. Greater Cincinnati ARA's *The Mike & Key* has a nice picture of W1NJM, ARRL NEC, along with W8JIN at WKRC-TV. Cleveland Chapter QCWA elected W8AZU, pres.; W8IRM, vice-pres.; W8EFW, secy. Springfield ARC's *The Q-Five* and V.H.F. High Banders' *The High Banders Log* were received.

	Sess.	*QNI*	*QTC*	*Avg.*
BN	30		281	9.37
OLN		121	131	6.46
OSSB	66	1760	1444	25.1

Traffic: (Nov.) W8UPH 837, K8LGA 338, WA8SHP 322, W8RYP 261, W8DAE 224, W8CHT 220, WA8OCG 206, WA8LAM 200, W8NAL 185, WA8CFJ 181, WA8HTR 176, K8UBK 174, WA8PQL 162, WA8FSX 153, W8BZX 144, WA8PZA 136, W8QZK 114, K8DHJ 106, W8TV 106, W8-PMJ 100, W8QCU 95, K8BYR 94, K8CKR 71, K8EZJ 66, WA8JXM 57, WA8KUW 45, W8FGD 43, WA8MHO 42, K8LGB 40, WA8RWK 36, W8AEB 34, WA8AJZ 28, WA8FKD 26, W8DQD 22, W8LT 21, WA8NTA 15, W8-ETO 13, W8LAG 12, K8DDG 11, W8LZE 8, W8WEG 8, WA8KPN 3, W8EEQ 1, W8GIU 1, W8WUO 1. (Oct.) W8IHNP 148. (Sept.) WA8PZA 453.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointments: W2VP as OO and WB2UHZ as ORS, Endorsements: WA2WGS as ORS and WB2FOA as OVS. Congrats to our BPL certificate winner, W2SZ, for Nov. traffic. The Overlook Radio Society (West Hurley) reports new officers are WA2UKS, pres.; WA2TIF, vice-pres.; K2AYB, secy.; W2JYU, treas. The club holds weekly code and theory classes at the Kingston H.S. and its second auction was held at Woodstock Nov. 16. The SS and two new beams were the discussion at the RPI Club, W2SZ. In New Rochelle, the Communications Club had a speaker from RCA on trouble-shooting kit-assembled equipment. Our congrats to WA2QEG and K2SJN on receiving the K2BVC Memorial Award jointly for meritorious service in New Rochelle. An auction was the Nov. feature at both the Albany and Schenectady Clubs. The Union College Club, W2UC, reports a new 6-meter converter and beam. WB2UEQ is working /1 at Wesleyan U. in Conn. Both a new "sixer" and "twoer" are reported by WB2QYZ. Among those assisting with the Thanksgiving Day Parade in New Rochelle were WA2-ZPD and WB2FXB. WB2DXL is now in the U.S. Navy at Great Lakes. WB2CPU and WB2CPV are engineering freshmen at Cornell operating W2CXM, the club station. Your SCM thanks those who sent in official SS messages – you kept the phone ringing. Traffic: (Nov.) WB2HZY 312, WA2UZK 219, W2SZ 152. WB2UHZ 109, W2UC 87, K2SSX/2 75, WA2VYS 73, W2URP 67, K2SJN 55, W2-ANV 24, WB2FOA 22, K2HNW 22, WB2DXL 21, WB2-JYV 20, WA2WGS 16, WA2ZPD 9, K2LKI 6, WB2QYZ 6, WB2UEQ/1 1. (Oct.) WB2VJB 41.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM, Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW. Section nets:

NLI	3630 kc.	1915 Nightly	K2UFT-RM
NLIVHF	145.8 Mc.	2000 TWTh	WB2RQF-PAM
NLIVHF	146.25 Mc.	1900 FSSnM	WB2RQF-PAM
NLIPN	3932 kc.	1600 Daily	WB2SLH-PAM
NLS (Slo)	3630 kc.	1900 Nightly	WB2LI-RM

BPL certificates were awarded to WA2GPT and K2UBG for Nov. traffic. K2UBG reactivated the Mike Farad midnight session on 3610 kc. for the holidays. The reluctant modulator, which loathes husky power resistors, is going again at WB2RBA. With the work load increasing with every school term, WB2DXM elected to resign as PAM for NYCLIPN. Many thanks to WB2DXM for his fine efforts with the net. WB2RQF reports that Kings RACES did a fine job with the Metro Air Support operation last Nov. WB2AEK, venerable OPS, just picked up a Twoer, so look out for him on the NLIVHF Net! WB2PTS made OPS and CP-35 in December. K2IDB played with traffic for 50 points this month and some late appointments are gonna get him into hot water around here. WB2UQP received OPS also and worked the SS with the NYC-LI Contest Club. WB2UGP is a member of ESS now and plays quite a bit of chess on the air with WB2EMJ and WB2UEZ. WB2NZL wants to know what kind of a dummy I am for reporting the Opposum Net every Sun. at 0800. It's 2000 hours, dumkoff! WB2-TWH wants someone to pep-talk ole WB2WDX on to the air. K2JFE reports that the Staten Island ARA again is holding its meetings at W2VKF's place. Some hoodlum guys got atop the apartment roof at WB2RKS's and broke up his 2-meter beam and the AR-22. WB2-AWX is unhappy with his new pair of binoculars because he can now see more DX than he can work! WB2SIZ, a brand-new frosh at the University of Michigan, has been working out from W8UM and W8PGW.

K2DGI, intrepid and unfettered mobileer, has so many rigs in the car there's no room for YLs. Tsk, tsk! WA2-RKK found himself in the Navy the other day and his hammin' has slackened somewhat. WA2PJL is on 2 up at R.P.I. with his new call, WB2ZBX. WA2JKX is sending c.w. practice on 145.64 Mc. every Thurs. at 0045Z. K2RVQ, WA2ACV, WB2ZGH and WN2YUN are all new members of TARCOM. New officers of the FLIRC are K2RPW, pres.; WA2TAQ, vice-pres.; W2-OUQ, secy.-treas. The FLIRC Point Lookout Hamfest is expected to be held Sun. July 16, 1967. New officers of the American Red Cross Queens ARC are WB2QHD, pres.; WB2UYA, vice-pres.; WB2UDD, secy.; WB2SEQ, treas.; WB2UFG, station mgr. The Red Cross Hamfest is coming up on April 30, 1967. The L.I. Termite Net is on 145.35 Mc. every Fri. at 2030 local. WB2TOM, one of our new OVSs, gave a talk on communications satellites at the Holy Name High School. WA2IPC just picked up his Extra Class ticket and CP-25. Traffic: WA2UWA 492, WA2GPT 407, K2UBG 306, WB2SRN 221, WB2RBA 107, W2EW 74, WB2DXM 69, W2LDQ 66, WB2RQF 66, WB2-AEK 65, W2GKZ 58, WB2PTS 58, K2IDB 50, WB2UQP 44, WB2TCS 37, WB4APN/2 32, K2UFT 27, WA2RAR 24, WB2UGP 23, W2GP 21, WB2NZL 21, W2EC 19, W2DBQ 13, WB2EMJ 8, WB2TWH 8, W2PF 6, WB2BKS 2, K2JFE 2, WB2AWX 1, WB2SIZ 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2-CVW. SEC: K2ZFI. ARPSC Section Net schedules:

NJN	3695 kc.	Daily	7:00 P.M.	WA2KIP RM
NJ Phone	3900 kc.	Ex. Sun.	6:00 P.M.	W2PEV PAM
NJ Phone	3900 kc.	Sun.	9:00 A.M.	W2ZI PAM
NJ 6	51,150 kc.	M-W-Sat.	11:00 P.M.	K2VNL PAM
NJ 2	146,700 kc.	Tue.-Sat.	10:00 P.M.	K2PTZ Mgr.
NJ P.O. Net	3900 kc.	Sun.	6:00 P.M.	WA2TEK Mgr.

All times shown local in effect. AREC net skeds are available from K2ZFI. New appointments: WB2IYO as EC; WB2WWH as OPS and OBS. His OBS sked will be Mon., Wed. and Fri. at 6:30 P.M. on 3695 kc. W2TCQ is back after a long absence. WN2ZAW is a new ham in Englewood. WB2TEC got his General. W2BLQ got his 40- and 80-meter trap back up. W2GUG is going RTTY. WB2RAA is on 10. WB2YJS is a new General in Montvale. K2MHP has a new TR4-A. WA2KZF is doing an FB job with his 6-meter AREC net. WB2UFV is up to 26 confirmed for DXCC and is waiting on cards for WAC. WB2WID is getting good results with his new beam. W2CVW is considering new receiver gear for v.h.f.-u.h.f. WA2ASM has a Clegg 22er. He also is looking for new members for his EC unit. WN2YPQ is in the Navesink Emergency Net. New officers of the Knights Raiders V.H.F. Club are K2KDQ, pres.; WA2-MOD, vice-pres.; K2YWA, trustee. The club will offer a Novice through General course for beginners commencing the 1st Thurs. in March at 7 P.M. WA2CCF is up to 102 worked for his DXCC. WB2TFK has 95 and K2IEF has 84. WB2SEZ reports the Brick Town ARC has code classes. WB2WIK, with 6 watts on 2, now has 13 states. WN2YXV is a new ham in Bernardsville. WB2VUJ is on RTTY. Newly-elected officers of the East Coast V.H.F. Society are WB2OHH, pres.; WB2NCB, vice-pres.; K2HHS, secy.; K2MHP, treas.; K2LME, Sgt. at arms. Good luck to WA2INB, who recently joined the ARRL Hq. staff. Hudson Division Director W2TUK and SCM W2LQP spoke at the Fairlawn ARC on HamQuest 67. We are available to all clubs in the section for a talk. Congratulations to W2PBZ on the arrival of a new harmonic, an 8-lb. boy. WB2JWB is back after clearing up his rig troubles. WB2QGB is 97/130 for his DXCC. We wish to thank all for the SS Contest traffic. It's an FB idea. NNJ was well represented on both week ends. Good luck in the DX contest. Traffic: (Nov.) WB2OHK 506, WA2TEK 213. WP2WWH 173. W2PEV 94. W2QNL 81. W2LQP 79. WB2IYO 76, WB2VUJ 63, K2KDQ 60, WP2IWB 52. WE2WNH 49. WB2SEZ 38. K2ZFI 34. WB2-UFV 33. K2EQP 30. W2CVW 26. W2DRV 20. W2IGL 20. WA2KZF 18 K2STG 18. W2EWZ 17. W2BCS 15. WA2TBS 14. W2TFM 14. WB2QLF 10. K2MFX 8. WB2TKP 8. WP2UOQ 8. K2EQP 7. K2DEL 4. WB2KTO/2 4. WB2-VJS 4. WB2UIR 3. WA2ABL 2. WB2URD 2. WA2ASM 1. WB2GFY 1. WN2YPQ 1. (Oct.) WB2WNH 106.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. Sweepstakes messages were received from WOs CRG, BVR, GHZ, TYK, DRE, HZC, KOs GXR, AZJ, WAOs JOA, KNJ, OTE, LEW. New appointees: WØEIT as OVS. WØDRE as OO. WAØJEG as OPS. WØPFP reports several band openings on 50 Mc. during Nov. He has regular schedules with WØQIN and KØUYN in Minnesota Sat. and Sun. with good results. Some traffic reports were two months late. Let's try to keep them current and get them in as soon as possible after the end of the month. The Iowa 160-Meter Emergency Net reports QNI 710, QTC 8 in 31 sessions. The Iowa 75-Meter Phone Net reports QNI 1316, QTC 196 in 26 sessions. The TLCN (Tall Corn Net) reports QNI 67, QTC 6 in 21 sessions for Oct. Several other nets are operating in Iowa but I don't seem to get reports from them. WØLGG still is tops in traffic in Iowa with WØLCX not far behind. Both rate BPL certificates again and again. Traffic: (Nov.) WØLGG 1509, WØLCX 702, WAØJEG 141, WØCZ 102, WAØDYV 49, KØASR 46, KØBRE 37, WAØKXJ 32, WAØMIH 31, WAØJCT 28, WØLJW 28, WØYLS 21, WAØIYH 19, KØEVC 18, KØKAQ 13, KØZCQ 13, KØ-TDO 12, WØEEG 10, WAØNEH 9, KØFLY 5, WØNGS 4, WAØAFY 2, WAØKWH 2, WAØMIT 2, KØTFT 2. (Oct.) KØTFT 12.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. V.H.F. PAMs: WØHAJ, WAØKSK, WAØLSH. WAØJII has resigned as RM, because of pressing obligations elsewhere. The JARS in KC is planning an old-timers night. The Salina repeater is on the air. The club repeater call is WAØCJQ. WAØLSH announces a 6-meter net on 50.202 Mc. M.W.F. at 7 P.M. CST a.m. or c.w. Kansas U. Amateur Radio Club's officers are KØTLM, pres.; KØYRQ, vice-pres.; WAØ-NHD, secy.-treas. Club station WØAHW was moved to the new Engineering Bldg. WAØLLC the new EC, is net mgr. of the Kansas WX Net. The PI Net (2 meters) reports for Nov.: Dodge City section, QNI 15, Sessions 2; Beloit section, QNI 36, sessions 4; Topeka section, QNI 32, QTC 2, sessions 4; HB, 22 sessions, QNI 518, QTC 209. Operator-of-the-Month, WAØFKD; Ks EC Net for Nov., 4 sessions, 47 QNI, 15 QTC; KSBN week days, QNI 785, QTC 119; KPN week days, QNI 111, QTC 16; KPN Sun., QNI 116, QTC 32; QKS, QNI 158 QTC 112; Kansas WX Net, QNI 701, QTC 2. Some changes in AREC Zone ECs and Zones follow: Zone 2, WOCWJ, Brown, Nemaha, Pottawatomie, Riley, Clay. Zone 3, WØQNI, Geary, Wabunsee, Shawnee, Jackson, Osage, Lyon, Morris, Chase. Zone 5, WØZGK, Doniphan, Atchinson, Jefferson, Leavenworth, Douglas, Wyandotte. Zone 6, KØGOZ, Johnson, Miami, Linn, Franklyn, Anderson, Coffey. Zone 7, ——, Woodson, Allen, Bourbon, Wilson, Chautauqua, Crawford, Cherokee, Labett, Montgomery. Zone 8, KØVQC, Greenwood, Butler, Elk, Cowley. Zone 9, WAØJOG, Sedgwick. Zone 10, WØVRZ, Marion, McPherson, Harvey, Reno, Rice, Kingman, Sumner, Harper, Barber, Pratt, Stafford. Zone 11, KØJDD, Hamilton, Kearney, Finney, Hodgeman, Pawnee, Edwards, Kiowa, Comanche, Clark, Ford, Grey, Meade, Seward, Haskell, Grant, Stevens, Stanton, Morton. Zone 13, KØLPE, Smith, Jewell, Republick, Washington, Marshall, Cloud, Mitchell, Osborne, Rooks. Zone 14, KØ-MZZ, Ellis, Russell, Lincoln, Ottawa, Salina, Dickinson, Ellsworth, Barton, Rush. Zone 15, KØUVH, Cheyenne, Rawlins, Decatur, Morton, Phillips, Graham, Sheridan, Thomas, Sherman, Wallace, Logan, Gove, Trego, Ness, Lane, Scott, Wichita, Greeley. Traffic: (Nov.) WAØ-MLE 280, WØINH 260, WØAVX 132, KØJME 111, WAØ-LLC 109, KØUVH 102, KØMRI 71, WAØCCW 64, WAØ-JOG 43, KØGII 42, KØBXF 36, KØMZZ 31, KØEMB 29, WØFDJ 13, KØLPE 10, WAØEMQ 7, KØGZP 4, WAØ-HMZ 4, WØFIT 2. (Oct.) WAØJOG 52, WAØHMZ 39, WØFDJ 7.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK SEC: WØBUL. I am sorry to report that WAØAMR and KØRDC are now Silent Keys. WØTDR received RM appointment, replacing WOWYJ, manager of Mo. Traffic Net (MON) who had to resign because of his working hours. WAØPYJ is now ORS and is active on MON. The St. Louis Contest Operators is a new ARRL affiliated club. WØTDR is pres. and secy.; KØLGZ is vice-pres. WØSXY is the new station call of the ARC of Central Mo., Sedalia. The club's station display at the CB convention at the State Fairgrounds attracted 3 Novice candidates for their code and theory classes. First successful licensee is WNØQCJ. WAØHTY and WAØ-HQR are instructing code and theory classes at the Oak Park High School ARC in K.C. SS messages were received by the SCM from the following: Phone—WAØAPC, WØEEE, WAØELM, WAØFAE, WAØFLL, WAØJNF, KØJPG, WAØKBZ. KØLGZ, WØPEM, WAØPYJ, KØREV, KØRPH, and WØTDR. C.W.—KØDEQ, WØEEE, WAØELM, WAØJNF, KØLGZ, WAØPAN, WØTDR, KØTNI, WØVVU, KØVGR, KØ-VIP, WAØJIH is active in the 40-Meter Eve Bank Net. KØRPH has a new kw. linear. WØBAZ has a RACES Communicator III on 2 meters. OO reports were received from WØQWS and KØGSV. Net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2345Z	M-W-F	13	200	17	WØBUL
MON	3580	0100Z	Daily	30	230	201	WØTDR
MNN	7063	1900Z	M-Sat.	25	65	18	WØOUD
MoSSB	3963	2400Z	M-Sat.	26	470	146	KØTCB
MoPON	3810	2100Z	M-F	21	327	232	WØHVJ

MTTN	3940	2300Z	M-F	22	216	74	WAØELM
QMO	3580	2200Z	Sun.	4	8	9	WAØFKD
MSN	3715	0300Z	Daily	30	41	12	KØONK
PHD	50.4	0130Z	Tues (GMT)	4	72	3	WAØFLL

Traffic: KØONK 6096, WØEEE 333, WØTDR 255, WØZLN 245, WØHVJ 220, KØRPH 176, KØAEM 154, WØOUD 130, WAØPYJ 114, KØYGR 87, WAØFMD 82, KØREV 47, WAØJIH 39, WØBAZ 32, KØENH 31, WAØFKD 28, KØJPS 28, WØRTO 27, KØTCB 27, WAØELM 25, WØGQR 17, KØLGZ 16, KØVXU 14, KØVVH/Ø 13, KØGCB/Ø 9, KØORB 9, WAØIHV 8, WAØHQR 6, WAØFLL 5, WØJBK 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØOAL. Net reports for Nov.: Nebr. AREC Phone Net, WØIRZ, QNI 147, QTC 2. Nebr. Morning Phone Net, WAØJUF, QNI 903, QTC 91. 160 Meter Net, WAØCBJ, QNI 529, QTC 7. West Nebr. Phone Net, WØNIK, QNI 600, QTC 72, Wx QTC 151. Dead End Net, WAØLLQ, QNI 424, QTC 80. Nebr. Storm Net, WAØKGD, 1st session: QNI 939, QTC 75; 2nd session: QNI 1057, QTC 73. Nebr. AREC C.W. Net (NACN), WAØEEI, QNI 12, QTC 5. Nebr. Emergency Phone Net, WAØGHZ, QNI 1568, QTC 110. Nebr. C.W. Net (NEB) WAØGHZ, 1st session QNI 93, QTC 41; 2nd session QNI 97, QTC 66. All ECs are requested to submit their monthly *reports soon after the 1st of the month to* KØOAL. Traffic: (Nov.) WAØGHZ 310, WØNIK 168, WØLOD 161, WAØHWR 134, WAØMOB 104, WAØNUK 86, KØUWK 63, WAØBOK 54, WØAGK 47. WAØKGD 46, WAØLOY 46, WAØAES 43, WØBFV 42, WØGGP 36, KØRRL 32, WAØPDE 30, KØQKW 27, WAØGVJ 24, KØVTD 22, WAØIBB 21, WAØIBL 20, KØJFN 20, WØVEA 18, WØGEQ 15, KØFRU 14, WØWKP 14, KØJTW 13, WAØKFP 10, WAØEEI 9, WAØKHE 9, KØLXY 8, WAØIXD 6, WAØLLQ 6, WAØODH 6, KØDGW 5, KØECH 5, WØHOP 5, KØFJT 4, KØHNT 4, WØLJO 4, WØRAM 4, WØYFR 4, WØCXH 2, WØFHF 2, WAØJAV 2, WAØJES 2, WAØJUF 2, WAØJZL 2, WAØLRQ 2, WØWZR 2. (Oct.) WAØNUK 32, WAØJES 8. (Sept.) WAØKGD 143.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Nov.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	30	299	260
CPN	3880	M-S	1800	30	459	228

High QNI: CN—WA1FNJ, W1RFJ, W1KUO. CPN—WA1EEJ and W1GVT 30, K1SRF 26, W1YBH 25, W1LUH 24, K1OQG 23, W1YU 21, W1MPW 19, K1PPF 17, K1DGK and K1EIC 16. SEC W1PRT would appreciate reports from all ECs. AREC mobile units on 10, 6 and 2 meters are invited to assist in providing communications May 7 in Norwich for the VFW Parade. RM W1ZFM and PAM W1YBH invite all amateurs to check in regularly to any of the Connecticut traffic nets. The Nutmeg V.H.F. Traffic Net operates at 9 P.M. on 145.98 and 50.6 Mc. each night. The 2-Meter F.M. Net is monitored nightly from 5 to 11 P.M. on 146.88 Mc. and would appreciate your call. K1HTV suggests a v.h.f. club for serious v.h.f. operators. The *Operating Manual* is a new ARRL publication that will become a "Bible" just as surely as the *Handbook* has. This is a "must" for all stations—it covers completely all phases of amateur operating and is an asset to any station. The Worked All Conn. Award still is available—details from W1HHR or the SCM. W1QV, N.E. Division Director, offers use of a tape recording covering the latest news, etc., to all clubs. Excellent newsletters from the HCARA, CARA and IRN are worthy of imitation by all other clubs. Activity is the basis for success and a newsletter keeps all members intormed! W1BGD made over 2100 QSOs during Nov. and has over 8285 for the year. Can you beat it? The Meriden ARC auction was very successful and well enjoyed. Now is a good time to accept an ARRL appointment. Contact the SCM for the appointment of your choice. Traffic: (Nov.) W1EFW 635, W1AW 210, K1RQO 158, K1LMS 149, W1BGD 145, W1GVT 123, WA1CYV 105, WA1FNJ 89, K1SXF 68, K1SRF 66, W1BDI 62, W1KUO 62, W1YBH 52, W1MPW 45, WA1BLP 36, WA1ELA 35, K1QPN 32, W1KAM 30, K1BXC 27, W1YU 25, K1OQG 24, W1LXV 23, W1QV 16, K1UDD 16, W1CTI 15, WA1DEM 12, K1YGS 8, W1BNB 4, W1CUH 4, W1DVE 4, K1LGB 4, W1ZL 4. (Oct.) WA1BLP 31, W1CUH 6.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from WIs JVZ, LVK, WA1BZJ, W1YQF and K1PNB. New ECs: W1RPF Avon, W1UJF Hudson. We need ECs for many towns. Write to W1AOG or myself. W1DVH-K3QDD is a new ORS, also WA1DGH. New OVSs: K1FFE, WA1EFN. Appointments endorsed: W1AUQ/BB as OO; WIs JSM and EOJ as OVSs; WIs JSM, YYZ, BB, as ECs; WIs JLI and ALP met with a group at K1-YGW's QTH. W1PEX and K1PNB made the BPL. W1-HIL keeps skeds with WIs GAG, CTS and AOG. WA1-GUU is on 6. K1LIE writes that the Barnstable RC meets the 1st Wed. of each month at the Barnstable Village Fire Dept. on Route 6A. The 6-Meter Cross Band Net had 22 sessions, 288 QNIs, 31 traffic. WN1GBT has an antenna up for 80. The EM2MN had 22 sessions, 254 QNIs, 232 traffic. W1DVX/W3CLR now is in Walpole. The South Shore Club elected W1WK, pres.: W1MME, treas.; W1OTZ, secy. Ex-W1KTG says she has been doing a lot of traveling. W1NF built a 100-ke. standard for OO work. W1VAH has a ground plane for 40, and was visited by W8FO, with his 1-watt transistor rig. W1KAN has new antennas up at the new QTH. W1DVH is putting up some dipoles. The Quannapowitt RA held a meeting. WA2AOI/1 and K2RMN/1 are now in this section. WA1DWS is on 6, fixed and mobile. WN1FYK is on 15 and working DX. K1DZG has a Swan 350. K1CLM has been very ill. K1VZX says he was the first one to earn WANE on 2, also Worked all N.H. W1AR had a very serious operation. The EMNN had 13 sessions, 81 QNI, 35 traffic on 3733 kc. K1GPH is working on RTTY. WA1EOT has 82 countries. WA1FSI says she has a new SB-301. WA1DJC is on 10. WN1GSB is WA1EOT's dad. W1JVZ has been endorsed as EC for Melrose. WN1GYY is on 2. W1BB has been endorsed as EC and OO. The following members of the N.E. Emerg Net met at N.U. in Boston: WIs OJM, HPV, DFS, AOG, DJJ, ALP, K1s OVA, KED, PPP. WA1BFD has worked 11 KC4 out of the 19. Danvers ARA elected K1TWJ, pres.; W1JLX, vice-pres.; W1ZMO, secy.-treas. W1PRI spoke at the Middlesex ARC. WA1GZA is on several bands. K1MER is on 6 and 2. WA1EOX has DXCC on 20 and needs KH6 for WAS. WA1DIM, ex-WN1DJO, has General on 80 and 40 c.w. W1EUJ is building rigs for 220 and 432. W1-OFY is very active in MARS. WA1EEJ, net mgr. of the N.E. Teenage Net, invites new-comers on Tue., Wed. and Thurs. at 4 P.M. on 3880 kc. Cape Cod & Islands ARA held its annual meeting with a lecture by W1HWK. W1WAJ is taking courses at M.I.T. K1SKP and W1PMC keep skeds on 2. W1MX worked K2HLA on 2. K1OWM, W1PYT, K1JLW, W1JBA and W1WNK are working on a transceiver for 420 Mc. from the '66 *Handbook*. WA1-EFN is in the Mass. Post Office Net. K1FWE is active on 6. WA1DGH had antenna troubles. The Framingham RC had a talk by Mr. Hann of Computer Control. The Wellesley ARS held a meeting. The Capeway RC met at W1ZST's. The Yankee RC had a demonstration and lecture from Communications Development. Traffic: (Nov.) W1PEX 1501, W1EMG 316, W1DOM 262, K1PNB 252, WA1EYY 204, W1UIR 160, W1OFK 97, K1GPH 80. WA1DPX 64, WA1EFN 60, W1ZSS 60, K1VPJ 57, W1-DAL 56, WA1EAT 55, W1AOG 50, W1CTR 50, K1ESG 35, K1VOK 35, WA1EVY 28, K1OKE 20, WA1DEC 16, W1JDP 16, WA1DED 12, K1GKA 11, WA1EOT 10, WA1FSI 5, WA1DJC 1, WA1DLT 1. (Oct.) K1ESG 267. K1PNB 171, WA1EOT 4, K1ETT 3.

MAINE—SCM, Herbert A. Davis, W1DYG—SEC: K1QIG. PAMs: K1WQI, K1ZVN: RM: K1TZH. Traffic nets: Sea Gull Net, Mon. through Sat. at 1700 to 1800 and 2000 to 2100 on 3940 kc.; Pine Tree Net, daily at 1900 on 3596 kc. c.w. K1TMK is back from the Navy and has become a member of the A-1 Operators club. He also reports 15-meter c.w. to Europe open in the morning. W1BTR and W1EFR took part in the c.d. drill. Tribute to a Silent Key: W1VV, Manley Haskell of Bingham, passed away recently. He will be sadly missed by all who knew him along the way. The v.h.f. news comes from K1WNC with things about the same. Good luck to a new member, WA1HBH of Bath. Hope all goes well for you. Traffic: K1TMK 83, K1WQI 80, W1NND 66.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1YSD. PAM: K1APQ. RM: Open.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
GSPN	3842	2300Z	M to F	26	710	117	K1APQ
GSPN	3842	1330Z	Sun	—	—	—	K1APQ
VTNHN	3685	2230Z	M to F	21	73	44	K1UZG
NHPON	50.82	2400Z	M to F	22	?	?	K1BGI
MV AREC	50.82	0100Z	Mon.	4	39	2	K1DWK
NHEPN	3842	2230Z	Sat.	3	50	4	K1YSD

Please note the New Hampshire Emergency Phone Net addition. Hope you can join in. Appointments: K1RSC as Rockingham County EC, K1PQV as ORS. Endorsements: W1AIJ as ORS and OPS, W1JB as OBS, W1MHX as ORS and K1YSD as OPS. W1AIJ is chasing DX on 20 meters. W1ALE, K1DWK, K1MVA, K1NQR, K1EEH, WA1AMG, W1NNM, W1NNL, K1LCY, K1OXO, WA1-

FSZ and WA3DGU/1 attended the recent MVARC-NHPON meeting at Concord. The Contoocook Radio Club holds code and theory classes. New EC K1QES is busy getting new AREC members. K1YSD received his gold-plated QSL from WWV. W1MHX and W1UDB were active in the CDEX 66 RACES Net. W1TFS has a new SB-100. WA1FSZ writes about numerous projects plus studies at New England College. Active in the SS were W1DYE, W1FZ, K1WKP, K1YSD, K1CTQ and W1-BUT/1. K1-EG has a new antenna. W1LOO and K1IFQ are moving north. Traffic: W1ALE 32, K1YSD 24, W1-MHX 22, K1PQV 10, K1PCY 2, K1MNK 1, W1SWX 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. Endorsements: K1NJT and K1NKR as OVSs. RISPN report: 30 sessions, 503 QNI, 112 traffic. The Fidelity RC reports that W1GGD and W1FOS have passed the General Class exams. WN1HDB is a new Novice in the club. The club station, K1NQG, was active in the recent Sweepstakes with W1GGD as operator. The Newport County ARC reports that WN1HBG has been elected a full member. K1TLQ/MM, operating off the USS *Robert Wilson*, expects to be back in Newport soon to attend the club meetings. Club certificate No. 71 was issued to W9WR for having worked five club members. Sweepstakes reports were received from WA1FQG, K1LPL, W1KMV, WA1FNK and WA1EEJ. K2KMF/1, who is attending Brown University and is a member of the W1AQ Club, recently received his WAC and WAS awards. He also received WRI certificate No. 90 from W1AQ. WA1EEJ reports that the Teenage Net now meets at 2100Z on 3880 kc. every Tue., Wed. and Thurs. If your EC appointment is not in good standing, contact the SEC K1LII 119 Owen Ave., Pawtucket, R.I. Traffic: W1YKQ 248, W1TXL 200, W1BTV 81, K1TPK 81, WA1-EEJ 66, K1VYC 37, K1QZW 19, WA1CSO 17.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: K1UZG. Nov. net reports:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2230Z	Dy x S	723	40	W1VMC
Vt. Fone	3855	1400Z	Sun.	195	—	W1UCL
VTNH	3685	2330Z	M-F	73	44	K1UZG
VTCD	3990½	1500Z	Sun.	44	3	W1AD
VTSB	3909	2330Z	M-Sat.	631	37	W1CBW
		1330Z	Sun.			

