January 1966
60 Cents

QST

devoted entirely to

amateur radio

STATION CONTROL AT W1AW

hallicrafters has harnessed 500 watts of brute power for only $395.

NEW SR-500 Tornado tri-band transceiver!

Own your own private tornado—*500 watts worth of sheer power* for the big, effortless signal you've always wanted in a transceiver. And that's just the beginning! You get:

Exclusive Hallicrafters AALC (Amplified Automatic Level Control) providing up to 12 db. of effective compression • RIT (Receiver Incremental Tuning) with ± 3 kc. for superior net and CW operation • A superbly designed crystal lattice filter which makes the most of the desirable SSB transmission characteristics • A built-in changeover relay permits direct operation with the HT-45 or other linear amplifier • Sensitivity is less than 1 μv for 20 db. S+N/N ratio • Receiver employs a separate AVC amplifier providing a figure of merit of 100 db. • Price: $395.00 less power supplies and mobile mounting kit.

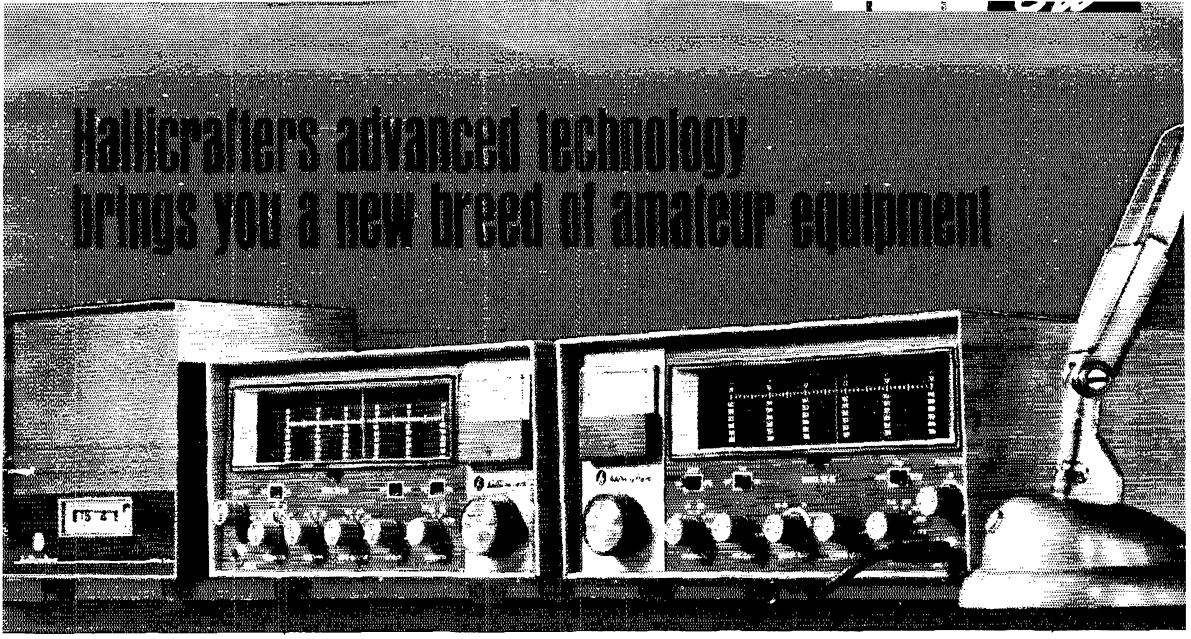
Get the full story from your distributor or write for complete specifications today.

"Quality through Craftsmanship"

hallicrafters

5th & Kostner Aves., Chicago, Ill. 60624
Export: International Div., Hallicrafters
Available from Gould Sales in Canada

Hallicrafters advanced technology brings you a new breed of amateur equipment



SX-146 Receiver

This is an amateur band receiver of advanced design employing a single conversion signal path and pre-mixed oscillator chain to assure high order frequency stability and freedom from adjacent channel cross-modulation products. The SX-146 employs a high frequency quartz crystal filter and has provision for installation of two more crystal filters. The receiver may also be used from 2 to 30 mc, with the exception of a narrow gap at 9.0 mc, with the connection of auxiliary oscillators. The highly stable conversion oscillator chain may be used for transceiver operation of the matching HT-46 transmitter.

FREQUENCY BANDS: 3.5-4.0; 7.0-7.5; 14.0-14.5; 21.0-21.5; 28.0-28.5; 28.5-29.0; 29.0-29.5; 29.5-30.0 mc (28.0 to 28.5, 29.0 to 30.0 requires extra crystals at users option).

SENSITIVITY: Better than 1 μv for 20 db S/N.

TUBES AND FUNCTIONS: 6JD6 RF amplifier; 12AT7 Signal mixer and cathode follower; (2) 6AU6A 9 mc IF amplifier; 12AT7 AM detector—AVC rectifier—product detector; 12AT7 USB—LSB crystal oscillators; 6GW8 Audio amplifier and audio output; 6BA6 Variable frequency oscillator; 6EA8 Crystal heterodyne oscillator and pre-mixer; Plus diode power supply rectifier, ANL diode and AVC gates diode; *6AU6A—100 kc crystal calibrator oscillator; *Harmonic generator diode.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 20 lbs.

FRONT PANEL CONTROLS: Frequency; Power off CW-upper-lower and AM; Audio gain; Band selector—3.5, 7.0, 14, 21.0, 28.0, 28.5, 29.0, 29.5; Selectivity—0.5, 2.1, 5.0 kc (0.5 and 5.0 kc filters optional extra); Pre-selector; RF gain; AVC on-off; Cal. on-off; ANL on-off; Phone set jack; Smiter.

REAR CHASSIS: S-meter zero adjust; Internal-External oscillator switch; Slave oscillator output; External oscillator input; Antenna socket; Speaker, ground and mute terminals; Grounding stud; AC power cord.

POWER REQ.: 105/125 volt—50/60 cycle AC—55 watts.

I-F SELECTIVITY: Uses a 6-pole crystal filter to obtain a nose-to-skirt ratio better than 1 to 1.8.

Amateur net, $269.95

Model HA-19 plug-in, 100-kc quartz calibrator available as accessory. **Amateur net, $19.95**

**Part of HA-19 calibrator.*

HT-46 5-band transmitter

All new from the ground up! Here's the "new breed" transmitter that matches your SX-146 . . . works independently or may be interconnected for transceiver operation.

FEATURES: 180 watts PEP input on SSB; 140 watts on CW; Frequency control independent or slaved to SX-146 receiver; Upper or lower sideband via 9 mc quartz filter; Built-in power supply; Press-to-talk or optional plug-in VOX; grid block for keying for CW.

FREQUENCY COVERAGE: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5 mc and 28-30 mc in four 500-kc steps. Crystal supplied for 28.5-29.0 mc coverage. Other plug-in crystals at user's option.

TUBES: 6BA6 VFO; 6EA8 Heterodyne crystal oscillator and mixer; 12AT7 Carrier oscillator-third audio; 12AT7 Mic amplifier; 6EA8 9 mc I-F amplifier and AALC; 6AH6 Mixer; 12BY7 Driver; 6HF5 Power amplifier; 0A2 Reg.

FRONT PANEL CONTROLS: Frequency Tuning; Operation-Off, Standby, USB, LSB, CW-Tune, Standby LSB USB; Microphone gain; Driver tune; Carrier level; Band selector; Final tune; VFO selector—Transmitter-Receiver; Dial cal.; Calibrate Off-On; Meter MA-RFO.

REAR APRON FUNCTIONS: AC Cord; Ground lug; Fuse; Key jack; VOX accessory socket; Antenna jack; Receiver input (for transceiver); 11 pin control socket; bias adjust.

PHYSICAL DATA: Size: 5⅞" x 13⅛" x 11". Shipping wt., 26½ lbs.

HA-16 Vox Adapter, **$37.95** **Amateur net, $349.95**

R-51 Speaker,

4 x 6 inch oval speaker and attractive 24 hour clock.
amateur net $34.95

"Quality through Craftsmanship"

hallicrafters

Fifth and Kostner Aves., Chicago, Illinois 60624
Export: International Division

Available in Canada from Gould Sales Co.

CONFIDENCE MEN.

These are men you can trust. Men who know the amateur business. Who know their equipment. Who know how to help you get the best value for the money you've invested in amateur gear. Our confidence in these men is the reason they're Collins distributors.

ALABAMA
Birmingham — Ack Radio Supply Co.
Huntsville — Electronic Wholesalers, Inc.
Mobile — Specialty Distributing Co.

ALASKA
Anchorage — Yukon Radio Supply, Inc.

ARIZONA
Phoenix — Henry Radio Co.
Southwest Electronic Devices
Tucson — Elliott Electronics, Inc.

ARKANSAS
De Witt — Moory's Wholesale Radio Co.

CALIFORNIA
Anaheim — Henry Radio, Inc.
Burbank — Electronic City, Inc.
Burlingame — Amrad Electronics
Fresno — Dymond Electronics
Los Angeles — Henry Radio Co., Inc.
Radio Products Sales, Inc.
Oakland — Elmar Electronics
Riverside — Mission Ham Supplies
San Diego — Western Radio & TV Supply Co.
San Francisco — Amrad Supply, Inc.
San Jose — Quement Industrial Electronics

COLORADO
Denver — Burstein-Applebee Co. of Colorado

CONNECTICUT
Hartford — Hatry of Hartford

DISTRICT OF COLUMBIA
Washington — Electronic Wholesalers, Inc.

FLORIDA
Miami — Amateur Radio Center, Inc.
Electronic Wholesalers, Inc.
Orlando — Amateur Electronic Supply
Pensacola — Grice Electronics, Inc.
Tampa — Kinkade Radio Supply

GEORGIA
Atlanta — Ack Radio Supply Co.
Southeastern Radio Parts Co.
Specialty Distributing Co., Inc.

HAWAII
Honolulu — Honolulu Electronics

ILLINOIS
Chicago — Amateur Electronic Supply
Newark Electronics Corporation
Peoria — Klaus Radio & Electric Co.

INDIANA
Indianapolis — Graham Electronics Supply, Inc.
South Bend — Radio Distributing Co., Inc.

IOWA
Council Bluffs — World Radio Laboratories, Inc.
Des Moines — Radio Trade Supply Co.

LOUISIANA
New Orleans — Crescent Electronic Supply, Inc.
Radio Parts, Inc.

MARYLAND
Wheaton — Electronics Distributors, Inc.

MASSACHUSETTS
Boston — Demambro Radio Supply Co., Inc.
Reading — Graham Radio, Inc.

MICHIGAN
Ann Arbor — Purchase Radio Supply
Detroit — Radio Supply & Engineering
Kalamazoo — Warren Radio Co.
Muskegon — Electronic Distributors, Inc.

MINNESOTA
Minneapolis — Electronic Center, Inc.
Lew Bonn Co.

MISSOURI
Butler — Henry Radio Co.
Kansas City — Burstein-Applebee Co.
St. Louis — Walter Ashe Division of Radio Shack

NEW HAMPSHIRE
Concord — Evans Radio Co.

NEW JERSEY
Springfield — Federated Purchaser, Inc.

NEW YORK
Albany — Ft. Orange Radio Distributors, Inc.
Amsterdam — Adirondack Radio Supply Co.
Ithaca — Stellar Industries
Jamaica, L. I. — Harrison Radio Co.
New York — Harrison Radio Co.
Harvey Radio Co., Inc.

NORTH CAROLINA
Asheville — Freck Radio & Supply Co., Inc.
Winston-Salem — Electronic Wholesalers, Inc.

OHIO
Cleveland — Pioneer Electronic Supply Co.
Columbus — Universal Service
Dayton — Custom Electronics, Inc.
Toledo — Selectronic Supplies, Inc.

OKLAHOMA
Tulsa — Radio, Inc.

OREGON
Portland — Portland Radio Supply Co.

PENNSYLVANIA
Philadelphia — Radio Electric Service Co. of Pa.
Pittsburgh — Cameradio Co.
Wyncote — "Ham" Buerger, Div. of
Howard C. Buerger Co., Inc.

RHODE ISLAND
Providence — W. H. Edwards Co.

SOUTH DAKOTA
Watertown — Burghardt Radio Supply

TENNESSEE
Memphis — W & W Distributing Co.
Nashville — Electra Distributing Co.

TEXAS
Abilene — Howard Radio Co.
Corpus Christi — Electronic Equipment & Engineering Co.
Dallas — Amateur Electronics, Inc.
El Paso — McNicol, Inc.
Houston — Busacker Electronic Equipment Co., Inc.
Electronic Equipment & Engineering Co.
San Antonio — Radio & TV Parts

UTAH
Salt Lake City — Manwill Supply Co.

WASHINGTON
Lynnwood — Cascade Electronic Supply
Spokane — HCJ Electronics
Tacoma — C & G Electronic Co.

WEST VIRGINIA
Beckley — Mountain Electronics Co., Inc.
Huntington — Mountain Electronics Co., Inc.

WISCONSIN
Fond du Lac — Harris Radio Corporation
Madison — Satterfield Electronics, Inc.
Milwaukee — Amateur Electronic Supply

COLLINS

QST

JANUARY 1966

VOLUME L NUMBER 1

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.: 666-1541
Area Code 203

Subscription rate in United States and Possessions, $6.00 per year, postpaid; $6.50 in Canada, $7.00 in all other countries. 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

—CONTENTS—

TECHNICAL —

6/60 Special.....*John S. Raydo, K0LMZ* 11

An Effective Low-Pass Filter
Glenn R. Welsh, WB6HRM 16

Accessory Package for Transceivers
John J. Schultz, W2EEY/DJ0BV 18

Smith-Chart Calculations for the Radio Amateur
Gerald L. Hall, K1PLP 22

Some Thoughts on Station Control
Douglas A. Blakeslee, W1KLK 27

Portable Beams for 50 and 144 Mc.
Edward P. Tilton, W1HDQ 32

A 100-Watt 2-Meter Transmit-Receive Converter
William J. Hall, K1RPB 35

A 5-Band 3-Transistor Receiver..... 51

Predicting Sag in Long-Wire Antennas
John J. Elengo, Jr., K1AFR 57

Recent Equipment:
WRL Galaxy 2000 + Linear Amplifier..... 68
Singer Metrics Panadaptor..... 70

BEGINNER AND NOVICE —

Building a Transmatch Into the Heath S.W.R. Meter
Thomas B. Perera, K2DCY 20

OPERATING —

Annual ARRL Novice Roundup..... 50

1966 Contest Calendar..... 58

1966 ARRL International DX Competition..... 59

Changes Versus Improvements..... 64

GENERAL —

Project Oscar Wins Christopher Columbus Award..... 31

Building Fund Progress..... 34

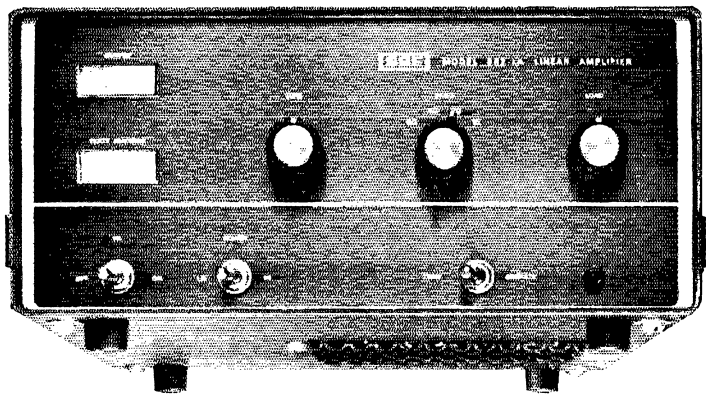
Members Are Saying..... 34

A New Method for the Reception of Weak Signals at Short Wave Lengths (reprinted from *QST*, February, 1920)..
Edwin H. Armstrong 41

Improve Your Club's Training Program
John H. Foss, K6KPH 55

The Antenna Ranchero.....*John G. Troster, W6ISQ* 74

ARPSC..... 64
Coming Conventions..... 10
Correspondence From Members. 72
Hamfest Calendar..... 40
Hams at ARRL/*QST*..... 73
Hints & Kinks..... 62
How's DX..... 75
Index to Advertisers..... 158
"It Seems to Us . . "..... 9
IARU News..... 30
Operating News..... 88
Operator of the Month..... 93
Our Cover..... 10
Silent Keys..... 148
Station Activities..... 94
World Above 50 Mc..... 80
Y1 News and Views..... 85
25 Years Ago in *QST*..... 61

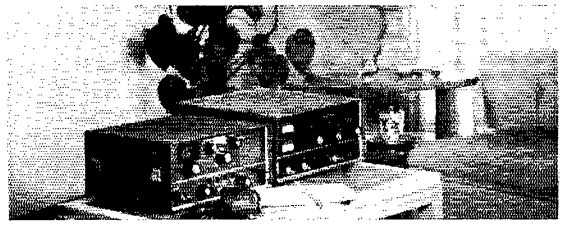


SBE

owners of SBE, SB2-LA linears have money in the bank . . .

(This 1000-watt p.e.p input beauty costs only 24.95 cents-per-watt, half the cost of other 1 KW p.e.p. linear amplifiers.)

wives of owners of SBE linears are often pleased . . .



(at the small equipment size and uncluttered appearance . . particularly so this winter when the OM moves the shack into her nice living room.)

and car rear trunks are practically empty

(Very comforting when you take your KW mobiling along with a lot of luggage.)

249.50 buys you about 10 db worth of power gain in an exceptionally small, convenient package, 5⅛" high, 11⅝" wide and 11⅝" deep— and this includes A.C. power supply.

SB-2LA linear amplifier matches **SB-34** in appearance, operates perfectly with it but will boost the output of **any** SSB exciter to a full KW. Drive: 60 watts or more depending upon amplifier output, passive grid input for resistive load to driver.

4 bands: 80-40-20-15. Pi-network. Band switching. Uses 6, parallel-connected 6JE6's. Built-in AC power supply is all-solid-state. Linear operates at low plate voltage (800V), high plate current. Easier on capacitors, rectifiers and power transformers. Safer under environmental extremes. Built-in antenna relays (2). Internal blocking bias.