VERMONT QSO PARTY

February 25-26, 1967

All amateurs are invited to participate in the Vermont QSO Party, sponsored by the Central Vermont Amateur Radio Club.

Rules: 1) Time, the 28-hour period from 2300 GMT Feb. 25 to 0300 GMT Feb. 27. 2) No power restrictions, all bands can be used and contact credit with the same station on different bands and/or modes will be given. 3) Vermont stations score 1 point per contact and multiply by the number of ARRL sections and foreign countries worked. Outside stations score 3 points per Vermont station and multiply by the number of Vermont counties worked on each band. 4) Certificates will be awarded to the highest scoring station in each ARRL section, plus a trophy to the highest scoring station outside Vermont. A trophy will also be awarded to the top Vermont scorer, with 2nd, 3rd and 4th place stations receiving a gold-trimmed certificate. 5) Suggested frequencies: 3685 3855 3909 7030 7240 7290 14,040 14,225 14,290 21,050 21,300 28,100 28,600 50.250 50.360 144-144.5 145.8, and Novice frequencies. 6) Vermont stations send number of QSO, report and county. Others send QSO number, report and section. 7) General call to be used "CQ VT" on c.w. and "Calling any Vermont station" on phone. 8) Logs should be postmarked no later than March 31 and sent to the CVARC, c/o E. Reg Murray K1MPN, 3 Hillcrest Drive, Montpelier, Vermont 05602.

Welcome to new Novices WN1GZM (Hartland) and WN1HVB (S. Royalton). The Trading Post Net is operational again following the Vt. Fone Net every Sun. W1UCL is NCS. The CVARC plans to reactivate the 2 meter net—145.8 Mc. Sun. at 8 P.M. WA1FTV has the QRP rig working well. All Vermont hams are urged to be as active as possible during the Vt. QSO Party Feb. 25-26. The chief complaint is "not enough Vt.-ers on" so fire up the rig and have a ball. Traffic: K1BQB 309, K1UZG 54, K1LLJ 18, K1MPN 14, W1FRT 11, K1EQI 7, K1FSY 4, K1YGI 4.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1bVR—SEC: K1IJV. New C.W. RM: W1DWA. It is with the deepest regret that we have accepted the resignation of K1IJV as our C.W. RM. She did a splendid job during the six years that she held this office. Her report for the month of Oct. follows: WAIN handled 69 messages with the following in attendance (in order of activity): W1DVW, K1IJV, W1DWA, K1PES, W1-BVR, K1WZY, K1SSH, W1AMI, W1MNG, W1ZPB, W1-YK, W1EOB, WA1FNX/1. At the Nov. meeting of the Valley Amateur Radio Club W1ICP, of ARRL, presented a talk on antennas and transmission line theory. K1-YGG, WA1EDM and WA1EDN comprise a father-sons trio. A new General is WA1GCC. W1BNO/4 was voted a lifetime membership in the Montachusett Amateur Radio Club. K1ECI, W1MBL, K1UTZ and K1KBS are on 6-meter phone. You know, from the lack of reports that I get from our holders of ARRL appointments in this section, I have often wondered if anyone ever reads this section of *QST*. My heart was gladdened recently by a letter from WA1FIH, who is now in Turkey. He says the boys there enjoy this section write-up very much. Now that I know I have readers, I'll try my best to do an even better job. Hi. But, gol ding it, please get those reports in. They had rather read about what you are doing than to read my gripes. Traffic: (Nov.) W1DWA 141, W1BVR 52, K1SSH 27, W1DVW 8, K1PES 8. (Oct.) K1IJV 86.

NORTHWESTERN DIVISION

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes at 0200 GMT on 3935 kc. Mon. through Fri. WA7EWV transmits Bulletins on 3890 kc. Tue. at 5:55 P.M., Fri. at 5:55 P.M. and Sun. at 9:00 A.M. W7IY moved to Grandview. K7OAB is rebuilding his equipment. K7YWM, K7YFF and K7SWW were active in the Sweepstakes Contest. The Lewiston-Clarkston Club has 35 students in a code and theory course. WN7CJE joined the AREC. Applicants for appointments as SEC, EC, OO, OPS, ORS, OVS and OBS are needed. FARM Net traffic for Nov.: 20 sessions, 418 check-ins, 83 traffic handled. Traffic: K7OQZ 20, W7GGV 14, W7ZNN 7 K7OAB 4.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. RM: K7ZIX. OOs: W7LBK, K7SVR, W7FIS.

Montana Traffic Net	3910 kc.	1800 MST	M-F
Montana RON	3885 kc.	0900 MST	Sun.
Montana RACES	3996.5 kc.	0900 MST	Sun.
Missoula AREC	3890 kc.	0900 MST	Sun.
Great Falls AREC	3910 kc.	0930 MST	Sun.
Billings AREC	3915 kc.	0915 MST	Sun.

Endorsement: W7COH as EC. WA7BEF is a new call in Helena. K7OQX is now living in New York City. WA7AZN is going to school in Bozeman. K7YPC has a new linear. WA7CWF has a new SR-160. The Yellowstone Radio Club was 13th in the nation last Field Day in the two-transmitter class. The state RACES held an exercise in Nov. with many of the RACES members participating. The Butte Amateur Radio Club participated in the 1966 SS as a club group in both the phone and c.w. week ends. W7FIS is using a new receiver in his OO activities. K7SVR, also an OO, has a new Collins S/Line receiver. W7WVL has moved to Anaconda and is the newest member of the Anaconda Radio Club. Traffic: K7EGJ 93, K7PWY 53, K7DCH 50, WA7AEX 35, W7FL 6, W7FIS 5.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7AJN. RM: W7ZFH. Section nets invite your participation.

Net	*GMT*	*Freq.*	*Days*	*Mgr.*	
OSN	0200	3585	T-S	W7ZFH	NTS
RSN	2000-0230	3825	Daily	K7IFG	NTS
AREC	0300	3875	Daily	WA7AHW	NTS

WA7AHW reports for the AREC Net, sessions 30, maximum counties 13, total attendance 466, traffic 2, QST 3, contacts 58. SCM W7AJN sent out a total of 26 Section Net certificates for the AREC net members, and 17 certificates were sent during December to members of the Beaver State Net. These certificates are sent upon recommendation of the net manager. W7DEM reports on activity in the Grants Pass area. WA7ADW has a new 20-meter beam. W7AEL is now on 2 meters. WA7EEJ

is on 75-meter phone. W7EMF is putting in a good 2-meter signal into Grants Pass from his 7000-ft. elevation on Mt. Ashland. Sweepstakes messages received by the SCM: K7ZNE 392 contacts, 64 sections, 150 watts c.w., 92,288 points; WA7CIP 256 contacts, 61 sections, 50 watts phone, 46,756 points; K7BPR 407 contacts, 65 sections, 150 watts c.w., 65,406 points. Traffic: (Nov.) W7ZB 205, WA7BYP 52, W7ZFH 42, W7DEM 8. (Oct.) W7ZFH 81, K7WWR 42.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7UWT. RM: W7OEB. PAM: W7LEC. Section nets NTS:

WSN	Daily	3535	0200Z	QNI 333	QTC 372	Sess.30
WARTS	Ex.Sun.	3970	0100Z	QNI 846	QTC 116	Sess.26
NTN	Daily	3970	2130Z	QNI 1024	QTC 623	Sess.30

W7HMA reports a new Novice in Arabland, WN7GEY. W7AIB is the new mgr. for WSN. WA7CFN again made the BPL. W7MCW reports QNI high but QTC down. Harry reports AREC-RACES drills are held regularly the 1st, 3rd and 5th Mon. W7OEB, with K7VNV, is busy in Novice General code and theory classes with a good turnout in Richland. K7OFW is back from a visit to L.A. W7AOQ *is looking at solid state receivers.* K7KSF got a spread in the *Tri-City Herald* as a grandmother ham active as country cousins and in eye-bank nets. W7GVC is helping to set up AREC activities for Walla Walla County. W7LEC is out of the hospital after a kidney removal and is now back at work, feeling fine. W7AXT took in the QCWA dinner in Seattle. Wally was seen eyeballing all the OTs. W7WTG, EC for Puget Sound, holds on-the-air meetings Mon. on 50.85 kc. 0400Z. K7CHH/7 hooked a few in the C.W. SS. K7THB is with Air Force E.C. School in Biloxi and his dad, WA7BLC, is popping his buttons. The Radio Club of Tacoma announces its annual "Loggers Contest" Feb. 25-26, 2400Z to 2400Z. Work 10 members, list stations with 10th station. BK any "CQ Logger" all bands. K7-CZM is chairman. W7AEA heads Tacoma Kiwanas. W7-IKG and his XYL K7AMJ now are eating crow. . . . spent all their money missing elk. The RC of T. also is showing off a new c.d. bus full of equipment. The VARC of Puyallup will hold its annual banquet and election Feb. 24. Also electing officers in Feb. is the Puget Sound Council of ARCs. W7HMQ and W7WHV are back in business following a year of illness in the family. The Washington section sadly notes the Silent Key of W7HKM and extends sympathy to WA7AKW on the loss of his wife and W7BUN on the loss of his father. Traffic: W7BA 1324, W7HMA 914, K7TCY 880, W7ZIW 684, WA7 DXI 443, W7JEY 240, K7CTP 236, W7PI 170. W7BTB 162, WA7CFN 130, K7JHA 78, W7APS 68, W7MCW 53, W7AIB 44, W7HMQ 42, W7OEB 32, W7GVC 20, K7ZVA 8, W7LEC 7, WA7EMM 5, W7AXT 2.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. PAM: WØPAN/KH6. RM: Vacant. V.H.F. PAM: KH6EEM.

Net	*Freq. (Mc.)*	*Time (GMT)*	*Days*
League Appointees	7.290	0700Z	Wed.
Friendly Net	7.290	2030Z	M-F
No Ka Oi	7.290	2230Z	Sat.
50th State	3.895	0500Z	Tu-Sat.

RACES Nets (40,10,6 and 2). Corrdinate with KH6GG. The ARRL QSL Bureau system functions to facilitate delivery to amateurs in the U.S., its possessions and Canada of those QSL cards which arrive from ameteur stations in other parts of the world. All you have to do is send your QSL Mgr. KH6DQ, a self-addressed stamped envelope (s.a.s.e.) about 4½ x 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call letters *printed* in the *upper left-hand corner.* A few points to remember: Do *not* telephone your QSL Mgr. needlessly asking if there are cards for you and when you can pick them up. Do *not* overstamp your s.a.s.e. Do *not* send cash or loose postage stamps. Do *not* send over-weight mail that has postage due to the Bureau. Your QSL Mgr. operates the Bureau as a voluntary service to the radio amateur of his area. For fast and best service to you, just follow the instructions as given.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. New officers of the Las Vegas Radio Amateur Club are K7PPE, pres.; K7USU, vice-pres.; W7FJN, treas.; K7RKH, secy.; W7AKE, WA7EZV and K7USR, board members. New officers of the Southern Nevada Amateur Radio Club are W7PRM, pres.; WA7BEU, K7-RKH, K7NYU, vice-pres.; WA7EPT, secy.; W7PBV, treas. and certificate custodian; W7JU and K7ZOK, board of directors. K7RKH/7, Castle Cliff, Utah, worked several stations in Southern California and Nevada on 2 meters. W7PRM has a new HB 2-meter receiver. W7-YDX and his XYL are vacationing in California and Southern Nevada with an FB mobile signal. W7KVJ and his XYL have a new QTH in Oregon. W7FJN, K7PPE and K7RKH provided communications for Boy Scout Group; W7FJN and K7PPE gave a fine demonstration on camp fire prevention. K7YXX is remodeling his ham shack. W7CTK has a complete lapidary shop in his ham shack. WA7CFS and K7PPE did an FB job in a recent Nevada c.d. drill. K7ICW is looking for African stations on 20/40 meters. WA7BOG is now WB6QRX in Sacramento. Traffic: K7RKH 34, K7OHX 25, WA7BEU 10, W7PBV 4, W7YDX 1.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC: WB6BWB. ECs: WB6MXD, K6RHW, W6SMU, WA6TQJ. RM: W6LNZ.

Net	*Freq.*	*Time*	*Days*	*Mgr.*
Yolo Co. C.D.	146.94 Mc.	0300Z	Wed.	WA6TQJ
SCEN	146.28 Mc.	0500Z	Wed.	WB6BWB
Nevada Co.	52.525 Mc.	1900Z	SSu.	K6ASU
TCEN	3815 kc.	1800Z	Su.	?
NCN	3635 kc.	0300Z	Daily	WB6HVA

On Nov. 27 SCEN had a surprise SET with 2 mobiles and 13 base stations. OBS WA6SLU has gone in the Navy as a radio operator. Radiograms were received from the following stations for 1000 bonus points for SS activity: (Phone) W6VUZ, WB6MZX and WB6ONU; (c.w.) K6-LRN and K6ORT. WA6JDT put up a 40-meter dipole and is the proud dad of a new daughter. W6NKR and W6VUZ have transferred from the L.A. section and have applied for station appointments. WB6QXR, in Weimar, is formerly WA7BOG from Reno. For those interested in handling traffic but afraid to QNI section level nets because of slow code speed, try the Gold and Silver Net (GSN) on 3590 kc. at 0230 and 0430 GMT. The rainy season is here—be prepared for emergency communications. It's our job, not the CBers. Traffic: (Nov.) W6LNZ 126, WB6RSY 35, WA6JDT 5, WB6MXD 4, W6NKR 4, W6-VUZ 2. (Oct.) WB6BWB 13, WA6CXB 1.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD —K6SAA plans to move to FO8-Land. W6WLV found a leaky roof interfering with the c.w. portion of Sweepstakes and lost six hours operating time. WB6JQP has been checking into the Northern California Net but sea duty in the merchant marine makes his activity sporadic. WA6QXV *is home from a long vacation trip.* WB6KHI has moved to San Pablo in the East Bay section. New appointments are WB6FZH as OBS and WB6QGT as OVS. W6PZE got a new s.s.b. transceiver and is back on the air. W6BYS has a two-element quad up. WA6-IVM reports that he was east when W2AOI, his brother-in-law, passed away. WB6OGF reports working 23 countries since Aug. while W6CYO reports 60 new ones since Apr. W6KVQ continues with a high traffic total. The San Francisco Section Net meets Mon. and Fri. at 1830 local time on 3900 kc. New officers in the Marin Club are WA6AUD, pres.; K6RKG, vice-pres.; WB6IMO, secy.; WB6PQE, treas.; K6OJO, W6CYO and WB6OTW, board members. WB6GVI reports poor SS results. The San Francisco Radio Club's new meeting place is the Lake Merced Sport Center. Sgt. Wallace, of the Hamilton AFB MARS station, spoke at the Nov. meeting of the Marin Club and asked for volunteers to help with overseas traffic from Viet Nam. Heard in the phone portion of the Sweepstakes were *W6BIP, K6NCG,* WB6PIM, WA6RXM, WB6OGF, W6BOC and WA6AUD. The Northern California Net would like more outlets from Marin, Humboldt and Mendocino Counties. Try 3635 kc. at 0300Z any time of the year. WB6FZH will be v.h.f. only in the future. Interest has been shown in the possibility of a 2-meter net to Southern California with three repeater relay points en route from K6GWE repeater. WB6IMO received the Ham of the Year Award at the Marin Club dinner in Fairfax in Dec. and K6OJO received an engraved plaque for Distinguished Service to Amateur Radio. W6BCM was the installing officer at the dinner. W6SLX, long time EC in Humboldt County and recipient of several Public Service Awards, will be retiring in the spring and moving to 7-Land. W6ZZK reports becoming interested in 420 Mc. from his new QTH in Kneeland. The Humboldt Radio Club continues to meet at the QTH of WB6DGJ the 1st Fri. of the month. W6DET had an article on his antenna in a magazine. W6CXU has a 75S-1 for his DXing. Traffic: (Nov.) W6KVQ 394, W6WLV 185, K6TWJ 41, W6BYS 40, W6UDL 32, WB6JQP 26, WB6GVI 20, WB6KHI 20, WA6AUD 19, WB6OGF 19, WB6IMO 14, K6TZN 9, W6BIP 8, W6CYO 8, W6BWV 7, WA6IVM 5, WN6TBC 5, WA6QXV 3. (Oct.) W6BWV 16, WB6KHI 6.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6-JPU—WB6PCQ made the BPL again with a total traffic count of 607. The Delta Amateur Radio Club, W6BWK, is on 2 meters with a 522 transmitter. WB6TNC is on 2 meters. KH6FDZ/6 is on 2 meters from Stockton, and is working into the L.A. area. WA6FUF has a WRL vertical on all bands. WB6ZMU is building up an SB-301. W6TO, the Fresno Radio Club, was set up at the County Fair, and handled a considerable amount of traffic. The Delta Amateur Radio Club boasts of 40 members. WA6ZLP lost his mast and went through the roof. W6COB is having rotator problems. WB6ETR lost one of the side bands on his 20A. WB6MWY is on duty in the CG on an ice-breaker. WA6TZN was home on leave from the Navy. WA6FFJ is playing around with ham TV. W6KTW got his beam back up, and is on 15 and 20 chasing DX, with a TR4 and T4X rig. K6LFR, who used to live in Fresno, is mobiling from L.A. to Kansas City, driving for P.I.E. and is operating on 40 and 20 meters. WA6KAH met WØNGZ on ham radio, and now they are going to get married. K6DYC put up a 2-meter antenna 90 feet in the air and will be on 2 meters. W6JPS, W6DVL, WØNGZ, and WA6HSP went deer hunting in Colorado, all mobile on 75 meters. Traffic: WB6PCQ 607, WB6HVA 268, W6ADB 150, WB6MWY 50, WB6MZU 27.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Ed Turner, W6NVO. SEC: W6VZE. RM: W6QMO. WA6DVV, club station of the Bandjammers of Fremont High School, ran a traffic pickup throughout the school during Nov. and Dec. and particularly encouraged the handling of traffic to servicemen overseas. W6YBV is working on equipment in his shack now that the rains are here. K6DYX is now sending the Pacific Division Bulletin on RTTY the 1st and 3rd Fri. on 3625 kc. W6DEF reports that SCARS was busy planning its Christmas Party. W6HC works TCC. WB6IZF reports that both 2- and 6-meter conditions have deteriorated in the King City area, but Ed hopes for better times this coming spring. W6BVB works NCN. K6HGV reported that the Nov. meteor shower gave a band opening on 2 meters. W6MMG works PCN. W6RSY made the BPL. W6AUC worked KL7FSD on regular schedules as the latter drove down the Alaska Hiway and down to San Carlos. K6GK reported that conditions on 40 meters were erratic. W6VZE held a meeting of ECs in South San Francisco with the SCM attending. W6ASH is working Europe on 40 meters regularly. WB6-NXK is now in Army MARS. Jim has been handling traffic for WA6DVV. W6RFF is active on NCN. Members of the SCCARA helped in a search operation in the Mt. Hamilton range east of San Jose in late Nov. The son of an employee of IBM in San Jose was missing on a trip over the mountain road to the San Joaquin Valley and a search was conducted by the Sierra Club. Red Cross and RACES furnished communications under the direction of WA6HVN, SCCARA pres. WA6YMX has been active in the Sister Cities program and maintains contact between officials of San Jose, Costa Rica, and San Jose, his home city. Schedules are kept on 20 meters on a regular basis, with city officials visiting Joe's station for the schedules. New officers of the SCCARA are WA6HVN, pres.; K6CME, vice-pres.; WA6VWI, secy.; and WA6KCY, treas. Speaker at the Nov. meeting of the PAARA was K6ESJ, of Oscar, who gave a slide talk on repeaters in the San Francisco Bay Area. New officers of the West Valley Radio Club are WB6JJD, pres.; WA6-LFN, vice-pres.; WB6DFB, secy.; WA6YDF, treas. The Santa Cruz Club featured a report on winners in its building contest for the Nov. meeting. Cabrillo College station WB6JOD worked 211 stations in 61 sections during the SS. Traffic: (Nov.) W6RSY 751, W6YBV 370, K6DYX 225, W6DEF 172, W6HC 89, W6ZRJ 77, W6AUC 49, K6GK 45, W6VZE 24, W6ASH 22, W6RFF 15, WB6-NXK 13, W6BVB 11, W6OII 8, WB6IZF 5, K6HGV 2. (Oct.) W6ASH 98.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. WB4BGL says he now has full break-in for better handling of traffic. WA4UFQ has a new SB-200 and also has a "big" 0.1-watt transistor rig on 80-meter c.w. WA4ANH says he has been enjoying temporary duty as NCS on NCN(E). WA4FJM has been pestered with rig trouble lately. K4-ZKQ is QRP with three watts on 10 meters. WA4KWC reports the best 10-meter DX this mounth as VK2ABW. WA4NAP has appointed WA4NZS as Asst. EC of Rockingham County. WA4IXW has a converted CB transceiver on 10 meters. K4AI participated in the c.d. exercise using 6-meter a.m.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN(E)	3573 kc.	2330Z	Daily	194	K4CWZ
THEN	3865 kc.	0030Z	Daily	135	K4ODX
SSBN	3938 kc.	0030Z	Daily	60	WA4LWE
NCN(L)	3573 kc.	0300Z	Daily	59	WA4ANH

Traffic: (Nov.) WB4BGL 258, W4HJS 254, W4EVN 198, K4CWZ 75, W4IRE 73, WA4UFQ 70, K4EO 41, W4LWZ 36, WA4NUO 34, W4BNU 27, WA4VNV 25, WA4VTV 18, WA4ANH 16, WA4FJM 15, WA4ZLK 15, K4ZKQ 12, WA4-KWC 9, WA4NAP 8, WA4UVH 4, K4AI 3, K4TTN 3. (Oct.) WA4CFN 25, K4PKE 11.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4-LNJ—SEC: WA4ECJ. Asst. SECs: W4WQM, WA4EFP. RM: K4LND. PAM: WA4RUB.

SCN:	3795 kc.	Daily	0000Z/0300Z	Nov.	Tfc. 102
SCSSBN	3915 kc.	Daily	0000Z	Nov.	Tfc. 175

At the S.S.B. Net meeting in Greenwood attended by SCN it was decided to hold 4 quarterly meetings each year of combined activities. Included are all nets, AREC, Radio Council, club members and representatives from RACES. The next meeting is scheduled for Feb. The Clemson University Radio Club is being reorganized, thanks to WA5PRI, WA4ICF, K4WJV and others. The Anderson Radio Club's new officers are WA4QKQ, pres.; WA4OTC, vice-pres.; W4RSK, secy.-treas.; K4SZB, act. chairman. Congratulations on 100% ARRL membership. K4LND and W4PED are writing SCN news. W4WQM will edit *Scan*. K4HDX is rebuilding the frequency meter, LNO is making the SB plunge. DXX is awaiting his General Class ticket, K4EUH is back on the air, W4JA has been in the hospital. Hope all is OK by now. The AREC forum was discontinued until after the holidays. Watch for an announcement. Traffic: K4LND 116, W4NTO 55, K4LNJ 45, W4WQM 44, K4OCU 40, W4PED 40, WB4BZA 24, W4JA 19, WA4HFA 16, WA4ICF 16, WA4QKQ 11.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4-LMB. Asst. SEC: K4ASU. PAM: W4OKN. RMs: WA4-EUL, K4LJK. The section again mourns the loss of one of its valued members, W4JAU. Jim was well known throughout the state as an old-time member of VFN. Some members are unaware that the VAH-500 award still is available. It is an award that must be truly earned and cannot be obtained in less than ten months. If interested, contact W4QDY for details. The Va. Beach Club has newly-acquired 2-meter rigs and is ARRL affiliated. *Virginia Ham* has passed its first year under the editorship of WA4EUL. W4JUJ has been licensed and active for over 40 years. WA4PBG is the new EC for Fairfax County. K4KNP is the c.w. Bulletin Station; listen for him after the VN. The new ARRL *Operating Manual* is now available from ARRL. You couldn't spend a dollar more wisely. Look for your friends in the Virginia section on the following frequencies at the indicated times:

3680 kc.	2330-0030 GMT and 0315 GMT
3935 kc.	2300 and 0300 GMT
3835 kc.	2400 GMT

Traffic: (Nov.) WA4DXJ 870, K4CG 264, W4SZT 244, W4NLC 228, W4DVT 191, W4RHA 154, K4LJK 143, W4-ZM 128, WA4EUL 104, W4SHJ 54, K4ITV 49, WA4NJG 42, WA4DAI 37, WA4URN 37, W4OKN 36, K4ASU 33, W4BWF 31, WA4UMX 31, W4IA 30, W4BZE 22, K4LMB 22, W4KFC 20, W4TE 19, W5SQH/4 18, K4FSS 17, W4JUJ 17, WA4PBG 17, K4KNP 15, K4SDS 14, W4MK 9, K4-MXF 7, WB4DRB 6, K4VCY 6, WB4DQF 4, W4KX 4, W4PTR 1, K4YEE 1. (Oct.) WA4EUL 141, WA4DAI 23. (Sept.) K4CG 453.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. PAMs: K8CHW, W8IYD. RMs: K8TPF, W8LMF. Phone Mgr.: WA8RQB. C.W. Net Mgr.: W8-HZA. Officers for the State Radio Convention '67, are W8IYD, pres.; K8TPF, vice-pres.; W8LMF, secy.; W8-SSA, treas. Plan now to be at Jackson's Mill, July 1 and 2. I regret to report the passing of W8PHY and W8-KLO. Is W8AKQ, of Jane Lew, West Virginia's most active old-timer? He has been licensed for 52 years and is a QCWA member. The following are on 6-meter s.s.b. in the Huntington area: K8UHC, K8CAY, K8YQG, WA8ACH, K8BEL, WA8JYR, WA8NJB, WA8MQI, WA8-HVM, K8EUK, W8FJJ. A new station in Huntington is WA8VBB. WA8SHT is the new Putnam County EC. K8BIT and K8MQB renewed as OPS; K8BIT as OBS. Congrats to K8ZDY on WACWV.

WVN C.W. Net	30 sessions	173 stations	101 msgs.
WVN Phone Net	21 sessions	595 stations	197 msgs.
WVN PON Net	14 sessions	205 stations	37 msgs.

WA8QND made the BPL again. W8MIS, with a good home-brew s.s.b. rig, also works DX on the low end of 80. Traffic: K8TPF 179, WA8QND 141, WA8POS 119, W8HZA 85, W8SSA 67, W8CKX 50, K8BIT 40, K8MYU 29, W8IYD 22, K8MQB 18, WA8CRW 9, W3FKB/8 8,

(Continued on page 118)

Technical Notes from **RAYTHEON**

This month we thought we'd take a breather from the usual shop talk and instead ask you to help us solve a problem. Since we're firm believers in the scientific method, we'll give you all the facts first.

Our problem involves finding new ways to attract good field service engineers — experienced in maintenance, installation, training, publishing and/or engineering writing. We went to three different sources in search of a magical phrase to use in our advertising — one that we hoped would trigger a new wave of incoming resumes.

First stop was our advertising agency, which offered to "spin us a grabber" that read:

> "Drop in to your neighborhood Raytheon office today. Win free world travel . . . challenge . . . money . . . success."

(Nice guys at the agency, but they won't be happy 'til we're on grocers' shelves.)

Next, we asked the people in our own Benefits Department if they could stop mailing valentines to our field service men long enough to answer us. Their contribution was:

> "You'll never have it so good! Comprehensive benefits program includes: hospitalization, surgical, major medical, life, disability, travel and accident insurances; company sponsored educational opportunities; attractive starting salaries with overseas and overtime bonuses; per diem allowances as applicable, etc., etc."

(Not bad, but not exactly what you'd call a catch phrase either.)

Our last attempt was with a group of about 35 of our field service engineers who also happen to be hams. They're a great bunch of guys (we know you'd enjoy working with them) but when we popped the big question we discovered they're hams in more ways than one:

> "Tell DX'ers if they join us they'll collect QSL cards faster. They can pick them up in person."
>
> "Give them the address of that place in the Philippines that sells foreign rigs with real banana plugs."
>
> "Ask them if they've heard the one about the travelling ARRL member that . . . (censored)"

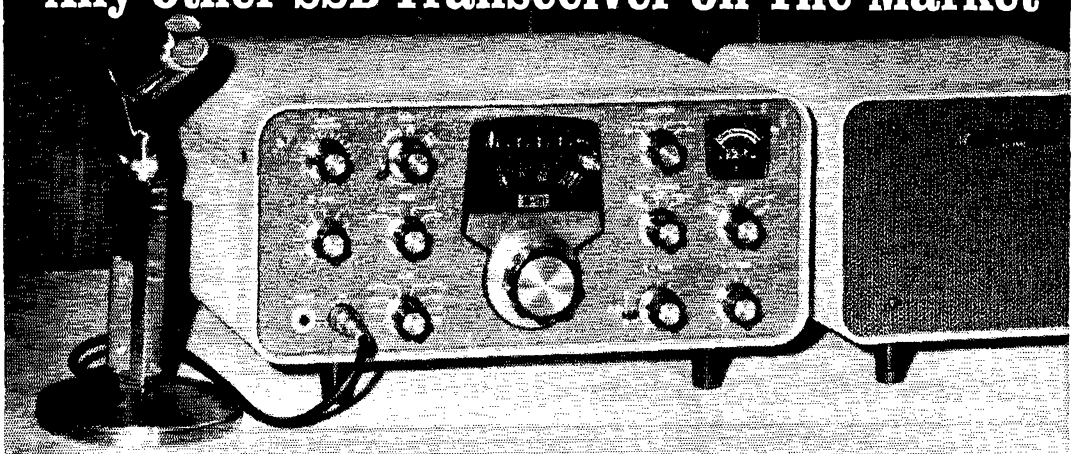
We haven't solved our problem yet but maybe you can. To help, just send your resume to me, Dan Mulkeen, Raytheon Company, Electronic Services Operation, Second Avenue, Burlington, Mass. 01804.

RAYTHEON

EXCELLENCE IN ELECTRONICS

An Equal Opportunity Employer

This Heathkit® SB-101 Can Outperform Any Other SSB Transceiver On The Market



And Here Are The "Specs" To Prove It!

SB-101 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Less than 1 microvolt for 15 db signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 db down, 5 kHz maximum at 60 db down — 2:1 nominal shape factor — 6:60 db. **CW selectivity:** (with optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 db down, 2.0 kHz maximum at 60 db down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION: DC power input: SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm nonreactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 db below rated output. **Harmonic radiation:** 45 db below rated output. **Transmit-receive operation: SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 db down from single-tone output. **Unwanted sideband suppression:** 55 db down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 db down from two-tone output. **Noise level:** At least 40 db below single-tone carrier. **RF compression (TALC):** 10 db or greater at .1 ma final grid current. **GENERAL: Frequency coverage:** 3.5 to 4.0; 7.0 to 7.5; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). **Frequency stability:** Less than 100 Hz per hour after 20 minutes warm-up from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial accuracy — "resettability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz ±3 db.

Front panel controls: Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch; Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-VOX; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutralizing. **Rear Apron connections:** CW Key jack; 8 ohm output; SPARE A; SPARE B; input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —110 volts at 10 ma; 12 volts at 4.76 amps. **Cabinet dimensions:** 14⅛" W x 6⅜" H x 13⅜" D.

The New SB-101 80-10 Meter SSB Transceiver Improves On the SB-100 . . . Now With Two New Unique Features It Moves Far Ahead Of The Field — To Surpass Every Other Make Of SSB Transceiver . . . Regardless Of Price!

CW FILTER PROVISIONS The new SB-101 features a front-panel switch for selection of the standard USB/LSB 2.1 kHz SSB filter or the optional SBA-301-2 400 Hz CW filter — the only SSB transceiver on the market with full CW provisions.

VERSATILE EXTERNAL LMO PROVISION When employed with the coming SB-640 external LMO, a front panel switch on the SB-101 permits transceive frequency control using *either* the SB-101 LMO or the external LMO in addition to independent operation with the SB-101 LMO controlling the receiver and the external LMO the transmitter. This unique versatile feature is like having a second receiver for DX work. In addition, the SB-640 will have provision for crystal control of two favorite operating frequencies. The SB-640 external LMO will be available in May at a price to be announced.

Order The SB-101 For The Best Value In SSB Transceivers . . . Regardless! The SB-101 features the famous Heath pre-built LMO (Linear Master Oscillator) for superior tuning characteristics, USB/LSB selection, TALC, built-in VOX and calibrator, low cost power supplies, plus all the other proven features and performance already established by the SB-100. Minor layout changes also make the SB-101 easier to assemble.

See next page for a discussion on value from Al Robertson, Heath Company Communications Product Manager. Then, if you need further convincing, order the assembly manual (only $2.00), and make a detailed comparison.

Kit SB-101, 23 lbs., $36 dn. $31 mo.,..... **$360.00**
SBA-301-2 Optional 400 Hz CW crystal filter, 1 lb..... **$20.95**
Kit HP-13, DC Power Supply, 7 lbs., no money dn., $6 mo..... **$64.95**
Kit HP-23, AC Power Supply, 19 lbs., no money dn., $5 mo..... **$49.95**
Kit SBA-100-1, Mobile Mounting Bracket, 6 lbs... **$14.95**
Kit SB-600, Speaker, 5 lbs..... **$17.95**

A Message On Value!

Why is the SB-101, at $360.00 in kit form, a better value than factory assembled five-band transceivers in the same price range? This question is frequently asked and now has become a key point in other manufacturers' transceiver promotions. Therefore, it is appropriate at this time that we further detail the two basic reasons why the SB-101 is your best buy.

First, when considering the purchase of an SSB transceiver, price is significant only when comparing "apples with apples". Does the assembled product have upper and lower sideband selection, built-in VOX circuitry, and truly linear tuning with 1 kHz calibration? Does it have a built-in crystal calibrator? Does the assembled product employ a single, stable, low frequency VFO and a crystal controlled front end? Is there provision for a CW filter to be installed and is VOX operated break-in CW operation offered? Has provision been made for an external VFO featuring transceive frequency control from either the internal or external VFO in addition to independent control of receiver and transmitter (a DXer's dream!)? Does the manufacturer of the assembled transceiver publish guaranteed specifications as complete as those for the SB-101 on these pages? Finally, what are the prices of the fixed and mobile power supplies? One manufacturer does not even offer a mobile supply; if you found this out too late, we have one for you. Considering the foregoing, it is obvious that you cannot make a decision regarding the purchase of a new SSB transceiver on the basis of "advertised" price alone.

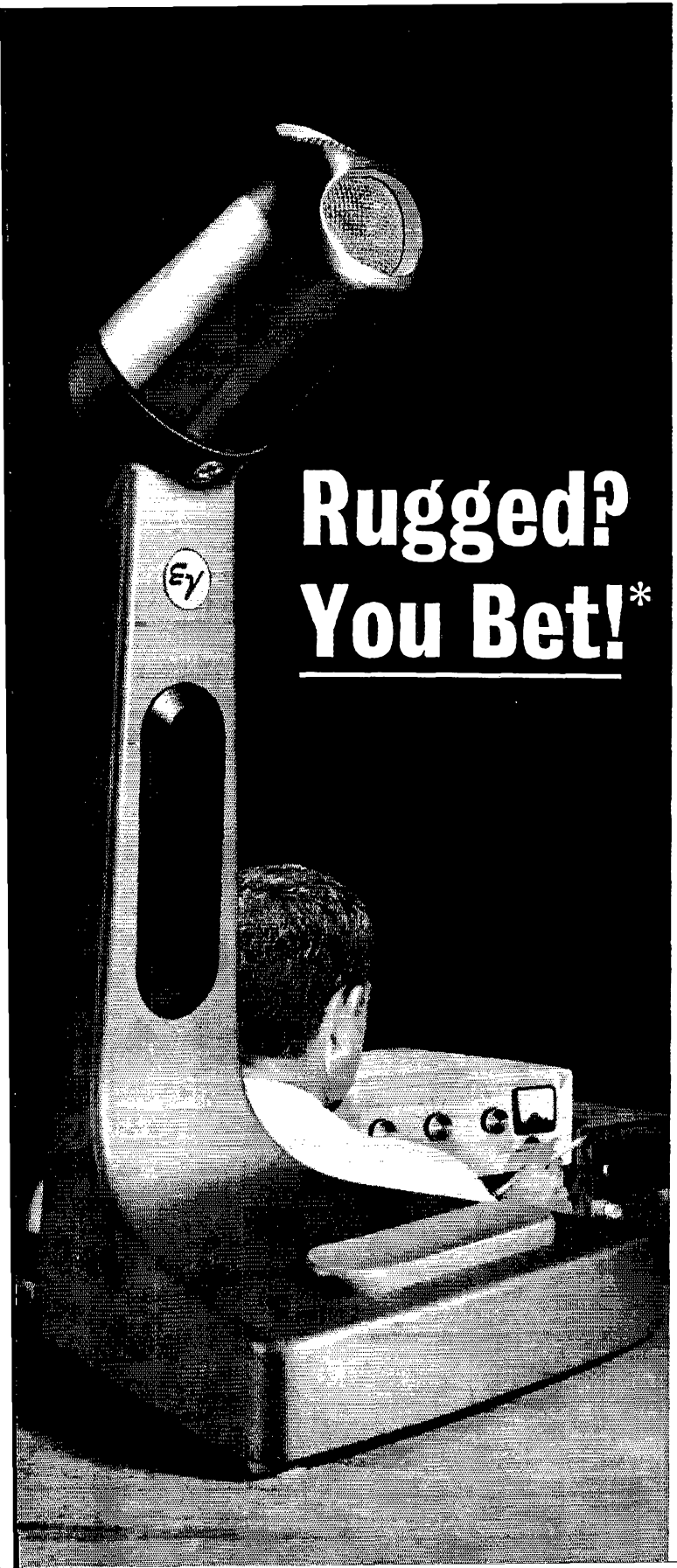
The second, and more subtle, reason why the SB-101 is today's best SSB transceiver value is "pride of authorship". There is a sense of accomplishment in assembling a fine piece of communications equipment like the SB-101. The feeling is difficult to describe but appeals to and has been experienced by most every amateur radio operator. The familiarity you develop with the SB-101 during assembly will ease the sense of frustration the other fellow has when his assembled "appliance" breaks down. Kit building is not "homebrewing" but it's the next best thing in this age of sophisticated electronic equipment.

With the introduction of the Heath SB-100 Transceiver in December of 1965, there was only one other SSB transceiver available at that time which could be considered comparable and its price was more than three times that of an SB-100. Now, with the addition of two unique features in the new SB-101, at no additional cost, there is no comparable transceiver at any price. We invite you to join the thousands of amateur radio operators who have found this kind of value and industry leadership to be typical of Heath Company.

Al Robertson

Al Robertson, K8BLL
Product Manager, Communications

P.S. Despite our appreciation of the advantages of kit-building, we are also aware that some amateur radio operators have vocations which do not leave them time to assemble an SB-101. Those of you with this problem who like what they see in this new transceiver will be pleased to learn that limited production of assembled SB-101 Transceivers (as well as SB-200 Linear Amplifiers, HP-23 AC Power Supplies, HP-13 DC Power Supplies, and SB-600 Speakers) will be available later this year. Watch our flyers and ads for availability and prices.



TOUCH-TO-TALK
COMMUNICATIONS
MICROPHONES

Model 619 Dynamic $28.50 net
Model 719 Ceramic $16.50 net

These new beauties are tough. No fragile plastics or lightweight metal. A 400-ton high-pressure die casting machine turns two pounds of molten metal into a solid stand that laughs at heavy service. And tough baked enamel plus heavy chrome plating guarantees lasting good looks.

Just touch the big bar to talk. It latches on with a simple, sliding motion. Or move it to the grip-to-talk position on the stand riser in just minutes, with only a screwdriver. The DPDT telephone-type leaf switch will last a million calls or more. It operates both voice and relay circuits, with optional electronic switching available at the end of the 619 (Hi-Z) and 719 cable.

All models are omnidirectional, and come complete with heavy-duty cable. Most economical is the Model 719 ceramic. Response is from 80 to 7,000 cps at —56 db output.

For top quality, choose the Model 619 dynamic models with exclusive E-V Acoustalloy diaphragms. Smooth, peak-free response from 70 to 10,000 cps at —56 db output insures highest talk power and full modulation. Choose either Hi-Z or balanced Lo-Z model.

Try one of these rugged new beauties today. You'll find that your rig never sounded — or looked — so good!

ELECTRO-VOICE, INC.
Dept. 272Q, 631 Cecil Street
Buchanan, Michigan 49107

Electro-Voice®
SETTING NEW STANDARDS IN SOUND

*We cover our bet with a *lifetime* guarantee. If any 619 or 719 ever fails, just send it to us. We'll repair it at nominal cost. But if there's even a hint that our workmanship or materials weren't up to par, the repair is on the house — even 30 years from now! Fair enough?

ARKANSAS
North Little Rock—Stanley Sound, Inc.
915 W. 23rd Street Phone: FR6-1331

CALIFORNIA
Hayward—Styles & Engleman Electronics
25354 Cypress Avenue Phone: 352-1933
Hollywood—Sunset Electronics
6249 Santa Monica Boulevard Phone: 467-5111
Oakland—Elmar Electronics
140 11th Street
Oakland—General Electronics
4158 Piedmont Avenue Phone: OL5-2711
San Francisco—House of Sound
104 9th Street
San Francisco—San Francisco Radio
1284 Market Street Phone: HE1-0652

COLORADO
Denver—C. W. Electronic Sales Co.
1237-16th Street Phone: 244-5523
Denver—Electronic Parts Company
1277 Broadway Phone: 266-3755

DELAWARE
Wilmington—First State Electronics, Inc.
805 E. 13th Street Phone: 658-6761

DISTRICT OF COLUMBIA
Washington—Burroughs Intercommunications Co.
4710-41st, N.W. EM2-3400
Washington—Electronic Wholesalers, Inc.
2345 Sherman Avenue, N.W. 483-5200

ILLINOIS
Benton—Lampley Electronics, Inc.
452 E. Church Street Phone: 435-8194
Chicago—Newark Electric Company
500 N. Pulaski Phone: 638-4411
Chicago—Stolz-Wicks, Inc.
8110 S. Western Avenue Phone: RE7-3363
Chicago Heights—Aid Electronic Supply
2027 Western Avenue
Harvey—The George Company
14524 S. Halsted Street Phone: PU5-0030
Peoria—Klaus Radio & Electric Co.
403 E. Lake Street
Peoria Heights—Put's Radio-Sales
737 E. Marietta Phone: 685-8413

INDIANA
Gary—Kulage TV
703 W. Ridge Road Phone: 887-4321
Hammond—Tri-Electronics
6241 Calumet Avenue Phone: 931-6850
Indianapolis—WFBM Sound Systems
1330 N. Meridian Street

KENTUCKY
Louisville—Mobile Communications, Inc.
4331 Poplar Level Road Phone: 451-0141

MARYLAND
Baltimore—Baltimore Dictating Machine Co.
3316 Greenmount Avenue Phone: BE5-4577
Baltimore—Electronic Center
5258 Reisterstown Road Phone: 664-1200
Wheaton—Electronic Distributors, Inc.
11325 Fern Street Phone: 949-2262

MISSOURI
St. Louis—Interstate Industrial Electronics
4445 Gustine Avenue Phone: FL3-8313
St. Louis—Van Sickle Radio & Elect.
1915 Washington Avenue Phone: 241-2700

NEW HAMPSHIRE
Concord—Evans Radio, Inc.
Bow Junction Phone: 225-3358

NEW YORK
Farmingdale, L.I.—Arrow Electronics
900 Broad Hollow Road Phone: MY4-6800
New York—Airex Radio Corporation
132 Nassau Street Phone: WO4-1820
New York—Dale Electronics
244 W. 14th Street Phone: AL5-3660
New York—Grand Central Radio
24 E. 44th Street Phone: MU2-3869
New York—Harrison Radio Corporation
225 Greenwich Street Phone: BA7-7777
New York—Harvey Radio Co., Inc.
2 W. 45th Street Phone: JU2-1500
New York—Packard Electronics Corporation
33 Union Square West Phone: OR4-4320

NORTH CAROLINA
Charlotte—Dixie Radio Supply Co., Inc.
1431 Bryant Street
Raleigh—Southeastern Sight and Sound Corp.
400 Glenwood Avenue Phone: 834-2966

PENNSYLVANIA
Allentown—A. A. Peters, Inc.
231 N. 7th Street
Camp Hill—John A. Morefield
35 N. 35th Street Phone: 737-3416
Philadelphia—General Sound, Inc.
3500 N. 9th Street Phone: 228-4133
Philadelphia—Radio Electric Service Co. of Pa.
7th & Arch Street Phone: WA5-5840

SOUTH CAROLINA
Columbia—Dixie Radio Supply Co., Inc.
1900 Barnwell Street
Greenville—Dixie Radio Supply Co., Inc.
500 Pendleton Street

TENNESSEE
Chattanooga—Curle Radio Supply Co.
439 Broad Street Phone: 266-4728

TEXAS
Dallas—Sound Engineering Company
2613 Ross Avenue Phone: RI2-3577
Fort Worth—Electronic Center
1518 E. Lancaster Phone: ED2-7157
Houston—Sterling Electronics
1616 McKinney, P.O. Box 1229
Lubbock—R & R Electronics
1607 Avenue G

WASHINGTON
Seattle—Western Electronic Company
717 Dexter Avenue North

WISCONSIN
Green Bay—A B Communications Service, Inc.
1484 Main Street Phone: 432-6982
Madison—Satterfield Electronics, Inc.
1900 S. Park Street Phone: 257-4801
Milwaukee—Radio Parts Co., Inc.
1314 N. 7th Street
Milwaukee—Taylor Electric Company
4080 North Port Washington Phone: 964-4321
West Allis—Marsh Radio Supply Co.
6047 W. Beloit Road

VIRGINIA
Falls Church—TV Workshop
116 W. Broad Street Phone: JE2-2990
Roanoke—Jack L. Hartman & Company
2840 Peter's Creek Road N.W. Phone: 362-3594
Winchester—Kann-Ellert Electronics of Virginia
1650 Valley Street Phone: 667-3030

WA8FRO 8, WA8KCO 8, WA8CKN 5, W8JM 5, K8CHW 4, W8GUL 3, K8MDI 2, K8NDY 2, WA8QZO 2, WA8RQB 2, W8SOR 2, W8VYI 2, K8WMQ 2, K8ZDY 2, W8AYB 1, WA8BUM 1, W8DYB 1, WA8FMA 1, WA8IMY 1, W8-KMZ 1, K8QYG 1, K8ZGZ 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—Asst. SCM: A.E. Hankinson, WAØNQL. SEC: WØ-SIN.

CCN	3780	Daily	6:30 P.M.	MST
HNN	3895	Mon. through Sat.	12 Noon	
Columbine	3898	Mon. through Sat.	7:00 P.M.	MST

Net skeds are to remind you we need representation all over the state. KØFDH is our new SCM. WAØNQL remains as Asst. SCM and WØSIN as SEC. We want every Novice to participate in the Novice Roundup Feb. 4 through 19. Also Generals should get on and provide contacts. In 1965 only 3 Colorado Novices entered, in 1966, 2. This year the goal is 25. Any Novices needing log sheets fast should send WAØNQL a message via Columbine or CCN. All c.d. appointees are requested to send in certificates to KØFDH for endorsement. My apologies for the error in the HNN frequency in the Dec. issue. It's nice to know that someone reads this report. Thanks to WAØJEV and WAØLCM for reports on the Columbine and CCN; also to KØDCW and KØZSQ for keeping me up on HNN reports. The new SCM will need your support to increase activity and improve the organization of the section. *You* will be asked to help. My personal thanks to those who have humored me in my attempts to generate some activity in the section. HNN reports QTC 95. This report was written by Asst. SCM WAØNQL. Traffic: KØFDH 120, WAØJEV 63, KØDCW 61, WØSIN 36, KØZSQ 25, WØHEP 24, KØ-ZIJ 24, WAØNQL 12, WØBWJ 8.

NEW MEXICO—SCM, Bill Farley, WA5FLG—SEC: W5ALL. PAM: WA5MCX. RM: W5WZK. The Albuquerque Amateur Radio Club held a very successful banquet recently. Plans are being made to start a new net on 7225 at 1830 GMT. If you would like to check into a c.w. net in this state please contact WA5FJK or W8-BZY/5, at Holloman. The Albuquerque and Los Alamos RACES groups took part in the national civil defense exercise in Nov. and Dec. C.d. headquarters says that all concerned were well pleased with the results. The Holloman Air Force MARS group is giving theory and code classes in Alamogordo at Central Junior High School Sat. mornings. K5RWB reports that he had a very interesting time visiting in Europe last Aug. and Sept. He spent some time in Denmark, Finland, Moscow and Sweden. K5GLJ and the XYLs of WA5KZP and WA5LFX have all had brief stays in the hospital. We are happy to report all are well. W5OYM also has been laid up. WA5LFX reports that 20 meters has been very good since he has started working nights and getting on the air during the day. If you are an EC, please contact W5ALL on the two nets at 3.838. He needs your report. Traffic: W5UBW 209, K5ONE 47, K5VXJ 44, WA5FLG 27, W5DMG 13, W5WZK 13, W5PNY 7, WA5RBU 3, W8BZY 3.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7-WKF. RM: W7OCX. Section nets: BUN, daily, 7272 kc., 1930Z. UARN, Sat.-Sun., 3987.5 kc., 1500Z. New appointment: W7RQT as OVS. W7OCX reports BUN activity is on the increase. New officers of the UARC are WA7-AIA, pres.; K7SOT, exec. vice-pres.; W7LQE, vice-pres.; K7JLF, secy. SS enthusiast K7RAJ is now a student at B.Y.U. WA7EML is on 40 meters with a new antenna, and also is working DX on 15 meters. W7RQT has a new antenna array on 2 meters and worked several new states during the Leonids shower in Nov. W7GPN reports 20 new AREC members, the result of a very successful membership drive in the Weber County area. Many excellent claimed scores were turned in for the '66 SS Contest. More activity reports would be appreciated. Best wishes for a Happy New Year. Traffic: (Nov.) W7OCX 131, K7CLS 71, WA7BME 35, K7ERR 33, W7FYR 4. W7VSS 4. (Oct.) WA7EBR 248.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs W7TZK, K7SLM, K7ZHT. Nets: Pony Express, Sun. at 0830 on 3920; YO Daily at 1830 on 3610; Jackalope Mon. through Sat. at 1215 on 3920. W7EVN has 32 continuous years as a member of ARRL. Can anyone top that? Wyoming is sponsoring the 1967 WIMU Hamfest to be held in Big Springs, Idaho Aug. 4-5-6, 1967. K7TCF is now in the service. The Casper teen-agers are attempting to start a morning teen-age net. Anyone interested, contact WA7BSS. Your SEC and myself had a very successful meeting with the Cheyenne Club in December. K7POX returned from a vacation in the sunny south in Nov. looking very tanned and rested. Casper College now has its club call—WA7GIT. Traffic: WA7CLF 58, K7SLM 56, K7ITH 52, W7DXV 41, W7TZK 28, K7QJW 12, W7BHH 10, WA7EWC 9, W7HLA 7, W7NKR 7, WA7-BPO 6, WA7BFG 4, WA7BYG 4, WA7DNZ 4, K7OVD 3, W7ABO 2, K7YPT 2, WA7GCG 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: WA4-EXA. PAM: K4WHW. This is my last report as SCM. I would like to express my appreciation for the wonderful support given me during my tenure of office. It would be impossible to name all who contributed toward making my term both a memorable and enjoyable one. Thanks to all. W4NML is grateful for efforts and support of all for the section nets and AREC program during the past four years. I am happy to report that the SCM and SEC monthly reports have been 100% for the past four years. Nov. net reports (times in GMT)

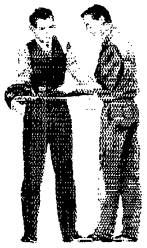
Net	*Freq.*	*Time*	*Days*	*Sess.*	*Ave. Tfc.*	*QNI Ave*
AENB	3575	0100/0400	Daily	52	1.5	3.0
AEND	3725	2330	Daily	24	1.63	4.09
AENH	50.7	0200	Sun./Tue.	8	2.12	21.0
AENM	3965	2400	Daily	30	3.1	52.2
AENO	50.55	0115	T/T/Sat.	13	.23	13.3
AENR	50.52	0115	Wed./Fri.	8	.375	13.f25
AENT	3970	2330	Daily	22	1.3	6.6

Traffic: (Nov.) WA4MTG 113, K4AOZ 108, K4BSK 92, K4NUW 75, WA4EXA 72, WA4UXC 66, W4FVY 51, WB4-BLX 50, WA4PIZ 49, W4USM 34, K4WHW 30, WA4EEC 20, K4KJD 15, WA4ROP 14, WA4FYO 7, WA4GGD 6, WA4WLD 6, WA4DBQ 2, W4NML 2, K4WOP 2, W4HON 1. (Oct.) K4HJX 379, WB4ADT 20, WA4WGF 3.

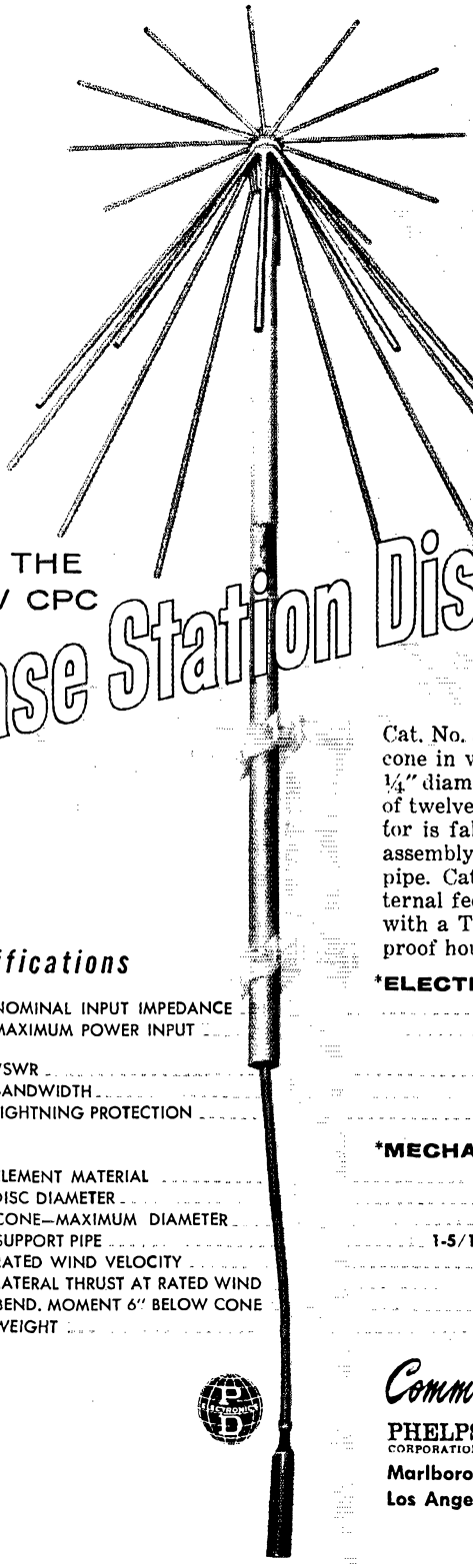
CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5TT—Asst. SCM: Russell Oberholtzer, KZ5OB. SEC: KZ5-MV. KZ5FX reports the Canal Zone Section Net meets nightly at 0200 GMT on 3.540. The first meeting was held Dec. 3 with 9 QNI, 3 KZ5s, 5 Ws, 1 4X4. The U.S.-Panama reciprocal agreement signed in Nov. does not include Canal Zone-Panama reciprocity. The new "Balboa Award" for working 5 members of the CZARA is now available and is a very attractive certificate. New Generals: KZ5DB, KZ5GO, KZ5HI and KZ5TL. New Novices: KZ5JSN, KZ5JZN and KZ5GRN. KZ5RW has been transferred stateside and will be on the air soon from Del Rio, Tex., as WA4ZRW/5. KZ5FN went sideband with a Swan 350. KZ5OB put up a new three-element fiber-glass quad. Traffic: KZ5RJ 105, KZ5FN 30, KZ5FH 24, KZ5FX 6.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJH—SEC: W4IYT. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAMs: W4SDR, W4-TUB, V.H.F. PAM: WA4BMC. W4EXM is back in the saddle again in Hawaii so cancel all previous references to retirement in Clearwater. Anyone know that YAK checks into QFN regularly running *6 watts* input? How about that? Let's hear no more excuses about low power. WB4DXC, Tampa, was QSO with Atlanta, Ga., on 3.7 Mc. using 1/10th watt. W4BKC reports that K4GHL became a Silent Key Nov. 22. WB4CAP is joining the ARRL Intruder Watch. This is service. WA4TJS is a new trafficker from the frozen north. Keep your eyes open for the new Florida traffic routing guide that our new RM W4ILE is working on. It includes 80 cities so far. OVS WA4STJ is sort of inactive because of a new harmonic he and the XYL are expecting in Feb. W4LMT says he doesn't hear me much. You mean on phone, Ken? Get back on c.w. and try it. By the way, I've ordered my s.s.b. rig finally so get the aspirin bottles out. Traffic: (Nov.) WA4SCK 1038, WA4RQR 663, W4TUB 422, WA4TWD 401, WA4NEV 369, W4ILE 299, WB4AIW 298, WA4BMC 254, WB4AJV 191, WA4BAW 166, W4AKB 137, K4SJH 133, W4FP 132, W4FPC 121, WA4IJH 91, K8-LNE/4 90, W4OGX 89, WA4HDH 77, WA4NBE 67, W4BJD 63, W4VWL 59, K4EVY 57, WA4BGW 46, W4-EHW 44, K4ILB 44, K4BY 40, W4QBY 40, W4TJM 40, K4KDN 38, W4NUH 38, W4DVO 37, WA4WOW 36, K4BNE 35, WA4MRK 34, WA4CIQ 32, K4YOQ 32, WA4OHO 30, W4YPX 30, W4NGR 25, K4LPS 24, W4-VPQ 23, W4GM 21, W4KRC 21, W4LMT 21, W4LUV 21, W4SMK 21, W4BKC 20, WA4DEL 20, WA4WNE 20, WB4CAP 19, K4ENW 17, W4IYT 17, K4EBE 14 ,W4-GDK 13, WN4DDO 12, WA4TJS 10, WA4LRW 9, K4-MTP 9, W4CWI 6, W4FCY 6. (Oct.) WA4BMC 363, W4-FPC 237, W4LUV 136, W4SMK 65, W4IYT 35.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4-DDY. RM: W4CZN. PAMs: K4PKK, WA4WDE, K4-GHR. K4SES operated during the SS. WB4APC (DL4-KS) is looking for Georgia on 14,225 to 14,275 Mc. He has a TH-3 up 75 feet. W4LRR made his first contacts



WE ANTICIPATED YOUR E/M* PROBLEMS— CHECK THE SPECS!



IT'S THE NEW CPC

Base Station Discone Antenna

Cat. No. 396-509
Frequency Range 150-470 Mc

Cat. No. 396-509 Discone Antenna is a skeletonized discone in which the disc element is fabricated of twelve ¼" diameter solid brass rods. The cone element consists of twelve ⅜" heavy wall brass tubes. Feed point insulator is fabricated of polycarbonate resin. The antenna assembly is mounted on a 4 ft. 1 in. IPS galvanized steel pipe. Cat. No. 396-509 is supplied with RG8A/U internal feed line terminated 18" below the support pipe with a Type N male connector and neoprene weatherproof housing.

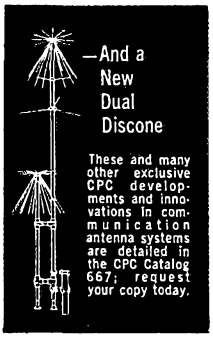
Specifications

***ELECTRICAL**

NOMINAL INPUT IMPEDANCE	50 OHMS
MAXIMUM POWER INPUT	500 WATTS AT 150 MC 150 WATTS AT 470 MC
VSWR	2.0:1 MAXIMUM
BANDWIDTH	150-470 MC
LIGHTNING PROTECTION	STARGAP

***MECHANICAL**

ELEMENT MATERIAL	BRASS
DISC DIAMETER	20"
CONE—MAXIMUM DIAMETER	23-1/2"
SUPPORT PIPE	1-5/16" DIA. GALVANIZED STEEL
RATED WIND VELOCITY	100 MPH
LATERAL THRUST AT RATED WIND	24.5 LBS.
BEND. MOMENT 6" BELOW CONE	37.0 FT. LBS.
WEIGHT	16 LBS.



Communication Products Company
DIVISION OF
PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION
Marlboro, New Jersey 07746—Tel. (201) 462-1880
Los Angeles, California 90065—Tel. (213) 245-1143

on RTTY. He shifts his 2-transistor v.f.o. WB4EOQ plans on the Drake S/Line. K4BAI operated in the DX Test from Washington, D.C. WA4JSU has a Swan 240 mobile on 40 and 20. WA4VVF operated CDEX-66 with WA4AJY and W4KGP.