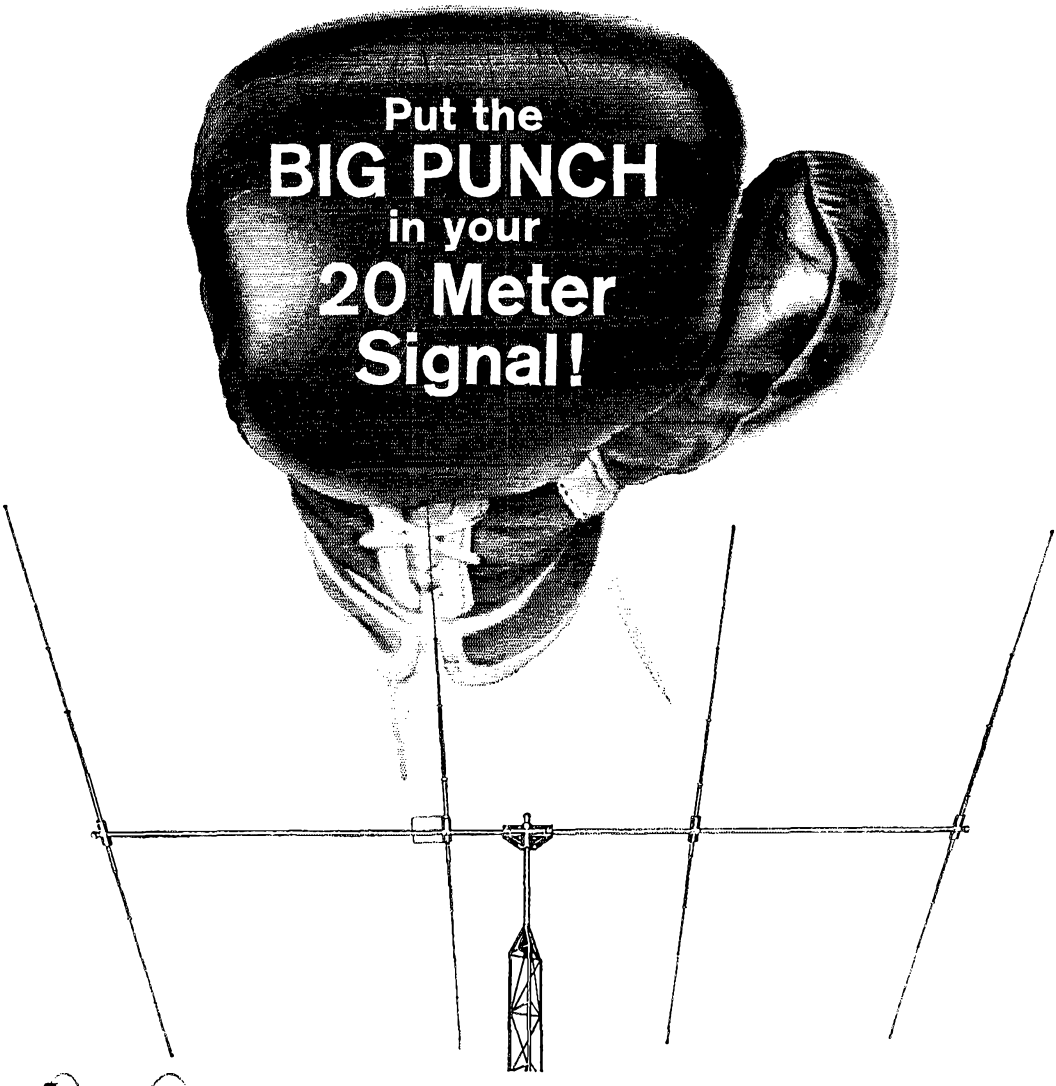
SB-3-DCP inverter is available for 12V DC operation. Suggested price: **249.50**

Write for new 4-page brochure describing SBE line.

RAYTHEON COMPANY

213 E. Grand Avenue, So. San Francisco, California 94080

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



hy-gain's 4-Element 20 Meter Beam - Model 204BA

If working 20 meters is your cup of tea and you're looking for sensational DX performance, you want Hy-Gain's Model 204BA. Four full-spaced elements that are factory pre-tuned using Hy-Gain's exclusive Beta Match provide optimum gain on phone or CW across the entire 20 meter band. Outstanding F/B and F/S ratios insure maximum discrimination of unwanted signals for peak performance. Tailored for installation on a lightweight tower using a standard Ham rotator, the Model 204BA employs the very latest in construction concepts...will provide years of reliable all-weather performance. Compatibly stacks with other beams and/or tribanders. A real buy at **$99.95** Net

Other Optimum Performance Hy-Gain Monobanders

For 40 Meters—Full-spaced 2-element Model 402BA .....$99.75 Net
For 20 Meters—Full-spaced 3-element Model 203BA .....$69.95 Net
For 15 Meters—Full-spaced 3-element Model 153BA .....$39.95 Net
For 10 Meters—Full-spaced 3-element Model 103BA .....$34.95 Net

Get Yours Today From Your Favorite Hy-Gain Distributor or write

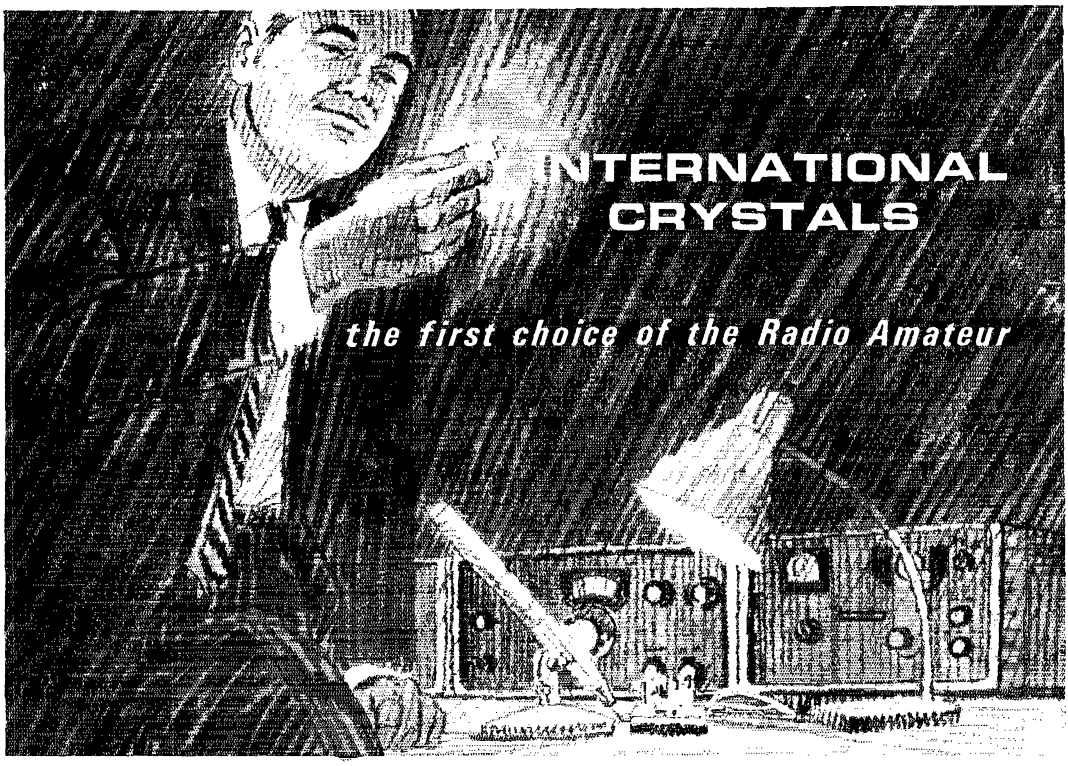
HY-GAIN ELECTRONICS CORPORATION 8403 N.E. Highway 6 • Lincoln, Nebraska 68501

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, OES, OPS, OO and OBS. *Technicians may be appointed OES, OBS or V.H.F. PAM. Novices may be appointed OES.* SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

ATLANTIC DIVISION				
Delaware	W3IYE	Roy A. Belair	415 Brighton Road	Wilmington 19809
Eastern Pennsylvania	W3ZRQ	Allen R. Breiner	212 Race St.	Tamaqua 18252
Maryland-D. C.	W3QA	Bruce Boyd	415 Wickham Rd.	Baltimore, Md. 21229
Southern New Jersey *	W2ZI	Edward G. Raser	19 Blackwood Drive	Wilburta Gardens, Trenton 08628
Western New York	K2HUK	Charles T. Hansen	241 Rosemont Drive	Buffalo 14226
Western Pennsylvania	W3GJY	John F. Wojtklewicz	1400 Chaplin St.	Conway 15027
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	K9IVG	M. Roberta Kroutik	401 El Portal Drive	Michigan City 46361
Wisconsin	K9GSC	Kenneth A. Ebneter	822 Wauona Trail	Portage 53901
DAKOTA DIVISION				
Minnesota	WØTCK	Herman R. Konischke, Jr.	RFD 2	Janesville 56048
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	KØFXW	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	W5EMM	S. H. Hairston	2321-27th Ave.	Meridian 39303
Tennessee	W4UVP	William 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	W2CVW	Edward F. Erickson	13 Robert Circle	South Amboy 08879
MIDWEST DIVISION				
Iowa	WØNTB	Dennis Burke	1418 Douglas Ave.	Ames 50010
Kansas	KØBXF	Robert M. Summers	2930 North 13th	Kansas City 66104
Missouri	WØTPK	Alfred E. Schwaneke	Edgar Star Rte	Rolla 65401
Nebraska	WØGGP	Frank Allen	Box 272	Gering 69341
NEW ENGLAND DIVISION				
Connecticut	K1GGG	Fred Tamm	685 Romanock Rd.	Fairfield 06432
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Maine	K1DYG	Herbert A. Davis	Lakes Ln.	Ellsworth Falls 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 *	KL7ENT	Daniel R. Wright	3206 Wyoming Drive	Spenard 99503
Idaho *	K7HLR	Raymond V. Evans	Route 3	Twin Falls 83301
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 94520
Hawaii	KH6BZF	Lee R. Wical	45-601 Luku Rd.	Kaneohe 96744
Nevada	W7PBV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	W6JDT	John F. Mlnke, III	4613 Rustic Rd.	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	W6ZRJ	Jean A. Gimelin	10835 Willowbrook Way	Cupertino 95014
ROANOKE DIVISION				
North Carolina	W4BNU	Barnett S. Dodd	420 West Franklin St.	Salisbury 28144
South Carolina	W4PED	Charles N. Wright	711 Merriwether Dr.	North Augusta 29841
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	KØTPB	Donald Ray Crumpton	P.O. Box 223	Alamosa 81101
New Mexico	WA5FLG	Bill Farley	1306 Spruce	Alamogordo 88310
Utah W7MWR/W7OAD		Marvin C. Witting	P.O. Box 1813	Salt Lake City 84110
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	K4KJD	William S. Crafts	Route 3, Box 233	Athens 35611
Canal Zone	KZ5TD	Thomas B. DeMeis	P.O. Box 1111	Balboa
Eastern Florida	K4SJH	A. L. Hamel	220 N.E. 25th St.	Pompano Beach 33064
Georgia	W4RZL	Howard L. Schonher	P.O. Box 1902	Columbus 31902
West Indies (P.R.-V.I.)*	KP4TL	Arturo E. Saldaña	Box 9127	Santurce, P. R. 00908
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 74106
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	VE1WB	D. E. Weeks		Harvey Station, N. B.
Ontario	VE3NG	Richard W. Roberts	170 Norton Ave.	Willowdale, Toronto, Ont.
Quebec	VE2DR	C. W. Skarstedt	62 St. Johns Rd.	Pointe Claire, Montreal 33, P. Q.
Saskatchewan	VE5QC	Mel Mills	P.O. Box 801	Saskatoon

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



THE AMATEUR WHO SELECTS INTERNATIONAL CRYSTALS FOR HIS COMMUNICATION GEAR PROBABLY KNOWS THESE IMPORTANT FACTS:

- Every amateur crystal is manufactured by the same skilled craftsmen who make International commercial crystals.
- International crystals are the product of a continuing research and development program.
- International crystals are designed and manufactured to operate under all types of field conditions . . . fixed or mobile.
- International crystals are used in all major makes of commercial two-way radio equipment.
- International customers include broadcast stations, airlines, military services, Civil Air Patrol, taxicabs.
- International crystals and electronic components are used in the United States missile and space research program.
- All International crystals are guaranteed against defective materials and workmanship for an unlimited time when used in equipment for which they were specifically made.

Whether you're an amateur building your first transmitter or an engineer with special crystal requirements, you can look to International for precision frequency control.

KEEPING YOU ON FREQUENCY IS OUR BUSINESS!

INTERNATIONAL

CRYSTAL MFG. CO., INC.

18 NO. LEE • OKLA. CITY, OKLA. 73102

Write today for a free catalog of International precision made crystals and quality electronic equipment.

International Crystal Mfg. Co., Inc.
18 North Lee
Oklahoma City, Oklahoma 73102
Rush Free Catalog

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

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
(President Emeritus)

Officers

President . . . . . HERBERT HOOVER, JR., W6ZH
900 Wilshire Blvd., Los Angeles, California 90017

First Vice-President . . . . WAYLAND M. GROVES, W5NW
1406 West 12th Street, Odessa, Texas 79761

Vice-President . . . . . FRANCIS E. HANDY, W1BDI
225 Main St., Newington, Connecticut 06111

Vice-President . . . . . ALEX REID, VE2BE
240 Logan Ave., St. Lambert, P. Q., Canada

Secretary . . . . . JOHN HUNTOON, W1LVQ

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

• • • • •

Secretary & General Manager Emeritus. A. L. BUDLONG, W1BUD

• • • • •

General Manager . . . . . JOHN HUNTOON, W1LVQ
Communications Manager . . . FRANCIS E. HANDY, W1BDI
Technical Director . . . . . GEORGE GRAMMER, W1DF
Assistant General Manager . RICHARD L. BALDWIN, W1IKE
Assistant Secretaries . . . . . PERRY F. WILLIAMS, W1UED
GARY L. FOSKETT, W1ECH
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, 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
3141 Bristol Road, Chalfont, Pa. 18914

Central Division

PHILIP E. HALLER W9HPG
6000 S. Tripp Ave., Chicago, Ill. 60629
Vice-Director: Edmond A. Metzger W9PRN
1520 South Fourth St., Springfield, Illinois 62703

Dakota Division

CHARLES G. COMPTON . . . . . WØBUO
1011 Fairmount Ave., St. Paul, Minn. 55105
Vice-Director: Charles M. Bove . . . . . WØMXC
1611½ East Lake St., Minneapolis, Minn. 55407

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 W8JSU
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 K2SJO
13 Jennifer Lane, Port Chester, New York 10573

Midwest Division

ROBERT W. DENNISTON . . . . . WØNWX
Box 73, Newton, Iowa 50208
Vice-Director: Sumner H. Foster . . . . . WØGQ
2110 Goblin's Gully Dr., S.E., Cedar Rapids, Iowa 52403

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, Conn. 06340
Vice-Director: Bigelow Green W1EAE
236 Marlboro St., Boston, Mass. 02116

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

P. LANIER ANDERSON JR. W4MWH
428 Maple Lane, Danville, Va. 24541
Vice-Director: Joseph F. Abernethy W4AKC
764 Colonial Drive, Rock Hill, S.C. 29730

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

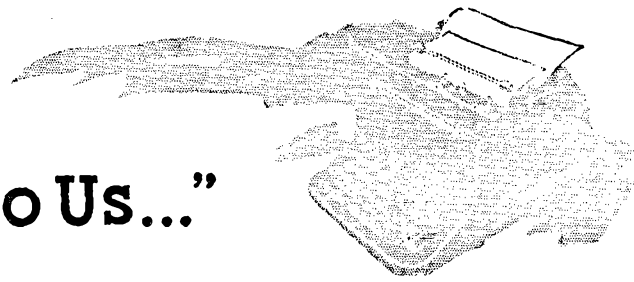
CHARLES J. BOLVIN W4LVV
Vice-Director: Albert L Hamel K4SJH
220 N.E. 25th Street, Pompano Beach, Fla. 33064

Southwestern Division

HOWARD F. SHEPHERD, JR. W6QJW
127 South Citrus Avenue, Los Angeles, Calif. 90036
Vice-Director: John F. Martin W6ECP
1135 Crest Drive, Encinitas, Calif. 92024

West Gulf Division

ROEMER O. REST W5QKF
P.O. Box 1656, Corpus Christi, Texas 78403
Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla. 73159



"It Seems to Us..."

THE YEAR IN REVIEW

Nineteen sixty-five was a year of cooperation, communication, and celebration. Before we pitch into the new year, let's take one last look.

Amateur radio added new laurels with meritorious emergency communications performances during the Caribbean incident, floods and tornadoes in the midwest, Hurricane Betsy along the gulf coast, and numerous other large or small crises. ARPSC and RACES crews also demonstrated preparedness in the November power blackout in the northeast by activating numerous nets, standing by to fill any serious gaps in communications channels. Field Day, with some 3400 stations and 14,000 amateurs participating, along with the annual Simulated Emergency Test, continued to expand the League's public service program.

Oscar III was perhaps the technical highlight of the year, although using its translator system called for new concepts in operating techniques as well. During its 18-day life, amateurs claimed 176 two-way contacts varying in distance from across town to across the Atlantic; a modern version of "calls heard" in *QST* showed hundreds of additional reception reports. Project Oscar, Inc., received the ARRL Technical Merit Award and the Christopher Columbus Gold Medal Award (Italy) for outstanding contributions to the art. Moonbounce was also very much in the headlines during the year, with after-hours ham use of the thousand-foot "dish" in Puerto Rico providing the opportunity for international contacts.

On the official international scene, the International Telecommunications Union marked its one-hundredth anniversary of worldwide cooperation in regulatory matters, and held a Plenipotentiary Conference in Switzerland for minor reorganizations of its structure. IARU, which reached its 40th year in 1965, increased membership to sixty-six societies; its new Region II (N. and S. America) division received further impetus at meetings of amateur officials and clubs in this hemisphere; and closer liaison with European activities was established through informal visits by League officers. New reciprocal operating agreements this past year make it possible for U.S. hams to operate in twelve countries on five continents.

Regulations for these new agreements as well as domestic proposals and actions occupied the amateur section of FCC. The Commission's docket on "incentive licensing," despite continued misunderstandings on some points, brought thousands of comments, the majority in support but with numerous specific suggestions for changes in details. The Supreme Court denied a review of licensing fees, and an additional League attempt with FCC to equalize the amateur fee structure was rejected. The mileage criterion for Conditional Class license eligibility was increased from 75 to 175 miles, thus bringing many more applicants within the personal-appearance areas. The League's "intruder watch" hit full stride, with a regular flow to FCC of reports of nonamateur operation in our bands.

League membership appeared largely static during the year; final figures are not available at this writing. The number of newly licensed amateurs again was down from earlier years. The annual Board meeting was held in Quebec amidst extensive Canadian hospitality, the first such session outside the U.S. A national convention in San Jose, California, set organized amateur operating and public service as its main theme. Three more divisions — Delta, Northwestern and Roanoke — went over the top in the Building Fund program. A new *The Radio Amateur's V.H.F. Manual* was added to the ARRL library and met enthusiastic acceptance; another project, an operating manual, neared completion at year end. As frosting on the year's publication activities, *QST* in December proudly marked its 50th anniversary.

So nineteen-sixty-five has come and gone. In the year just beginning, whatever your major activity, strive to do better this year than last — and to extend your interests to additional areas among the many amateur radio offers its practitioners. Our institution, our effectiveness, and our image will be just as strong as the sum total of individual participation makes it.

Happy New Year! QST

A list of early *QST* authors includes many names which later became household words in the electronics industry — Armstrong, Beverage, Clayton, Dellinger, Godley, Hazeltine, Heising, Kruse, McMurdo Silver, Reinartz. In its 1966 issues, *QST* will bring you reprints of several of the numerous articles which, in its 50-year history, helped establish the amateur body as an effective force in advancing the state of the art. See page 41 this month for a then-revolutionary discussion of the superhet principle by Major Edwin H. Armstrong, one of the old 1BCG Transatlantic crew and later most famous as the inventor of f.m. broadcasting.