Net	*Freq.*	*Time*	*Sess.*	*QNI*	*QTC*
GSN	3595	0000 & 0300 Dy.	62	515	197
GTN	3718	2200 Dy.	Not reported		
GTAN	3855	1600 Sat. 2130 Wed.	9	87	35
GPSN	3975	1730 Dy.	25	56	67
GSSN	3975	1130 Dy.	Not reported		

Cobb Co. AREC Net is on 145.8, NEGEN on 52.250, CSC Net on 145.350. The Georgia Cracker Mobile Net is on 3995 kc. Sun. at 1800Z. W4FQX is worked to death. W4GXU wants more power on 160 with A-1 only. W4HYW was active in the Delaware QSO Party and the SS. K4AHO is the new GTN net Mgr. K4YZE is DXing on 2 meters. Traffic: W4FOE 192, W4CZN 156, K4BAI 141, WB4BDG 106, WA4RAV 105, WA4NMU/4 102, W4TFL 66, WA4JSU 50, WA4OVS 46, W4DDY 43, WA4WDE 40, WA4VVF 28, W4RZL 22, W4FQX 18, W4GXU 18, W4HYW 16, K4AHO 15, W4FDN 11, WA4-BVD 8, WA4LLI 8, K4NFP 8, K4YZE 7, WN4EIE 5, WA4JES 5.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: WA4FIJ. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3950 kc.	2300Z	Daily	30	591	124
QFN	3651 kc.	2330/0300Z	"	60	—	574

Madison: WA4GHE is active again on 75 and 40 with an Eico 753. Tallahassee: W4WSY is the new EC for Leon County. W4GAA has a new Henry 2K linear. WA4EOQ has the bugs out of his linear, thanks to W4JM. W4-MLE held open house to autograph copies of the new ARRL *Operating* Manual. Chipley: WA4ZFK and W4-IKB took part in the recent state c.d. drill. WA4SRR has been appointed Asst. EC. Panama City: K4VFY made an FB score in the SS Contest. K4PMO moved to Georgia. W4FOX has built facsimile equipment to receive weather satellite broadcasts. Fort Walton/Eglin: W4ZWD is back after another ocean voyage. WA4HNI and WA7ABH are mobile on 2 meters; WA4ZTW is mobile on 6. WA4AFG runs a Heath SB-110 on 6-meter s.s.b. The EARS Club held another FB auction, run by W4JNI. Pensacola: K4BSS and W4OOW are striving to get the PARC going again. K4QOJ held a meeting to reorganize the c.d. group. Traffic: (Nov.) K4VFY 399, K4BSS/4 175, W4BVE 96, WA4IMC 71, WA4EOQ 70, W4IKB 39, WA4FIJ 18, WA4JTM 6. (Oct.) K4PMO 21.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7CAF. RM: K7NHL. W7AYY is working on a six-element beam for 50 Mc. W7AWH has moved into a new QTH in Scottsdale. K7NII has worked 23 states on 144 Mc. WA7FCV is a new General in Phoenix. Mr. George Studd, ZL2AFZ, favored the Scottsdale Amateur Radio Club with a fine talk and slide presentation about life in New Zealand. George is on a six-months tour of this country and Canada. W6QJW has formally approved Arizona Radio Council's request to host the 1968 Southwestern Division Convention. K7PYD and WA7ERH report a fine turnout for code and theory classes sponsored by the Scottsdale Amateur Radio Club. WA7FEY has a new WRL TC6 6-meter rig on the air. K7RUR reports that the Arizona Chapter of the QCWA had a fine meeting and dinner in Phoenix and elected W7QNC, chmn., W7WS, vice-chm., W7QZH, secy.-treas. WA7BOA and WA7BOB are new members of the DX Century Club. We wish to thank OOs K7OIX and K7RUR for helping fellow amateurs avoid trouble with the FCC. Traffic: (Nov.) K7NHL 269, W2TPV/7 58, W7DQS 21, W7FKK 16, WA7FCV 7, K7RUR 7. (Oct.) K7NHL 439.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: W. R. Calkins, W1KUX/6. RMs: W6-BHG, W6QAE, WB6BBO. PAMs: K6MDD, W6MLZ, W6ORS. BPLers for Nov.: K6EPT, K6IOV, W6TXJ, W6WPF, WA6TWS, WB6BBO, WB6KIL and WB6QXY. WB6QXY is planning 2-meter a.f.s.k. (RTTY). K6IOV is building a linear for 40 and 80 meters. W6GYH is keeping a traffic sked with W3CUL/W3VR on 14.1 Mc. WA6TWS passed the Amateur Extra Class, also the Commercial Radiophone Telegraph 3rd-Class exams. W6QAE is dividing operating time between the c.w. and phone nets because of conflicting schedules. WB6KIL has worked 170 countries, 129 confirmed. W6TXJ is doing well on 10 meters with an indoor dipole. W6HUJ is build-

THE NEW GALAXY V MARK 2

5 BAND TRANSCEIVER MOBILE OR FIXED STATION

NOW--even Better than Ever!

NEW 400 Watt POWER!

SIX WAYS BETTER! Yet Still Only $420.00

YOU CAN'T MATCH ALL THESE FEATURES ANYWHERE...*AT ANY PRICE!*

These NEW Features...

- New 400 Watt Power
- New Precise Vernier Logging Scale
- New Printed Circuit VFO
- New CW Sidetone Audio
- New CW Break-In Option
- New CW Filter Option

Plus all the great features that put the GALAXY V in a CLASS by ITSELF!

- Smallest of the High-Powered Transceivers. (6"x10¼" x11¼").
- Great for either Mobile or Fixed Station. No compromise in power.
- 'Hottest' Receiver of any Transceiver — Special New Six-Crystal lattice filter.
- Complete 80-10 Meter Coverage. 500 KC on all bands, with 1 Megacycle on 10 Meters.
- Both Upper and Lower Selectible Sideband.
- Highest Stability. Drift less than 100 CY in any 15 minute period after warmup.
- The personal drift chart of every Galaxy that comes off our line goes with the unit to its new owner!

Write for free Brochure, complete specs on the GALAXY V MARK 2—

GALAXY ELECTRONICS

"Pacesetter in Amateur/Commercial Equipment Design"

10 South 34th Street • Dept. QST-14Q • Council Bluffs, Iowa 51501

ing an SB-100 slowly. K6EA still is in the Midwest enjoying the snow. WA6UCR is building a new linear (833A). W6AM is home again after visiting amateurs in Hawaii, Hong Kong, Macau, Australia, New Zealand and Samoa. Apparently they do not have the extensive emergency system the U.S.A. has. WB6UPH blew up his 2-meter power supply. W6IBD has finished the first of two 3-10002 linears and it works great. WB6MQF is behind in school and radio, but hopes to catch up soon. K6MYK/W6MEP reports new equipment has enabled the WA6TDD repeater and K6MYK repeater to operate as a system, with the receiver of each repeater being heard on the output of both. W6AM operated VS6AZ in Hong Kong s.s.b. with a 65-ft. high rotary, so it was easy to work the U.S.A. *Support your section level nets*: EBN, Mon. through Fri. at 1616Z and Tue. through Sat. at 0230Z on 50,500 kc.; SCS, daily at 0230Z and 2000Z on 50,400 kc.; SCN, daily at 0300Z on 3600 kc. Traffic: (Nov.) K6EPT 1793, WB6QXY 831, WB6RRO 770, K6IOV 712, W6WPF 528, W6GYH 461, WA6TWS 352, W6MLF 285, WA6WKF 270, WA6KZI 260, W6QAE 221, WB6KIL 174, K6MDD 160, W6DSC 142, W6TXJ 125, W6BHG 99, K6CDW 93, W6BTV 92, K6ASK 75, W6SD 66, WB6QGM 56, WA6TYR 35, W6HUJ 32, W6USY 31, K6EA/Ø 27, WB6TMC 27, WA6UCR 19, K6UMV 19, WB6GGL 16, W6MILZ 15, WB6MSU 13, WB6KGK 11, W6PCP 11, WA6WJT 11, WB6OUD 10, WB6AEL 9, W6DQX 9, WA6OWM 9, W1KUX/6 8, W6OEO 8, WB6QMF 7, W6DGH 6, WB6SLG 6, W6TN 5, W6AM 4, WB6UPH 4, K6AEH 3, W6CXC 3, K6KA 2, W6SRE 2, K6BPC 1, WB6KVA 1. (Oct.) W6MILF 427, WB6TMC 45, W6AM 4. (Sept.) W6AM 4.

ORANGE—SCM, Roy R. Maxson, W6DEY—W6FB spent 13 days S.E. to Manila aboard *KFEC*. DU1GF, pres. of the PARA, was presented with a Certificate of Merit for his pioneering work in amateur radio in the Philippines at the club's regular meeting in Manila Nov. 6. Present also were OT friends ex-1DL, 1GZ and 1AU, SCM of the P.I. in the twenties, also W4JMR, mgr. of the P.I., VOA and other ham members of the VOA staff. W6FB says it's good to be home. He arrived back in 14 hours via jet. WB6RJX is operating c.w., 3.5/7 Mc. K6IQ handled holiday traffic from down-under via KC4USG. K6GMA is recovering after getting his throat cut by flying glass from a hydrogen explosion at work. W6EIY, Eagle Mountain, is making improvements in his antenna situation. W6BAM is open for DX on 28-Mc. C.W. Traffic: (Nov.) K6MICA 1235, WA6ROF 134, K6IME 97, K6IQ 64, W6EIY 53, W6WRJ 32, KØYVN/6 6, WA6TAG 4, W6FB 2. (Oct.) W6EIY 5.

SAN DIEGO—SCM, Don Stansifer, W6LRU/WA6VUI —The annual Palomar Club Christmas meeting featured the piano playing of member W6NAT. The San Diego V.H.F. Club's Annual Dinner was a huge success, with SEC W6SK making presentations of Emergency Coordinator certificates. W6VNQ, RM for PAN and ORS, is experimenting with a special filter to cut down on cross modulation from strong signals when handling traffic. New SoCalSix members in the area include WB6SQF, WA6UEL and W6NZX. The December San Diego DX meeting was held at the home of WA6OZL. The 3795-kc. Sunday Morning APRSC C.W. Net is open to check-ins from inside and outside the section. It meets at 8:30 local time with W6BGF as NCS. You are reminded of the ARRL DX Test being held in Feb. and Mar. 2-meter f.m. check-ins during November average 9 per week, so EC WA6OSB reports. Club secretaries are reminded to let the SCM know who they are so information can appear in this column. Traffic: (Nov.) K6BPI 9653, W6EOT 555, W6VNQ 508, W6BGF 431, WB6NMT 233, WA6TAD 17, WB6MPD 16, WA6UUO 15, W6LRU 7. (Oct.) W6ECP 282.

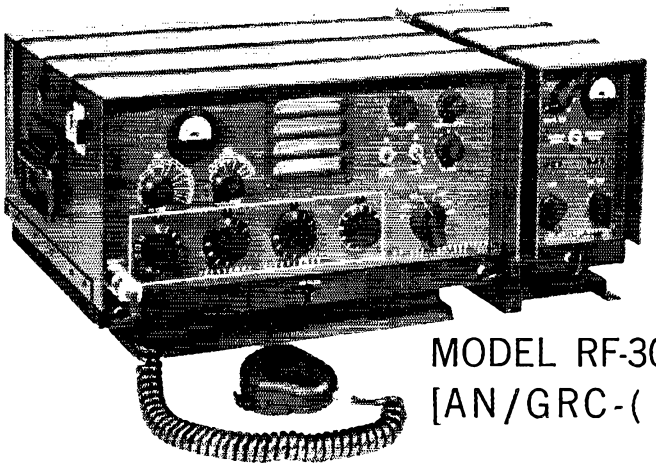
SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: WB6NDP. Sweepstake scores were received from W6GEB, WB6LJL, WB6DPV and W6JTA. K6KCI is handling Viet Nam traffic at the rate of 400 per month. K6AAK is spending much of his time at his Bass Lake mountain cabin, where he has the assigned call of W6EWX. K6EVQ, in Santa Suzana, reports that he checks in with the Mission Trail Net almost every night. Of special interest is an amateur effort in the city of Santa Barbara known as Project Med-Aid. In conjunction with Duke University, doctors in the four corners of the earth can now get specialist advice and place swift orders for drugs via W6LUC. W6VUV is finishing a 3-band four-element quad and has a new Heath scope. WB6MHL is the terror of the airways with a new Galaxy 5.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNQ —Assst. SCM: E. C. Pool. W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. W5MSG has erected a

NOW—FROM R F COMMUNICATIONS, INC.

A NEW HF SSB TRANSCEIVER



MODEL RF-301A
[AN/GRC-( )]

For Army Tactical Communications Applications

GENERAL. The RF-301A [AN/GRC-( )] was designed by R F Communications specifically for Army Tactical Communications applications. It is a rugged and very reliable modern Single Sideband Transceiver that can withstand the rough usage normally expected in the field army. The RF-301A includes in a single unit features usually found in transceivers costing two or three times as much.

This transceiver is compatible with all military type HF, SSB and AM equipment currently operational, and is now in full production.

PROVEN BY OPERATIONAL USE. The RF-301A [AN GRC-( )] is a revised Army version of the widely used RF-301 (AN URC-58) SSB Transceiver. This unit has been sold to military users in the United States and in 14 other countries. It has been used extensively in the field under tactical conditions and has proven to be a highly reliable and dependable radio set.

FOR FULL MILITARY APPLICATIONS. The RF-301A can operate under severe shock and vibration. It is designed for use at extreme temperatures and high humidity. The unit is fully splashproof and can be used in vehicles, transportable shelters, or in fixed station applications.

FULL FREQUENCY FLEXIBILITY. RF-301A transceiver includes a fully transistorized synthesizer that can be set to any frequency in one kilocycle steps between 2 and 15 megacycles. Standard stability is 1 part in 10^6 which is suited for normal voice SSB, AM, CW and wideband FSK communications. In addition, continuous tuning with resolution of 100 cycles over the entire 2 to 15 Mc frequency range of the transceiver is provided.

This is the only transceiver available with both synthesizer and continuous tuning in both receive and transmit.

FULL COMPATIBILITY. The RF-301A transceiver is an extremely flexible unit, fully compatible with all high frequency SSB and AM equipment used by U. S. Defense agencies and by commercial organizations throughout the world. Operating modes include SSB (upper and lower sideband), AM, CW and FSK (with external adapter).

HIGH RF POWER OUTPUT. 100 watts PEP and average r.f. power output. The RF-301A transceiver can operate continuous duty, keydown, at 100 watts output at a temperature of +50°C.

UNIVERSAL POWER INPUT. Operates from 110/230 volt, 50-60 cycle power. In addition, a small module can be added within the RF-301A cabinet which makes it possible to use the transceiver on DC power as well as AC. Modules are available for either 12 or 24 volt DC operation.

TRANSISTORIZED. Fully transistorized except for P.A. and receiver R.F. input stage.

• For further information, please request a copy of our brochure on the RF-301A and its accessories.

RF COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE • ROCHESTER, NEW YORK 14610

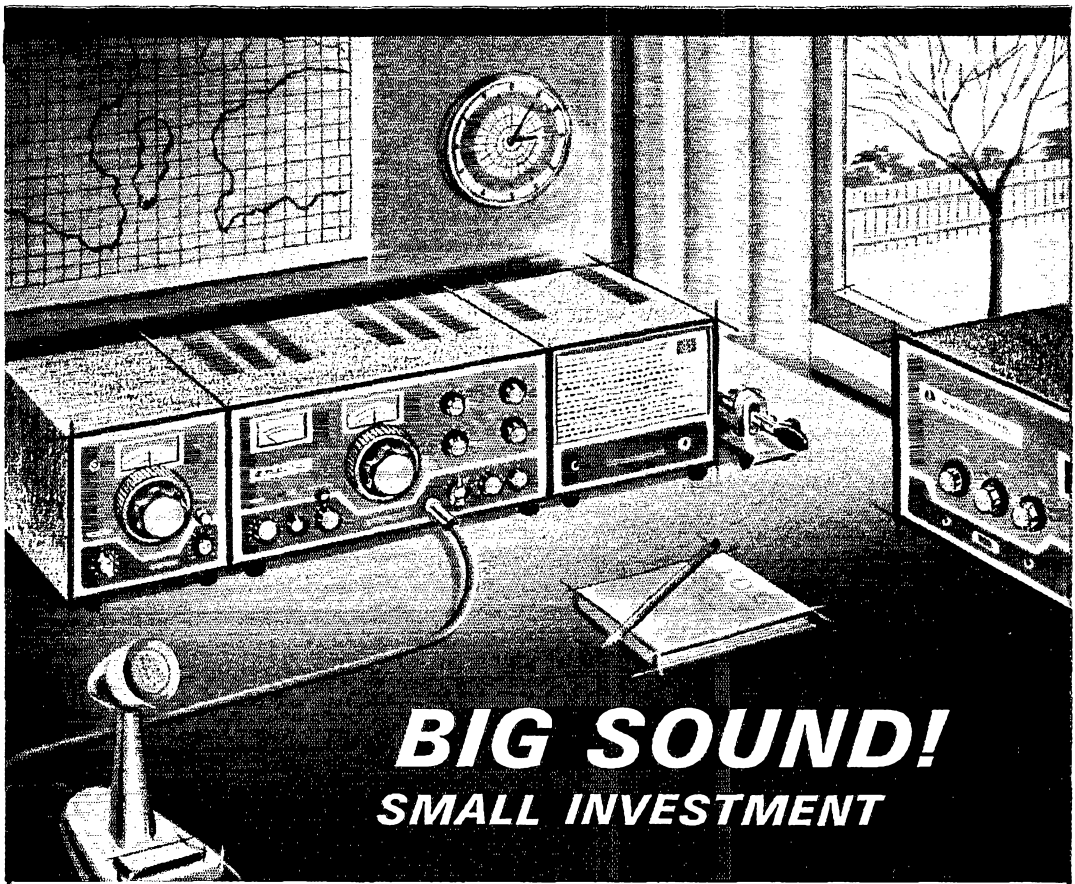
"Lazy H" beam and reports very fine results. With it he has been able to keep skeds with ZE5JJ in Rhodesia. WA5MSK is getting good results with a new SB-200 linear. Congratulations to K2EIU/5 and WA5AGH on making the BPL. Correction: I made an error and typed WA5AGN in place of WA5AGH in the BPL list. My apology, Bill. WA4PDM/5, your Sept. report was mislaid and will appear with this report. I am sorry I failed to get it in. W5IUP is doing a fine job as assistant net control for NTTN. The NTTN reports for Nov. that in 30 sessions, 1298 stations checked in and handled 568 pieces of traffic with an average of 18.93. W5YUO commutes to his job in various towns in the North Texas area in his plane. Of course it is equipped with a 2-meter f.m. rig. I was surprised to find more than 50 hams on 2-meter f.m. in the Ft. Worth area. My hat is off to the Dallas ARC for putting the West Gulf Division over the top in the ARRL Building Fund. Congratulations to W5QKF on his reelection as West Gulf Division Director. Let Doc know your gripes as well as your constructive suggestions for the betterment of amateur radio. Traffic: (Nov.) K5DBJ 202, WA5AGH 185, K2EIU/5 136, W5LGU 116, WA5RAN 63, K2GKK/5 52, W5PBN 35, WA5IIJ 33, W5LR 5, W5MSG 4. (Sept.) WA4PDM/5 49.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5ZCJ. RM: W5QMJ. PAM-75: WA5BTQ. PAM-6 meters: K5VFR. PAM 2-meters: WA5LBI. There was a great deal of interest in WWV's transmission from Boulder, Colo., after the ARRL Bulletin was read on the phone nets. W5UYQ and KPBE operated Oklahoma County RACES station during the test in Nov. A new Novice in Ponca City is WN5RDD. WA5OYY, of Oklahoma City, received the General Class license. WA5NTI did his share of originations of QTCs during Thanksgiving with over 100 again this month. W5WPP has a new tri-band beam up. WA5DZP reports he is working a lot of 10-meter stations. W5FFW turned in a fine OO report for Nov. W5-WAX reports that 2-meter activity in Eastern Oklahoma is increasing. Col. Johnston, Okla. County C.D. Director, was well pleased with RACES during the "Operation CDX-66" test. W5NML reports the Bartlesville repeater group has a unit working and waiting to get a location confirmed for installation. WA5DKP has a 2-meter exciter working for the Okla. City repeater and is looking for tape deck for logging purposes. Traffic: K5-TEY 2677, WA5NTI 210, W5NML 124, WA5KZA 79, WA5IMO 21, W5PML 21, W5UYQ 19, K5WPP 18, W5FKL 14, WA5OHX 14, WA5LWD 12, K5ZCJ 12, K5OEX 11, WA5DZP 7, WA5MDN 4.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG. PAM: W5KLV. RM K5ANS has moved from the section. A new RM is needed. The new Huntsville Amateur Radio Club, WA5NHL pres., has approximately 30 members. The San Jacinto Amateur Radio Club has been organized in Pasadena, Tex., with WA5OYS pres., and W5OBR, secy. Plans have been made to install the club station aboard the Texas Shrine Battle Ship *Texas*, anchored in the Houston Ship Channel near the San Jacinto monument. EC W5DAA reports construction is taking more time than operating. K5WIC reports that W5AC, Texas A & M U. station, has the new S/Line with 2-K linear and new antenna system and has daily schedules with HI8XRR for University traffic. EC K5HZR reports club station W5SC, located in Red Cross Hq., now is complete with 2- and 6-meter f.m., 40- and 80-meter s.s.b. W5VPQ puts out an excellent Newsletter for the Texas V.H.F.-F.M. Society and now has the new 2-meter f.m. repeater in operation in San Antonio complete with m.c.w. identification and logging facilities recorder. Input is 146.34 and output 146.94 Mc. OPS K5GJQ reports The Eyebank Nets on 7.294 and 3.970 Mc. have 150 stations in 85 cities in 35 states. These dedicated amateurs were responsible for obtaining 1516 eyes during the past four years, 38 during Nov. An LD call from Paris, France, to WQGET obtained an eye for a doctor friend pronto. OPS K5WYN has been QRL handling messages to the famous Texas State Hospital complex in Galveston. PAM W5KLV visited several 7290 Traffic Net members in the North Texas section. OO W5VW is out of the hospital and reports activities will be at a minimum for sometime. OO W5NGW, in the El Paso Club *W5ES Bulletin*, tells about K5DIT with a new quad. During a recent windy day the quad was okay but his tower bent. K5WON is a newcomer to El Paso and operates daily on 40 and 80 meters. Traffic: K5HZR 194, W5BGE 174, W5ZIN 74, WA5DEU 59, W5AC 52, W5HWY 44, WA5-NLY 31, W5AQN 26, W5ABQ 22, WA5BEU 22, W5KLV 22, W5AIR 19, W5TTW 14, K5HMF 12, W5TFW 5, K5-WYN 4.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC:



MODEL 410 VFO—SWAN 350 TRANSCEIVER—117XC POWER SUPPLY—MARK I LINEAR

Illustrated above is a complete Swan station for SSB, AM, AND CW. You can transmit and receive on all 5 bands with your 350 transceiver, and when used with the Mark I linear amplifier, you're at the legal power limit. Switch in the Model 410 outboard VFO and you're all set for separate transmit and receive operation. Yet this complete home station, with proven Swan performance, reliability, and craftsmanship is yours for substantially less than any other comparable equipment.

SWAN 350 TRANSCEIVER
5 BANDS—400 WATTS

Setting new standards for the industry. Includes full coverage VFO . . . features crystal lattice filter with shape factor of 1.7 and ultimate rejection of better than 100db . . . providing excellent selectivity and superior audio quality. **$420**

MODEL 410 FULL COVERAGE EXTERNAL VFO

Eight tuning ranges of 500 kc each. When used with the Model 22 dual VFO adaptor, the 410 provides separate transmit and receive frequency control.
Model 22 Adaptor . . $25 **MODEL 410. . $95**

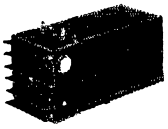
MODEL 117XC MATCHING AC POWER SUPPLY

Includes speaker and phone jack. **$95**

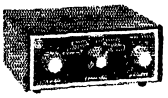
MARK I LINEAR AMPLIFIER

5 bands, 2000 watts PEP input. Uses two Eimac 3-400Z triodes. Built-in power supply. **$475**
Tubes $68 pr.

12 VOLT DC POWER SUPPLY
MODEL 14-117 . . . . . $130



CRYSTAL CONTROLLED MARS OSCILLATOR
5 Channels, Model 405X, less crystals **$45**



PLUG IN VOX UNIT $35.00
CRYSTAL CALIBRATOR KIT $19.50
SIDEBAND SELECTOR KIT $18.00

See the complete Swan home station at your dealers today.

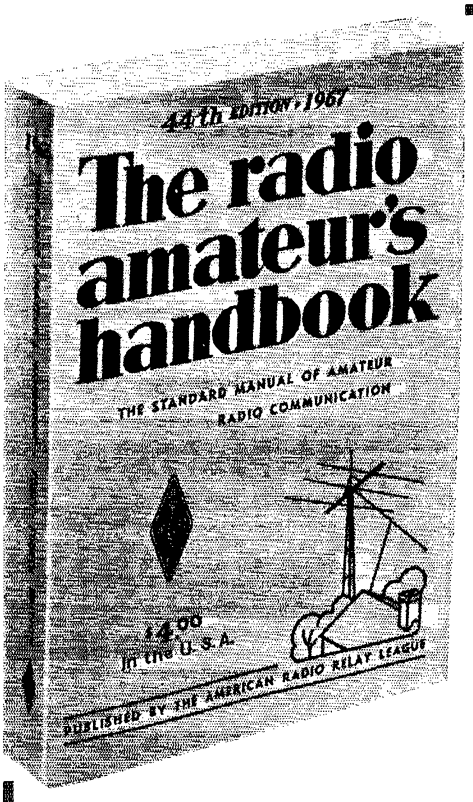
SWAN
ELECTRONICS Oceanside, California

VE6FK, PAM APN; VE6ADS, PAM ASBN; VE6ALQ, ECs: VE6SA, VE6SS, VE6XC, VE6AFQ, ORSs: VE6BR, VE6ATH, VE6ATG, OPSs: VE6HM, VE6SS, VE6ADS, OOs: VE6HM, VE6TY, VE6AKV, OBSs: VE6HM, VE6AIF. Things are shaping up very nicely for the Alberta Hamfest to be held in Calgary. All committees are to be commended on their efforts in trying to make this the biggest yet as it is our centennial year. Watch for more details and the date in ARLA. It is with regret that we note that VE6HM has resigned from the Executive Committee of the NARC. He will be missed by all as he has given a guiding hand to many. Bset of luck, Charlie. By the looks of things we may get some news from the north in the future. By the time you receive this you should have picked your candidate for your next SCM. From reports received the OOs are on their toes these days. All ORSs are keeping busy, also. Hope some are getting information from the traffic-handling sessions. Traffic: VE6FK 41, VE6HM 38, VE6BR 24, VE6XC 20, VE6AKV 14, VE6SS 9, VE6WN 9, VE6ALQ 8, VE6PL 6, VE6AFQ 5, VE6AOO 4, VE6AL 4, VE6KS 4, VE6AFV 2, VE6UK 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—Burnaby ARC's new officers are VE7BSF, pres.; VE7BHH, vice-pres.; VE7BOO, secy. VE7BBL was elected pres. of the North Burnaby Kiwanis Club. New ECs are VE7PF, North and West Vancouver; VE7BIM, Prince George; VE7BGN, Cranbrook. VE7BTW and VE7BSU have solved their c.w. problems by going 10-meter phone. VE7OF has poured the concrete for the tower and has received his giant modulation transformer. VE7BQU/W7 is in Portland and looking for VE7s on 3805 kc. VE7AKE dropped a 2-meter crystal on the floor and stepped on same. VE7BLO entered the Wn. QSO Party and won three certificates, top score Canada, top score B.C. and Boeing certificate (BEARS). VE7AC is looking for B.C. members to have a 160-meter net. In my last report I goofed, the BCARPSC Net meets at 0200 GMT and the BCEN meets at 0300 GMT on 3650 kc. RM VE7QQ is so busy with his job that he cannot find time to look after the RM duties and has requested VE7ASY to take over the duties. VE7FB managed to collect the North and West ARC Centennial Certificate. VE7KY is really proving that one can improve 2-meter rigs to work out of a hole. VE7BLO reports that VE7TO arranged with the BCSCC for transportation; amateur radio contact was made (via VE7AZ and VE5OF at Regina) for Ed Davey and five others of the wheel chair brigade to come to Vancouver and see the Grey Cup football classic! Traffic: (Nov.) VE7BLO 53, VE7BCJ 27, VE7AC 17, VE7BLS 9. (Oct.) VE7BCJ 57, VE7FO 43, VE7AC 12, VE7DH 12, VE7BQB 1.

MANITOBA—SCM, John Thomas Stacey, VE4JT—New appointments: VE4EI as RM, VE4LI as ORS, VE4SC as Asst. EC for Flin Flon. VE4NW reports a successful check-out of Flin Flon EC using 5 mobiles and 2 gas generators. Ex-VE4EP, signing VE3DNJ and VE4EJ, has been transferred to VE2-Land by the Army. New executives of the Brandon ARC are VE4RW, pres.; VE4XN, vice-pres.; VE4EL, secy.; VE4KN, treas. The Polar Net again is active at 0300Z on 3760. VE4NE has been issued a TEN certificate. VE4LG has the kw. linear perking. VE4EI is experimenting with a keyer. New calls in the Winnipeg area are VE4KC, VE4OH and VE4VX. MTN report for Nov.: Sessions 30, QTC 116, QNI 167. It has been repeatedly stressed that this column requires activity reports to live. The closing date for news is the fifth of the month. We have 21 appointees in the section 4 report regularly, 1 sporadically and 16 never. Traffic: (Nov.) VE4LG 146, VE4JT 105, VE4NE 55, VE4EI 50, VE4AP 19, VE4RW 19, VE4SC 19, VE4EF 16, VE4DL 14, VE4XN 9, VE4GN 6, VE4QJ 6, VE4EG 4, VE4GB 4, VE4MK 4, VE4JQ 3, VE4AN 2, VE4CR 2, VE4DQ 2, VE4NW 2. (Oct.) VE4EO 15. (Sept.) VE4JT 108, VE4LG 91, VE4EI 66, VE4NE 34, VE4XN 7. (Aug.) VE4EI 48, VE4EO 20, VE4JT 9, VE4GN 6.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ. The Halifax ARC held a successful smoker and auction recently with more than 30 hams attending. The CBC Club in Halifax staged a hidden transmitter hunt and VE1ANT was the winner of the Technical Achievement Award for 1966. Congratulations to VE1ARB on obtaining her Advanced ticket. VO1AW is active as VE0MD on 80 and 15. The 1966-67 executives of the HARC are VE1AAC, pres.; VE1AMC, 1st vice-pres.; VE1ANI, 2nd vice-pres.; VE1AFN, secy.; VE1AQS, treas. The 1967 executives of the CBC Club in Halifax are VE1UB, pres.; VE1NX, vice-pres.; VE1QI, secy.-treas. Let's have lots of activity from this section on all bands to help celebrate our Centennial. Your SCM hopes to be active from Antigua around the end of this month and will be looking for the 3C1 gang on 14-Mc. c.w. and



1967 EDITION

BIG . . . REVISED . . . COMPLETE . . .

THE STANDARD reference work and text for everyone—radio amateurs, students, experimenters, engineers, lab men, technicians.

Annual revision is a feature of the *Handbook*, always with the objective of presenting the soundest and best aspects of current practice. The big, 1967 Edition contains new descriptions of equipment. Semiconductor-diode and tube tables are brought up to date. Every important aspect of amateur radio is covered: transmitting, c.w., a.m., sideband, radioteletype; receiving; mobile; v.h.f.; propagation; antennas; construction; theory; charts; diagrams; transistors; vacuum tubes; station assembly and operation. The complete handbook!

$4.00 USA $4.50 US Possessions and Canada $5.50 Elsewhere

Clothbound Edition $6.50 USA, Possessions and Canada, $7.00 Elsewhere

The AMERICAN RADIO RELAY LEAGUE, Inc.
NEWINGTON, CONN. 06111

s.s.b. Please, fellows, let's hear what you are doing. Remember, I don't have a crystal ball, so I depend on your reports for this column. I am usually available on the APN at 0000Z on 3653 kc. Fri. Traffic: VE1RT 136, VE1AAX 22, VE1ARB 20, VE1DB 16, VE1AMR 8, VE1MX 6.

ONTARIO—SCM, Richard W. Roberts, VE3NG—Down London way VE3FVE was elected pres.; VE3DYS and VE3GDZ, vice-pres.; VE3FZJ, treas.; VE3FVZ secy. The FCC will permit VE hams to operate under the Centennial call Letters 3c3, etc., as mobiles or what you will. New operators are requested to join a c.w. net. The *OQN and ECN managers are* looking for *recruits* in all districts. Join now. The Ontario Trillums issue a paper called *Tot Topics*. We all wish you luck, ladies. VE3HW, PAM for 2 meters in the Metro Toronto area, reports that 2-meter activity in the big city is on the up. Both the Metro Net and the 2-Meter Net on f.m. are doing very well. Keep up the good work. I was happy to hear from the Lakehead ARC in Fort William and Port Arthur. The lads up there are fine and have a real good club. Meetings are lively with good turnouts. We do keep listening for you and perhaps we will hear VE3ZCD again soon. We offer congratulations to the Ottawa Valley Mobile Radio Club in this, our Centennial Year, on the occasion of its tenth birthday. Congrats, Mobileers. We tip our whips to you. From the Nortown ARC in Toronto we learn that VE3AEJ is in the body shop. Get well quick. Orv. VE3RX has a beam up for 20. The Renfrew County ARC's officers are VE3SZ, pres.; VE3DKV, vice-pres.; VE3FFU, secy.-treas. VE3BLR is EMO liaison and VE3YX is a past officer. The clubs *put out a fine paper and* will exchange. QTH, 18 Sunset Cres., Petawawa. Traffic: VE3BFO 119, VE3BII 110, VE3CYR 94, VE3VX 76, VE3AWE 71, VE3DBG 64, VE3NG 60, VE3ATI 57, VE3CCE 53, VE3GI 50, VE3BLZ 49, VE3BIE 44, VE3FHV 38, VE3EBH 32, VE3AUU 31, VE3FGV 27, VE3HW 27, VE3DGB 19, VE3ETM 18, VE3EHL 16, VE3BUR 12, VE3DU 12, VE3WW 8, VE3VD 4.

QUEBEC—SCM, Jim Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. We would like to hear of the RTTY activities in our section. It is certain that the RTTY gang could contribute a lot to the traffic and AREC. The Ontario-Quebec Net can handle a much greater volume of traffic. Another fine "get acquainted" meeting was sponsored by the Western Quebec V.H.F. Net. These very active fellows on 144.400 Mc. meet Mon. and Fri. at 0201Z. VE2HS, with his mobile and help from VE2BGJ, put on a very fine show of amateur radio for the Rover Scouts at Pine Beach. We are pleased to hear VE2UN active again. After a *successful auction* for the MARC in Nov., VE2ZM has plans for another in the spring. VE2BAI, as EC, performs a fine job of AREC recruiting in the Chicoutimi area and the same is done by VE2BWU in the north-east shore area. VE2DR and VE2BGJ continue to pick off their share of DX. From our very reliable report of the Three Rivers activity from VE2EC we know that VE2AYX has a very well-equipped emergency mobile; VE2BTY is active from Laval U.; VE2BVV, VE2BRJ and VE2AGP are very active. Excuse the error on our flag last month, of course our SEC is VE2ALE. Traffic: VE2BRD 65, VE2DR 59, VE2OJ 47, VE2BWL 41, VE2BVY 37, VE2UN 23, VE2BGJ 13, VE2AGQ 12, VE2AJD 11, VE2WM 6.

ARPSC

(Continued from page 73)

We think any rational, unprejudiced amateur with full knowledge of the capabilities of all modes involved would inevitably come to the above conclusions as the only logical ones.

There is only one difficulty with using different modes within the same system, and that is that you must have *liaison*. If the traffic transfers from voice to c.w. mode between Section and Region level, there has to be someone available who can make the transfer; in other words, someone equally at home with both modes, who can take the traffic from phone nets and transfer it to c.w. nets, or vice versa. Same with RTTY, the operator who shoots the traffic by RTTY to another TCC operator must have received that traffic by c.w. from an Area net, and the operator who receives it on his printer must pass it along toward its destination in a c.w. or phone net.

The alternative to this liaison procedure is separate NTS's by separate modes. Perish the thought! We have enough trouble keeping *one* NTS going.

Of course there are ways to get around the necessity for versatility in effecting the required liaison, but they

ANTENNA BREAKTHRU IN PERFORMANCE, VALUE, QUALITY, PRICE, AVAILABILITY

Answers to frequent questions on the 10-15-20 Cubical Quads: the shipping weight is 28 lbs; complete sets of wires are included (all Gotham antennas are complete); SWR is 1.1:1 or better at resonance; spreaders are high-strength aluminum alloy tubing—this is the strongest quad we have ever made; our 13 years plus in QST is your guarantee of integrity and value, so order with confidence.

ALL-BAND VERTICALS

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

"All band vertical?" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

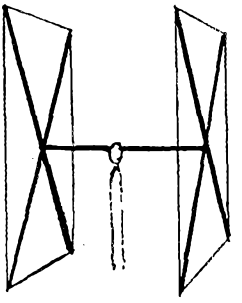
FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters.....$14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters.....$16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters...$18.95

QUADS

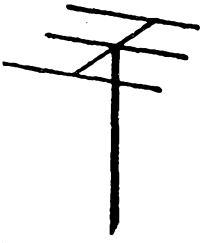


NEW! NEW! NEW! CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you! Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*	*20' boom	
5 El 15	28*		

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATEY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

are a little messy. You can always telephone the messages across town, or hand carry them from one person to another. V.h.f. links can sometimes be used to good advantage. But in most cases you just have to have someone with versatility — a c.w. traffic man who can and will operate phone, or operators equipped primarily for voice or RTTY who have enough c.w. proficiency to handle half their function by that mode. So, rephrasing again, we must "select the mode to suit the need within availabilities, using the more versatile operators to accomplish the required liaison function."

With this as a guideline, NTS has no limits. — *W1NJM.*

November report:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
EAN	30	1787	1.266	59.6	97.2
CAN	30	1392	1.040	46.4	100
PAN	30	1360	.998	45.3	95.5
1RN	60	550	.333	9.2	91.9
2RN	51	450	.662	7.5	84.2
3RN	60	750	.531	12.5	99.4
4RN	60	573	.506	9.6	96.5
RN5	60	868	.404	14.4	92.7
RN6	60	1265	.842	21.1	100
8RN	60	591	.356	9.9	93.3
9RN	30	412	.749	13.8	99.2[1]
TEN	60	975	.771	16.3	74.1
ECN	30	98	.210	3.3	73.3[1]
TWN	27	266	.328	9.9	72.6[1]
Sections[2]	1958	13,700		7.1	
TCC Eastern	112	805			
TCC Central	82	703			
Summary	2610	26,797	EAN	9.7	91.9
Records	2830	27,875	1.315	12.6	...

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

[2] Section/Local nets reporting (65): RISPN (R. I.); EMNN (E. Mass.); SCNE, SCNL (S. C.); QIN (Ind.); VN, VSBNE, VSBNL (Va.); PHD, MOTTN, MOSSB (Mo.); EPA, WPA, PTTN, EPAEPTN (Penna.); BN, OSSBN (Ohio); BUN (Utah); NCNE, NCNL, NCSSB (N. C.); Mich. 6, Wolverine, QMN(s) (Mich.); GN, FMTN, WFPN, QFN (Fla.); OZK (Ark.); NTTN (Tex.); PTN, SGN (Maine); VTNH (Vt.-N. H.); Alta. SSB; LAN (La.); MDDS (Md.-D. C.-Del.); NCN, SCN, SCS (Cal.); Iowa 75; CPN (Conn.); RTQ (Que.); WVN (W. Va.); AENB, AEND, AENH, AENM, AENO, AENR, AENT (Ala.); NJN, NJEPTN (N. J.); MSN, MJN (Minn.); TN, TSSBN, ETPN, TPN (Tenn.); MTN (Man.); GSN (Ga.); WSN (Wash.); NYCLIVHF, NYCLIPN, NLI (N. Y. C.-L. I.).

[3] TCC functions not counted as net sessions.

No new records this month, mainly because the total number of Section/Local net reports is a bit lower than last year and we missed a Region and TCC area report.

Representation this month looks quite good and we hope it will stay that way from now on. We consider 90% or better representation acceptable and have dreams about the month when every net will show 100%. That will be the month that was.

K1WJD remarks that this was an unusually good month in the representation department. W9DYG had to do a bit of fast foot work to replace one of his NCSs, and now everything is purring on CAN. W6VNQ issued PAN certificates to: *W6s* BGF HC IDY QAE RSY TYM YBV, *K6s* DYX LRN, *W1Gs* CVU ROF, *WB6s* BBO HVA, *W7s* DZX GMC HMA KZ JEY PI ZB, *K7s* HLR IWD JHA, NHL, WA7EBR, VE7BDJ. 1RN finally made it to the 90% representation mark. WA2GQZ reports some difficulty in the representation department from a few of the 2RN sections. K3MVO notices the effect of the impending holiday traffic rush on 3RN. *W4SHJ* comments that this was the first time in 13 months that all NCS reports have reached him on time. K5IBZ comments that November wasn't an extraordinary month for RN5 with the exception that representation from Texas is back up. W9QLW issued 9RN certificates to: *W9s* CLY (operated by K9DHN, *WA9s* BWY IZR), DND JUK, WA9SEO. WØLGG finally got her hands on some good men from the rarer sections and hopes they will continue to be available. VE4LG is trying to NCS TEN, but conditions are making life difficult. A TEN certificate was issued to WAØHWR. VE3BZB comments that the ECN crew is bracing themselves for the Christmas rush.

Are technically advanced signal levels, codes, and speeds outmoding your present high performance telegraph and data terminal equipment? You would rather "replace", but economy and the profit motive dictate utilization of present equipment over its normal life or amortization period. FREDERICK ELECTRONICS CORPORATION has the "missing link" to up-date the compatibility of your telecommunications equipment with the fast changing new standards of today. FEC capabilities can resolve your interfacing needs.

FEC has the skilled management and technical personnel to assist system suppliers and users with telegraph/data application problems in the telecommunications field.

FEC produces quality equipment used in the transmission, reception, conversion, encryption, testing, regeneration and display of information processed over telegraph/data communications systems.

FEC equipment has these outstanding features • Solid-State Design • Compact with Low Power Drain • Rugged Modular Construction • Operation Over a Wide Range of Environmental Conditions •

FEC

FREDERICK ELECTRONICS CORPORATION
HAYWARD ROAD, P.O. BOX 502,
FREDERICK, MARYLAND • PHONE: 301-662-5901

Transcontinental Corps: W3EML has all his vacancies filled for the moment. W9JUK issued TCC certificates to WA4WWT, W5GHP, WA5JOL and WØMLE. The TCC Operator of the Year Award will be issued by W9JUK to a station in the Central Area as soon as he narrows down the field of semi-finalists from seven.

November report:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	120	89.2	2134	805
Central	90	91.1	1430	703
Summary	210	90.2	3564	1508

TCC roster: Eastern Area (W3EML, Dir.) — *W1s* BGD EFW EMG NJM, K1WJD, *W2s* GVH SEI, *K2s* RYH SSX, *WA2s* BLV UFI/4 UPC/WBA/5, WB2OHK, *W3s* EML NEM, K3MVO, *W4s* DVT HJS ZM, *W8s* CHT RYP, K8KMQ. Central Area (W9JIK, Dir.) — W4OGG, K4DZM, WA4WWT, *W5s* GHP KRX, WA5JOL, *W9s* CXY DYG JUK KQB QLW VAY YT ZYK, *WA9s* NFS OYI, *WØs* LCX TDR YC, KØAEM, WAØMLE. QST

HF Propagation Effects of High Latitudes

(Continued from page 19)

In conclusion, when the v.h.f. operators are pointing their beams north, it is also a good time to crank the 10/15/20-meter tribander north and look for DX via one of the unconventional modes which we have attempted to describe.

References

[1] Oscanyan, Paul, "Arctic auroral radio interference," *QST, 13*, No. 12, Dec. 1929, 18–20.

[2] Moore, R. K., "Aurora and magnetic storms," *QST, 35*, No. 6, June 1951, 14.

[3] Dyce, R., "More about VHF auroral propagation," *QST, 34*, No. 1, Jan. 1955, 11–15.

[4] Bray, T. R., "Prediction of intensity of the present sunspot cycle," *Nature, 209*, 1966, 929.

[5] Bates, H. F., P. R. Albee and R.D. Hunsucker, "On the relationship of the aurora to non-great-circle high-frequency propagation," *J. Geophys. Res., 71*, March 1966, 1413–1420.

[6] Bates, H. F. and R. D. Hunsucker, "HF/VHF auroral and polar zone forward soundings," *Scientific Report #3 UAG-R150), Geophysical Institute, University of Alaska*, College, Alaska, 1964.

[7] Hunsucker, R. D. and Leif Owren, "Auroral sporadic-*E* ionization," *Jour. Res. NBS, Radio Propagation, 66D*, No. 5, Sept.-Oct. 1962, 581–592.

[8] Lund, D. S., R. D. Hunsucker, H. F. Bates, and W. B. Murcray, "Aurorally-associated ionospheric electron density increases to 1000 km," *J. Geophys. Res.*, p 72, Feb. 1, 1967.

[9] Basler, R. P., "Radio wave absorption in the auroral ionosphere," *J. Geophys. Res. 68*, No. 16, 1963, 4665–4682.

[10] Tveten, L. H., "Long-distance one-hop F_1 propagation through the auroral zone," *J. Geophys. Res., 66*, 1961, 1683–1684.

[11] Petrie, L. E. and E. E. Stevens, "An F_1 layer MUF prediction system for northern latitudes," *IEEE Trans. on Ant. and Prop.*, July 1965, 542–546.

[12] Bailey, D. K., "Polar cap absorption," *Planet. Space Sci., 12*, 1964, 495–541. QST

DRAKE MODEL **2-C** RECEIVER

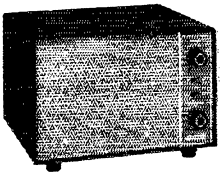
Excellent performance at low cost

$229.00 AMATEUR NET

Matching Speaker Model 2-CS $19.95 Amateur Net

- **Covers ham bands** 80, 40, 20, 15 meters completely and 28.5 to 29.0 mHz of 10 meters with crystals furnished.
- **Or tunes any 500 kHz range** between 3.0 and 30 mHz with an accessory crystal.
- **Three Bandwidths of selectivity** (equivalent to 3 filters) **are furnished:** .4 kHz, 2.4 kHz and 4.8 kHz.
- **Solid State Audio** with 1.8 watts output.
- **Solid State AVC** with fast attack and slow release for SSB or fast release for high break-in CW. Also AVC may be switched off.
- **Receives SSB, AM, CW, and RTTY** with full RF gain, complete AVC action and accurate S-meter indication.
- **Product Detector** for SSB/CW—diode detector for AM.
- **Excellent overload and cross modulation characteristics;** insensitive to operation of nearby transmitters.

ACCESSORIES:



$39.95 Net

2-CQ SPEAKER/ Q-MULTIPLIER & NOTCH FILTER: Plugs into a socket on the 2-C to provide increased selectivity and notching out of interfering hetrodynes and other interfering signals. Necessary controls are mounted on the 2-CQ.

2-NB NOISE BLANKER: Solid state circuitry is used to provide true noise blanking by quieting the receiver during the interval of the noise pulse.

2-CS MATCHING SPEAKER

2-AC CRYSTAL CALIBRATOR: 100 kHz crystal oscillator corresponding to the numbered dial divisions on the Main Tuning Dial.

SPECIFICATIONS

FREQUENCY COVERAGE: 3.5 to 4.0 mHz, 7.0 to 7.5 mHz, 14.0 to 14.5 mHz, 21.0 to 21.5 mHz and 28.5 to 29.0 mHz with crystals supplied. Accessory crystals provide 500 kHz incremental coverage from 3.0 to 30 mHz.

SELECTIVITY: Selectable Passband Filter provides:
.4 kHz at 6 DB down and 2.7 kHz at 60 DB down.
2.4 kHz at 6 DB down and 9.0 kHz at 60 DB down.
4.8 kHz at 6 DB down and 16.8 kHz at 60 DB down.

DIAL CALIBRATION: Main dial calibrated 0 to 500 kHz in 10 kHz divisions. Vernier dial calibrated in approximately 1 kHz divisions. Main dial and Vernier adjustable for calibration.

STABILITY: Less than 100 Hz after warm up. Less than 100 Hz for 10% line voltage change.

MODES OF OPERATION: USB, LSB, CW, AM, RTTY.

SENSITIVITY: Less than .5 uv for 10 DB signal plus noise to noise on all amateur bands.

AVC: Amplified delayed AVC having slow (.75 sec.) or fast (.025 sec.) discharge and less than 100 microsecond charge. AVC can be switched off. Less than 6 DB change for 100 DB RF input change.

AUDIO OUTPUT: 1.8 watts with less than 5% distortion and .75 watts at AVC threshold.

AUDIO OUTPUT IMPEDANCE: 4 ohms.

ANTENNA INPUT: Nominal 52 ohms.

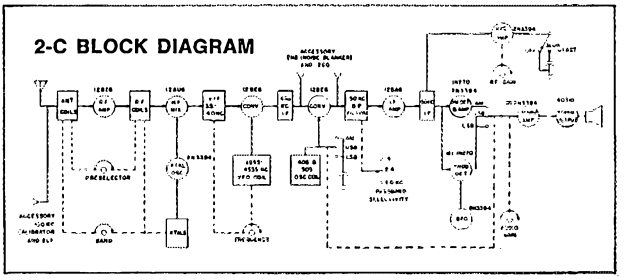
SPURIOUS RESPONSES: Image rejection greater than 60 DB. IF rejection greater than 60 DB on amateur bands. Internal spurious signals within amateur bands less than the equivalent of a 1 uv signal on the antenna.

CONTROLS AND JACKS:
Front: Main Tuning, Function switch, Band switch, Preselector, RF Gain, Mode, Selectivity switch, AVC, and S-Meter.
Rear: Antenna jack, S-Meter Zero, Mute Jack, Sidetone Jack, and Speaker Jack.
Side: Auxiliary crystal socket, auxiliary crystal — Normal switch, Phones.
Top Chassis: 2-CQ socket, 2-AC socket, and Noise Blanker socket.

POWER CONSUMPTION: 30 watts, 120 VAC, 50/60 kHz.

DIMENSIONS: 11 3/16" wide, 6 9/32" high, 9 1/2" deep, weight 13 1/2 lbs.

2-C BLOCK DIAGRAM



See your distributor or write for free Brochure

R. L. DRAKE COMPANY • MIAMISBURG, OHIO 45342

A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All *you* have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner. **Changes are shown in heavy type.**

W1, K1, WA1, WN1[1] — Providence Radio Ass'n., W1OP, Box 2903, Providence, Rhode Island 02908.
W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505, Ridgewood, New Jersey 07451.
W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
W4, K4[1] — F.A.R.C. — W4AM, P.O. Box 13, Chattanooga, Tennessee 37401.
WA4, WB4, WN4[1] — Richard Tesar, WA4WIP, 2666 Browning St., Sarasota, Florida 33577.
W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.
W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.
W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.
W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.
W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
WØ, KØ, WAØ, WNØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.
VE1, 3C1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S.
VE2, 3C2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.
VE3, 3C3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
VE4, 3C4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
VE5, 3C5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.
VE6, 3C6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
VE7, 3C7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
VE8, 3C8 — George T. Kondo, VE8RX, % Dept. of Transport, P.O. Box 339, Fort Smith, N.W.T.
VO1, 3B1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.
VO2, 3B2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.
KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.
KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
KP4, WP4 — Joseph Gonzalez, KP4YT, Box 1061, San Juan, Puerto Rico 00902.
KV4, WV4 — Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, Virgin Islands 00820.
KZ5 — Ralph E. Harvey, KZ5RV, Box 407, Balboa, C. Z.
SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020.

NOTE: Foreign and U.S. Possessions Bureaus were listed in IARU News, December 1966 *QST*.

[1] **These bureaus prefer 5 × 8 inch manila envelopes.**

Our message to the amateurs of the world is simple:

We believe the new 2K-2 is the finest linear amplifier ever made for the amateur service

2K-2 FLOOR CONSOLE $675.00

The new 2K-2, Floor Console, 2KD-2 Desk Model and 2KR-2 RF Deck are destined for greatness. Following the pattern of excellence established by the world famous 2-K, the new 2K-2 reaches previously unattainable levels of achievement. Its exceptional simplicity of design, extraordinary concern for reliability, superb linearity with attendant signal sharpness, remarkable power output and modern design all combine to make the 2K-2 the finest linear available to the amateur today.
Wouldn't you like to own the finest? Write today for full information. Note to commercial and military users: please ask about the new 4-K high power linear.

6% FINANCE CHARGE • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models.
Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin.

TED HENRY (W6UOU) **BOB HENRY** (W0ARA) **WALT HENRY** (W6NRV)

Henry Radio Stores

CALL DIRECT . . . USE AREA CODE

Butler 1, Missouri, 64730	816 679-3127
11240 W. Olympic, Los Angeles, Calif., 90064	213 477-6701
931 N. Euclid, Anaheim, Calif., 92801	714 772-9200
6116 N. 27th Ave., Phoenix, Ariz., 85017	602 AM 4-3895

East Coast Rep.: Howard Laughrey, 2 Elizabeth St., Chappaqua, N.Y. 10514, (914) CE 8-3683

"Worlds Largest Distributors of Short Wave Receivers"

Silent Keys

IT is with deep regret that we record the passing of these amateurs.

ex-W1BII, Daniel T. Wilkins, Laconia, N. H.
W1VV, Manley W. Haskell, Bingham, Me.
W2AFN, Roy L. Ruske, Pittsford, N. Y.
WB2CSV, Anthony Vastano, Yonkers, N. Y.
W2CUD, Frederick R. MaDan, Irvington, N. Y.
W2IRS, Hugh J. Larkin, Maspeth, N. Y.
W2JPX, Maurice K. Bretzfelder, Larchmont, N. Y.
W2KYS, William W. Jones, Glens Falls, N. Y.
W2NK, Louis H. Schramm, Buffalo, N. Y.
W2UUL, John B. Ramsay, Bellmore, N. Y.
W3KIZ, Wallace R. Moths, Coopersburg, Penn.
K3LGJ, Charles W. Newton, Newark, Del.
W3LQ, Harry R. Schulte, Washington, D. C.
WN4BSO, John W. Breedlove, Jamestown, N. C.
W4DMM, Robert H. Buchanan, Memphis, Tenn.
W4FNI, James J. Fitzgerald, Pompano Beach, Fla.
K4HTA, Alfred R. Valliere, Vienna, Va.
W4JAU, James W. Carter, Norfolk, Va.
WA4TOA, James S. Davis, Nashville, Tenn.
W4VDU, William C. Benedict, Nashville, Tenn.
W5AFX, Arthur R. LaMarche, Oklahoma City, Okla.
W5BFA, Ray Samberson, Borger, Texas
W5DLA, J. C. Wallis, Gulfport, Miss.
W5IMQ, G. G. Ryan, Talco, Texas
K5JKM, Henry G. Templeton, Hollis, Okla.
WB6GGB, Conrad Creim, Pasadena, Calif.
W6GGE, Lloyd A. Johnson, Healdsburg, Calif.
WB6IND, Ruben G. Enmark, Glendora, Calif.
K6QGW, Donald L. Russell, Los Angeles, Calif.
W7EX, Everett W. Hull, Portland, Ore.
W7PAY, Clayton J. Clark, Phoenix, Ariz.
W8AC, John I. Bell, South Branch, Mich.
K8DCS, Grant D. Goodfellow, Grand Rapids, Mich.
W8GVB, Richard H. Plantz, Marion, Ohio
W8KLO, E. N. (Sam) Warden, Bluefield, W. Va.
K8KSZ, Ralph P. Boat, Xenia, Ohio
W8LKV, Wallace H. Slocum, Jackson, Mich.
K8NPY, Frank R. Rebner, Wickliffe, Ohio
ex-8OY, Walter H. Bullock, Brooklyn, N. Y.
W8PHY, Melvin H. Creighton, Elm Grove, W. Va.
K8PNA, Faye F. Purman, Newberry, Mich.
W9BYY, Thomas H. Keyworth, South Bend, Ind.
W9CCU, Stephen W. Crowe, West Chicago, Ill.
W9CKM, Walter E. Hinkle, Oregon, Ill.
K9IWV/K9YSA, Albert M. Stein, Lake Forest, Ill.
K9RTQ, Arthur J. Gardner, Blue Island, Ill.
W9SQK, Cyril V. Shallow, West Allis, Wisc.
WØAM, Roy W. Haile, St. Louis, Mo.
KØJCH, Earle F. Collicott, Cambridge, Neb.
KØQZH, Donald R. McCubbin, Duluth, Minn.
XE1DDN, Lorenzo Echazarreta C., Mexico DF, Mexico

WWV Moves to Colorado

(*Continued from page 35*)

the use of satellites and the use of VHF meteor-scatter propagation. It studies propagation errors for correction of the WWVB and WWVL signals. It operates a number of receivers for

(*Continued on page 138*)

NOW INSTANT CREDIT, INSTANT SHIPMENT OPEN ACCOUNT OR TIME PAYMENTS

Trigger has cut the red tape of time-consuming credit investigations and interminable delays! If you are the holder of any *major* credit card such as:

■ **Town & Country** ■ **American Express** ■ **Carte Blanche** ■ **Diner's Club, Etc.**

we will grant you *instant credit* on Open Account or Time Payments—on either brand new equipment, or like-new equipment. Just pick up the phone and call us (no collect calls, please) or write and your goodies will be on their way the very same day. If you live in the Chicago area, drop in and take the merchandise home with you. What's more, there is no carrying charge, up to 25 days, on Open Account. Or you can take advantage of Trigger's easy budget terms at a *very* low interest rate. Merely give us the name of your credit card, and its number, and tell us what you want. You can also get a substantial trade-in on your present gear.

For a real eye-opener, visit Trigger, located near the junction of Routes 64 and 42A, where there's plenty of free parking.

No company processes foreign orders and inquiries with greater dispatch than Trigger.

NEW EQUIPMENT ON LOW BUDGET TERMS

SWAN	**DRAKE**	**SBE**
HALLICRAFTERS	**HY-GAIN**	**NATIONAL**
JOHNSON	**REGENCY**	**WELLER**
AMECO	**WATERS**	**SHURE**
ASTATIC	**NUMECHRON**	**DOW-KEY**
FINCO	**CDR**	**B & W**
HAMMARLUND	**UNGAR**	**EICO**

and other major brands

LIKE-NEW EQUIPMENT ON LOW BUDGET TERMS

■ **Ten-Day Trial** ■ **30-Day Guarantee** ■ **Trades Accepted**

Tops in performance and appearance, thoroughly reconditioned, clean-as-a-pin; alignment, calibration as good as new. Write for complete listing and prices.

another important TRIGGER service:

WE BUY USED HAM GEAR FOR CA$H

PROMPT SERVICE . . .
PROMPT CASH!

SPECIALS OF THE MONTH FOR FEBRUARY

312B4	$139	SX140	$ 77	HW32	$ 89
KWM DC SUPPLY	57	HT40	57	SB200 LINEAR	199
516F1 AC	69	HA5 VFO	49	HP23	37
DRAKE TR3	379	SR46	139	HP13	57
DRAKE TR4	519	HA26 VFO	39	MP1 SUPPLY	24
DRAKE R4	289	HQ105TR	127	HEATH GDO	19
DRAKE R4A	349	HQ110C	129	SWR BRIDGE	12
DRAKE T4X	319	HQ170AC & NB	329	KNIGHT T60	47
SWAN 240	177	NC155	99	EICO 723	39
SWAN 350	349	NCX5	499	GONSET GR211	37
SBE 34	339	HRO50T1R & 4 CLS	137	HE35 6MTR	47
SB2LA LINEAR	209	HRO500	1350	24 HOUR CLOCK	7
CLEGG 22ER	177	NCL2000	549	100KC XTAL CAL.	9
SB5	67	VX501 VFO	179		
S118	59	DX60	59	*TRIGGER HAS LATEST*	
S120	39	DX60A	69	*NEW MODELS IN STOCK*	
SX110	87	HX11	39	*FOR IMMEDIATE*	
SX111	157	HW12	89	*SHIPMENT TO YOU.*	

TRIGGER Attn: W9IVJ Q267
7361 North Avenue
River Forest, Illinois
RUSH THE FOLLOWING: Amount Enclosed

_____

_____

NAME_____

ADDRESS_____

CITY_____STATE_____ZIP_____

ORDER BLANK TO: trade ur present gear, order equipment, sell ur gear for cash.

A SMALL DEPOSIT WILL HOLD ANY UNIT ON LAY-AWAY.