SOUTHEASTERN DIVISION CONVENTION

Miami, Florida **January 22-23**

The Southeastern Division ARRL Convention will be held in the Miami Bayfront Park Auditorium and the Everglades Hotel Saturday and Sunday, January 22 and 23. Convention activities will be combined with the seventh annual Tropical Hamboree and the first annual YL International Sidebanders Convention.

The program will include special sessions for League officials and appointees, MARS, QCWA, OTC, DXers, Floridoras and net organizations. Speakers will include Wade Nelms, Deputy Director, 3rd Army MARS; Stuart Meyer, W2GHK, "DXpedition of the Month;" and Lew McCoy, W1ICP, ARRL technical staff. The general membership meeting is scheduled for Sunday afternoon where the League will be represented by the new Director and Vice Director of the Division. Local and Washington FCC representatives will also address this group.

Visitors can look forward to taking part in contests, browsing through the Tropical Hamboree exhibit area (manufacturers' latest products, displays by ARRL, Florida DX Club, Flamingo Net and other local clubs), hunting for bargains at the big Swap Shop, rag-chewing with over-the-air friends at the Floridora "kaffee klatch," or possibly taking an FCC examination. Those interested in s.s.b. will get together at the Florida Sidebanders Breakfast and the YL International Sidebanders Convention Luncheon.

The Saturday evening banquet will feature, as guest speaker, hamdom's greatest activator of rare prefixes, Gus Browning, W4BPD.

Headquarters for out-of-town guests will be the Everglades Hotel, located just a half-block from the auditorium. Special rates are as follows: single rooms, $8; doubles, $12; suites, $22. Convention/Hamboree registration is $1; banquet tickets, $4.95. For tickets and hotel reservations at the special rates, write Dade Radio Club, P.O. Box 73, Biscayne Annex, Miami, Florida 33152. YL Sidebanders should coordinate their reservations with Ellie Horner, K4RHL.

OUR COVER

This is the control panel for W1AW's new bulletin transmitters. See page 27 for more information on the VOX unit at the center of the control panel

OSCAR IV DUE DEC. 21

We hope you're ready, gang — at press time the launch of Oscar IV is imminent! Except for a change of translator output frequency, now 431.972 Mc. (with the beacon at 431.962 Mc.), the dope on page 41 of December *QST* generally applies. Oscar will eject somewhere over the Galapagos Islands, and hover near the equator, drifting *east*ward at 28.53 degrees per day. It is planned that the Oscar IV package will be spin-stabilized, with satellite axis and transmitting antenna parallel to the axis of the earth. Oscar IV will be solar-powered, with about a year's life span. Peak up those 2-meter rigs and 430-Mc. converters and let's be prepared for another step forward in amateur space communication. Listen for W6EE and W1AW to catch any last minute info or changes.

ARRL NATIONAL CONVENTION

Boston, Massachusetts **April 22 - 24**

Have you planned your vacation yet? Don't forget these dates: April 22, 23 and 24. The National Convention committee is hard at work on the best possible program for the thousands of amateurs and their families expected to come to Boston for the convention.

The National Aeronautics and Space Administration will be a featured guest, and NASA officials are preparing an entirely new program on space communications. Special activities are also being planned for YLs and XYLs, DXers, v.h.f. enthusiasts, oldtimers, newcomers — in fact, practically everyone!

Those wishing to take advantage of "early-bird" prices may do so now. Saturday banquet and entertainment costs $8.60; registration alone, $3.00; or the complete package, $11.60. Checks, payable to FEMARA, should be sent to the ticket chairmen, John and Bertha McCormick, Berkeley Street, RFD #1, Taunton 1, Massachusetts; a self-addressed, stamped return envelope should be included.

Watch future issues of *QST* for complete convention details.

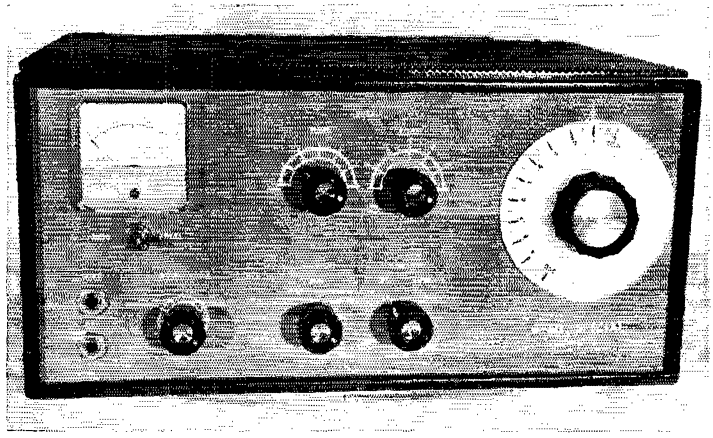


Fig. 1—Front view of the 6-60 Special, showing layout of the panel.

6/60 Special

An All-Mode Transmitter for 6

BY JOHN S. RAYDO,* KØLMZ

THE transmitter described in this article was built to satisfy the need for a flexible rig of moderate power for the 6-meter band. It features a built-in high-stability v.f.o., broad-band exciter, high-level plate modulation, mixer keying for c.w., and with the addition of a 20-meter s.s.b. signal, is a s.s.b. transmitting converter. All parts, with few exceptions, are standard and may be purchased from most large distributors.

Circuit Details

The built-in v.f.o. is used for a.m. and c.w operation. The oscillator uses the familiar Colpitts circuit, operating between 14 and 15 Mc., with the plate circuit tuned to 14.5 Mc. The tube socket and tuning capacitor are ceramic-insulated. Long leads and unnecessary stray capacitance are avoided. The oscillator coil is solidly mounted to prevent vibration.

The output from the v.f.o. is injected into the grid of the mixer along with 36-Mc. energy from an overtone oscillator, V_{2B}. On a.m. and c.w. the mixer selects the sum of these two signals in a high-L/C plate circuit tuned to 50.5 Mc. This heterodyne method of obtaining 50-Mc. signal results in higher 6-meter stability with a v.f.o. If the transmitter is used as an s.s.b. converter, the v.f.o. is disabled and in its place, 20-meter s.s.b. of low level is injected into the mixer cathode.

The 50-Mc. energy is amplified by the 12BY7 buffer, V_3. The output circuit of this stage is a broad-band coupler. This coupler provides near-optimum coupling efficiency, yet has sufficient bandwidth to permit operation across the first megacycle or so, without retuning the exciter.

The 6146 amplifier stage has a shunt-fed pi-network plate circuit. For best stability the stage is neutralized. Choke RFC_5 is provided to short out the d.c. voltage that would appear on the output circuit if C_{13} should break down. The choke in the plate lead, Z_1, is for parasitic suppression. Note that each of the three cathode leads is bypassed separately at the socket and that the screen is bypassed directly to the cathode, rather than to ground.

The modulator section, used only for a.m., has a 12AX7 driving a pair of 6BQ6GTB tubes operating Class AB_2. The power supply uses a choke-input filter and silicon rectifiers in a bridge circuit. A high voltage of about 575 volts and a low voltage of about 275 volts are produced under load. A small filament transformer, reverse connected and hooked to the filament line, provides fixed bias. Practically all control of the transmitter, except for an external antenna relay, is performed by the bias network.

R_2 permits setting the 6146 to Class AB_2 for s.s.b. operation. On a.m. and c.w. the fixed bias is high enough to limit plate current to a safe value and when grid current flows, the voltage drop across the resistance from the arm of R_2 to ground will shift the final amplifier into Class C operation. The ground side of controls R_2 and R_3 is transferred by the function switch, S_{2C}, and the control relay. If the line is not grounded in the "operate" position, with the push-to-talk

* Rann Industries, 2801 West 50th Terrace, Shawnee Mission, Kansas.

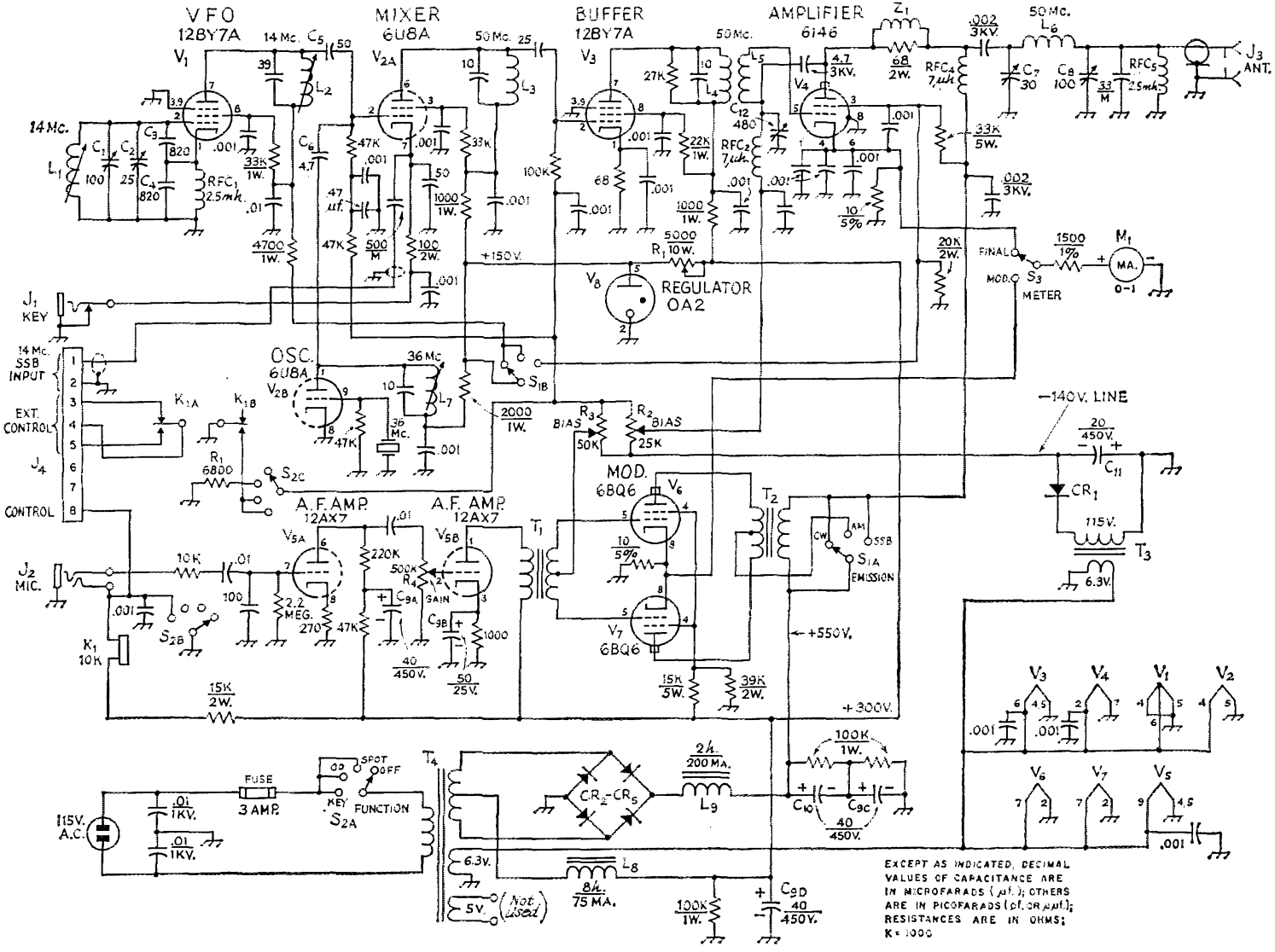

VFO
12BY7A
MIXER
6U8A
BUFFER
12BY7A
AMPLIFIER
6146
14 Mc.
50 Mc.
OSC.
6U8A
36 Mc.
A.F. AMP.
12AX7
A.F. AMP.
12AX7
MOD.
6BQ6
6BQ6
REGULATOR
0A2
+150V.
+550V.
+300V.
-140V. LINE
115V. A.C.
FUSE
3 AMP.
SPOT
OFF
KEY
FUNCTION
FINAL
MOD.
METER
0-1
SSB INPUT
EXT. CONTROL
CONTROL
KEY
MIC.
ANT.
BIAS
GAIN
EMISSION
CW
AM
SSB
6.3V.
5V.
(Not Used)
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μf.); OTHERS ARE IN PICOFARADS (pf. OR μμf.); RESISTANCES ARE IN OHMS; K = 1000

Fig. 2—Schematic diagram of the 6/60 Special. M is mica. Polarized capacitors are electrolytic type. Resistors are ½-watt composition unless otherwise noted.

C_1—100-pf. variable (Bud 1855).
C_2—25-pf. trimmer (Hammarlund APC-25).
C_3, C_4—820-pf. silver mica.
C_5—50-pf. silver mica or NPO disk.
C_6—4.7-pf. silver mica or NPO disk.
C_7—30-pf. variable (Hammarlund HF-30-X).
C_8—100-pf. variable (Hammarlund HF-100).
C_9—40-40-40 μf. at 450 volts, 50 μf. at 25 volts, can-type electrolytic (Cornell-Dubilier Electronics DO663.2).
C_{10}—40 μf. at 450 volts, tubular electrolytic (Cornell-Dubilier Electronics BR 40-450).
C_{11}—20 μf. at 450 volts, tubular electrolytic (Cornell-Dubilier BR 20-450).
C_{12}—80-480-pf. mica trimmer.
CR_1—400 p.i.v., 500-ma. silicon diode.
CR_2–CR_5, inc.—800 p.i.v., 500-ma. silicon diodes.
J_1—¼-inch 2-conductor shorting jack (Switchcraft 12A).
J_2—¼-inch 3-conductor jack (Switchcraft 12B).
J_3—Coaxial chassis fitting (SO-239).
J_4—Octal socket.
K_1—D.p.d.t. plate relay, 10,000-ohm coil (Potter & Brumfield KCP11).
L_1—4 turns No. 16, ¾ inch long, on ½-inch diam. iron-slug form (North Hills 1300C).
L_2—15 turns No. 20, close-wound on ⅜-inch diam. iron-slug form (Miller 21A000RBI).
L_3—9 turns No. 16, air-wound, ½-inch diam., 1 inch long.
L_4—9 turns No. 16, air-wound, ½ inch diam., ⅞ inch long.
L_5—7½ turns No. 16, air-wound, ½-inch diam., ¾ inch long.
L_6—5 turns No. 12, air-wound, ⅞-inch diam., ¾ inch long.
L_7—6 turns No. 22, ½ inch long, on ⅜-inch diam. iron-slug form (Miller 21A000RBI).
L_8—8-hy. 75-ma. filter choke (Stancor C1355).
L_9—2 hy. 200-ma. filter choke (McGee Radio 2H-200 or C200-45).[6]
M_1—0–1-d.c. milliammeter, calibrated 0–150 ma. (Lafayette 99G2514).
R_1—5000 ohm, 10-watt resistor (adjustable).
R_2—25,000-ohm 2-watt potentiometer, screwdriver adjustable (Ohmite CLU2531).
R_3—50,000-ohm potentiometer, screwdriver adjustable (Ohmite CLU5031).
R_4—0.5 megohm control, audio taper (IRC Q13-133).
FC_1, RFC_5—2.5-mh. r.f. choke (National R50).
RFC_2, RFC_4—7-μh. r.f. choke (Ohmite Z-50).
S_1—3-pole 3-position single section phenolic rotary switch (Centralab PA-1007).
S_2—3-pole 4-position 2 section ceramic rotary switch (Centralab PA-1012).
S_3—S.p.d.t. toggle switch.
T_1—1:3 interstage transformer (Stancor A-53-C).
T_2—25-watt modulation transformer (Stancor A-3845). Use 8000-ohm tap on secondary.
T_3—Fil. trans. 6.3-volt 1.2 amp. (Stancor P-6134).
T_4—Power transformer: 560 v. ct., 250 ma.; 6.3 v., 8 amp.; 5 v., 3 amp. (not used). (McGee Radio 961761-1).
Z_1—3 turns No. 16, ½ inch long, wound on 68-ohm 2-watt resistor.

[6] McGee Radio, 1991 McGee St., Kansas City 8, Mo.

mike switch open, the full 120-volt bias cuts off tubes V_{2A}, V_3, V_4, V_6, and V_7. If a relatively low resistance, R_1, is connected in the line, these tubes are almost cut off, and a low-level spot signal results. Relatively few contacts are needed on the function switch with this method of control and the relay switches less than 7 ma. at 140 volts. R_1 may be replaced by a panel-mounted 25K control if variable spotting injection is desired.

Construction

The unit is built on a 14 × 10 × 3-inch chassis with a 15 × 6½ × 0.090-inch panel, and fits into a handmade cabinet.[1] Other types of cabinets (such as the standard rack styles) may be used. All sockets, terminal strips and other parts are securely mounted with shakeproof washers under the mounting nuts. A neat-looking unit can be obtained by dressing the leads and components in parallel lines or at right angles. D.c. and a.c. leads can be trucked out of the way along the edges of the chassis, while r.f. leads should be as direct as possible. The wiring can be harnessed to add to the eye appeal of the unit. Avoid the use of stranded wire when assembling the circuit. Where this wire must be used, be careful to avoid wild strands that stray over to an adjacent terminal and result in a short circuit. The location of most of the major components can be seen by referring to the photographs.[2] The plate circuit of the 6146 is shielded by a 3¾ deep × 4⅝ wide × 3½ high U-shaped bracket. This shield is attached to the chassis with three spade bolts. Below the chassis, the grid circuit of the 6146, and the 12BY7 plate circuit, are enclosed by a similar 3¼ × 5 × 2½-inch bracket. This shield is notched where it passes over the 12BY7 socket.

The type of socket used for the final-amplifier tube is important. Do not use the common molded socket with an elevated grounding ring having 4 lugs spaced around its circumference. Grounding should be done to lugs placed under the nuts used for mounting the socket. It is imperative that the bypass capacitor connections be made with virtually no leads at all, in the buffer and final-amplifier stages. The 6BQ6 modulator tubes are sub-mounted in the chassis with one-inch spacers. The newer 6BQ6GTB tubes must be used if the height of the transmitter is to remain at 6½ inches. The vernier drive for the v.f.o. capacitor is a Jackson 4511/DAF with a 6:1 ratio,[3] mounted behind the front panel so that the v.f.o. dial clears the panel by about 1/16 inch. The dial is a 4-inch disk of ⅛-inch translucent plastic, calibrated with a Datak lettering set.[4] Several light coats of clear plastic spray will prevent the markings

[1] Peck, "Home-Brew Custom Designing," *QST*, April, 1961.

[2] The author will supply full-scale templates of the chassis and panel at a cost of $2.00.

[3] Arrow Electronics, Inc., 900 Broad Hollow Road, Farmingdale, N. Y.

[4] The Datak Corp., Dept. 6111-2, 63 71st St., Guttenberg, N. J.

from rubbing off. Illumination may be added by cutting a small fan-shaped window in the panel behind the dial. A small bulb assembly will softly illuminate the dial near the pointer. A 0-1-ma. clear plastic meter, calibrated 0-150 ma., is used to measure the cathode current for both the final amplifier and modulator. Originally an S meter, this unit was chosen because it could be illuminated. The original scale was removed by rubbing with a household cleaner and recalibrated with a Datak meter-marking kit. Other 0-1 ma. meters may be used in place of the one specified.