STORE HOURS Weekdays 11:00 A.M.—8:00 P.M.
Saturdays 9:00 A.M.—3:00 P.M.

TELEPHONE (312) 771-8616

TRIGGER Electronics
7361 NORTH AVE. • RIVER FOREST, ILLINOIS 60305
(WEST SUBURBAN CHICAGO)

SUNDAY TELEPHONE SERVICE
11 A.M.—3 P.M.

monitoring both NBS and some non-NBS standard frequency broadcasts. Comparisons are continually made between the NBS standards and those elsewhere, both in the U.S.A. and in foreign countries.

The theoretical group in the Division Office, headed by Dr. George E. Hudson, also has made important contributions to the time and frequency program through representing the Division on important committees such as the CCIR, in analyzing data, and in aiding in the determination of frequency offsets and step adjustments.

Acknowledgments

As stated previously, Mr. David H. Andrews is Chief of the section which administers the new station, and Mr. Peter P. Viezbicke is the engineer in charge of the design and construction of the new station. Mr. R. S. Gray served as an assistant to Mr. Viezbicke during early construction. Mr. John B. Milton is in charge of the design of the frequency-control system of the new station.

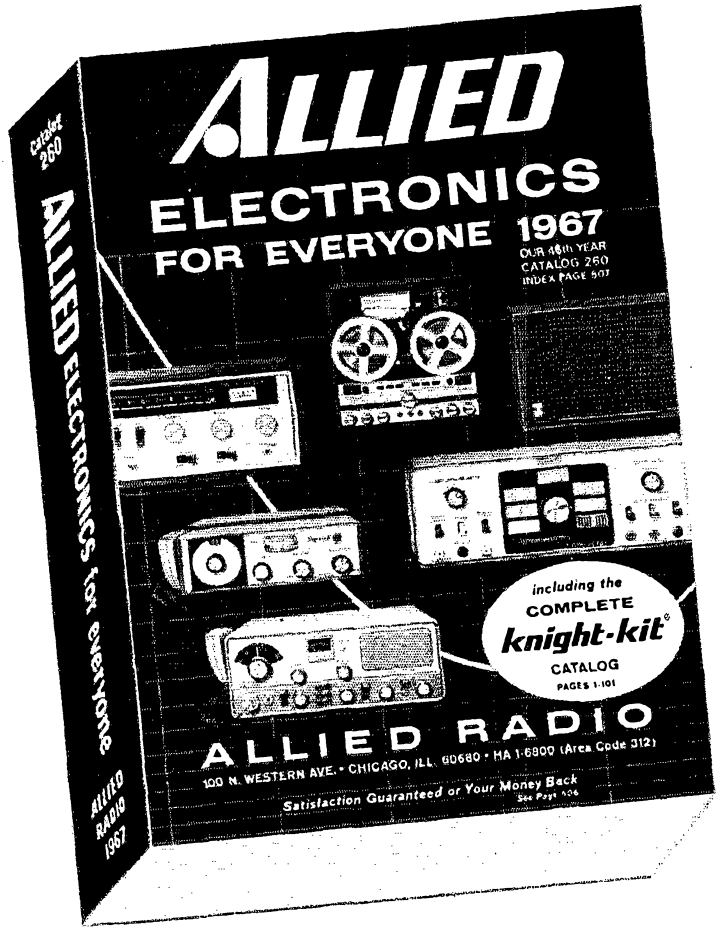
The writer could not have prepared this article without the help of many individuals, especially many of those mentioned in the article, in supplying information and checking the manuscript for correctness. He is also indebted to Mr. Hugh J. Stewart for help in obtaining the photographs; to Mr. Eldred C. Wolzien for correcting the historical portions; and to Mmes. Donna Stolt and Eddyce Helfrich for typing and editing.

During the last few months of operation of the Greenbelt station, it was necessary to have extra staff in order to man both the old and new stations. During this period, much of the manpower at Greenbelt was supplied under contract with the Philco Corporation by a staff headed by Mr. W. M. Swartz. QST

First-Day Covers Still Available

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1964, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn't want anyone to be disappointed. We still have some of these left. They are all singles, unaddressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

FREE NEW 514-PAGE *1967 ALLIED CATALOG*



TOP SAVINGS ON THE BEST IN ELECTRONICS FOR THE AMATEUR

Receivers, Transmitters, Transceivers • Station Supplies and Accessories • Build-Your-Own Knight-Kits • Citizens Band 2-Way Radio and Accessories • Walkie-talkies and Intercoms • Electronic Tubes and Semiconductors • Test Instruments and Meters Automotive Electronics • Stereo Hi-Fi • Tape Recorders and Tape • Hardware, Parts, Tools, Batteries, Books . . . Also Hundreds of New Items, Scores of Special Values!

FREE! *Send for new 1967 ALLIED Catalog*

ALLIED RADIO, Dept. 13-B
P.O. Box 4398, Chicago, Ill. 60680

☐ Send FREE 1967 Allied Catalog

Name_____
PLEASE PRINT
Address_____
City_____ State_____ Zip_____

A staff of over 50 licensed hams give your orders and inquiries prompt, expert attention.

NO MONEY DOWN! 24 MONTHS TO PAY!

Enjoy the things you want *now*, while you take 24 months to pay for them on the convenient, easy-on-the-budget Allied Credit Fund Plan.

ALLIED RADIO

P.O. Box 4398, Dept. 13-B
Chicago, Illinois 60680

Does Your H.S. Have a Ham Station?

(*Continued from page 65*)

politics right, you might well find that they can be talked into buying you some little item just to help you get started like, say, a little triple-conversion s.s.b. receiver (???). Ask your sponsor to check with the school's business manager and find out what's available through military surplus channels. Don't be afraid to beg. Scout around the neighborhood and see if any of the old timers have any little goodies with which they might part. Of course, you wouldn't say it to the principal, but drop around and have a little chat with the heads of the Science and Industrial Arts Departments and see if they can't slip an item or two into their next year's budget and don't forget your A-V Coordinator. An s.s.b. transceiver in his budget might look like any other item of A-V equipment — Hi Hi.

You were almost out the door with the principal's O.K. when his questioning voice said: "Say now, you fellows aren't going to clutter up the top of the building with all kinds of pipes and that sort of junk, are you?" As you see your beautiful plans for a 3-element beam going up in smoke, don't attempt to discuss the merits of the situation. Not now! Remember that artistic and aesthetic values are highly relative. What is beautiful to you may well be a monstrosity to some one else. Simply assure the principal that you plan relatively simple antennas and that you have figured out locations that will make them quite inconspicuous. This will suffice for the time being. Most modern schools are 40 to 60 feet high and have large flat roofs that afford ample opportunity for antennas.

Well, having run that gauntlet successfully, now all you have to do is sit down and make out your application to the FCC for your club license. Doesn't sound so hard, does it? Well, OM, flip through the pages of the *Callbook* and notice the number of call signs assigned to high-school club stations. A good many others have made the grade; so can you. When you are ready for a signal check, just give us a shout. Our call at Hicksville Senior High School is WA2SCF. QST

10-Meter Conversion of CB Transceivers

(*Continued from page 29*)

always starts upon closing the microphone button or transmit switch. If the transceiver has a driver, peak this stage also.

Usually the final amplifier in a CB transceiver will have either an inductive-link output coupling circuit or a pi-section output tank. In those amplifiers employing link coupling, peak the plate-tuning capacitor and vary the position of the link for maximum output. However, some link coils may be so positioned as to prevent them from being moved. In such cases, a more efficient transfer of power can sometimes be obtained by adding a variable capacitor in series with the link. A 75-pf. variable should do for the 28-Mc. band. As with the link, adjust the added capacitor along with the plate-tuning capacitor for maximum output.

Begin tuning a pi network, once the loading capacitor has been set at maximum capacitance, by peaking the plate-tuning capacitor for maximum output. Then open up the plates of the loading capacitor a small amount, and repeak the plate-tuning capacitor. Continue this procedure, further opening the plates of the loading capacitor and repeaking the plate-tuning capacitor, until the amplifier is fully loaded.

At this time it's a good idea to check the modulation of the amplifier. With a No. 47 lamp being used as a dummy load, talk into the microphone. There should be an increase in lamp brilliance. If, however, the lamp dims, go back and make sure all the circuits are peaking correctly. In some cases, a slug-tuned coil will appear to be on frequency when in actuality it has been adjusted to a point of maximum or minimum inductance. If after correctly tuning all the stages, downward modulation still persists, the final might be too heavily loaded for the amount of available drive. Unload the amplifier until upward modulation is obtained. In two of the transistorized units that were converted it was necessary to detune the pi-network inductor on the low-frequency side in order to achieve upward modulation.

The last part of the transceiver that may require attention is the second-harmonic filter. It may be present in the form of a series-tuned trap, parallel-tuned trap or low-pass filter. In one case, a double pi network was used in the final amplifier for improved harmonic suppression. If the filter is adjustable, tune it for minimum interference to television Channel 2. TVI filters were found in six of the twelve transceivers converted

(*Continued on page 144*)

Of the twelve transmitters put on 10 meters, only four required component changes other than transmitting crystals. All units needed to be retuned. Table II describes what had to be done to each transmitter for 10-meter operation. If crystals no greater than a few hundred kilocycles apart are used, there probably will not be any need for retuning the transmitter when changing frequency. QST

Multielement Quad

(Continued from page 29)

information on multielement quads. Tests were conducted with a local amateur (Smitty, WA7CSN) and a number of stations in Australia, New Zealand, and Hawaii. WA7CSN was using a three-element Yagi, calculated by half-power beamwidth at a theoretical 7.5-db. gain. The Yagi was at the same height as the quad, 40 feet. Transmitter power and coax attenuation were carefully calculated to determine the db. difference between the power applied to two antennas. An alternating 10-second ON with identification and 10-second OFF, while WA7CSN transmitted a carrier of 10 seconds with identification, was used to minimize the effect of fading. Although the quad did not give the strongest signal at the receiving end during every transmission, it averaged a signal that seemed to be approximately 4.5 db. greater than that of the three-element yagi.[1]

As the band was going out, the last two stations contacted gave reports indicating the quad's superiority over the Yagi in the order of a relative 10-db. signal difference.[1] This tends to reinforce the concept that the quad is a good band "opener" and "closer." Another interesting note was that three of the seven stations participating in the first comparison test volunteered the fact that there was noticeably less QSB with the quad than with the Yagi.

Although such tests are not conclusive, it is felt that they are perhaps more valid than tests conducted with other than on-the-air conditions or with other frequencies. It is believed that, anyone induced by this article to construct the W5HVV quad will meet with the same gratifying end result experienced by the author.

I should like to express my great debt to WA7CSN for his efforts on this antenna (especially regarding raising the quad into place amidst the empty beer cans on that wonderful Saturday afternoon). Also, my sincerest thanks to ZL1ATM, ZL2UD, VK3AGM, VK3VL, VK4UW, KH6DUE, and KH6FNZ (to mention only a few) who rendered their most critical reports during the comparison tests. QST

[1] Details of equipment and probable accuracy of these measurements are not available. — *Editor*

How's DX?

(*Continued from page 89*)

W9WNV's DX QSLs, is a member, as well as the Alabama winners of most recent ARRL DX Contests. Our club bylaws include adherence to operating practices and ethics spelled out in DXCC rules and at various times in *QST*." Watch out, FDXC! . . . . . Ontario DX Association's *Long Skip* is back in print with VE3EWY editing, VE3EUU assisting. Check with ODXA, P.O. Box 717, Toronto 7, Canada, for info on club activities which include issuance of a Centennial Award based on a hundred contacts with Canadian stations this year (at least five QSOs with each of the eight VE call areas, five with VO-land, VE0 not mandatory but acceptable). Remember that some Canadian stations will be using 3C and 3B prefixes in 1967 . . . . . G3MIHV, lately G3MIIV/W6, tries his DX hand as XE0MIIV on occasion . . . . . WA6SLU boarded up the shack for a Navy tour. "I went out fightin' — my last contact was with TA2AC on 20 c.w. Perhaps at some time during my enlistment I'll get a chance to operate from some rare DX spot." ARRL SCM WA6JDT will miss George, too. "He was less than a mile away from me with that 100-foot tower! Now all's quiet on the western front." . . . . . Many a European 80-meter DX hound is delighted to discover that W1SWX means New Hampshire . . . . . W0CAQ calls attention to Fargo (N. Dak.) DX Association's WAFA certification and invites s.a.s.e. inquiries . . . . . "VP2KJ, now living in New York City, will return to the West Indies now and then for DX-peditionary work," learns WA2FQG . . . . . WA8RQQ, with a 15-ft.-high dipole, says his 10-watt DX success on 40 meters must be due to an effective ground system . . . . . W6PEU/KS4, formerly KW6CQ and KX6JI, will sign his own Swan KS4 call soon, according to his XYL, K6QPG. Watch 21,420 kc. at 1500-1600 GMT when the OM skeds Mary. KS4CA went back to WA4HIE in November . . . . . K4IIF enjoyed autumnal phone contesting from KV4AA . . . . . W8EWS may conclude a two-month Montserrat VP2MK maneuver about now . . . . . The Puerto Rican *DXer*, worthy voice of DX Club of Puerto Rico, reports that CO5CN earned All-P.R. and Mayer Memorial certifications. A new DXCPR member of renown is KP4CRT who was an outstanding DX performer as CO2SW before 1960. Sergio concentrates on 20 c.w. with an HT-44, SX-117, rotary beam and dipoles . . . . . Northern California DX Club divides itself into scrappy Red and Blue teams for intramural DX contest rivalry. W6PHF becomes editor of NCDXC's *DXer*, a respected organ now in its 16th year . . . . . Exchange student WA1FEO keeps in touch with home via the 80-watter of LU5DGQ. Dave says ten meters is fine to the States at 1700-2300 GMT. "Victor and I have made contacts from Mozambique to Japan, 20-over signals, near 28,500 kc. We'll soon have an NCX-5 on the air." QST

Happenings of the Month

(*Continued from page 76*)

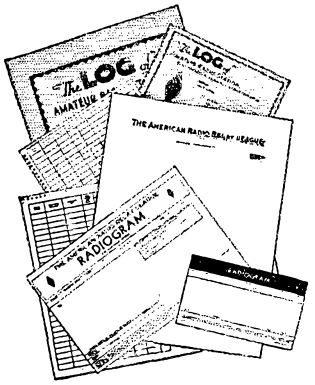
amended its rules to conform to the revised sections of the Act. In the first line of each subparagraph of Section 97.9, eligibility for new operator license, the words "or national" are added after the word citizen.

Nationals are persons owing permanent allegiance to the U. S. but not citizens of it, primarily people born on outlying possessions such as the Carolines.

SUSPENSIONS AND REVOCATIONS

The FCC has revoked the license of Charles J. Kulabonish, W8RXII, Bridgeport, Ohio for transmitting obscene, indecent or profane language over his amateur station in violation of Section 97.119 of the regulations. Mr. Kula-

FOR THE ACTIVE AMATEUR



Record keeping can often be tedious. But not with the *ARRL Log Book*. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book ..... **50¢**

Mobile and portable operational needs are met by the pocket-size log book, the *Minilog*. Designed for utmost convenience and ease ..... **30¢**

First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram . . . and you can do this by using the *official radiogram form*. 70 blanks per pad. **35¢**

If you like to correspond with fellow hams you will find the *ARRL membership stationery* ideal. Adds that final touch to your letter. 100 sheets **$1.50**

and they are available postpaid from . . .

The American Radio Relay League

NEWINGTON, CONN. 06111

telrex "BALUN" FED INVERTED "V" ANTENNA KITS

SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

1 KW P.E.P. Mono-Band Kit . . . 1KMB1V/81K . . . **$21.95***
2 KW P.E.P. Mono-Band Kit . . . 2KMB1V/81K . . . **$26.95***

*Kit comprises, encapsulated, "Balun," copperweld, insulators, plus installation and adjustment instructions for any Mono-band 80 thru 10 Meters. Also available 2, 3, 4, 5 Band Models.

TELREX COMMUNICATION ENGINEERING LABORATORIES
ASBURY PARK, N.J. 07712

SURPLUS NEEDED

Guaranteed highest prices. Shipping paid. We'll buy, trade or give you new equipment of your choice. Send list or telephone for immediate quote. Payment in 24 hrs.

MILITARY ELECTRONICS CORP.
SPACE ELECTRONICS DIVISION
4178 PARK AVE., BX., N. Y. 10457 • (212) CY 9-0300

EMPLOYMENT OPPORTUNITIES
At
HAMMARLUND MANUFACTURING CO.

Continuing expansion at Hammarlund is creating new opportunities for:

- **PRODUCT ENGINEERS**
- **DESIGN ENGINEERS**
- **ELECTRONIC TECHNICIANS**
- **MECHANICAL DESIGNERS**
- **DRAFTSMEN**

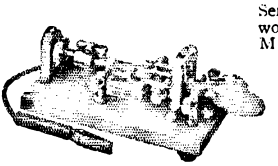
Send resume in complete confidence to:

Personnel Manager
Hammarlund Manufacturing Company
Mars Hill, North Carolina 28754

An Equal Opportunity Employer

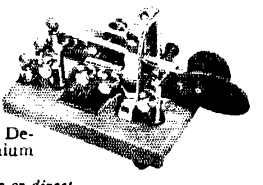
ENJOY EASY, RESTFUL KEYING

With VIBROPLEX



Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium Base and red finger and thumb pieces. Five models to choose from, priced at $19.95 to the 24K Gold Plated Base "Presentation" at $39.95.

VIBRO-KEYER



Works perfectly with any Electronic Transmitting Unit. Weighs 2¾ lbs., with a base 3½" by 4¼". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model $18.95; DeLuxe model includes Chromium Plated Base at only $24.95.

Order today at your dealers or direct

THE VIBROPLEX CO., INC.
833 Broadway New York, N. Y. 10003

FREE Folder

bonish's citizens radio station license, KHJ-8262, was likewise revoked. The revocations became effective August 15.

The amateur licenses of Richard Paul Prater, K8CIH and WA8ITO, Jackson, Michigan were revoked effective May 24 for violation of Section 97.129, obtaining an amateur license by fraudulent means, and for operating on frequencies authorized for use by operators holding a General or higher class license. In his written statement to the FCC, Mr. Prater admitted Wayne G. Bamford, K8EAP, Clark Lake, Michigan had taken the General Class examination for him. The license of K8EAP was revoked effective June 28.

In other FCC action, the license of James D. McGill, K3TSC, College Park, Maryland was revoked April 19 for failure to reply to an Official Notice of Violation alleging violation of Section 97.97, notice of operation away from authorized location.

The FCC has suspended the license of Richard D. Davis, WB6IVX, Fresno, California for the remainder of its term for violation of Section 97.29 relating to failure to return to the Commission, examination papers for a Novice-Technician Class license. The suspension was effective August 16; the license was due for expiration November 8, 1968.

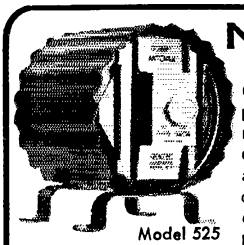
A six-month suspension of license for Edward W. Terrell, Jr., WA9MHX, Western Springs, Illinois was ordered on August 13 for unauthorized operation on 1620 kilocycles in violation of Section 301.

NEW FORM 610

The Federal Communications Commission has begun distribution of a new version of its Form 610, used by amateurs when applying for new, renewed, modified or upgraded licenses. (Earlier editions are still acceptable for the time being). The new version is the most detailed yet, and amateurs who take the time to read the form carefully should find all the necessary information at hand.

One minor omission: the form states that the present amateur license must be attached. Actually, the Commission will accept a photocopy in lieu of the original, since it can no longer return cancelled licenses to the amateur.

If the station location has stayed the same and an amateur has changed only his mail address or name (in the case of a YL getting married, for instance) the FCC may be notified of the new address or name by letter instead of by formal application for modification. In similar fashion, a letter will suffice in requesting a



Model 525

NEW HIGH POWER DUMMY ANTENNAS

Gentec Dummy Antennas permit transmitter adjustments under electrical conditions duplicating actual antenna conditions, but converting and dissipating electrical power as heat, preventing radiation and eliminating TVI, QRM and associated problems. Transmitters readily peaked for top DX operation.

SPECIFICATIONS—DC to 250 MCS. (50 Ohm Units)

Price	$1.95	$11.95	$19.95	$19.95	$19.95	$29.95	$29.95
Model	507	525	525L	525B	510U	510N	510B
Term'ls	UHF	UHF	N	BNC	UHF	N	BNC
VSWR (max)	1.05	1.1	1.05	1.05	1.1	1.05	1.05
Power	7W	125W	(250W ICAS)		500W	(1KW ICAS)	

Terms: C.O.D. plus postage or ppd in U.S.A. when check included with order.

Write for Free Literature (50 and 70 Ohm Units)

GENTEC INCORPORATED, P.O. Box 233, Raritan, New Jersey

TUNAVERTER

NEW MODELS! NEW PRICES!

— TUNABILITY — USABILITY — QUALITY —

Marine
Police
VHF

Amateur
160 M
to
2 Meters

TUNABLE, CALIBRATED solid state converters to change your auto and home radios into excellent, sensitive, selective, calibrated Amateur and VHF receivers!

- 6-1 reduction tuning!
- HF—2 gang tuning!
- VHF 3 gang tuning!
- FREE 24" conn. coax!
- 2 WEEK MONEY BACK GUARANTEE!
- Plug into auto radio!
- BC & ham ant. inputs!
- 100% American Made!
- 9 volt btry powered!
- Mute terminals!
- Size 2¼" X 3½" X 4½"

Models for AM-FM!

BAND	MODEL	COVERS	OUTPUT	PRICE
Marine	Marine	2.0-3.0 mc	550 kc	$19.95 ppd
Shortwave & WWV time.	SWL / SW	9.3-10 mc / 14-18 mc	800 kc / 1500 kc	$19.95 ppd
160 meters	160	1.8-2.0 mc	550 kc	$19.95 ppd
75 meters	75	3.8-4.0 mc	800 kc	$19.95 ppd
CB & 10 M	273	26.9-30 mc	1500 kc	$29.95 ppd
6 meters	504	49.5-54.5 mc	1500 kc	$29.95 ppd
2 meters	1450	144-150 mc	1500 kc	$29.95 ppd
Police, fire, & Marine.	308 / 375 / 1564	30-38 mc / 37-50 mc / 150-164 mc	1500 kc	$29.95 ppd
Aircraft	1828	118-128 mc	1500 kc	$29.95 ppd

Special VHF Model outputs up to 15 mc. add $5.00

Models with Tunable BFO for SSB-CW-AM-FM !

160 M	1600	1.8-2.0 mc	550 kc	$24.95 ppd
80 M	800	3.4-4.1 mc	550 kc	$24.95 ppd
75 M	750	3.8-4.0 mc	550 kc	$24.95 ppd
40 M	400	6.97-7.325 mc	550 kc	$24.95 ppd
20 M	200	14.0-14.35 mc	800 kc	$24.95 ppd
15 M	150	20.975-22 mc	1500 kc	$24.95 ppd

Output kits for use with home radios, (state output) **$1.25**

HERBERT SALCH & CO. Dept. Q, Woodsboro, Texas 78393

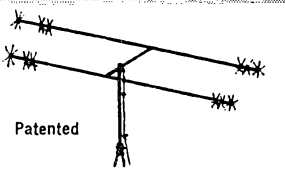
Now...2000 Watts P.E.P.

Full Power/Minimum Size

FOR APARTMENTS • SUBURBAN HOMES

Marine and Portable Operation

Packaged for APO and FPO Shipping



Bands	6-10-15-20 Meters
Power Rating	2000 Watts P.E.P.
El. Length	11'
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

6-10-15-20 METERS

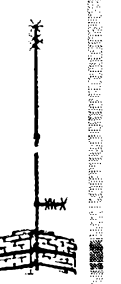
The time proven B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Model B-24
Net $59.95

MULTIBAND COAXIAL ANTENNA for 6 - 10 - 15 - 20 METERS

Needs no ground plane radials. Full elecrical ½ wave on each band. Excellent quality construction. Mount with inexpensive TV hardware. Patented.

Power Rating	2000 Watts P.E.P.
Total Weight	5 lbs.
Height	11'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.



Model C4 Net $34.95

Send for Free Brochure

If there is no stocking distributor near you order direct from factory. We pay shipping to your Qth if in Continental U.S.A.

Mini-Products, Inc.

1001 W. 18th Street • Erie, Pennsylvania 16502

• LEADERS IN COMPACT ANTENNAS •

LEARN CODE

the right way - with

Code Sound Language!

de W3CVE

"The specialized language of sound" brings you a complete study of the International Morse Code. Satisfied users say—"Complete in every detail"—"Easy to learn!"—"CSL is the best!"—Increase YOUR receiving speed, master the code now!

CSL NR 1 & NR 2 (1 tape) for the prospective Novice, Technician, General or Amateur Extra First. 3 to 25 wpm.

CSL NR 3 & NR 4 (1 tape) for the advanced operator with a sincere desire to copy code sounds at rapid speeds. How to copy behind, etc. 25 to 55 wpm. **Both tapes, plenty of copy—plain and scrambled, numerals and punctuation.**

Magnetic tape, 7" reel, dual track, 2 hours. Immediate delivery. Send check or money order. (Specify which tape.) **$6.95 each.**

Both tapes on one order, only **$13.50.**

SOUND HISTORY RECORDING Box 16015, Washington, D. C. 20023

duplicate where the original license has been lost or destroyed.

Fees remain at $2 for modification; $4 for new, renewed, renewed-and-modified, or upgraded licenses; and $20 for recovery of a former call, requests by ex-two-letter call-holders for another call of that type, and for club calls in memory of a deceased former member.

The membership services section at headquarters will be happy to assist amateurs having special problems on licensing matters.

LATE NEWS

Netherlands-U. S. Reciprocity

A reciprocal agreement between the U.S. and the Netherlands, including the Netherlands Antilles, is now in effect. Under it, amateurs licensed by one of the countries may receive permission to operate in the other. The agreement is the 22nd to be signed by the U.S.; others are in process and successes will be announced from W1AW and in *QST* as they occur.

New Examining Point

FCC has responded to demand and created a new annual examination point at Butte, Montana. Information can be obtained from the District FCC Engineer-in-Charge, 806 Federal Office Building, Seattle, Washington, 98104. The new point will not affect eligibility for Conditional Class examinations, of course, since the 175-mile distance is in reference to semi-annual test centers.

Viet Nam Still on Ban List

FCC recently told the operator of 3W8D that, despite his having received some form of permission to operate his station in Viet Nam, it is not legal for U.S. stations to communicate with him, much less handle third-party messages. Viet Nam has notified the ITU in Geneva that it objects to international communications by its amateurs. The U.S. feels it must honor its treaty obligations, and thus must not permit its licensees to contact Vietnamese stations. QST

YES!

I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my $5.00 ($5.25 from Canada, $6.00 elsewhere). Sign me up for a year's membership and twelve big issues of *QST!*

My name .....Call.....

Street .....

City .....State.....Zip.....

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS-267

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode when you furnish it. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**

(8) **No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.**

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

DAYTON Hamvention April 15, 1967. Dayton Amateur Radio Association's 16th Annual Hamvention, Wampler Arena Center, Dayton, Ohio. Participate in the technical sessions, forums, banquet, hidden transmitter hunt. Bring XYL for best in women's activities. For information write Dayton Hamvention, Department B, Box 44, Dayton, Ohio 45401.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings. Second Monday of each month at George Washington Hotel, 23rd St. and Lexington Ave., promptly at 8 P.M. All are welcome. W2ATT, New York Radio Club.

HUDSON Amateur Radio Council announces visitors to K2US at New York's World Fair 1964-1965 may send self-addressed stamped envelope to K2US QSL Manager Ernest Bressette, WA2TEK, 33 Roosevelt St., Pequannock, New Jersey for K2US souvenir QSL card and log sheet.

AUCTIONFEST: Hollywood, Florida. Chaminade High School, 500 North 51st Ave., March 11th. Doors open at 8:00 AM. Auction begins at 10. This is a new location for the popular Broward ARC Auctionfest. Chairman: Jack Wainwright, W4-IEH.

OLD Old Timers Club now over 650 members with verified 2-way contacts before 1926. Life membership $15.00. Bi-monthly "Spark Gap Times" $2.50 annually. Roster free to members. Write Secretary, W5VA, Box 840, Corpus Christi Texas 78403.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA Wayne Nelson, Concord, N.C. 28025.

WANTED: all types of aircraft or ground radios. 17L, 618F or S388, 390, GRC, PRC, 51 JRVX, Collins linear amplifier. Type 294: Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames W2KUW, 308 Hickory, Arlington, N.J.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts: 617-598-2530 for the gear u want at the prices u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Canton, Chicago 6, Ill.

TOPPING All offers for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

TUBES Wanted. All types, highest prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

MANUALS for surplus electronics. List, 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts, BC-610, GRC-2, Antodyne. Bethpage, L.I., N.Y.

QSLS?? "America's Finest!!" Samples 25¢. DeLuxe 35¢ (refunded). Sakkers, W8DED, Holland, Michigan 49423.

QSLS's, samples 20¢. QSL Press, Box 281, Oak Park, Ill. 60303.

QSLS "Brownie" W3CJI. 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ For better QSLS! Bringing hams greater returns for over a quarter-century. Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Ill.)

QSLS: Moyers Printing, 846 Rising Sun, Telford, Penna. Samples, stamped envelope.

QSLS-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo 1, Ohio 43601.

DELUXE QSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1944 N.M. 18, Gladwin, Mich.

10¢ Brings free samples. Sims Advertising Service, B3227 Missouri Ave., St. Louis, Mo. 63118.

QSL Specialists. Distinctive Samples, 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago, Illinois 60639.

SUPERIOR QSLS, samples 10¢. Hamsco, Box 773, Hobbs, New Mexico.

QSLS, finest, YLRL's, OMs, samples 10c. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal, snazzy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul 6, Minn.

3-D QSL cards add prestige with spectacularly different glittering colors and raised designs. Samples 25¢ (refundable), 3-D QSL Co., Monson 2, Mass.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS 300 for $4.35. Samples 10¢ W9SKR, George Vesely Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS. Radio Press, Box 17112, San Diego, Calif.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples, Thomas St., Riegel Ridge, Milford, N.J.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City Mo. 64116.

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

RUBBER Stamps $1.15 includes tax and postage. Clint's radio W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

COLORFUL QSLS. Samples 10¢ or SASE. K8LNL Print, 510 Riddle Rd., Cincinnati, Ohio 45220.

QSLS—Free samples. Attractive designs. Quick Service. W7IIZ, Press, Box 183, Springfield, Ore.

ORIGINAL EZ-IN double holders display 20 cards each in plastic. 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John K4MNT, Box 198T, Gallatin, Tenn. 37066.

DON'T Buy QSLs until you see our free samples. Wilshire Printing, P.O. Box 292, Crowley, Texas 76036.

QSLS Glossy coated, 3 and 4 colors, 100-$2.00. Samples dime. Bob Garra, Leighton, Penna.

SINCE 1937. QSLS by W1LMS, Sheehan Press, 23 West St., Stoneham, Mass. 02180. Samples 10¢. Catalog, 25¢.

QSLS: Quality with Service. Samples free with zip. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

PICTURE QSL Cards for your shack, etc. Made from your photograph. 1000, $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

QSLS. Fast one day service. Free samples. Bolles, W5OWC. Box 9363, Austin, Texas.

RUBBER Stamps. 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLS, 30 sharp samples. Catalog, 10¢. Filmcrafters, Box 304X, Martins Ferry, Ohio 43935.

QSL Rubber Stamp 3" x 5", $5.00. Other ham stamps, $1.00 up. Set sample impressions 5¢ Postage. Wes's, W1FP, RFD Amesbury, Mass. 01913.

BEST Quality rubber stamp or 1000 address labels, $1.25 postpaid. Joe Harms, 905 Fernald, Edgewater, Fla. 32032.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors. 100—$3.00 up. Samples 15¢. Agent for Call-D-Cals, K2VOB Press, 31 Argyle Terrace, Irvington, New Jersey 07111.

QSLS. Your personal combination from large selection, glossy reds, blacks, calypso, Pinecraft, etc. Silver, Gold, Rainbow inks. Many cards styles, types, cuts, photos. Fast service. Samples 25¢. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

QSL Cards. Free samples. Send stamped envelope to George, WA3OKD. Box 282, Valparaiso, Florida 32580.

100 QSLs, $1.00. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

QSLS. Hundred, $2. Samples 10¢. Erickson, 2436-Q Myers, Sunnymead, Calif. 92388.

RUBBER Stamps. 3-line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

CANADIANS: Squires-Sanders SS-1R receiver complete with SS-1V video band scanner, SS-1S noise silencer and rack mounting panels if desired. All in brand new condition and fully guaranteed. $2500.00 value for $1200.00 cash, will only sell as a complete unit. Contact VE3MR, 161 Old Forest Hill Road, Toronto 10, Ont. Canada.

WANTED: Heathkit B-1 balun coil box or equivalent. Doug Dixon, 635 Armour Road, Peterborough, Ont., Canada.

CANADIANS Eico 753K kit with solid state VFO, never unpacked. Sacrifice: $195.00. VE7XX, Box 880, Hope, B.C., Canada.

WANTED: HT44 and PS-150. Will pick up. Must be reasonable. K. B. Orton, VE3CCB, 1593 Dale St., London, Ont. P., Canada.

TELETYPE: Buy 28s, sell parts. W4NYF, Schmidt.

MICHIGAN Hams! Amateur supplies, atandard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 37 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmandy 8-8262.

INTERESTING Offers galore! Ham's trading paper. Next 12 big issues, $1. Sample copy free. "Equipment Exchange—Ham Trader", Sycamore, Ill.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime international Co., Box 516, Hempstead, N.Y.

HW12,22,32 owner convert your rig to three bands for a total cos of $28.50. This price includes new front panel and dial. Complete assembly manual only 50¢ or send for free brochure.

RTTY Gear for sale. List issued monthly. 88 or 44 mhy toroids, five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mancana Blvd., Oakland, Calif. 94610.

TOOOOBES: 6146B, $4.00; 6CW4, $1.40; 417A, $3.95; 6360, $3.45; 6146, $2.55; 5894; $15.50. All new, boxed guaranteed. No pulls, seconds or JAN, Catalog of many other types, free. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

CASH Paid for your unused Tubes, and good Ham and Commercial Equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NYC 10012. Call 212-WAlker 5-7000.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J., Tel:GArfield Area code 201-471-2020.

NOVICE Crystals 80-40M, $1.30 each. Also other freqs. Free list Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

WANTED: For personal collection; OST. May 1916; Learning the Radiotelegraph Code, 3rd edition; How to Become a Radio Amateur, Edition 10: The Radio Amateur's License Manual, Edition 7, 11, 12, 15 and 16. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each, $10,000 paid prepair in U.S.A. Send check or m.o. Everett Stidham, Jr., W5LQ, 722 So. 30th, Muskogee, Okla.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

STAINLESS Steel Hardware. Small quantities. Send SASE for list. Arlington Stainless, Section B, Box 2641, Baltimore, Md. 21215.

ESTATE Liquidation offers. Big list. Paradd Engineering Service, 284 Rte, 10, Dover, N.J. 07801.

FOR Sale: In excellent condition: Drake Model 2-B receiver Drake Model 2-BQ "Q" Multiplier; Johnson Viking Adventurer transmitter with key and 40M-80M crystals. All for $350.00. Will sell separately. Write Wayne Banks, 1207 Loch Lomand, Ct., Richmond, Va. 23221.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

FB Condition SX101 MK 3, G SB-100, GSB-101, plus other ham needs. All $475. WA2QEK, RN3-0591.

WANTED: Electronics Instructor. Generally indispensable. Theory and workshops. Science Camp, Lake Placid, New York. Write Eppstein, 440 West End Ave., N.Y. 24.

RTTY Channel filters, $5.95 pair. 88 mh toroids, 5/$2.50; FSK units for 32S-3, complete, variable shitt, easy installation, $14.95. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

TV Cameras. Vidicon-Orthicon. Industrial, new and used lenses. Vidicons, Pan, Tilts, Zooms, Industrial Suppliers camera reconditioning and repair. Closed circuit T.V. Center, Inc., Rte. 46, Little Falls, N.J. Tel: 201-256-7379.

WANTED: National HRO-60 coil set AB. and NFM-83-50 narrow band FM adaptor. Also proportional temperature controlled 100 KHZ freq. standard "stability" three parts in ten to the ninth per day or beter. Bill O'Brien, 14 Laurel S., Rockville, Conn. 06066.

HA-14 and HP-24, assembled, tested, in mint condx, with all necessities, $175.00 or you make offer. WA3CBL, 900 Stony Lane, Gladwyne, Penna. Tel: (215) LAS-7581.

CINE special, other professional 16 or 35mm cameras or lenses, video recorders wanted for cash or trade. Ted, W2KUW, 64 Grand Place, Arlington, New Jersey.

SX-101A receiver, $165.00. Excellent condition. Priced for fast sale. Les Moskowitz, WB2RSW, Tel: 212-H15-0242 between 5 and 10 PM.

SACRIFICE: KWM-2 mint condx, $659. "Factory installed", Noise Blanker $69.00; mobile supply, $49.00; mobile mount, $64.00; A.C. supply, $65.00; 30L-1, $319.00; Heath HO-10 Monitor scope, $54.00; Hy-Gain full size 3-el. 20M beam, $35.00. Fred Breidbart, 1725 Broadway, Brooklyn, N.Y. GL-5-2222.

FREE Catalog. Loads of electronic bargains. R. W. Electronics, Inc., 2244 So. Michigan Ave., Chicago, Ill. 60616.

EXCELLENT Condition: NCX-3, plus power supply. $225.00 takes both. Call Jack Siegel, 914-769-7500.

HEATH Transmitter/Receiver. DX-60xmtr, HR10 recvr with xtal calibrator; Hy-Gain vertical antenna. Many extras and accessories. Deal: $150. Will sell individual units, if necessary, but prefer pckg deal. Bob Berman, 16 Osage Rd., West Hartford, Conn. 06117. Tel: (a.c. 203)-232-3551.

BEST Condition, Eico 315 sig. gen., $45.00; Eico 460 'scope, $65.00; Paco V-70 VFVM, $17.00; Apache TX-1, mint 6146BS, $150.00. WB2OQK, 1129 Astor Ave., Bx, NY 10469.

WANTED: Collins VFOs, Richard Mann, 430 Wilmot Road, Deerfield, Ill. 60015.

FOR Sale: Johnson Viking 500 transmitter, 500 watts c.w., FSK, plate-modulated AM, SSB with external exciter. Separate power supply and modulator unit would be excellent for VHF use. Original Canadian price was $1500. Will sacrifice at $350 American or Canadian funds or highest offer. Will deliver in Ontario, Quebec or Northeastern U.S.A. Also sell: SB-10 and power supply, $50. Contact VE2UN, 3480 McTavish St., Montreal, Quebec, Canada.

ESTATE Sale: Complete, ham rig: NC-303 receiver, Johnson Viking Invader 2000 transmitter; Knight P2 SWR meter; GMT Numechron Tymeter, CDR rotor TR-44; Vibroplex Key, T234 Tri-Ex Tower; DB24 Hy-Gain beam antenna; DK-60 Dow-Key relay; all cables and misc. equipment to complete hook-up and manuals. All equipment purchased new and in excellent condition, very little use. Will ship anywhere in USA. $1100.00 or reasonable offer. Marc Maury, Phone 714-626-0441 or write to 1679 Sumner Ave., Claremont, Calif.

HEATH HO-10 signal monitor completely wired and in perfect operating condx. Cabinet in A-1 share. Will ship to first offer over $60.00. Send check or money-order to Pete Chamalian, W1BGD, 111 Buena Vista Road, West Harttord, Conn. 06107. (Shipping Continental U.S. and Canada only).

4X250B, $10 pair; 4X150A, $5 pair; 4CX250B, $12 pair, used, new, $20 pair p.p.; 4-65 new $7.50 pair; 811A, new, $5.50 pair. Powerstat variac new 0-250V, 1.5 KVA, $23.00; excellent BC-640, 811A modulator and power supply, $45.00. C. M. Pruett, Star Rte C, Flamingo Bay, Ft. Myers, Fla. 33901.

THE Following Heath equipment is in excellent condition for sale at less than kit cost: Marauder; Mohawk, Warrior, Monitorscope, Mohican K8VHD, 788 Pipestone, Benton Harbor, Michigan 49022. All inquiries acknowledged.

WANTED: SX-71 receiver. Must be late model with black dials and 15 meters calibration. Will pay top dollar for good unit. Write details and price wanted to M. M. Ward, 16 Sunset Drive, Cherry Hill, N.J. 08034.

SEND SASE for list of goodies galore. Liquidation. No junk! WØLQQ, 2016 Grandview Blvd., Kansas City, Kansas 66102.

FOR Sale: Collins 32S-1, 75S1, Heath SB-200, separate or complete; best offer takes it. Excellent condition. Dan Pierce, KØQCT, 1930 8th Avenue, Kearney, Nebraska.

EICO 753 xcvr. $150.00. Perfect condition. 2616 Liberty, Erie, Penna. 16508. Tel: 8660935.

HW12,22,32 owner convert your rig to three bands for a total cost of $28.50. This price includes new front panel and dial. Complete assembly manual only 50¢ or send for free brochure. DRC Kit, 215-28 Spencer Ave., Queens Villiage, N.Y. 11427.

SELL: CQ, QST. Handbooks, old radio magazines, any quantity. Buy: Old radio gear and pubications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

FOR Sale: Volumes One, Two, Three, Four, Frederick Research Corp Test Equipment (Military) Data Handbooks, 1961 publication—Four New Bound Books, $5.50 Postpaid. Payment With Order. Wanted: Military, Commercial, Surplus, Airborn, Ground, Transmitters, Receivers, Testsets, Accessories, Especially Collins .We pay Cash and Freight. RITCO Electronics, Box 156, Annandale, Virginia (703) 560-5480 collect.

FOR Sale: SB-100, SB-200, SB-300. Wanted: Any kit to wire and repair, preferably Heathkit. Most Heathkits in stock. Business ref. on request. Lan Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

3-1000Z Fire Band Linear Amplifier complete with tube and power supply, $550.00. Rev. Anderson, WA9OBR, Manlius, Illinois.

SELL: RTTY Model 14 typing reperf, $22.50 polar relays & sockets, $2.00. Distortion test set TS-383 B/GG, $15.00. Facsimile transceivers $130/fr. Bob Friebertshauser, WB2PLY, Box 207, Princeton Jct., N.J. 08550.

APACHE for sale. In good condition. Best reasonable offer will be accepted. Contact Stan Sanders, W2TIW, Tel: 201-796-2936. 0-52-28th St., Fairlawn, New Jersey.

FOR Sale: Spanking new Mosley TA-40KR conversion kit. Original carton, $30.00. Will ship. Ted Rouilard, Breck Court, Claremont, N.H.

WANTED: Bird Thruline R.F. wattmeter, Model 43. Call or write: W1CAJ, Sam's Radio Service, 170 Main St., Everett, Mass.

ALL Issues QST 1954 to and including 1965 plus miscellaneous issues to April 1950. All CQs 1957 to and incl. 1965, except Oct. 1959, plus misc. issues to June 1950. Total 264 mags at 20¢ each. Will ship collect in one lot. Fred Hofferth, 771 Dunwoodie Dr., Cincinnati, Ohio 45230.

ANTIQUE Kennedy 110, best offer. Conrad, 5482 Crittenden, Akron, N.Y. 14020.

SELL: BC-221 freq. meter. All tubes, manual. Good condx. Best offer. David Ralston, Brebeuf Prep, 2801 W. 86th St., Indianapolis, Ind. 46268.

WANTED: NCL-2000. State price/condition. 5637 Heming Ave., North Springfield, Va.

FOR Sale: Like-new Marauder and Mohawk. $325.00 freight collect; Astatic 10C with Metrodynamics Compreamp in beautiful machined aluminum housing on bottom of G-type stand, $40.00. Matchbox, $35.00. K1MOU, Box 141, West Suffield, Conn. 06093.

HQ-180C good condx noise immunizer, $250.00; trade for linear. NYC area call WB2VAE (212) TW-9-0182.

THE Favorite of the DXCCS, Collins 75A4, late model, clean, no modifications. One owner. F.o.b. Eagle River, W9PSU.

HEATH HX-20, HR-20, HP-20, and matching speaker. Excellent condition. $200.00. Will ship collect. Ron Clark, K8JJE, 11½ S. Roselawn, Pontiac, Michigan, 48058.

DX-100B Manual Wanted. Contact: M. Pressman, 4519 N. 35th St., Arlington, Va. 22207.

SALE: SB-34, mike. Mobile Mount, Hustler 20M antenna. Excellent condition. W3GSC, 3172 Colony Lane, Plymouth Meeting, Penna. 19462.

GRIMSON Wide angle TV system. Complete camera, monitor, sync generator, cables, vidicon. Excellent condition. Best offer. Burt Cohen. W3CRE, 8559 Glen Dale Rd., Greenbelt, Md. 20770.

DX-60 and HG-10 for sale. Perfect condition. $100. WAØJTB, 427 Delaware Way, Sterling, Colorado 80751.

SELL: 4-1000A, 7.6 V 48A trans., Jennings UCS-300, 5 Kw rotory inductor LP-5 sig. gen., SX-71, 250TH, 4-400A, SK-400, SV, 30A trans., 589d. Want: HRO-7. SASE please. R. C. Sparling, K2DPA, Bemus Pt., N. Y. 14712.

TR-4 for sale with power supply and speaker, $525. Will sell separately, good condition. David Pietraszewski, KITHQ, 311 Eddy Glover Blvd., New Britain, Conn. 06053.

SELL: Mobile AM station. Cheyenne MT-1 xmtr, PMR6A rcvr, HP-10 power supply (transistor, new model), Micromatch, Microphone. Good shape. $195.00. Make respectable offer. Will ship. Lester Meisenheimer, R #5, Princeton, Illinois 61356.

GLOBE Champ 300; 160-10 meters; 275 watts fone, 350 c.w., 500 P.E.P. with adapter, $150.00. Price includes pair of spare AX9909 final tubes. KØHUO, Horace Hudson, 9431 Crestwood Manor Dr., St. Louis, Mo. 63126.

HALLICRAFTERS HT-37, $215.00. Excellent condition. WA3-GHD, 3641 Warder St., N.W. Washington, D.C. 20010

HA-230 Communications Receiver, brand new gift, never used, 9 tubes, 550m to 10m, RF stage, bandspread, Q-mult., CW-SSB-AM, $67.00. M. Blair, 40-14 Elbertson St., Elmhurst, N.Y. 11373.

COLLINS 75S-1 with 500 cycle filter, good condition. $300.00. Jack Lippincott, 140 Boonville, Jefferson City, Mo.

SELL: Complete commercial ATV camera A-1 reasonable, in original carton. H. E. Wright, 3857 No. 86th St., Milwaukee, Wis.

EICO 753 transceiver, newest line in outstanding condition, with attractive National p/s and speaker, $250.00. Phil Gluckman, WN6SSA, 19790 Merribrook, Saratoga, Calif. 95070.

SACRIFICE Apache, $140.00; SX-111, w/speaker, $150.00; Bud low pass filter, $10.00; Eico VTVM, $18.00 individually or $300 for all. QST 1957 thru 1966 in binders. Make offer. R. Faucett, 2218 Harden Circle, Hendersonville, N.C. 28739.

SACRIFICE HQ-100C gud condx, $79.00; QF-1, $5.00; Twoer, brand new, $39.00; 2M Halo w/mast, $6.50. C. Carlson, WA2-LYP, 1016 Peoples Ave., Troy, N.Y. 12180.

WANTED: Pair of selsyns for beam indication. State price, condition, type. Every response answered. Tom Menas, K3VCH, 319 Homer Drive, Turtle Creek, Penna. 15145.

BARGAIN: Heath Mohawk receiver, $119.00. WA6SNE, 921 Yale, Santa Monica, Calif. 90403.

WANTED: Information on CV-357/A RTTY converter. Also connectors or complete cable assemblies for TCS transmitter and receiver. W1CNY, 228 Hickory Hill Lane, Newington, Conn. 06111.

ANTIQUE: Western Electric 8-A oscillator with three 101-D tubes. Must sell or trade. Will answer all reasonable offers. Tony H. Scamardo, Box 294, Mumford, Texas 77867.

JOHNSON KW Matchbox. Perfect, used 6 months, $125.00. WB2QQX, 15 Myrtledale Rd., Scarsdale, N.Y. Tel: 914-SC3-6050.

DRAKE TR-4 transceiver, $450.00; Hammarlund HQ-180C, $250.00; Eico 720 transmitter, $60.00; Espey receiver, $20.00; Lafayette multitester SWR and field strength meter, Turner SSB microphone, Mosley V-4-6 antennae, Lafayette bug, Stereo headset, Goldberg, Tel: 516-WE-8-4814, 49 Felice Crescent, Hicksville, L.I., N.Y.

EXCLUSIVE! Amateurs! Your name, call on door-mat for house, shack, only $9.95! Car $14.95! Protect your license, pictures, with plastic laminating kit. 9 x 12" 2-3 x 4" sheets, $1.00! Money-back guarantee! Salch Company, 2OSX, Woodsboro, Texas 78393.

NEW and excellent reconditioned equipment at lower prices. Terms. Collins 75S-3, KWM-2; Drake 2-B, T-4X; Gonset GSB-101, GSB-201, G-50, Hallicrafters SX-110, SX-111, SX-101A, HT-37, SR-160; National HRO-60, NC-303, NCX-3, NCX-5, NCL-2000. Much other equipment. Write for price lists. Henry Radio Company, Butler, Mo.

FOR Sale: Heathkit Marauder, $245.00; Mohawk, $125.00; Warrior, $170.00. Guaranteed excellent. W2CGL, Box 485, Far Hills, New Jersey.

R-4, T-4X, MS-4. Homebrew p/s; 3-el. 15-beam, rotor, tower, $600. W2EUQ. Tel: 607-692-5924.

SELL: QST 45 year solid run, in binders $375, plus shipping. W2DTE.

DRAKE R4, barely used, $300.00. KØCAB, 1207 28th St., S.E., Cedar Rapids, Iowa 52403.

WANTED: Gonset G-28 ten-meter transceiver. Williams, WØRVB, 908 Lanyard, Kirkwood, Missouri 63122.

WANT: HP-13 power supply. Sell excellent Regency ATC-1 converter, $22.50. LaVern Smith, 3104 Catherwood Ave., Indianapolis, Ind. 46226.

EICO 720, like new, $60.00. Hallicrafters SX-99 with HD-11 Q-mult., $70.00. Jim Velleman, 15 Cliffway, Port Washington, N.Y. 11050. Tel: 516-PO7-5952.s

DRAKE 2-B calibrator, low frequency converter, speaker, Q-multiplier, $240.00. Heath KW amplifier. Original owner of both, like new. K7AOA, 5750 Yukon, Sparks, Nevada 89431.

SELL: Brand new, 100 mfd. 3,5000 vdc G-E Pyranol capacitor in original sealed carton. Size 4 x 8 x 14, wt. 24 lbs. $45.00 f.o.b. WØAIH, 814 4th St. S., Virginia, Minn. 55792.

SELL: Hornet TB-500 beam, AR-22 rotator, 811A GG amplifier with power supply, MARS EK-20 keyer. $125.00 plus shipping. WB6AWR, 3438 36th St., Sacramento, Calif. 95817.

WANTED: 32S-3, 516F2, 312B4, 30S-1. Sell or trade new Dumont 5890B frequency meter with crystals for VHF-FM marine band, W8RWZ, C. H. Buchanan, 4812 Lehigh Dr., Springfield, Ohio 45503.

75A-4, SN1660. 6 Kc 3.1 Kc., 800 cps. filters, $400.00. Johnson 500 transmitter, $300. Gonset Commander w/VFO, $50.00. Assorted meters at $2.00. W2KQA, 127 Nesbit Terrace, Irvington, N.J. 07111.

FOR Sale: Collins 75A-4 Serial No. 2509, excellent condx, $340.00; Electronic organ, Schober consolette, seldom used, no shipping. Cost $800. (trade?), sell $400. QSTs 1940-1966, missing 3½ years 1955,. 1956, 1957. $30.00. 3" Triumph 'scope. Hustler 20-meter antenna, $10 Allen Margolis, W2UPN, 196-43 69th Ave., Flushing, 65 L.I. N.Y. GL4-0354.

TELREX 20M-317B. Excellent condition. $85.00. 710 Arnold, Alamagordo, New Mexico 88310.

WANTED: General Radio 874 Series air lines, stubs, adaptors, accessories. Particularly need 874-M component mount and 874-Z stand. Also need ESI type 855A-1 bridge oscillator/detector. W5QMI, Freund, 9310 Beck, Dallas, Texas 75228.

4-1000A console 10-80 meter linear amplifier with 4-5 KV 1 amp. power supply with various voltages for exciter; vacuum variable and desk-top monitor scope and SWR bridge. Homebrew, but FB mechanically, electrically and in appearance: $390.00. Like-new SX-117 receiver, $250.00, and HT-44 xmtr with a/c p.s., $250.00 or $480 for both. WA8AWD, 15801 Woodbrook, Maple Heights, Ohio. Phone 216-662-6533.

DX-60 and HG-10, both $65.00. Very good condition. WB6-ONE, 2411 Alamo St., Pinole, Calif. 94564.

FOR Sale: Oil capacitors, 13 mfd, 4000 VDC, $5.00; 6 mfd. 4000 VDC, $4.00; 10 mfd. 2500 VDC, $3.00; 6 and 4 mfd, 2000 VDC, $1.50; 12, 10 and 6 mfd. 1000 VDC, $1.00. 4 mfd. 10,000 VDC (make offer). You pay shipping. J. Stafford, 478 Oriole Ave., Phila., Penna. 19128.

JOHNSON Viking Valiant II, in A- condx, used very little. Will ship. $230.00. W6ULC, 2878 No. Bailey Dr., Anderson, Calif. 96007.

FOR Sale: Gonset GSB-100, needs calibration and adjustment, $105.00. Linear 2-4400A, $55.00; power supply, 1800 volts, $25.00; Tecraft 6-meter transmitter, $23.00. Gonset Super-12 converter, $25.00. Ramon Velazquez, WA2YDH, 34-36 64th st., Woodside, L.I., N.Y. 11377. Tel: OL-13157.

HT-44 transmitter and PS-150-120 supply, $200.00; SX-117 and transceiver cables, $200.00. In new condition with manuals. Richard Hennis, 3409 Sevier Dr., North Little Rock, Arkansas, 72116.

SELL: KWM-2, 30L-1, and power supply $1000. W4CPQ, 1351 Bolling, Norfolk, Virginia.

WANTED: Magnavox electrodynamic speaker (6-volt) with gooseneck bell horn, Remler type 3-honeycomb coil tuner. Atwater Kent variometers and variocouplers, 6 ohm and 30-ohm rheostats, surface mounting sockets, Cardwell or Bremmer-Tully variable condensers. No trades. Price C.o.d. Harold L. Brouse, 2290 Struble Road, Cincinnati, Ohio 45231.

SELLING Out: Large collection of AM and FM gear. Going SSB. Send stamped envelope for list. Warren Waterman, W2-JRX, 55 Lake Ave., Middletown, N.Y.10940.

WANTED: Late model Collins receiver, Hallicrafters HT-44, with AC supply, Swan 350 or Galaxy V with AC supply. Must be mint condx. Certified check within 24 hours. WA6JWK, 6951 San Joaquin Circle, Buena Park, Calif. 90620.

WASHINGTON, D.C. Area: Collins KWM-2, 516F-2, 30L-1, 312B 3, 189A-2. Mint condx. $1150. K4LYW, 8114 Blairton Rd., Springfield, Va. 22150. Tel: 451-2371.

HX-30, $150.00; Drake 2B, $175. Ameco converter, $25.00. 1 Kw. amplifier, extra 4-250A, $175.00. 6 meters. Pick-up or ship collect. WA7BTG, 3061 Northlake Way, Bremerton, Washington 98310.

COLLEGE Expenses. Eico 753, 751 p.s., factory aligned, s.s. VFO, $280.00; SX-140, $65.00; HT-40, $55.00; HA-5 VFO, 6 mtr. xtal, $55.00. All three, $165.00. Webco "Compact Deluxe" tape recorder, $65.00; with mike, $70. Turner Dynamic mike, stand, $14.00. Mosley "El Toro" (80-40-20), $9.00. Command T-19/ARC-5 xmtr, $14.00. WA5JVL, 8704 Belfast, New Orleans, Louisiana, 70118.

HW-12, AC, DC supplies. PTT mike, cables, all for $140.00. HQ-129X, $70. J. Uffenbeck, WA9ETL, 111 Meadowbrook, Fond du Lac, Wis. 54935.

THUNDERBOLT KWT., factory wired with original packing, like new condx, $250.00. K8IKB, 221 Edinborough Dr., Findlay, Ohio 45840.

SELL: Collins 75S-1 receiver, serial 2668, sharp condition. $250.00. W9NRT, Effingham, Ill.

CLEGG Zeus and Interceptor with Allbander 3-31 Mc. converter-speaker. Like new, $650.00. WB6PDN, 7800 Brentwood Dr., Stockton, Calif. 95207. Tel: 209-477-0536.

SELL: Surplus equipment, excellent for brand new ham, particularly for six. Johnson Viking Challenger, covering six thru eighty. Hallicrafters Super Het S-106 exclusively for six. Globe 6 and 2 VFO and Cesco Reflectometer. Complete station on six and transmitter on lower bands. Excellent condition, all for $150.00. H. C. Kranich, W2JWS, 390 Riverside Drive, N.Y., N.Y. 10025. Tel: 212-662-9822.

DUMMY Loads, 1 KW, all-band, kit, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford, N.J.

BUY My SX-100, $90.00. Get free Johnson Adventurer, Heath Balun. All in vy gd condx; manuals. Philip Lowe, 111 E. Spring St., Somerville, N.J. 08876.

GONSET GSB-100, mint condition, only $160.00. WAØLAA, B. D. Rosenberg, 6020 Waterbury Circle, Des Moines, Iowa.

WANT: Johnson K. W. and 275 W. Matchbox, Harvey-Wells 500 W. Z-Match coupler. L. D. Perry, K4ORZ, Rte. 2, Box 75 P. Thomson, Georgia 30824. Tel: PH 404-595-2440.

CHEAP Cost, excellent condition; Collins 75S-1, $250.00; Hallicrafters SR-160, DC, AC power supplies, only $350.00. Al Goldberg, WA1CSW, Lindley Terrace, Williamstown, Mass. 01267.

RANGER I, modified for six meters (See April 1959 QST). With temperature compensated VFO, grid block keying, spare 6146, and instruction manual, $115.00. W1VAH, A. C. Berg, 19 Woodland Road, Ashland, Mass.

1.5 to 3.0 Mc. ARC-5 rcvr, new, W/P.S., $15.00; 25 W.H.B. mod., $15.00; 3-el. 10M beam, $15.00. Ameco L.P.F., $2.00. WB2AEO. Tel: 212-721-4518.

HAMMARLUND HQ-180C, in mint condx, with S-200 spkr, xtal calibrator and clock. Best offer over $200 takes it. WA4-PCC, 2123 Alameda Ave., Orlando, Fla. 32804.

FOR Sale: Heathkit SB-400, $300.00: Hammarlund HQ-170C, $180.00: Heathkit DX-60, $40.00; 4-400A, $20.00; Vibroplex key for electronic keyer, $10.00. All offers considered. WA7-BNM. Bruce Horn, Box 402, Coos River, Coos Bay, Oregon

DRAKE 2-B and 2-BQ in absolutely perfect condition, $199.00 and $29.00. Dow-Key DK-60-G2C relay, $8.00; DKC-TRP t/r switch, $15.00. Want an SB-34. Make offer. WA3CRA, 4715 Merivale, Washington, D.C. 20015. Tel: a.c. (301)-656-4803.

WANTED: 2B or other good receiver, reasonable. For sale: 2 new 5867 tubes, $12.00 each. 100 watt variable 360-440 cycles power supply: $45.00. 50 new miscellaneous UTC transformers and filters: $100.00. WA2FKZ, 54 Nassau Road, Huntington, N.Y. 11743.

WANTED H.R.O. or H.R.O.5. Must be in good condition. Harold Parsons, 1646 Aline Dr., Grosse Pointe, Michigan 48236.

FOR Sale: Florida 3-bedroom DXer's QTH with 70 ft. guyed tower, 40 ft. crank-up and tilt-over tower, several beams: $19,000. HT-37 with HT-41 linear, both very clean, in excint condx, with manuals. Best offer near $400. K4IIF, Box 205, Winter Haven, Fla. 33881.

SELL: Engineering student needs money. HR-10 receiver with calibrator, $65.00; T-60 transmitter with 4 crystal, $40.00; SBA-300-3 6-meter converter, $15.00; Vanguard transistor 2-meter converter, $8.00; WRL 6-meter preamp with tubes, $8.00. All aligned by engineer; all manuals. Everything for $125.00. John Salk, WA9SSZ, 157 Pierce St., West Lafayette, Ind. 47906.

FOR Sale: PMR-6 receiver, PSR 6-12 power supply, $30.00; Brush Model BL-905 amplifier, 4-stage, 6V6 output, $10.00. Wanted: pair 2 meter FM transceivers. Jack Bardon, W4RHC, 2238 Morgan Lane, Dunn Loring, Va. 22027.