Special care should be taken in all phases of construction, especially with external details such as the front panel. This particular unit received a coat of primer and three coats of blue hammertone paint. After the decals were applied, a final coat of clear plastic was added. The use of black knobs, and a cabinet of contrasting black accentuates the panel. The meter is complimented by the v.f.o. dial, yet no monotonously perfect symmetry is evident. It seems strange that so much home-brew equipment is so well engineered and yet so little time is spent trying to make it look like a commercial rig. The payoff is in greater satisfaction and the excellent possibility of selling the rig later on, at a profit.

Adjustment Procedure

Initial checkout and alignment are conducted as follows: Remove the 6146 and 6BQ6 tubes from their sockets. All other tubes should be left in place. Turn the emission switch to c.w. and the function switch to "key." All tubes should light, and power-supply voltages should be close to 300, 700, and −150 volts under light load. Adjust the v.f.o. coil, L_1, and trimmer C_2 to cover 14 to 15 Mc., while listening on a receiver to the fundamental or a harmonic. Peak the plate coil, L_2, at 14.5 Mc. Adjust L_7, the overtone oscillator coil, until the crystal oscillates cleanly at 36 Mc. Adjust L_3 in the mixer plate circuit by squeezing or spreading the turns until it peaks at 50.5 Mc.

Turn the transmitter to the "off" position. Plug the 6146 and 6BQ6 tubes into their sockets. Temporarily connect a shorting wire across L_5, in the bandpass coupler. Tune L_4 to 50.5 Mc. in a similar manner to L_3. The two coils should be separated by about ½ inch. Remove the shorting wire after adjustment is complete.

The next step is to neutralize the 6146 amplifier. Open the heater circuit to the 6146 stage during this process. Turn the emission switch to c.w. and the function to "key." Peak the output pi network for maximum output, using a sensitive wavemeter coupled to L_6. Neutralize the 6146 by adjusting C_{12} for minimum feedthrough. Be sure to resonate the plate circuit after each adjustment of C_{12}, and take suitable precautions with the high voltage present in the plate circuit.

After neutralization is complete, plug an open-circuited key into the c.w. jack, and switch the emission mode to s.s.b. Adjust the final-amplifier bias control, R_2, for 15-ma. final plate current. Turn the emission switch to a.m. and the function switch to "operate", and adjust the modulator bias control, R_3, for 25-ma. modulator current. Switch the meter back to read final plate current. Connect a dummy load to the unit. Remove the key and close the mike push-to-talk switch. Dip and load the final to 110 ma. Switch the meter to read modulator plate current and adjust the mike gain until the meter kicks up to about 80 ma. on voice peaks. A check with a scope will indicate more precisely the point of 100 per cent modulation. When the push-to-talk switch is released, both the final and modulator plate currents should fall to zero. Resting plate current for the final, when in the c.w. mode and key open, should be close to 15 ma. "Key" function is the tune position for all modes and is the c.w. position. "Operate" function is the push-to-talk position for a.m., the external control position for s.s.b. and the c.w. standby position.

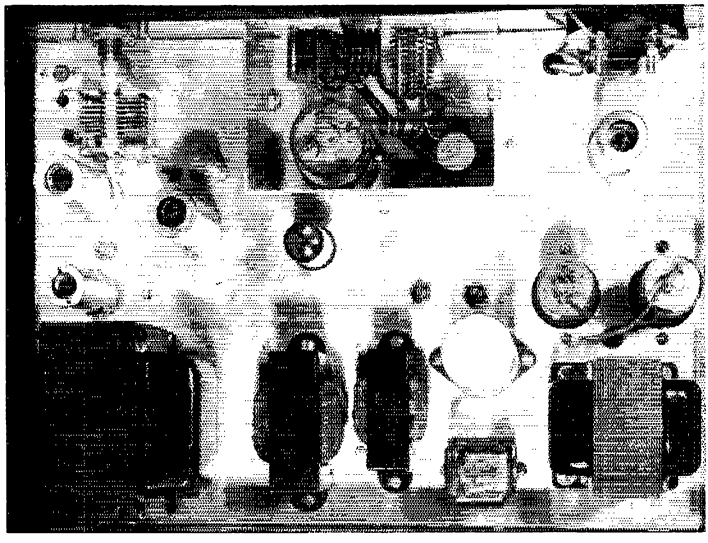


Fig. 3—Top view of the chassis, showing placement of tubes and other components.

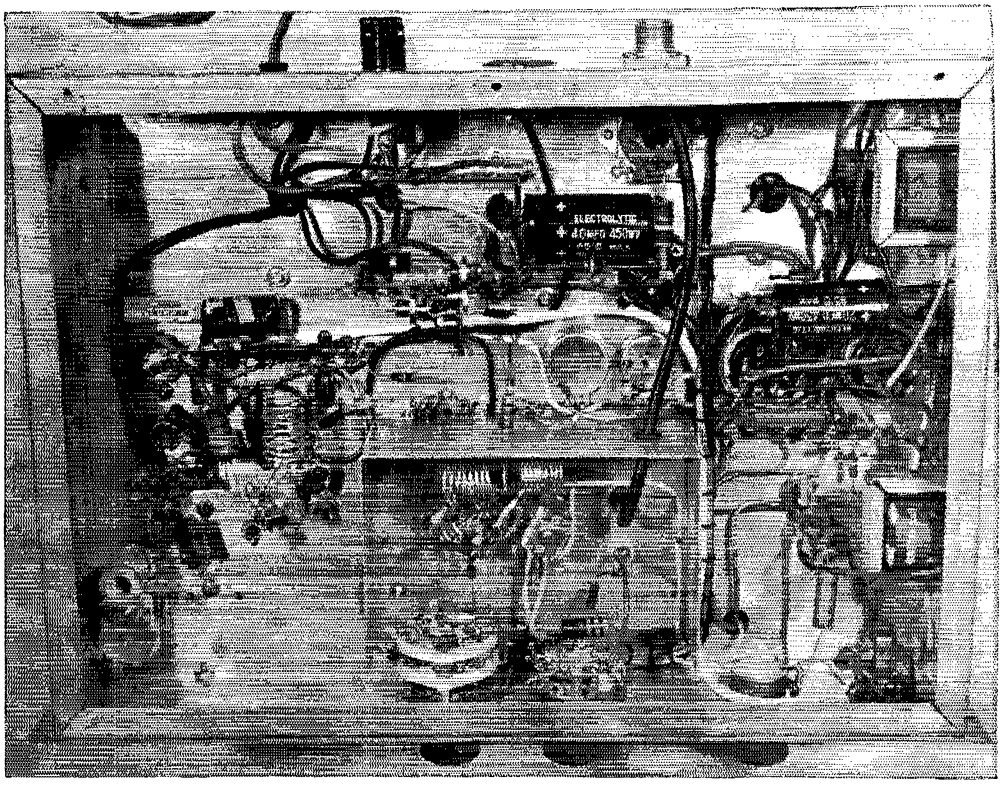


Fig. 4—Under-chassis view of the unit, showing placement of shield compartment and various components.

To check s.s.b. converter operation, switch the emission to s.s.b. and the function to "key." The final amplifier should draw 15 ma. of plate current and the a.m. modulator should draw no current. Inject about 5 watts of 20-meter s.s.b. signal into Pins 1 and 2 of J_4. The final amplifier should kick up to about 70 ma. on voice peaks, for an input of about 65 watts p.e.p. If you have a surplus of drive, add an attenuation pad between the s.s.b. exciter and the transmitter.[5] The s.s.b. exciter will control the transmitter if Pin 8 of J_4 is grounded on "transmit," through an extra contact on the s.s.b. exciter relay. An antenna relay may be controlled through Pins 3,4, and 5. To check the spotting level, switch the function to "spot." A moderate signal should be heard in the 6-meter receiver. If the signal is of excessive strength, increase the value of R_1, and conversely, if insufficient signal is present, reduce R_1.

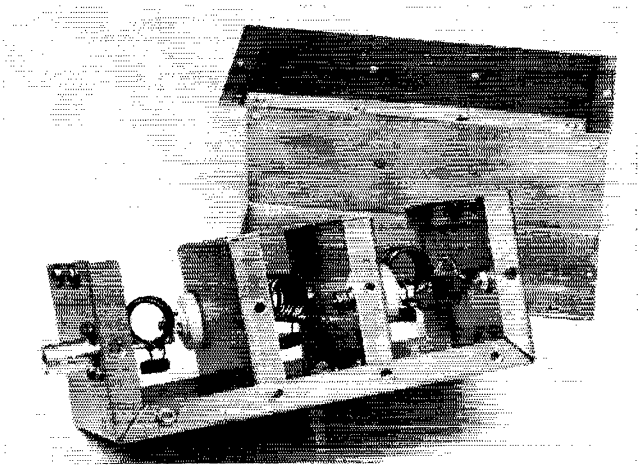
The transmitter has been in operation for several months now and has given me no trouble. It seems to "get out" well and numerous stations have commented on its excellent operation in all modes. The advantages of high-level modulated a.m., s.s.b., break-in c.w. and a high-stability v.f.o., make this a useful rig. Build one and I'm sure you'll agree! QST

[5] Hubbell, "A Step-Type R.F. Attenuator," *QST*, December, 1959.

QSL Card Tie Clasp

The accompanying photograph shows an interesting tie clasp made by the Gift Shop, Box 73, Northfield, Ohio. Measuring about ¾ by 1¼ inches, the clasp is made by taking a full-sized QSL card containing plain lettering, line drawings or even photographs and reducing it photographically. The image is then transferred to a .032-inch thick metal plate which is then attached to the tie clasp. A pin using the same process is available for ladies. The manufacturer will consider two or three-color jobs, but a sample QSL card must be submitted first. Price class: $4.00.

The author describes an easily-built low-pass filter for use below 30 Mc. The filter contains standard components and will handle power levels of 50 watts at 28 Mc., about 150 watts at 21 Mc., and 300 watts at 14 Mc. and lower frequencies, when used with antenna systems having a low s.w.r.



An Effective Low-Pass Filter

BY GLENN R. WELSH.* WB6HRM

THE low-pass filter described in this article is simple, inexpensive, and was designed for use with transmitters operating below 30 Mc. The filter is specifically designed to provide high attenuation in the v.h.f. television bands and at 40 Mc., a common television intermediate frequency. When properly constructed and tuned the unwanted signal attenuation through the filter is in excess of 50 decibels — a power reduction greater than 100,000.

The Circuit

After examining several existing low-pass filter designs intended for amateur use, a decision was made to build a filter using the insertion-loss design concept. This design offers the following advantages over the image-parameter designs previously described:

1) Two less coils are required for the same stopband attenuation.
2) Relative freedom in the selection of frequencies of maximum attenuation.
3) Easier to tune.

The schematic and component values are given in Fig. 2. The frequencies of maximum attenuation are 40.5 Mc., 47.5 Mc., and 78.1 Mc. The filter sections are formed by the parallel combinations of C_2 and L_1, C_4 and L_2, C_6 and L_3, respectively. The theoretical maximum v.s.w.r. is 1.1:1 in the passband. (The design cutoff frequency is 30 Mc.)

The filter is designed for 50-ohm unbalanced systems. The component values for any other impedance may be rapidly determined by a simple calculation. To accomplish this, multiply the capacitor values by $\frac{50}{Z_o}$ and the inductor values by $\frac{Z_o}{50}$. For example, if a 70-ohm line is used the values of C_2 and L_1 would be:

$$C_2 = 12\,\frac{50}{Z_o} = 12\,\frac{50}{70} = 8.6 \text{ pf.}$$

$$L_1 = 0.0334\,\frac{Z_o}{50} = 0.334\,\frac{70}{50} = 0.468 \ \mu\text{h.}$$

The frequencies remain unchanged for different impedances.

* Lencurt Electric, 1105 Old County Road, San Carlos, California.

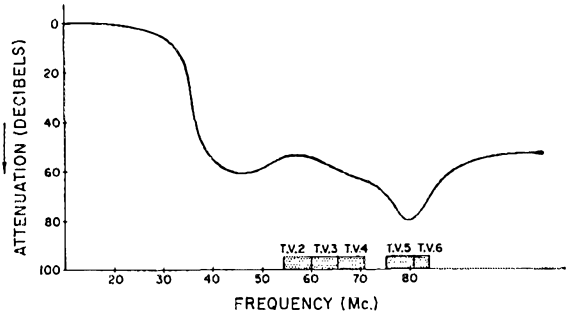


Fig. 1—A graphic illustration of the relative attenuation characteristics of the WB6HRM filter. A 50-db. attenuation level, or greater, is available at frequencies above 40 Mc.

Building the Filter

The coils are made from No. 14 enameled copper wire, and are formed on a ½-inch dia. mandrel. L_1 has 8 turns while L_2 and L_3 each have 6 turns. After the coils are formed, the capacitors are soldered across them and the parallel branches are initially tuned to resonance by adjusting the turns spacing until a grid-dip meter indicates resonance at the frequencies shown in Fig. 2. The coil/capacitor assemblies are then mounted in the chassis (individually) and the resonant frequency is checked again. Finally, the shunt capacitors are mounted and soldered in.

The filter is housed in a 5 × 3 × 2-inch aluminum Minibox. Aluminum shields are used to provide isolation between filter sections. Each shield is secured to the Minibox at eight places to assure isolation and prevent "hot spots." Also, the two angle brackets shown in the photograph are included to prevent leakage from the enclosure. The paint is removed from along the edges of the cover to insure good metallic contact between the overlapping flanges, when the unit is assembled.

These constructional details may appear frivolous. But, it must be emphasized that the harmonic currents must not be allowed to reach the outside surface of the housing. If the harmonics do reach the outside, and the connecting coaxial cables, they will flow over the filter to the antenna and the filter will be relatively useless.

Results

The filter has been found effective in eliminating TVI in a relatively weak signal area. The maximum v.s.w.r. introduced by the unit is 1.3:1, measured at the high end of the 10-meter band (29.7 Mc.).

In conclusion, it is well to emphasize that this low-pass filter is *not* a proposed cure for all types of television interference. The filter acts only to reduce the radiation of harmonic energy from the antenna system. Other possible sources of interference, such as direct radiation from the transmitter, fundamental TV receiver overloading, and many others, are described in the *ARRL Handbook*. The author strongly recommends the latter as a valuable source of information for identification of TVI and the subsequent cure for each variety of interference. QST

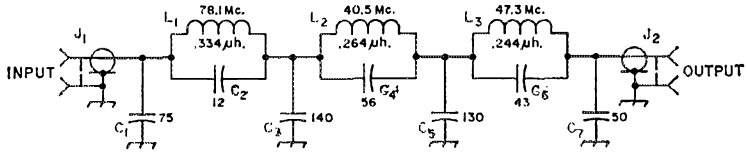


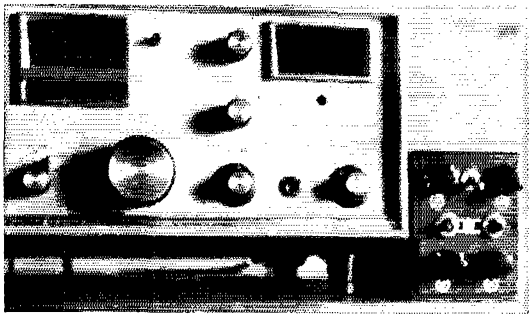
Fig. 2—A schematic diagram of the low-pass filter. All capacitors are in pf. and are silver-mica units rated at 500 v.d.c.
J_1, J_2—Type BNC coaxial chassis connector (U.h.f. or type N connectors may be used if desired).
L_1–L_3, inc.—See text.

Strays

WA2WNX wrote us that his school's amateur radio club station operation was interrupted recently when the school shop class teacher complained that the station was "coming in loud and clear" in his mouth! When asked for more details, the teacher said that he was at the other end of the building in the teacher's lounge eating a sandwich when he felt some code in his mouth (he wears an upper bridge!).

The New Providence ARC serving New Providence, Berkeley Heights, Summit and surrounding New Jersey communities, meets at the New Providence Recreation Center, corner of Springfield and South Streets in New Providence on the second Monday of each month at 8:00 P.M. Licensed amateurs, as well as those interested in becoming amateurs, are invited to attend meetings and to join the club.

Accessory Package for Transceivers



The multipurpose adapter is shown here next to the NCX-3.

Multifunction Adapter for Improved C. W. Performance

BY JOHN J. SCHULTZ,* W2EEY/DJØBV

Most transceivers on the market today are designed primarily for mobile operation. In an effort to keep the size to a minimum, some of the features found desirable in home-station use are often sacrificed — particularly those special qualities needed for present-day c.w. work. After a few hours of operation, the corners that have been cut become evident, and one begins to think of a number of accessories that could be added to enhance the performance in fixed-station operation.

In connection with my NCX-3, I felt it desirable to limit revisions to those possible with only the simplest of alterations in the original wiring. Nevertheless, it turned out that several attractive features could be provided within this restriction:

1) Audio-type noise limiter.
2) Audio filter for c.w. selectivity.
3) Side-tone oscillator for c.w. monitoring.
4) 100-kc. crystal calibrator.

All of these functions are provided by an adapter unit which plugs into the accessory socket, after a few very simple changes in original wiring have been made. None of these changes in any way affects the original operation of the transceiver. Since most of the modifications are applied to the audio section, they can be adapted quite easily to transceivers other than the NCX-3.

Noise Limiter

Fig. 1 shows the schematic of the adapter unit. The 6AL5 serves as a conventional full-wave shunt limiter, with the clipping level set by potentiometer R_1. The effectiveness of such a limiter on s.s.b., as compared to a Bishop-type i.f. noise limiter, is debatable but, in this case, the main purpose of the limiter is to remove the strong clicks caused by switching lights and appliances, which are usually bothersome in home-station operation. This is accomplished easily enough by audio limiting. Also, no work has to be done on an i.f. circuit as would be required for the Bishop limiter. The audio line between the product detector and the first audio stage in the transceiver is the only connection that has to be brought out.

Audio Filter

The shunt limiter is followed by an audio filter for c.w. The filter shown in the schematic is a simple, single, parallel-tuned circuit using a high-Q inductor, such as the UTC type MQA, and tuned to about 800 cycles. However, any other desired audio filter, such as the OCO multisection filter [1] (minus the input transformer and transistor amplifiers), may be used, depending on how elaborate you want to make the unit. In any case, c.w. will be much more of a pleasure to copy than with the 2- to 3-kc. s.s.b. bandwidth of the transceiver. R_2 is used for coarse adjustment of the selectivity of the filter. It is not absolutely necessary, but is useful in relieving the ring of a sharp filter when conditions do not warrant maximum selectivity.

Crystal Calibrator

The 100-kc. calibration oscillator is adapted from the *ARRL Handbook*. L_2 is broadly resonant in the 14-Mc. range. I used this circuit, instead of the conventional one-stage arrangement, because, after trying most of the one-stage circuits, I have never been satisfied with the output above 14 Mc. It has always been difficult to find the 100-kc. markers on 10 meters, unless the antenna is disconnected. The NCX-3 does not cover bands higher than 14 Mc., of course, but, since I wanted to make the adapter suitable for use with other equipment covering the higher-frequency bands, I decided to incorporate a calibration oscillator that could be easily heard. R_4 is used to reduce the output on 80 and 40 if necessary.

Side-Tone Oscillator

The c.w. side-tone oscillator is conventional. It produces a tone of about 800 cycles with the values shown. The tone can be varied by changing the value of the capacitor across the output transformer primary; probably some experimenting with the value of this capacitor will be

* c/o Engineering Department, Radio Free Europe, Englischer Garten 1, Munich 22, Germany.

[1] Gensler, "The OCO Audio Filter," *QST*, January, 1962.

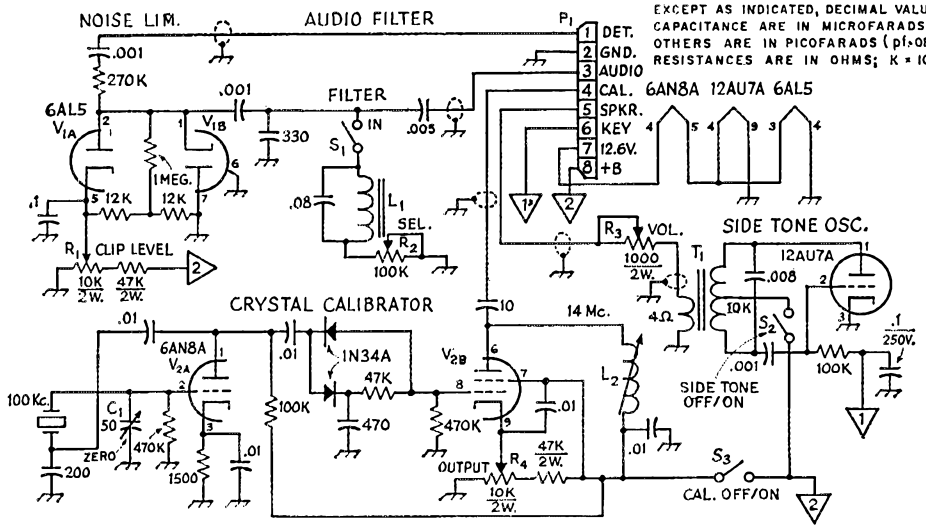


Fig. 1—Circuit of the NCX-3 adapter. Fixed capacitors of decimal value are paper, mylar, or disk ceramic; others are mica. Fixed resistors are ½ watt.

C_1—Air trimmer.
L_1—0.5-henry high-Q inductor (UTC MQA-10).
L_2—5–10-μh. slug-tuned coil (Miller 4406, or similar).
P_1—Octal plug.
R_1, R_2, R_3, R_4—Linear control.
S_1, S_2, S_3—S.p.s.t. toggle switch.
T_1—Output trans., 10,000 ohms, plate-to-plate, to 4 ohms.

necessary anyway, depending on the transformer used. R_3 serves mainly as a volume control, although it does vary the tone slightly. The blocking-bias connections in a grid-block-keyed transceiver can be made at the key terminals directly, or internally in the transceiver. The loudspeaker connections may also be made directly to the station loudspeaker, or a small 2- or 3-inch loudspeaker might be included in the outboard unit. Note that only one section of the 12AU7 dual triode is used and also only one side of the heater (to balance the series-connected heaters), so connections must be made to the heater terminals indicated.

Transceiver Modification

Constructional details of the adapter unit depend upon the size of the c.w. filter used, and whether or not a separate loudspeaker is incorporated for the c.w. monitor. The unit I built, without loudspeaker, fits into a 6 × 4 × 3-inch German equivalent of a Minibox.

Connections to the NCX-3 were very simple, since B plus and filament power are already available at the 100-kc. calibrator accessory socket on the rear apron. The only changes in the connections to this socket were to short out the 22-ohm resistor in series with the 12.6-volt filament line, and to remove the ground from Pin 6. This connection is not needed, since Pin 2 also provides a ground connection.

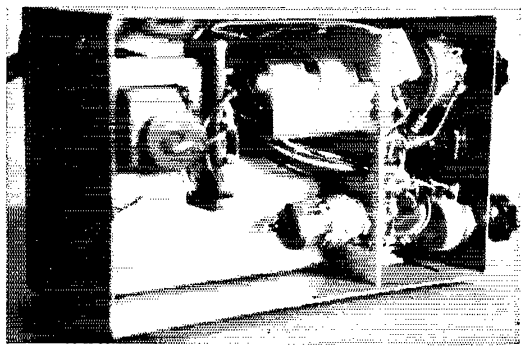
The coupling connection between the product detector and the audio section of the NCX-3 should be broken. The output of the detector is then brought out to Pin 1 of the accessory socket, while the input to the audio section is brought out to Pin 3. Shielded wire should be used for these connections as well as for the crystal-calibrator output lead.

Keyed bias for the side-tone oscillator and a connection to the "hot" side of the speaker circuit are available at the power plug adjacent to the calibrator plug at the rear of the NCX-3. The keying bias connection is strapped over to Pin 6 on the calibrator plug, and the speaker connection to Pin 5.

The adapter unit will operate on any plate voltage from about 150 to approximately 220 volts. Current drain averages about 25 ma.

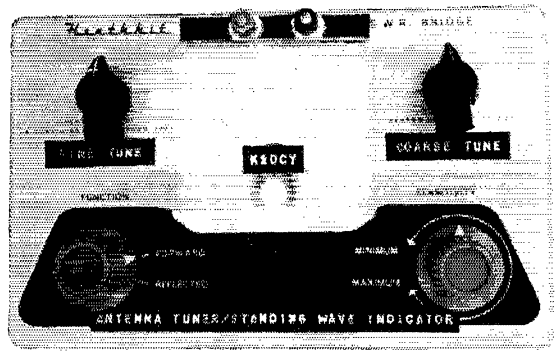
Although the inside of the transceiver was hardly touched, this accessory package has gone a long way toward making my NCX-3 a really complete station for use on c.w. as well as s.s.b.

QST



T_1 is in the upper left-hand corner, above the i.f. can which houses the audio filter. Across the top of the partition are the 100-kc. crystal, the 6AN8A, and the 12AU7A (hidden in this view). The tube below the crystal is the 6AL5.

• *Beginner and Novice*



The control for the L-network capacitor is to the left of the meter, the coil switch to the right. Antenna and ground terminals are installed above the meter.

Simple Network for Feeding Random Wires

Building a Transmatch into the Heath S.W.R. Meter

BY THOMAS B. PERERA,* K2DCY

This easily-constructed matching network is built into the extra space available in the housing of the Heath AM-2 s.w.r. meter. Normal operation of the meter is in no way hampered by the modification.

HAVING often found myself afield with my transceiver but without a suitable antenna, I have tried to load up the output amplifier with various random-length long-wire antennas. However, the narrow impedance-matching range available in my output circuit made it impossible to load satisfactorily with anything other than an accurately-measured wire. In looking over the various antenna tuners on the market, I noted that some of them included an s.w.r. indicator for tuning purposes, and I considered building my Heath s.w.r. meter into a larger tuner unit.

Before starting this, however, it occurred to me that the large-size coils and widely-spaced capacitors in conventional antenna tuners might not be necessary if the tuner were preset to the proper values of inductance and capacitance. This, I reasoned, could be done at reduced input first, and full power applied only after the antenna was properly matched. With this in mind, I eyed the considerable amount of unused space within the Heath meter housing.

The L network, consisting as it does of only a tapped series inductor and a capacitor to ground, seemed to be the simplest arrangement. Since the transmitter's pi network takes care of low-impedance loads, the L network is connected with the capacitor permanently across the output to provide an impedance step-up, as shown in Fig. 1.

Construction

Construction is not difficult, requiring only the drilling of two holes for the capacitor and switch shafts, and another pair of holes for whatever output terminals are desired for the antenna and ground connections. (I used small ceramic feed-through insulators for the purpose.) However, care should be used in drilling the holes, and it may prove to be advisable to remove the meter, potentiometer, and original switch while doing the job .This is not too inconvenient, since it can be done without disturbing the soldered connections to the panel components.

* 410 Riverside Drive, New York, N. Y. 10025.

All connections are made with heavy bus wire, and the tuner is connected to the output antenna connector of the s.w.r. meter with a short length of insulated braided wire obtained by pulling the center conductor and its insulation out of a short piece of coaxial cable, such as RG-58/U, and using the braid and outer sheath only. The interior view shows this connection.

The inductor is tapped at the points indicated under Fig. 1 by soldering bus wire to one turn after pushing the adjacent turns out of the way as shown in the coil photo. The coil is supported by these bus wires. They all run parallel, and are securely soldered to the contacts of the wafer switch. A spare switch terminal is used as a tie point for the end of the coil connected to the capacitor. A piece of bus wire is run from this terminal to the stator terminal of the variable capacitor. The antenna terminal is connected to this wire at some convenient point.

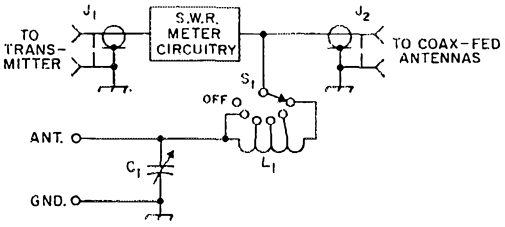


Fig. 1—Circuit of the L network.

C_1—Approx. 250-pf. variable capacitor, 0.025-inch or greater plate spacing (Johnson 167-12, or similar). Depth should not exceed 3½ inches.

J_1, J_2—Original meter input and output connectors, respectively.

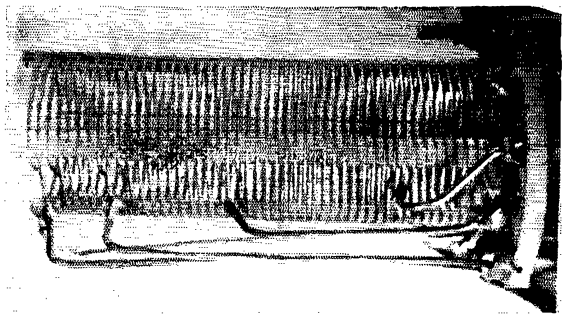
L_1—48 turns No. 20, 1-inch diam., 16 turns per inch (B & W 3015 Miniductor or Illumitronics 816 Air Dux), tapped at 1, 2, 4, 8, 16, and 32 turns from capacitor end.

S_1—Ceramic rotary switch, single-section, single-pole, 9 or more positions (Centralab 2503). Leave first position open as "off" position. Note: For simplicity, only 6 switch positions are shown in the diagram.

In putting the unit to use, first connect a good ground to the ground post, and an antenna to the antenna post. The importance of a good ground cannot be overemphasized. Wires at least 70 ft. long give the best results on all bands. The transmitter should be connected to the input terminal of the s.w.r. meter, as usual, but there should be nothing connected externally to the coax output connector.

Apply just enough power to the transmitter to obtain a reading on the reflected-power scale of the meter (with sensitivity at maximum). Try the different switch positions to obtain a minimum reading on the meter, and adjust the variable capacitor to obtain the least reflected power (increasing power as necessary to obtain a reading). Now, reduce the sensitivity of the meter and tune up your transmitter to full power in the normal manner.

Adjusting the tuner at low power reduces the chance of capacitor arcing or exessive coil heating



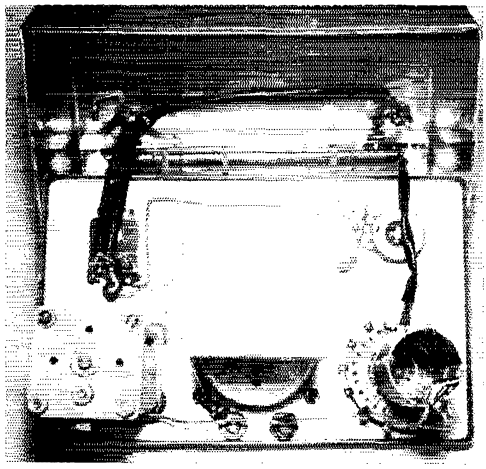
Detail view of the coil, showing the method of mounting, and making the taps.

while the matching circuit is unloaded. No arcing has been experienced with a transmitter running 175 watts input, and the unit should easily handle 300-watt transmitters when properly adjusted.

The s.w.r. meter can be used in the normal manner with coax-fed antennas by simply turning the rotary switch to the OFF position, which disconnects the L network.

After the components had been installed in the meter cabinet, it was found that there was still considerable unused space, so a more complex transmatch configuration could be tried. Other suitable networks are shown in the ARRL *Handbook*. For instance, the variable capacitor could be switched in series with the antenna to extend the range of reactive components that could be handled.

Even for those who have never built any equipment, I would like to point out that this project is well within the capabilities of any ham who can drill a hole and solder a joint. You will end up with a useful gadget for portable and emergency operation, or just for getting out the day after the beam blows down. Almost any wire can now serve as an antenna, and you have built something! QST



Interior view, showing the L-network capacitor to the left, the coil and switch to the right. The insulated wire connecting the s.w.r.-meter coaxial output connector to the switch may be seen above the switch.

Smith-Chart Calculations for the Radio Amateur

Graphical Solutions of Transmission-Line Problems

PART I

BY GERALD L. HALL,* K1PLP, EX-KH6EGL

This article reviews the basic use of the Smith Chart and, in addition, discusses the external scales now provided on most versions of the Chart. These scales greatly simplify the calculations involved in line-loss considerations.

Because of the length of the article, it is divided into two parts. The second part will appear in an early issue.

An earlier *QST* article by K6CRT [1] has created considerable interest among amateurs in the use of the Smith Chart. Now that the measurement of the resistive and reactive components of a complex impedance has been brought into the realm of possibility, even for an amateur with a limited budget,[2] still greater amateur interest in the Chart will undoubtedly develop.

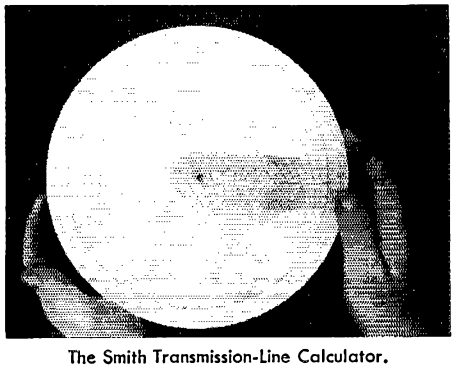
The Smith Radio Transmission-Line Calculator is named after its inventor, Phillip H. Smith, and was originally described in *Electronics* for January, 1939, where it was presented in cutout form. Radio development, during and since the war, has promoted considerable interest in this calculator among engineers and research workers, particularly in the field of u.h.f. where electrical measurements must be made indirectly. The Calculator has also proven itself useful in h.f. and v.h.f. work, because it eliminates the need for complex mathematical calculations in solving most transmission-line problems. Although its appearance may at first seem somewhat formidable, the use of the Smith Chart is quite similar to the use of a graph. In fact, the Chart might be considered as a specialized type of graph, with curved, rather than rectangular, coordinate lines.

When a transmission line is not terminated in its characteristic impedance, standing waves will result, and the input impedance of the line will vary depending on the line's length. If the terminating impedance is known, it is a simple matter to determine the input impedance of the line for any length by means of the Smith Chart or Calculator. Conversely, with a given line length and a known (or measured) input impedance, the load impedance may be determined by means of the Chart or Calculator — a convenient method of remotely determining an antenna impedance, for example.

* Hopkins St., Wilmington, Mass. 01887.

[1] Cholewski, "Some Amateur Applications of the Smith Chart," *QST*, January, 1960.

[2] Strandlund, "Amateur Measurement of $R + jX$," *QST*, June, 1965.



The Smith Transmission-Line Calculator.

Impedance Coordinate System

The Calculator is fundamentally a special kind of impedance coordinate system, mechanically arranged with respect to a set of movable scales, to show the relationship of impedance at any point along a uniform open-wire or coaxial transmission line to the impedance at any other point, and to several other electrical characteristics. The true Calculator assumes a form similar in appearance to a circular slide rule, but with different scales, of course. The Smith Calculator is available in durable plastic for a few dollars from the Emeloid Company, 1239 Central Ave., Hillside, N. J.

A perhaps more common form of the Calculator is the Smith Transmission-Line Chart, or merely Smith Chart, which is a printed copy of the Calculator coordinate system and its various scales. The fact that the scales are not movable on the printed charts offers only slight inconvenience over the true Calculator. An advantage of the printed Chart is that actual calculations may be kept for record or later checking — a feat which is impossible with the Calculator version. Smith Charts are available at most college bookstores for a few cents each, or from General Radio Company, West Concord, Mass.

The Smith Chart coordinate system consists simply of two families of circles — the resistance family and the reactance family. The *resistance circles* (Fig. 1) are centered on the *resistance axis* (the only straight line on the Chart), and are tangent to the outer circle at the bottom of the Chart. Each circle is assigned a value of resistance, which is indicated at the point where the circle crosses the resistance axis. All points along any one circle have the same resistance value.

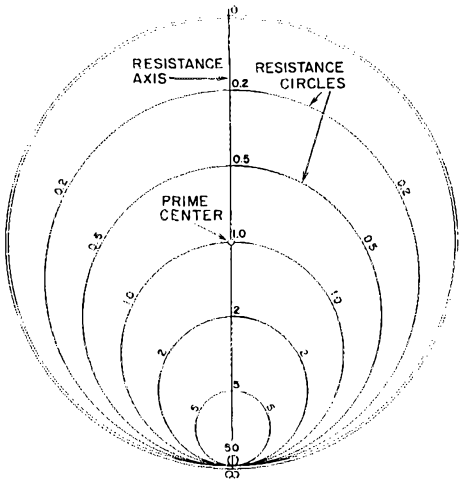


Fig. 1.

The values assigned to these circles vary from zero at the top of the chart to infinity at the bottom, and actually represent a ratio with respect to the impedance value assigned to the center point of the Chart, indicated 1.0. This center point is called *prime center*. If prime center is assigned a value of 100 ohms, then 200 ohms resistance is represented by the 2.0 circle, 50 ohms by the 0.5 circle, 20 ohms by the 0.2 circle, and so on. If a value of 50 is assigned to prime center, the 2.0 circle now represents 100 ohms, the 0.5 circle 25 ohms, and the 0.2 circle 10 ohms. In each case, it may be seen that the value on the Chart is determined by dividing the actual resistance by the number assigned to prime center. This process is called *normalizing*. Conversely, values from the Chart are converted back to actual resistance values by multiplying the Chart value times the value assigned to prime center. This feature permits the use of the Smith Chart for any impedance values, and therefore with any type of uniform transmission line, whatever its impedance may be. Specialized versions of the Smith Chart may be found with a value of 50 or 75 at prime center. These are intended primarily for use with 50- and 75-ohm lines, respectively.

Now consider the *reactance circles* (Fig. 2) which appear as curved lines on the Chart because only segments of the complete circles are drawn. These circles are tangent to the resistance axis, which itself is a member of the reactance family (with a radius of infinity). The centers are displaced to the right or left on a line tangent to the bottom of the chart. The large outer circle bounding the coordinate portion of the Chart is the reactance axis.