INVENTORY Reduction; Prices good until March 10th only: Cash, no trades: 32S-1, $365.00; R-4, $235.00; HT-37, $199.00; HT-44, $199.00; SW250, $225.00; GSB-100, $149.00; SX-96, $89.00; SX-100, $129.00; 2A, $125.00; and $135.00; Courier 500, $109.00; NC-183, $85.00; Viking II, $72.50, (new, boxed. HT-37, $315.00; HT-44, $265.00). G-76 W/A.C., $169.00; SR150 W/AC, $349.00. Howard Radio, Box 1269, Abilene, Texas 79604.

KNIGHT V-44 VFO. In excint condx. Any offer within reason. David Fisher, WA6ZMR, 243 Cimmeron, Glendora, Calif. 91740.

DX-60A, $65.00; HR-10, $65.00; HG-10 VFO (new), $30.00. Buy all complete with accessories for $160.00. WA7EKQ, Box 191, Roy, Utah 84067.

JOHNSON Viking II, 250-20 filter, 250-23 Matchbox, WRL 755 VFO, $130.00. Dave Christel, 219 Shady Lane Ct., La Crosse, Wis. 54601.

SELL: SX-117, $300.00; T-60, $30.00. Both in A-1 condition. Chuck Johnson, 3551 W. 81 Pl., Chicago, Illinois.

WHEATSTONE Perforators WPE3/1SS, new surplus but have been in storage for some time; with manuals, repair parts and tools. Roy Brougher, W5HPB, 4002 Levonshire, Houston, Texas 77025.

FOR Sale: Clegg 99'er, in excint condx, $90.00. Stan Israel, WA2BAH/1, 21 Hartford Ave., Apt. 16, Newington, Conn. Phone: a.c. (203)-666-3254.

WANTED: Gonset Super Six converter. Must be reasonable. Also want: antique radios, xtal sets, tubes, prior to 1925. Raymond Fisher, Box 234, Charleroi, Penna.

CRYSTALS Airmailed: MARS, Novice, Nets, SSB, etc. Custom finished etch stabilized FT-243 .01% any frequency or fraction, 3500 to 8600 $1.90. (Five or more same or mixed frequencies $1.75) (Nets: Ten or more same frequency $1.40). 1700 to 3499 and 8601 to 20,000 $2.50). Overtones supplied above 10,000. 10,000 to 13,500 fundamentals $2.95. Add 50¢ each for .005%. HC-6/u metal miniatures above 2000 add 75¢ each. Crystal kits for ARRL and other projects including "IMP", "SSB Package," "DCS-500" etc. Tell us your needs. Write for order-bulletin. Crystals since 1933. Airmail 10¢/crystal, surface 5¢. C-W Crystals, Marshfield, Missouri 65706.

TR-4, $480.00; AC-4, $93.00; R4-A, $330.00; T4-X, $330.00. Factory sealed boxes. Sell separately. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C.

COSMOPHONE 35 transceiver, the gem of them all: $275.00. W2DYU, 360 Marlboro Road, Englewood, N.J.

WANTED: Frequency Counter, HP-608B signal generator, $250.00; Boonton "Q" meter 180-A, $150.00; Tektronix 524, $275.00. W8RMH, 1910 Longpoint, Pontiac, Michigan.

HQ-10 monitor 'scope, used 2 months, in perf. condx, $55.00. Hammarlund HK1B keyer, 4 months new $30.00. Art Kendall, WB2VXN, tel: 992-6391, 37 Passaic Ave., Livingston, N.J. 07039.

FOR Sale: Galaxy V, remote VFO, AC and DC supplies. Latest VOX, xtal calibrator and speaker console: $500.00. Less than a year old. Will dicker. James Don Pryor Jr., WØIPB, 626 North Erie, Wichita, Kans. 67214.

NATIONAL NCL-2000 2 KW linear amplifier, in mint condx $400. W9HOG, Alan Kogerup, 324 Crestwood Dr., Roselle, Illinois. Phone a.c. 312-894-1328.

TRANSMITTERS, Receivers repaired by Radio Engineer. Lab Equipment. J & J Electronics, Windham Rd., Canterbury, Conn. Tel: 203-546-9126.

SELL: DX-100, T-R switch, low-pass filter, SX-111, $200.00. W9EFV, 419 S. Oakwood, Angola, Ind.

WANTED: Clean allband transceiver. Prefer Southern Californian deal. Byrn, K6ZUT, 613 S. Lambert, Fullerton, Calif. 92633.

BARGAIN: Knight R-55A receiver with xtal calibrator, $46.00; Heath GD-1B grid dip meter, $12.00. WA1FLZ, Glenn Pearson, Box 503, Ivoryston, Conn. 06442.

INCENTIVE Licensing? You need Posi-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to IBM type answer sheets. A very good aid to learning and a Must in preparation for FCC Amateur exams. General Posi-Check consists of 297 questions and explained answers for only $2.98. Extra Class, 115 questions and diagrams with explained answers, $2.00. 139 questions of the 297 in the General Posi-Check apply directly to Extra Class also. Get both for only $4.50 postpaid. Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322

COLLINS 75S-1, with notch filter, $200; Heath DX-60A and HG-10 VFO, $90.00; Mosley TA-33 Jr., $30.00. Mike Tewksbury, 2674 Green Road, Shaker Heights, Ohio 44122.

HALLICRAFTERS SX-115 and Johnson Ranger I. Both in perfect condx. Need money for college. WA2YFS, Jeff Delbridge, 166 Huxley Drive, Buffalo, N.Y. Phone: 716-839-3342.

20A with QT-1 anti-trip, $100.00: Gonset Super 12, $30.00: HK-170, $185.00: all above in like-new condition. AF-67 with M1070 power supply, $65.00: AN/ARR2 receiver, $6.00. A new 4X150A tubes, $20.00. New Collins mechanical filter F4SS-N40, $15.00: 12V DC to 110V AC ATR inverter 125-watt, $25.00; Johnson T-R switch, $15.00. Radiophone bandscanner Model 44, $30.00. Will trade a Hy-Gain 20-meter beam for a Tri-Bander. All f.o.b. Robert G. Thompson, 5801 N. 79th St., Milwaukee, Wis. 53218.

HAVE Quit coin-collecting. Will trade full set of Lincoln or mercury or Buffalo or other coins for mobile SSB transceiver. Lew Holt, W7AAI, 2611 Liberty, North Bend, Oregon 97459.

CLEANING Out shack: for sale—National NC-183, $55.00; Heathkit DX-100, needs work, $20; Hammarlund SuperPro SP-400X, $85. Will accept any reasonable offer. W1YU, Yale University Radio Club, Yale Station, New Haven, Conn. 06520.

COLLINS: For the very best in servicing done with the personal touch, it's W2VCZ. 75-A-4 front end mods. $69.95. 75-S series front end mods. $34.95. VCZ Sales. W2VCZ, 5 Pinetree Road, Ramsey, N.J. Tel.: 201-327-9494.

SELL: HQ-110A with speaker, $140.00. WA8RXL. Stephen G. Hurtuk, 27 N. Bridge St., Struthers, Ohio 44471.

BILL Ogg, WA9RMO, at Evansville Amateur Radio Supply, 1306 Division, Evansville, Indiana 47715, will save you 15% plus on ham supplies. We stock Drake TR-4, T4-X, R4-A, Galaxy 2000, Galaxy V, Swan 350, complete Hy-Gain line, Ham-Ms, Waters, and many more. Send us a stamped envelope for the deal you have been looking for. Freight prepaid on large orders.

FAMOUS ARRL Handbook 813 rig, 350 watts AM, CW, six bands, VFO, complete with modulator and power supplies, $100. W5OD, Smith, 2009 Oak Ave., Port Arthur, Texas.

EICO 720 factory-wired with ten crystals for 80, 40, and 15 meters, $75.00 RME-4350 receiver, $115.00. Both are in mint condition with manuals. Will ship. Ira Deutsch, WA1FNS, 1575 Tremont St., Boston, Mass. 02120. Tel: (a.c. 617) 277-0729.

FOR Sale: Heath SB-10, perfect condition: $50.00. Heath O-8 3" oscilloscope, good operating condition, $25. Carl Vai, 2514 Birch Drive, Richmond, Indiana 47374.

QSTs. Sell complete only. April thru Dec. 1921. Years 1925 thru 1965 inc. unbound, $75.00. U pay shipping. K. N. Emerson, 862 Clear Ave., St. Paul, Minn. 55106.

FOR Sale: HT-44 and P-150AC, $275.00; SX-117 with Ameco preamp, $235.00. Pick-up deal preferred. WB2AUB, Philip Bernstein, phone: (516)-767-8078.

WANTED: HRO-50 or 60 with coils and accessories. Top dollar for one in excellent condition. Ray Nowak, 1823 Monroe Ave., South Milwaukee, Wisconsin 53172.

SELL: Gonset Sidewinder 2-meter, A.C. power supply, mike, mint condition D.C. power supply, never used. S.W.R. Bridge #262 and #261 $375.00. Al Taylor WB2KTA, 3092 Avenue X, Brooklyn, N.Y. 11235.

WANTED: Cabinet for SP-600, Hammarlund HC-10. Sell: 75A-4 No. 1201, 0.5, 2.1, 3.1 kc. filters, Noise Blanker, speaker, $500.00. HW-32, HP-23, $125.00; HT-37, $250.00. 200-V, $425.00. W3DZZ, Tri-band beam, $100. HO-13 ham-scan, $65.00. KWS-1 plate transformer new, $50.00. James Craig, 172 White Birch, Portsmouth, N.H. 03801.

SELLING: Valiant, HQ-170C, all accessories. Also transformers, chokes, filter condensers, tubes, meters, test gear, other items. SASE for list. Benson, W1RUJ, 14 Reservoir, Westwood, Mass. 02090.

SSB: Heath HX-20 transmitter, 80-10 V/LSB, CW, VFO, VOX, 100 WPEP, 15 hours, engineer-wired, clean, $125.00 less supply. Parts, cabinet, tubes for 10 tube linear (Jan. 1964), $35.00. Best offer each or both. Bases, K2IUV, 19 Standish Ave., Yonkers, N.Y. 914-SP-9-6425.

HEATHKIT HW-12, GH-12 mike, $95.00. Viking I, Viking 122 VFO, $75.00. WAØDNV, Dawson, Nebraska 68337.

HT-32A, HQ-170, good working condition, $420.00. K9OFB, Ken Eigsti, Rte. 2, Morton, Illinois, 61550.

BARGAIN: Conversion kit for HW-32 transceiver to Triband xcvr. Original cost, $50.00, will sell for $30.00 postpaid. WA8-JWR, Larry, 2501 Lippincott Blvd. B-46, Flint, Michigan.

SAVE $200.00 Swan Mark 1 linear for $343.00. Like new. Will deliver 100 miles. Just finished homebrew linear. Don't need two. Jack Yeoman, W8VHY, R #4, Washington Court House, Ohio 43160.

FOR Trade: BC-610 xfrm, filtering accessories, pair (new) 4-400A's, 4X250's, 20-amp. powerstat, meters, xmitt variables, other goodies. Want test equipment. Jess Speer, W6ELJ/K6MNU, 2433 S. Lowell, Santa Ana, Calif. 92707.

FIRST Certified check for $250 takes Drake R-4A receiver, MS-4 matching speaker, manual, 5 months old, new condition. I pay shipping. R. S. Crowell, 640 Stonehenge Drive, Mary Esther, Florida 32569.

WANTED: Interceptor B or HQ-170A-VHF receiver. Tom Hanrahan, K9ZHJ, 8116 S. Whipple St., Chicago, Illinois 60652.

DRAKE TR-3, MS-4, AC-3, and DC-3. All in mint condition. First $500 takes all. Will ship. Shipping charges collect. K8DIJ, L. Staszak, 1445 Hagley Road, Toledo, Ohio 43612.

COLLINS 32V-3, in brand new condition, $250.00. Edward J. Vilagi, Page Drive, Mentor, Ohio

DRAKE 2-B plus calibrator, speaker/Q-multiplier, crystals, $215.00; Heath HX-20 SSB VFO 80-10 exciter, plus HP-23AC, $145.00. Manuals. Working perfectly. G. V. Cordioli, WB6SBJ, 18062 Norwood Park, Tustin, California 92680.

VIKING II xmtr, Heath VFO. Shipped postpaid, $50.00. L. D. McCreary, K4KHE, RFD #6, Franklin, Kentucky 42134.

KWM-2 factory-modified, set of spare tubes, PM-2 AC power supply, 516E-1 12-volt mobile power supply negative ground 10-C mike, $185.00; 30L-1 final, $385.00. All manuals. Prepaid stateside, $1200.00 certified check. W. P. Searcy, Jr., W5LV, 1821 N. Turnbull Drive, Metairie, Louisiana 70001.

AMECO Power supply PS-1 and 6 mgr. converter CB-6, $25.00; APR-4 receiver, complete with 3 tuning units (2) 38 to 95 Mc (1) 74-320 Mc complete with APA 38 Panadaptor converted to 60 cy., $150.00 Ken R. Hancock, K2SGZ, 2108 Richmond Road, Endicott, New York 13760.

HALLICRAFTERS HT-32, $240.00; D-104 microphone with G-stand, $24.00. K3DCP, 818 Sturgis Place, Baltimore, Maryland 21208.

WANTED: SX-88. State condition and price. W9JKC, Byron Sharpe, P.O. Box 366, Glencoe, Illinois 60022.

BC-1031C Panadaptor, 455 Kc input, like-new condition, $60.00; Viking Invader 2000, in mint condition, $700.00. W5OBX, O. C. Lindsey, 1919 Ramada, Houston, Texas 77058.

COLLEGE Bound: RME-4350 Hamband receiver. In absolute mint condition. $100.00 firm. Marvin C. Sachs, WB2DTU, 29 Chestnut, Rockville Centre, New York 11570.

WANTED: Several KTV 11" x 10 ft. tower sections. Within 100 miles. David Eaton, WA3EKD, 35 E. Elizabeth Ave., Bethlehem, Penna. 18018. Tel: a.c. (215)-865-0843.

FOR Sale: HRO-500, in mint condition. Save $500.00 by sending me your certified check, or money-order for $1,000. W3VDA, Bernard Schmidt, P.O. Box 1333, Harrisburg, Penna. 17105.

HALLICRAFTERS SR-160 transceiver, $175.00. Original Standard Vibroplex, $12.00. Workshop 10-meter beam, $10.00 (beam local only). W. F. Walsh, W2BTE, 368 Durham Court, Union, N.J. 07083.

DRAKE 2A receiver with Drake "Q-Xer". Q-multiplier in good condition, $125.00. John Sailer, K6PZL, 2 School Way, Watsonville, California 95076.

MUST Sell, Going to medical school: Drake TR-3 SSB transceiver w/AC-3 AC supply; Heath HO-10 Monitor 'scope; Turner 4S4-C SSB mike; Hy-Gain 10-15-20 trap doublet. Best offer above $500.00 takes all! Jay Klein, WA2PKD, 1020 Grand Concourse, N.Y. 10451. Tel: JE-6-3741.

"HOSS TRADER Ed Moory says if "you can pay cash and no trades are involved, you can purchase the following demonstrator equipment with factory warranty: NCX-5, $459.00; NCL-2000, $549.00; NC-200, $296.00; Swan 350, $349.95; Mark I linear, $389.95; Swan 250, $269.95; Galaxy V, $344.00; 32S-3, $619.00; KWM-2, $899.00; SB-34, $329.00; Drake R-4A, $334.95; T4-X, $338.00; 30L-1, $419.00; new 516F-2, $124.00; Drake 2-C receiver, $185.00; new Ham-M rotor and demo TA-33 beam, $188.95. Demo Mosley Classic 33 beam, $105.00; Special Rohn 50 ft. fold-over steel tower, $189.00; demo Ham-M rotor, $89.95. Reconditioned gear: HT-35, $219.00; KWM-2, $639.00; 32S-3, $529.00; Swan 350, $295.00; SB-33, $179.00; Swan 240, $195.00: Ed Moory Wholesale Radio, P.O. Box 506, DeWitt, Arkansas. Phone 946-2820.

TOROIDS. 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

HAVE Complete following QST years: 1928, 1929, 1931, 1932, 1935, 1936, 1938, 1939, 1940, 1952, 1953 and 1956. $75.00. A. Winslow, 381 Cornwall, Hartford, Conn.

HALLICRAFTERS SX-117, $190.00; HT-44 with PS-150, $210.00. All three for $350.00. Dick Kelly, W6BKY, 1837 Calistoga Drive, San Jose, California 95124.

WANTED: SB-10 Heath Sideband Adapter. Must be in good condition. Will pay top price. Rex W. Eagle, 241 E. Harvard, Anchorage, Alaska 99501.

COLLINS 75S-1 (incl. c.w. filter); HT-44 with matching power supply, spkr; Johnson electronic switch, Astatic microphone, Telrex 20-meter beam (3-el.). Swap package for or a VW sedan. W6FFD, 5228 Linda Rosa, La Jolla, Calif. 92037.

FOR Sale: Knight 50 watt c.w. transmitter, $25.00; Lafayette, factory-aligned and checked, KT-320 receiver, $40.00; Heath HD-11 Q-Multiplier, $7.50. Michael Wilkinson, 1280 Johnston Drive, Watchung, New Jersey 07060.

SELL: Eico 730 Modulator, new EL34's, perfect, $35.00. Stephens, 1055 Morewood, Pittsburgh, Penna.

QSTS. Commercially bound: 1928-1931, $40.00; 1943-1963, $150; 1933, 1941/$7.50 each. Unbound, 1964-1966, $3.50 each. Also 1934, 1939, 1944 with one issue missing, at $2.50 each, or 50¢ an issue. W1BKR, William G. Chace, 35 Depot St., Westford, Mass. 01886.

COMPLETE 80 meter Novice station ready to go with antenna key, headphone, etc. $63.00. Also miscellaneous ham parts cheap. C. V. Kimball, WA8UNS, 810 W. Jefferson, Ann Arbor, Michigan.

HAMMARLUND HC-10 SSB converter w/manual. Mint condx. $75.00. PP in cont. USA. Bill, WA6RZT, 5311 W. 98th St., Los Angeles, Calif. 90045.

WANTED: Harvey-Wells Z-Match antenna Coupler. Art Myers, 1451 South 15th St., Omaha, Nebraska 68108.

FOR Sale: Clegg 22er 2-meter transceiver, used 27 hours, excellent condition, $165.00. Nittany Amateur Radio Club, P.O. Box 60, State College, Penna. 16801.

75A2, in excellent condx. Built-in SSB product detector (only modification). With book, less speaker: $175.00. F.o.b. Chicago. Will deliver within 100 miles. Ben Piller, 9238 S. Kingston, Chicago, Ill. 60617. Tel: a.c. (312)-375-9294.

Index of Advertisers

EIMAC

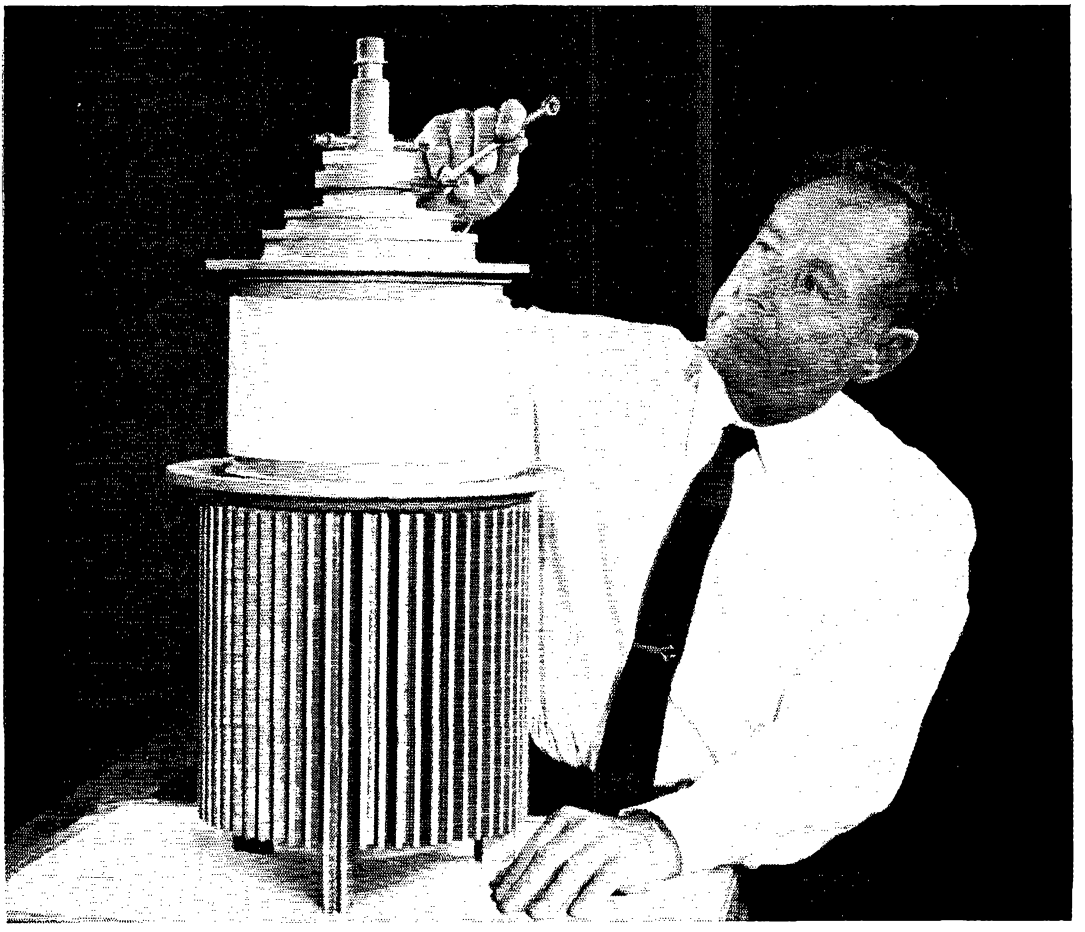
250 kW tetrode now ready for tomorrow's super-power transmitters

The EIMAC 4CV250,000C is the world's highest power tetrode. It is designed for service in super-power broadcast transmitters, and was developed on the foundation of technology which produced its "little brother," the hundred-kilowatt 4CV100,000C, now used by the USIA. The giant new vapor-cooled tube combines high power gain with long life. Vapor cooling is accepted as an efficient and economical method of cooling in advanced broadcast systems. As EIMAC's latest addition to its line of power tetrodes, the 4CV250,000C is ideally suited for service as an audio modulator, a pulse modulator, or a regulator, and as an rf amplifier in linear accelerators. Ready now for the super-power transmitters of the future, this 250 kW tetrode is another example of how EIMAC's experience in power tube technology paves the way for the developments of tomorrow. For a power tube to fit your needs—big or small—write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.

TYPICAL OPERATION
(as a Plate-Modulated Power Amplifier at Frequencies below 30 MHz)

DC Plate Voltage	14 kV
DC Screen Voltage	800 V
Peak AF Screen Voltage (for 100% Modulation)	800 V
DC Grid Voltage	−800 V
DC Plate Current	29 Amps
DC Screen Current	3.6 Amps
DC Grid Current	1.8 Amps
Peak RF Grid Voltage	1200 V
Grid Driving Power	2.5 kW
Plate Output Power	292 kW

EIMAC
Division of Varian
San Carlos, California 94070



RUSH...RUSH...RUSH TO "HAM HEADQUARTERS, U.S.A."®

WASHINGTON'S BIRTHDAY GIANT RIOT SALE

AT BOTH HARRISON STORES!

SAVE! SAVE! SAVE!

COME IN AND CHOOSE FROM

101 FULLY GUARANTEED TOP CONDITION TRADE-INS

in the world famous Harrison Trade-in Center. At prices chopped 'way down for this super sale!

MOST CRAZY PRICE DAY IS WASHINGTON'S BIRTHDAY

Wednesday, Feb. 22nd!

(Sorry, we cannot give any information by phone or mail.)

COME, AND BE SURPRISED!

Doors open 8:30 to 6:15

COME IN, AND TAKE YOUR PICK OF

100 BRAND NEW RECEIVERS & TRANSMITTERS

at and even below Regular Franchised Distributor's Cost

Most Makes! Lots of Models!

All Fully Guaranteed!

TRADE-INS WELCOMED

BRING 'EM ALONG

ONLY ONE SPECIAL SALE ITEM TO A CUSTOMER

Thousands of other items specially reduced for this sale

NO DEALERS ADMITTED!

CASH & CARRY

(It will pay you to empty the Piggy Bank for this one!)

AMPLE PARKING

COME TO OUR BIG ALL-MONTH MOVING CLEARANCE SALE!

Starting Feb. 1st, plenty of fresh bargains will be placed on sale each and every day, with prices slashed 'way down!

Parts, accessories, equipment, etc.

IT WILL PAY YOU TO DROP IN EVERY DAY!

HARRISON

225 GREENWICH ST.
New York, N. Y. 10007
139-20 HILLSIDE AVE.
Jamaica, N. Y.

Next to good band conditions you need this RCA "library"

Power Tubes • Receiving Tubes • Transistors

Here from RCA is Amateur Radio's most comprehensive "library" of tube and transistor references. You'll find a storehouse of technical facts on hundreds of RCA tubes and transistors: application hints; installation tips; pages of circuits; characteristic curves—helpful regardless of mode and band you operate, QRP or QRO, DX or rag-chewing. Next to good band conditions, these RCA publications can help you to better QSO's by maintaining equipment that's always at top efficiency. Get the manuals you want from your RCA Industrial Tube Distributor.

RCA Transmitting Tube Manual TT-5 $1.00*

RCA Receiving Tube Manual RC-25 $1.25*

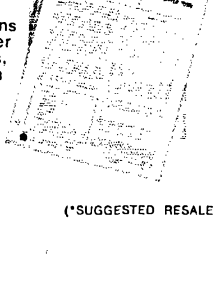
RCA Transistor Manual SC-12 $1.50*

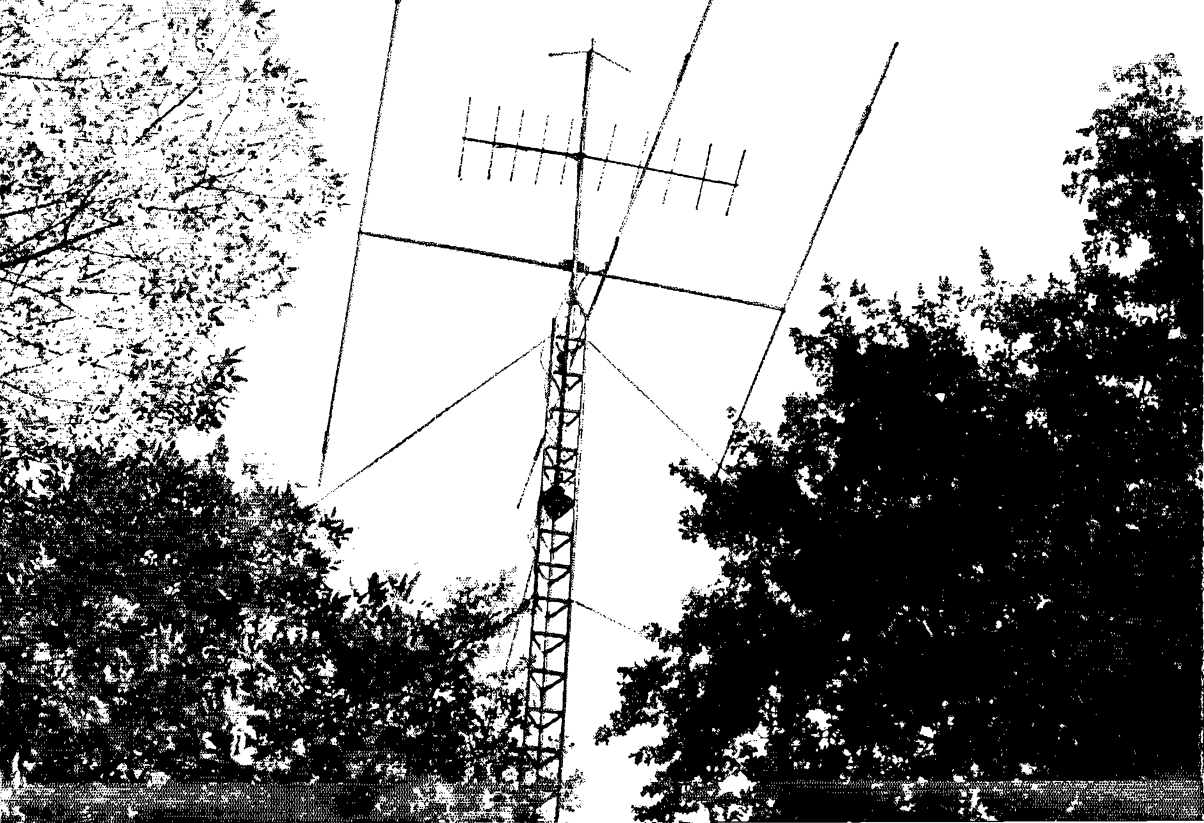
(*SUGGESTED RESALE PRICES)

RCA ELECTRONIC COMPONENTS AND DEVICES, HARRISON, N.J.

The Most Trusted Name in Electronics ®

RCA Technical Bulletins on single types of power tubes, receiving tubes, transistor and silicon rectifier types are available from RCA Commercial Engineering Dept., Harrison, N.J. 07029





New from National

The most versatile 5-bander on the market ...priced even lower than a kit rig!

Here's the fastest way to move up from single band or triband operation . . . the all-new National 200. It's a fabulous five-bander, an ideal rig for mobile, portable, or home operation . . . and it's only $359! For the first time at this amazingly low price, you get top-notch SSB, CW, and AM performance on the 80 through 10 meter bands . . . plus National's traditional quality and full One-Year Guarantee.

National gives you these important features: ■ Complete coverage of the 80 through 10 meter bands. ■ 200 Watt PEP input on SSB, plus CW and AM. ■ Separate product and AM detection plus fast-attack slow-release AGC. ■ Crystal-controlled front end and single VFO for high stability, and identical calibration and tuning rate on all bands. ■ Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent QRM on receive . . . plus solid-state balanced modulator for "set-and-forget" carrier suppression. ■ Operation from new low-cost AC-200 supply or from NCX-A or mobile power supplies. ■ ALC. ■ 45/1 planetary/split gear tuning drive. ■ Automatic carrier insertion in AM and CW modes. ■ Panel meter automatically switched to S-units on receive. ■ Universal mobile mount included.

ONLY $359.
with National's full One-Year Guarantee

National Radio Company, Inc.
37 Washington Street, Melrose, Massachusetts 02176