Each reactance circle segment is assigned a value of reactance, indicated near the point where the circle touches the reactance axis. All points along any one segment have the same reactance value. As with the resistance circles, the values

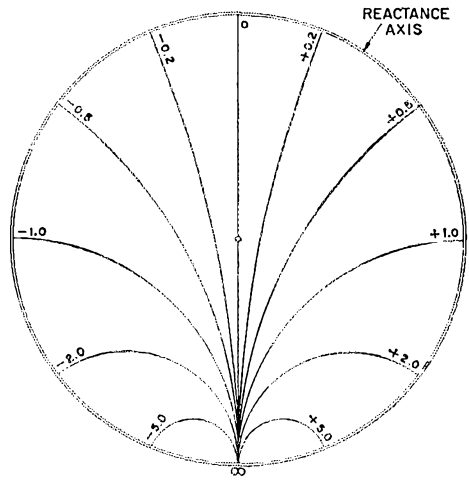


Fig. 2.

assigned to each reactance circle are normalized with respect to the value assigned to prime center. Values to the right of the resistance axis are positive (inductive), and those to the left of the reactance axis are negative (capacitive).

When the resistance family and the reactance family of circles are combined, the coordinate system of the Smith Chart results, as shown in Fig. 3. Complex series impedances can be plotted on this coordinate system.

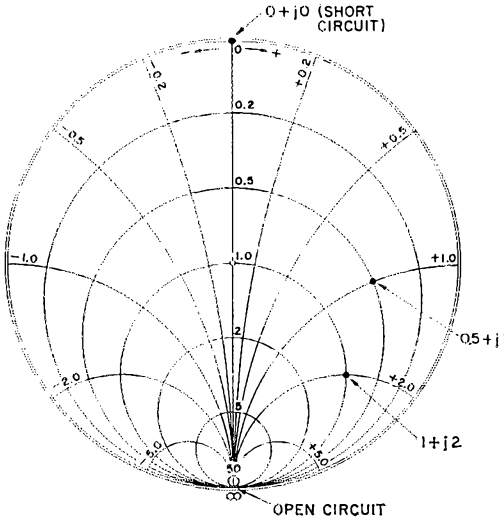


Fig. 3.

Impedance Plotting

Suppose we have an impedance consisting of 50 ohms resistance and 100 ohms inductive reactance ($Z = 50 + j100$). If we assign a value of 100 ohms to prime center, we normalize the above impedance by dividing each component of the impedance by 100. The normalized impedance would then be $\frac{50}{100} + j\frac{100}{100} = 0.5 + j1.0$. This impedance would be plotted on the Smith Chart

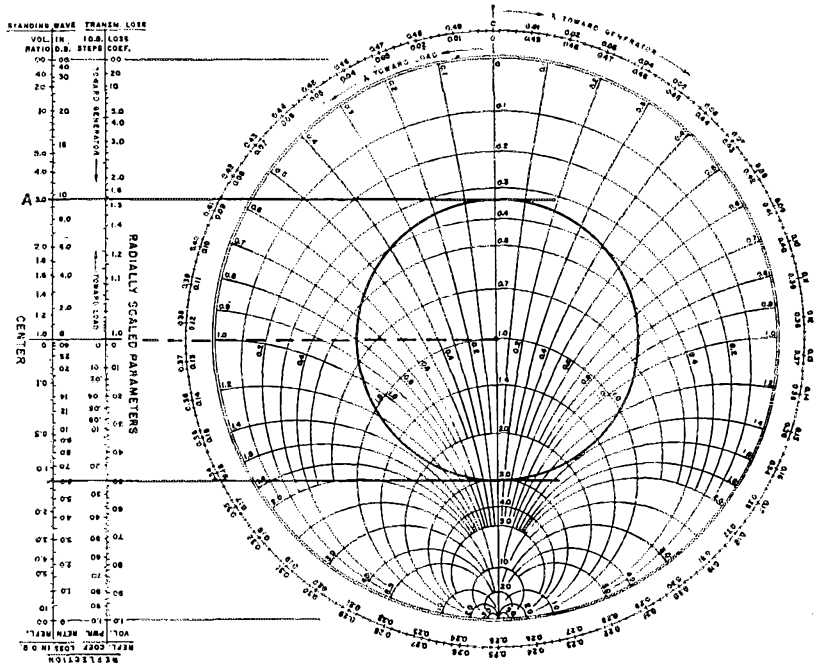


Fig. 5.

at the intersection of the 0.5 resistance circle and the +1.0 reactance circle, as indicated in Fig. 3. If a value of 50 ohms had been assigned to prime center, as for 50-ohm coaxial line, the same impedance would be plotted at the intersection of the $\frac{50}{50} = 1.0$ resistance circle, and the $\frac{100}{50} = 2.0$ positive reactance circle, or at $1 + j2$ (also indicated in Fig. 3). From these examples, it may be seen that the same impedance may be plotted at different points on the Chart, depending upon the value assigned to prime center. It is customary when solving transmission-line problems to assign to prime center a value equal to the characteristic impedance, or Z_0, of the line being used. This value should always be recorded at the start of calculations, to avoid possible confusion later.

In using the specialized charts with the value of 50 at prime center, it is, of course, not necessary to normalize impedances when working with 50-ohm line. The resistance and reactance values may be plotted directly.

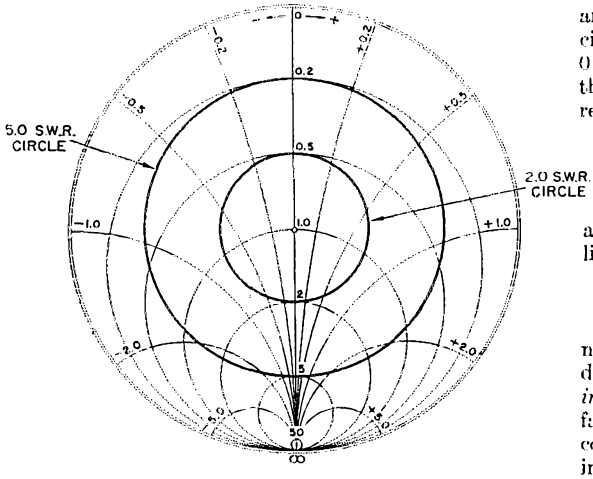


Fig. 4.

Short and Open Circuits

While on the subject of plotting impedances, two special cases deserve consideration. These are short circuits and open circuits. A true short circuit has zero resistance and zero reactance, or $0 + j0$. This impedance would be plotted at the top of the Chart, at the intersection of the resistance and the reactance axes. An open circuit has infinite resistance, and would therefore be plotted at the bottom of the Chart, at the intersection of the resistance and reactance axes. These two special cases are sometimes used in determining line lengths, line losses, and line impedances.

Standing-Wave Ratio Circles

Members of a third family of circles, which are not printed on the chart but which are added during the process of solving problems, are *standing-wave-ratio*, or *s.w.r., circles*. See Fig. 4. This family is centered on prime center, and appears as concentric circles inside the reactance axis. During calculations, one or more of these circles may be added with a drawing compass. Each circle

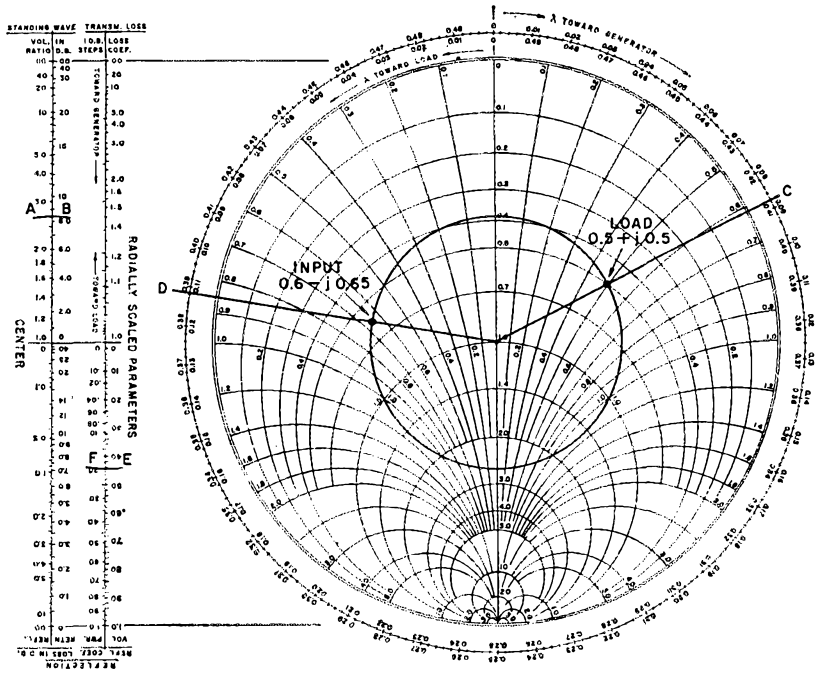


Fig. 6.

represents a value of s.w.r., every point on a given circle representing the same s.w.r. The s.w.r. value for a given circle may be determined directly from the chart coordinate system, by reading the resistance value where the s.w.r. circle crosses the resistance axis, below prime center. (The reading where the circle crosses the resistance axis above prime center indicates the inverse ratio.)

Consider the situation where a load mismatch in a length of line causes a 3-to-1 standing-wave ratio to exist. If we temporarily disregard line losses, we may state that the s.w.r. remains constant throughout the entire length of this line. This is represented on the Smith Chart by drawing a 3:1 constant-s.w.r. circle (a circle with a radius of 3 on the resistance axis), as in Fig. 5. The design of the Chart is such that any impedance encountered anywhere along the length of this mismatched line will fall on the s.w.r. circle, and may be read from the coordinates merely by progressing around the s.w.r. circle by an amount corresponding to the length of the line involved.

This brings into use the *wavelength scales*, which appear, in Fig. 5, near the outer perimeter of the Smith Chart. These scales are calibrated in terms of portions of an electrical wavelength along a transmission line. One scale, running counterclockwise, starts at the generator or input end of the line and progresses toward the load, while the other scale starts at the load and proceeds toward the generator in a clockwise direction. The complete circle represents one half wavelength. Progressing once around the perimeter of these scales corresponds to progressing along a transmission line for a half wavelength. Because impedances will repeat themselves every half wavelength along a piece of line, the Chart may be used for any length of line by disregarding or subtracting from the line's total length an integral, or whole number, of half wavelengths.

Also shown in Fig. 5 is a means of transferring the radius of the s.w.r. circle to the external scales of the chart, by drawing lines tangent to the circle. Or, the radius of the s.w.r. circle may be simply transferred to the external scale by placing the point of a drawing compass at the center, or 0, line and inscribing a short arc across the appropriate scale. It will be noted that when this is done in Fig. 5, the external STANDING-WAVE VOLTAGE-RATIO scale indicates the s.w.r. to be 3.0 (at A) — our condition for intially drawing the circle on the Chart (and the same as the s.w.r. reading on the resistance axis).

Solving Problems with the Smith Chart

Suppose we have a transmission line with a characteristic impedance of 50 ohms, and an electrical length of 0.3 wavelength. Also, suppose we terminate this line with an impedance having a resistive component of 25 ohms and an inductive reactance of 25 ohms ($Z = 25 + j25$), and desire to determine the input impedance to the line. Because the line is not terminated in its characteristic impedance, we know that standing waves will be present on the line, and that, therefore, the input impedance to the line will not be exactly 50 ohms. We proceed as follows: First, normalize the load impedance by dividing both the resistive and reactive components by 50 (Z_0 of the line being used). The normalized im-

pedance in this case is $0.5 + j0.5$. This is plotted on the Chart at the intersection of the 0.5 resistance and +0.5 reactance circles, as in Fig. 6. Then draw a constant-s.w.r. circle passing through this plotted point. The radius of this circle may then be transferred to the external scales with the drawing compass. From the external s.w.v.r. scale, it may be seen (at A), that the voltage ratio of 2.6 exists for this radius, indicating that our line is operating with an s.w.r. of 2.6 to 1. This figure is converted to decibels in the adjacent scale, where 8.4 db. may be read (at B), indicating that the ratio of the voltage maximum to the voltage minimum along the line is 8.4 db.

Next, with a straightedge, draw a radial line from prime center through the plotted point to intersect the wavelengths scale, and read a value from the wavelengths scale. Because we are starting from the load, we use the TOWARD-GENERATOR or outermost calibration, and read 0.088 wavelength (at C). To obtain the line input impedance, we merely find the point on the s.w.r. circle which is 0.3 wavelengths toward the generator from the plotted load impedance. This is accomplished by adding 0.3 (the length of the line in wavelengths) to the reference or starting point, 0.088; $0.3 + 0.088 = 0.388$. Locate 0.388 on the TOWARD-GENERATOR scale (at D), and draw a second radial line from this point to prime center. The intersection of the new radial line with the s.w.r. circle represents the line input impedance, in this case $0.6 - j0.65$. To find the actual line input impedance, multiply by 50 — the value assigned to prime center, which equals $30 - j32.5$, or 30 ohms resistance and 32.5 ohms capacitive reactance. This is the impedance which a transmitter must match if such a system were a combination of antenna and transmission line, or is the impedance which would be measured on an impedance bridge if the measurement were taken at the line input.

In addition to the line input impedance and the s.w.r., the Chart reveals several other operating characteristics of the above system of line and load, if a closer look is desired. For example, the voltage reflection coefficient, both magnitude and phase angle, for this particular load is given. The phase angle is read under the radial line draw through the plot of the load impedance where the line intersects the ANGLE-OF-REFLECTION-COEFFICIENT scale. This scale is not included in Fig. 6, but will be found on the Smith Chart, just inside the wavelengths scales. In this example, the reading would be about 116.5 degrees. This indicates the angle by which the reflected voltage wave lags the incident wave at the load. It will be noted that angles on the left half, or capacitive-reactance side, of the Chart are negative angles, a "negative" lag indicating that the reflected voltage wave actually leads the incident wave.

The magnitude of the voltage-reflection-coefficient may be read from the external REFLECTION-COEFFICIENT-VOLTAGE scale, and is seen to be approximately 0.44 (at E) for this example, meaning 44 per cent of the incident voltage is reflected. Adjacent to this scale on the POWER calibration, it is noted (at F) that the power reflection coefficient is 0.20, indicating that 20 per cent of the incident power would be reflected. QST

Strays

Stolen Equipment:

On or about November 17, a complete Heath HW-22 station was stolen from my vehicle. The unit had my call taped on it and the antenna connector was modified to an SO-239. Samuel Garshofsky, W2PWF, 7842 264th, Floral Park, New York, 11004.

—•••—

This is to report that on November 5, my National NCX-3 was stolen from my car while it was parked in front of my home. The serial number is 48-6952. Marco J. Magnano, K7VJC, 1513 Norton Bldg., Seattle, Washington 98101.

—•••—

The following equipment was stolen from Archbishop Molloy High School Amateur Radio Club, WB2LHY: Johnson Viking Ranger Model No. 240-161, serial No. 69740; Heath SB-200 linear amplifier (high voltage cover plate missing); CDR rotor control for the AR-22; Superex head set Model AP-S; and a Pennwood 24-hour clock, Ivory finish. Anyone with information please contact Brother Francis X. Backus, Archbishop Molloy H.S., 83-53 Manton St., Jamaica, N. Y. 11435.

A Clegg Intereceptor v.h.f. receiver, serial No. 340-209, was stolen from Near North Radio Club station, K9JAM, Chicago, sometime around end of September. It is the property of Edwin Webb, W9IPO, 812 N. Dearborn St., Chicago, who would like any information leading to its recovery.

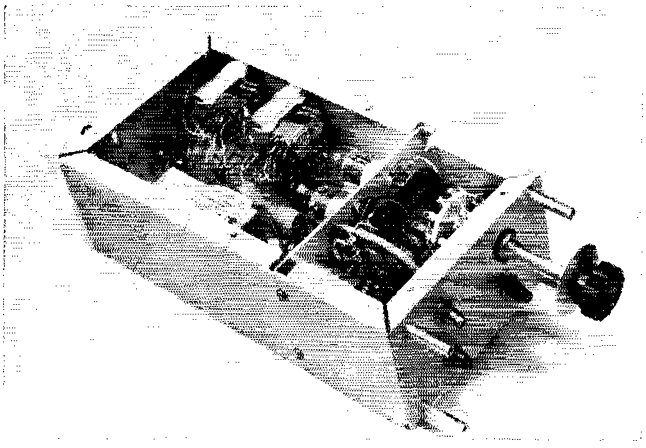
—•••—

Our Museum Curator, W1ANA, being somewhat of an attic prowler and basement investigator himself, feels sure that there must be a lot of real choice amateur radio material laying around. Right now he would love to have a Paragon RA6 receiver for the ARRL Museum. He's also looking for a CG1144 tube, the predecessor of the UV203.

—•••—

A weekly radio program about amateur radio is being broadcast Sunday mornings by KPFK (f.m.) Los Angeles. Ray E. Meyers, W6MLZ, past director of the ARRL Southwestern Division and amateur radio columnist of the *Herald-Examiner* conducts the show. And, if you're interested in other amateur radio activities in Northern California, listen to "CQ ES QST DE KPFA," conducted by Gene Bergman, WB6IBU on KPFA (f.m.). The program is scheduled for Saturdays at 10:00 A.M.

SOME THOUGHTS ON STATION CONTROL



The W1AW VOX unit with the top cover removed. The large capacitor in the front section is C_1. The power supply is constructed on the bottom of the chassis in the rear section. The relays are mounted on the chassis wall at the rear, just above J4.

Including a Description of the W1AW VOX Unit

BY DOUGLAS A. BLAKESLEE,* W1KLK

One of the principal considerations in the design of any amateur station should be operating convenience. The days when throwing a couple of knife switches would take the station from transmit to receive are — hopefully — gone forever. High power, using single antennas for both transmitting and receiving, plus voice and c.w. break-in all make the problem of station control more complex. The newcomer is often confused about just what his station should do. How is he to know if he wants semi-break-in for c.w. or not, or for that matter how to put such a system together?

The manufacturers don't seem to have the answer — or rather each has his own answer, as anyone who has tried to interconnect different makes of equipment will testify. When undertaking the design of a new control circuit for the remodeled W1AW, the author talked to a number of active local amateurs to see what the operators themselves had and wanted. As might be expected from a group of amateurs, each had his own ideas and "dream" system. Also, it seems that one cannot purchase the advanced control systems that make operating a pleasure, but rather the amateur must be able to convert, build and modify to get what he wants.

Most of the hams we talked to felt the beginner should start with an antenna relay and a multi-

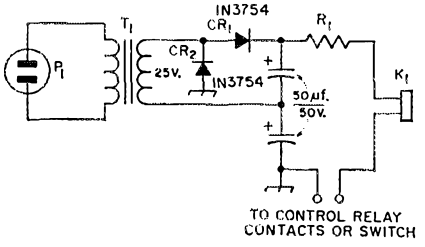


Fig. 1—Schematic diagram of the power supply for antenna relays. The filter capacitors are electrolytics. CR_1, CR_2—Silicon diode, 100 volts p.i.v., 750 ma. (1N3754).
K_1—6-, 12-, or 24-volt antenna changeover relay.
P_1—A.c. connector, male.
R_1—See text.
T_1—Power transformer, 25 volts, 1 amp. (Knight 61 U 421).

*Technical Departments Editor.

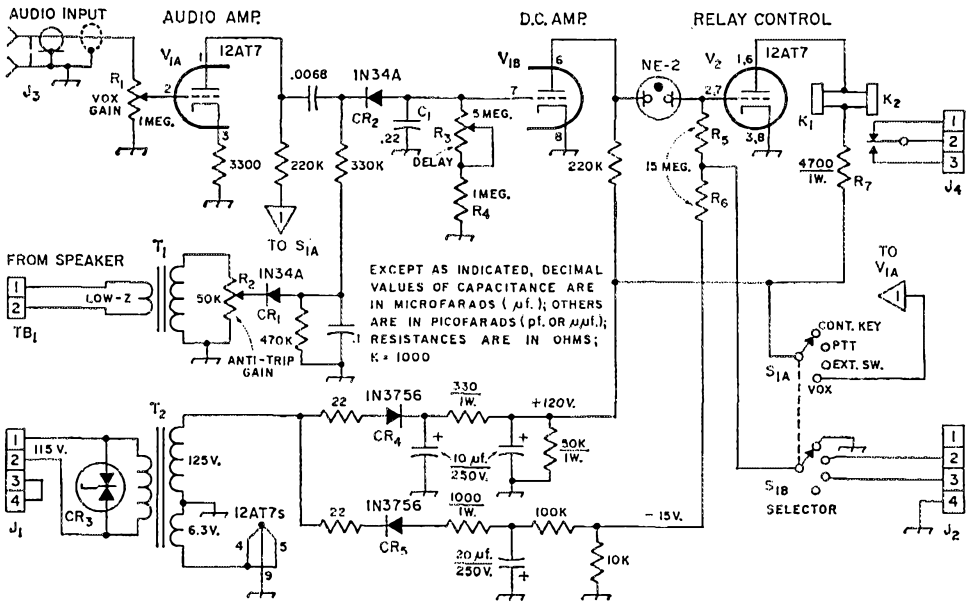


Fig. 2—The VOX circuit. All resistors are ½-watt composition unless otherwise marked. Capacitors may be paper or Mylar, except those with polarity indicated which are electrolytic. Only one of the 12 sets of relay contacts is shown—the builder should choose K_1 (K_2 if necessary) and J_4 to suit his own requirements.

C_1—0.22-μf., 400-volt paper capacitor.

CR_1, CR_2—1N34A germanium diode.

CR_3—Thyrector transient protection diode (GE 6RS20-SP4B4).

CR_4, CR_5—Silicon diode, 400 volts p.i.v., 750 ma. (1N3756).

K_1, K_2—6 p.d.t. miniature sensitive d.c. relay, 5000-ohm coil (Potter Brumfield ML23D, or use ML11D for d.p.d.t. contacts or ML17D for 4 p.d.t.).

J_1, J_2—4-contact chassis mounting plug, male (Cinch-Jones P-304-AB).

J_3—BNC coax connector, chassis mounting.

J_4—Chassis-mounting plug, male, contacts to suit relay used.

R_1—1-megohm, linear taper control (Ohmite CLU1052 or Mallory U-54).

R_2—50,000-ohm, linear taper control (Ohmite CLU5031 or Mallory U-35).

R_3—5-megohm, linear taper control (Ohmite CLU5052 or Mallory U-67).

R_4, R_5, R_6—½-watt composition.

R_7—1-watt composition.

S_1—2-pole, 4 position rotary switch (Centralab 2501 or 1401).

T_1—Universal audio output transformer (UTC-03 or Knight 61 U 400).

T_2—Power transformer, 125 volts, 50 ma.; 6.3 volts 2 amps. (Knight 61 U 411).

TB_1—Terminal strip, 2 contact (Millen 37302).

contact toggle or lever switch. For s.s.b. everyone agrees VOX is best, if you can get it to work properly, and push-to-talk is excellent for a.m. The c.w. ops all seem to dream about full break-in. But it must be only a dream, for few ever reach this promised land. Many settle grudgingly for a semi-break-in system accomplished with a relay plus time delay circuit so that the relay stays closed at normal keying speeds. No one ever seems to get the delay just right, so perhaps this system is only used because many of the popular commercial transmitters have this feature built in. A foot switch is an easy answer for the c.w. man who wants both hands free, and one ideal is a proximity-operated relay that turns on the transmitter as the operator places his hand on the key and returns the station to receive when the hand is removed.

A control unit for the amateur station must have a selection of activation methods so the operator can choose the method of control that fits his mood, the type of operation (contest or ragchew), and the mode . . . flexibility for the active ham.

Antenna Changeover

With high-power transmitters, antenna switching becomes a sticky problem, especially if the antenna relay must follow the transmitter keying. T.r. switches are out of favor because of TVI they can cause, as well as the operator's objections to having to retune either the t.r. switch itself or the transmitter when changing the receiver frequency. Several DXers really cried over the rare one they missed when the t.r. switch tube had gone — they had tuned the band and thought it was dead.

Reed switches offer the possibility of break-in by keying the antenna relay directly. These switches are now available in models that will handle higher powers. As yet, no manufacturer has produced a reed-switch antenna relay, so amateurs will have to roll their own.

A good lever-action relay can be made to work

fast enough for VOX operation. D.c. relays are preferred both for speed and quiet operation. A good coaxial antenna relay is expensive; the penny-wise amateur will look to the surplus market. You can find some beautiful relays retired from military service — some so silent it is difficult to tell when the relay activates. These surplus units usually have 24-volt d.c. coils. Take a page from the RTTYers and use a higher voltage and current-limiting resistor for snap action.

The 65-volt, 500-ma. power supply shown in Fig. 1 is intended for use with 6-, 12-, or 24-volt antenna relays. As an example, suppose you have purchased a 24-volt relay at the local surplus house. First, measure the d.c. resistance of the relay's coil with an ohmmeter. If, again for example, the resistance was 300 ohms, you would need to drop 40 volts across R_1 and limit the current through the relay coil to about 80 ma. Ohm's Law will show R_1 should be a 470-ohm, 5-watt resistor. Similar calculations will determine the correct value of R_1 for any relay you wish to use.

The W1AW VOX Unit

The switching in the W1AW VOX unit was tailored to the special requirements of an unusual station, so few if any will be interested in duplicating the unit layout in detail. The simple circuitry should, however, be of interest to those wishing to take a VOX unit or include VOX in a planned transmitter.

The VOX unit, shown in Fig. 2, can be activated in four ways: selected by means of S_1: by an external switch such as a foot switch, by a push-to-talk microphone, by voice control, or by S_1 itself. The first position of S_1 is used to key the transmitters for tune-up. The other three methods of control are accomplished by grounding the junction of R_5 and R_6, which decreases the bias on the control tube, V_2, and causes it to draw plate current. The control relay(s) and a current-limiting resistor are connected in series with the plate supply for V_2. The current limiting resistor, R_7, is adjusted in value to give the proper operating current for the relay used. In the W1AW unit both sections of V_2 are tied together, although those who use a low-current sensitive relay may wish to use only one section.

With S_1 in the VOX position, plate voltage is applied to V_{1A}, a resistance-coupled voltage amplifier. The output of this stage is rectified by CR_2, and the resulting d.c. charges C_1, a 0.22-μf. capacitor. The discharge time of C_1 is controlled by R_3, providing a variable hold-in time for the VOX relay. The minimum delay time is set by the value of R_4.

V_{1B} is a direct-coupled d.c. amplifier with its output connected to the control tube through a neon bulb to provide a sharp make/break characteristic. The control tube is held at cutoff by bias applied through R_5 and R_6. When an audio signal is present the neon bulb fires and V_2 draws full plate current until the neon extinguishes.

The parts used in this unit are of high quality because of the continuous service given to W1AW. A builder will, no doubt, wish to use less expensive substitutes where possible. Alternate parts are given in the parts list. The choice of VOX relay or relays will depend on the number of circuits in the station.

The unit is constructed to mount behind a rack panel. A $5 \times 9\frac{1}{2} \times 3$-inch chassis is used as a base, with a 3×6-inch subchassis supporting V_1 and V_2. A $\frac{1}{2}$-inch lip is bent on either end of the subchassis, and when the wiring is completed, it is placed $3\frac{1}{2}$ inches behind the front of the main chassis by "nibbling" a $\frac{1}{2}$-inch slot in the main chassis lip (see Fig. 3), and securing the subchassis with sheet metal screws. Four 1-inch spacers are bolted to the front of the main chassis to recess the VOX unit behind the rack panel. The screwdriver-adjustment controls are located behind the panel to prevent tampering. Quarter-inch holes are drilled in the rack panel to pass a screwdriver for the adjustment of these controls; normally the holes are covered with General Cement "fillers" (GC 1711-AC). The shaft for S_1 extends through the rack panel, as it is used in everyday operation.

Audio for the VOX unit is obtained from the first audio amplifier of the s.s.b. transmitter, before the microphone gain control, and fed to the input jack, J_4. The VOX gain and delay are adjusted to suit individual operating habits. Audio is taken directly from the speaker terminals of the station receiver and connected to J_3. The anti-VOX control is set so the receiver does not trip the VOX unit.

An audio compressor is used at W1AW before the s.s.b. exciter. The use of compression seems to help the VOX unit, no doubt because the average amplitude is held at a relatively high level. Those who object to VOX-type operation may find it more enjoyable when an audio compressor is used. QST

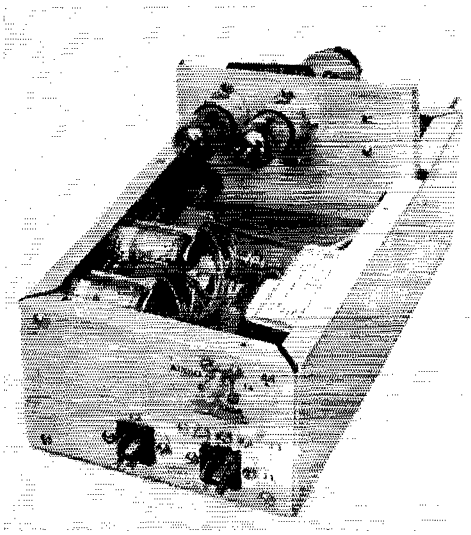


Fig. 3—The subchassis is mounted through slots cut in the chassis lip and held in place with sheet metal screws.

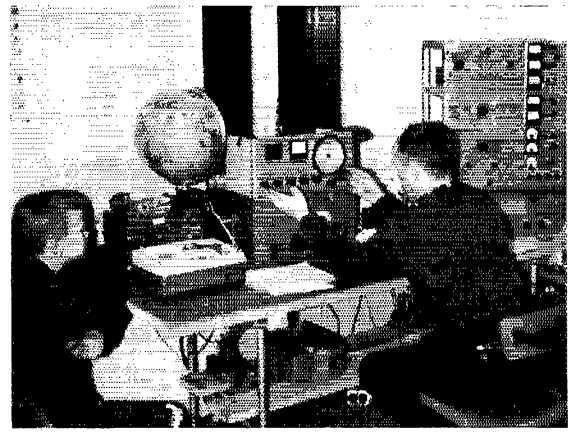
I.A.R.U. News

50-MC. BAND DROPPED IN RHODESIA

R. G. Cracknell, ZE2JV, advises that effective January 1, 1966, the 50-Mc. band is no longer available for amateur use in Rhodesia. With the ban, ZE1AZC is being taken off the air. The station, a 40-watt beacon, operated continuously for over 18 months on 50.046 Mc.; reception reports should be sent to Ivan Wood, ZE3JJ, c/o E.S.C., P. O. Box 377, Salisbury.

NOVICE CLASS LICENSE SOUGHT IN ZAMBIA

To encourage more citizens of Zambia to acquire amateur licenses and thus technical training, in mid-1965, the Radio Society of Zambia submitted a proposal to the Postmaster General for creation of a Novice-Class amateur license. As proposed, the Novice licensee would be permitted use of c.w. only, 10 watts input, on 1760–1790 kc. and 3520–3580 kc., with crystal control. In addition to paying an annual fee of ten shillings, applicants would have to pass a code test at 5 w.p.m. and a written test on operating knowledge.



In 1965, an ambitious group of six Swedish radio amateurs with this station and the call sign SM7OSC, made eight 144-Mc. contacts with six European stations via the Oscar III satellite, as well as a 432-Mc. moonbounce contact with KP4BPZ.

DX OPERATING NOTES

(**Bold face** indicates changes since the most recent *QST* listing.)

United States Reciprocal Operating Agreements currently exist *only* with: Australia, Belgium, Bolivia, Canada, **Colombia,** Costa Rica, Dominican Republic, Ecuador, Luxembourg, Peru, Portugal, and Sierra Leone. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details concerning a particular place.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U. S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela. Permissible prefixes are: CE CM CO CP EL HC HH HI HK HP HR OA PY TI VE VO XE XP YN YS YV ZP and 4X. CANADIAN radio amateurs may handle these relatively unimportant third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Mexico, Peru, U. S., and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS and YV.

DX Restrictions

United States amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the International Telecommunications Union under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Indonesia (including West New Guinea), Thailand and Viet Nam forbid radio communication between their amateur stations and amateur stations in other countries. U. S. amateurs should not work HS XU 3WS or SF. CANADIAN amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Viet Nam and Jordan. Prefixes to be avoided are HS JY XU XW3 3WS and SF.

ROAR INTERNATIONAL FRIENDSHIP AWARD

With the stated purpose of encouraging international friendship and understanding through amateur radio, the Rotarians of Amateur Radio offer an award to any licensed radio amateur who has completed 100 international "rag chews" of at least 15 minutes (phone) or 30 minutes (c.w.) duration; readability must be at least R4 in either case. Contacts must have taken place after December 31, 1964, and applicants must show contacts with a minimum of 50 different foreign stations in at least 25 different countries. No QSLs need be acquired or submitted; a list is sufficient. There is no charge for the award. Applications or requests for more information should be sent to J. Foy Guin, Jr., W4RLS, Box 26, Russellville, Alabama, 35653.

—•••—

Effective January 1, the mailing address of the Finnish Amateur Radio League (SRAL) will change to P. O. Box 10306, Helsinki 10, Finland. This is for all mail, including QSL cards.

—•••—

ON4CC received official permission from the British government to operate G3OSS from October 29 to November 2, 1965, becoming the first foreign amateur allowed routine operation of a British station. Prior privileges have been granted, but only for special events stations. QST

Shown at a 1965 gathering are IARU Region I Committee members, l. to r.: YU1AA, DL1XJ, F9DX, HB9GA, G6CL and SM5ZD

Project Oscar Wins Christopher Columbus Award

Yugoslavs also Honored

THE International Institute of Communications presented the Christopher Columbus Gold Medal Award to Project Oscar for the greatest technical achievement in amateur radio during 1965. The award cited Project Oscar for "the brightest success in the space age: placing into orbit the Oscar satellite to provide new developments in the art of communications."

Presenting the award to William I. Orr, W6SAI president, and William W. Eitel, W6UF, a director of Project Oscar, Inc. was the President of the I.I.C., Prof. Ing. Guido Corbellini, Minister of Scientific Research for Italy. The presentation was made in a colorful ceremony at Genoa, Italy, reminiscent of the golden days of discovery of Christopher Columbus.

A second gold medal, awarded for humanitarian service was awarded to the *Savez Radioamatera Jugoslavije* (*S.R.J.*) IARU member society of Yugoslavia, for the efforts of the YU-amateurs during the Skoplje earthquake and emergency. Receiving the award for the S.R.J. was Janez Znidarsic, YU1AA.

The award ceremonies were presided over by the Minister of Communications of Italy, Mr. Carlo Russo.

The Awards were presented in conjunction with the 1965 Communications Exhibit in Genoa, at which the Italian amateurs had installed an exhibit dealing with amateur radio and featuring the exhibition station IIIIC which operated 20-meter s.s.b. and c.w. from the exhibition hall.

The Christopher Columbus Award is shown proudly at the Columbus exhibition station IIIIC by W6UF, W6SAI's XYL Sunny, and W6SAI.

Project Oscar, an ARRL affiliated society, was nominated by the League for this medal; Oscar also holds the 1965 ARRL Technical Merit Award for pioneering amateur work with artificial earth satellites. QST

Portable Beams for 50 and 144 Mc.

Lightweight Arrays That Carry in a Compact Package

BY EDWARD P. TILTON,* W1HDQ

MOBILE work on the v.h.f. bands is growing steadily in popularity and usefulness. Almost universal occupancy of the 50- and 144-Mc. bands around the country makes a v.h.f. mobile station pay off almost anywhere these days, but its range and utility are greatly improved if the owner takes along something better than the usual mobile antenna systems, to set up whenever time, band occupancy or propagation conditions make this appear desirable.

Some examples from the writer's experience may not be amiss. One morning in June we were headed west into New Mexico, near the Texas line, when the 50-Mc. band suddenly began to fill up with signals. There were 4s, 6s, 8s, and 9s by the score, and even a few 1s and 2s coming through on double-hop E_s. We tried a few calls and CQs, with results that are all too familiar to the 6-meter mobile operator: an occasional answer, but nearly always a losing battle with the colossal QRM.

We looked for a suitable stopping place, which turned out to be a roadside picnic area near Tucumcari. Here we lashed our sectional support to a fence post, assembled our 3-element beam and went to work. One CQ started a massive pile-up on our frequency, and we were off on a 3-hour series of QSOs that netted 19 states and 5 call areas, not to mention a mailbox full of QSLs back in Connecticut. We made at least 30 6-meter men (and women) happy with their first New Mexico contacts on that band. Not bad for 5 watts!

Later in the trip we spent a couple of days in Lassen Volcanic National Park — a beautiful place, but a long way from any v.h.f. activity. Several times we stopped at the highest spot accessible by car, over 8200 feet up on the south side of Mt. Lassen. Never once did we hear a signal there on either 6 or 2 with our mobile antennas, but when we set up the portable beams we had several good contacts. The nearest were in the Sacramento area, 125 miles to the south, and behind a shoulder of the mountain that juts into the line to the principal population areas of Northern California. Mt. Lassen turned out to be no great shakes as a v.h.f. location, but the beams put us in business.

Around New England we find these portable beams an equally good investment. Many a Sunday or weekend trip is made more enjoyable because we can set up a reasonably good v.h.f. station almost anywhere, at a few moments' notice. On a recent contest Saturday night in New Hampshire we worked stations as distant as Maryland and Pennsylvania on 144 Mc., using the 5-element 2-meter antenna and less than 5 watts from the car rig. The following day we climbed rugged Mt. Monadnock with our 50-milliwatt 6-meter transistor rig and the 3-element array, and worked 21 stations in 7 ARRL Sections, and spanned distances out to more than 100 miles. The gain of a beam, always helpful, is almost mandatory if one is to accomplish anything interesting with 0.05 watt of transmitter power!

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

Boom and Support

The boom and vertical support are the same for either band. The former is a 6-foot length of ¾-inch aluminum tubing from the corner hardware store. The support is four pieces of aluminum TV masting, cut from two pieces originally 7½ feet long. The length of these can be whatever you feel is the maximum that you can carry or stow in the car conveniently. The canvas golf bag we carry the stuff in most of the time limits the practical length of individual sections to around 3½ feet each.

Details of the boom are shown in Fig. 1. Before cutting it into two pieces, drill 9 holes ¼ inch in diameter, in approximately the positions shown. These are, left to right, for the 6-meter reflector, the 2-meter reflector, the 2-meter driven element, the 6-meter driven element or the first 2-meter director, the U clamp, the second and third 2-meter directors, and 6-meter director. The tubing is then cut at the center.

Holes are drilled at each element position perpendicular to the element holes. The drill size depends on the size of screws which will be run into these holes to bear against the center of each element. We used half-inch No. 10 aluminum self-tapping screws with their ends filed flat. They seem to bind in the holes enough so that they do not fall out when left loose in the dismantled boom. Run them down to press on the elements only enough to hold them in place.

The two boom sections are held in alignment with a U clamp and a short piece of aluminum angle stock, as shown in the lower sketch. This brace can be dispensed with, but the assembly is stronger if it is used.

Various means can be used to hold the mast in a vertical position. Often there is a fence

post or something similar available, or a simple clamp can be made to fasten the mast to a car door handle or bumper. Three pieces of aluminum bent to fit your particular requirements will handle this job. An example often used by the writer is shown in *QST* for June, 1962, page 51, and in the *V.H.F. Manual*, Fig. 9-50. If the base of the support is forced into the ground to keep it from tilting over, a device of this kind works very well.

The elements are carried inside the boom sections, with any that there are not room for dropped into the masting. Corks can be fitted into the bottom ends of the tubing, to prevent loss of parts, or specially-made end caps can be obtained to fit the Reynolds aluminum used for the boom. The element-holding set screws can be run down to tighten the elements inside the boom sections, too, if desired.

Elements

If the array is not to be hand carried to any great extent, it need not be extremely light or compact, and many arrangements can be made to keep the over-all length of any pieces to convenient dimensions. We wanted ultralight weight, for packing up mountins, in addition to convenience, so we went to rather special ends to achieve this. The 6-meter element design is a holdover from an earlier version described in *QST* for August, 1960, and in *The Radio Amateur's V.H.F. Manual*. Briefly, it uses center sections of ¼-inch aluminum tubing of suitable length so that 38-inch telescoping whips plugged into the ends give over-all lengths of 120½, 116 and 113 inches, for the reflector, driven element and director, respectively. These unusual lengths are necessitated by the very small diameter of the whips used for the end sections.

Tubing or rod stock of suitable size could be used for the end sections, but the whips are very light and they stow easily in a small space. They are 38 inches extended, telescoping to 9 inches, and only 3/16 inch maximum in diameter. They can be found in several mail-order catalogs. Ours were from Lafayette Radio, part No. F-343.

The center sections are 46½, 42 and 39 inches long, and are drilled out 3/16-inch diameter to a depth of one inch at each end. The ends are slotted lengthwise with a hacksaw, ½ inch deep, so that a small aluminum clamp can be wrapped around the end to hold the extension in place. See Fig. 9-68 of the *V.H.F. Manual*, or page 38, August, 1960 *QST*.

Elements for 2-meter use have center sections of ¼-inch aluminum rod, drilled and tapped for 6-32 thread to a depth of ½ inch on each end. Inserts are ⅛-inch aluminum welding rod, which is generally sold in 36-inch lengths. These can be cut in half, threaded for 6-32, and screwed into the center portions. With the center lengths shown in Fig. 1, 18-inch inserts run in ½ inch make an antenna that works well for use from the low end up to about 145.5 Mc. For best performance above 145 Mc., make the element center portions about ¼ inch shorter.

Feed Methods

The matching systems most commonly used in v.h.f. arrays do not lend themselves to quick dismantling and portability. The old delta match is ideal in these respects, so it was used on both antennas. The 50-Mc. array has a delta made of a half wavelength of 300-ohm Twin-Lead, 96 inches over-all, when the propagation factor of the line is taken into account. The plastic webbing is slit for 36 inches with a sharp knife, to make the fanned-out portion. Spring metal-tube grid clips are soldered to the top ends, to slip over the driven element. These are set at about 4 inches in from the ends of the center section, or 34 inches apart. This is not a critical dimension.

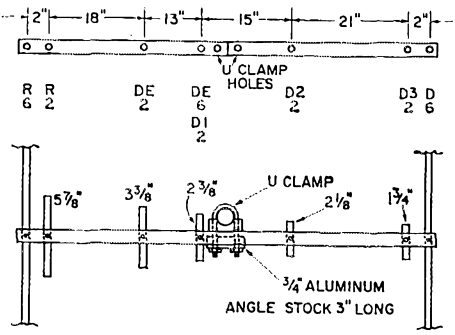


Fig. 1—Principal details of the two-band portable array. Positions of the various elements are shown above, with the mounting methods below. Center sections of the 2-meter elements are ¼-inch aluminum rod, tapped for 6-32 thread. The U clamp and angle-stock bracket at the center keep the boom sections in alignment on the vertical support.

The bottom end of the Twin-Lead is fitted with plug-in tips, to match an antenna coupler unit. We use the tiny plastic-box coupler described with the 50-Mc. transistor transceiver in November, 1964 *QST*, and Figs. 7-11 and 7-12 of the *V.H.F. Manual*. Coax of any desired length, size and impedance can run from the coupler to the station. We usually carry miscellaneous lengths of RG-58/U, equipped with suitable fittings, plus a through-connector or two, in case we need a longer run.

For the 2-meter antenna, the delta is fed directly with RG-58/U, through a balun. Small alligator clips were soldered onto 4-inch lengths of split zip cord (any strong flexible wire will do) which serve as the arms of the delta match. With these arms connected to the end of the coaxial line and balun, the position of the clips on the driven element can be adjusted for minimum reflected power, as indicated on an s.w.r. bridge connected in the line to the transmitter. Precise adjustment is not important, as a short run of line is normally used, and mismatch losses are negligible.

In the case of operation with very low power and an antenna coupler, as described for the 50-Mc. case, the coupler can be adjusted for

(Continued on page 150)

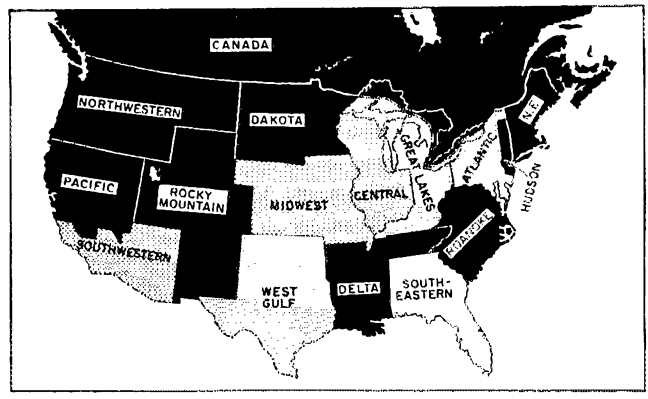
Building Fund Progress

DURING November the Delta Division, comprising the states of Arkansas, Louisiana, Mississippi, and Tennessee, reached 100% of its quota in the Building Fund Drive, thus becoming the ninth of the sixteen divisions to go over the top. Congratulations to all in that division who helped reach the goal, especially to Director Spencer and retiring Vice Director Cassen for leading the way.

Will Midwest be next? It's not many dollars away.

Here's our Honor Roll of divisions which have achieved 100% of Building Fund quota:

Canada	**New England**
Dakota	**Northwestern**
Delta	**Pacific**
Hudson	**Roanoke**
Rocky Mountain	



Solid black indicates that the division has achieved 100% of quota; double cross-hatching between 80 and 100%; single cross-hatching between 60 and 80%; and no cross-hatching below 60%.

Members Are Saying . . .

I am sending [this] for the Building Fund. I may not always agree with the Board of Directors, but I helped elect them so I have no one to blame but myself. Anyway, I know they are trying to do their best. What more can I ask of them? — *W1ASGD*

Check enclosed for the Building Fund with my best wishes for continued success in this and all your endeavors. — *W6JQ*

On behalf of the Delaware Amateur Radio Club, I have enclosed our contribution to the Building Fund. We, being from the "First State," are sorry that our contribution was not the first to be received, but do hope that it is not the last. — *K3VIIL*

Please add this contribution to your Building Fund. It is only a small token of the appreciation I feel for the ARRL. Thanks for your hard work and service. — *WN1BQK*

I would like to do my little bit for the building. Best wishes from a very happy and satisfied ARRL member. — *K9QIID*

Please accept the enclosed check for the Building Fund. Once again, I wish to express my appreciation for the help and guidance that the ARRL has provided, over the many years, for me and the whole amateur radio society of the world. — *W6UQG*

I have written my Director and the FCC to express my favor for the new FCC amateur license proposals, Docket No. 15928. I think this proposal will go far toward putting ham radio back on a more respectful basis, and is long overdue. Enclosed is another contribution of mine to the Building Fund. — *W8WNA*

Please find enclosed my second contribution to the Building Fund, and let it speak for my support of your fine organization. I say hooray for more education in the field of radio, forced or otherwise! — *W9IIFR*

The enclosed check represents the number of years I have been a licensed amateur operator and a full member of the ARRL. My interest in amateur radio extends way back to 1914, at which time I prepared to apply for a ticket but was unfortunately unable to complete the necessary process. I have followed the ARRL and *QST* for many years since then and appreciate your efforts on behalf of the amateur fraternity. — *W1SUV*

In renewing my membership-subscription, ARRL and *QST*, for the coming year, I am including [a contribution] toward the Building Fund. For "all time" I know that I will be in debt to ARRL and all of its activities. — *VE3AJM*

A 100-Watt 2-Meter Transmit-Receive Converter

BY WILLIAM J. HALL,* K1RPB

After several years of h.f.-band operation, using such equipment as the ARC-5 and AR-3, and operating such modes as c.w. and s.s.b., I sought a change from the congestion common to these bands.

The v.h.f. spectrum seemed to offer a refreshing challenge. I had been told about the nice, quiet contacts which were possible on 144 Mc., plus the DX opportunities in connection with tropo and aurora openings. Oscar III provided further interest, so I decided to try v.h.f.

To make the adventure more exciting, I chose to build a complete unit which would include transmitting and receiving converters, both capable of working with the existing 10-meter s.s.b. station. Through this medium, I could operate all modes and generate a 2-meter s.s.b. signal with the equipment I had available.

In addition to being v.f.o. controlled, the unit would be tunable over a range of two megacycles changing the crystal in the transverter. The gear described here meets these requirements as planned. The best features of previously published circuits, plus a modest amount of original design, provided efficient operation.

Circuit Details

The incoming 2-meter signal is routed through the antenna relay, K_1, (Fig. 2) to the 6CW4 cascode r.f. amplifier stage (Fig. 3). The broad-band input stage is neutralized by L_2.

The amplified signal is loosely coupled to the grid circuit of the 6AK5 mixer stage, through L_4. Injection on 116 Mc. is provided by a voltage regulated 6U8A oscillator-tripler. Coupling is accomplished through a pair of one-inch lengths of hookup wire, twisted together (C_{12}). The mixer output coil, L_5, is tuned to 28-Mc. and is link-coupled to the low impedance antenna input terminal of the station receiver, a Heath SB-300. A switch has been included by the manufactuer, to allow convenient selection of v.h.f., or normal h.f. reception.

The transmitter section uses a 6CB6 low-level mixer, with 116-Mc. injection voltage being supplied by the same 6U8A oscillator-tripler, previously mentioned. A two-inch length of RG-174/U coaxial cable, C_{13}, provides capacity coupling. (Any capacitor of about 5 pf. will work equally well.) The inner conductor is connected to the 6U8A output tank. The shield is hooked to the grid of the 6CB6 mixer. A rather small amount of 28-Mc. energy is obtained by placing a 2½-inch length of insulated hookup wire parallel to the grid bus of the final amplifier section of the station transmitter, a Heathkit SB-400 transmitter.

The 28-Mc. signal voltage is link-coupled to the 6CB6 mixer grid through L_9 and L_{10}. Care

* 36 Maple St., North Wilbraham, Mass.

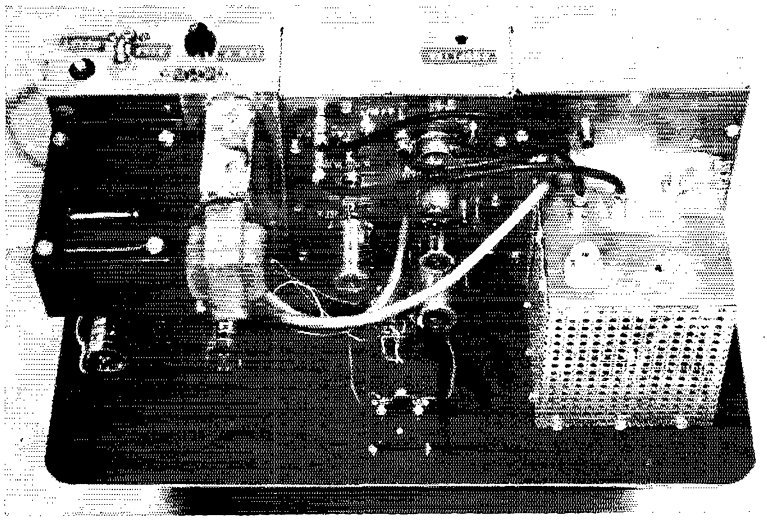


Fig. 1—Rear view of the completed transmit-receive converter, showing the three modules connected together.

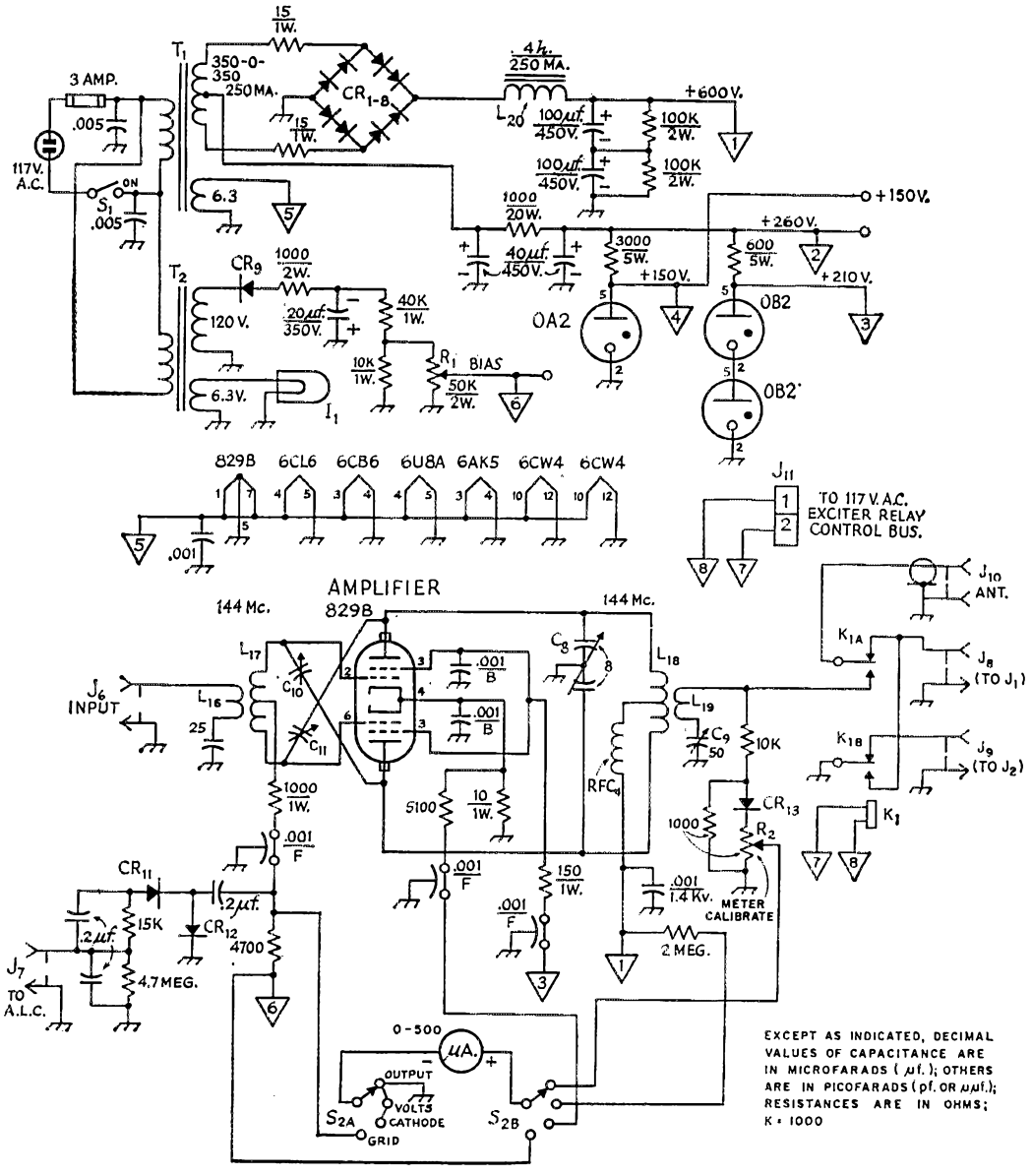
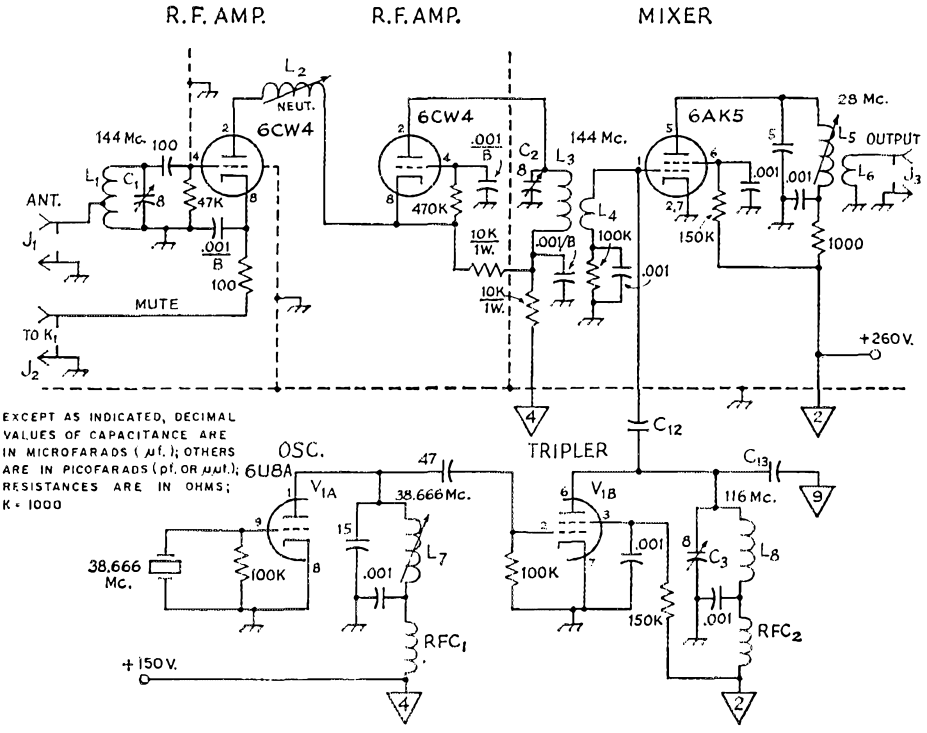
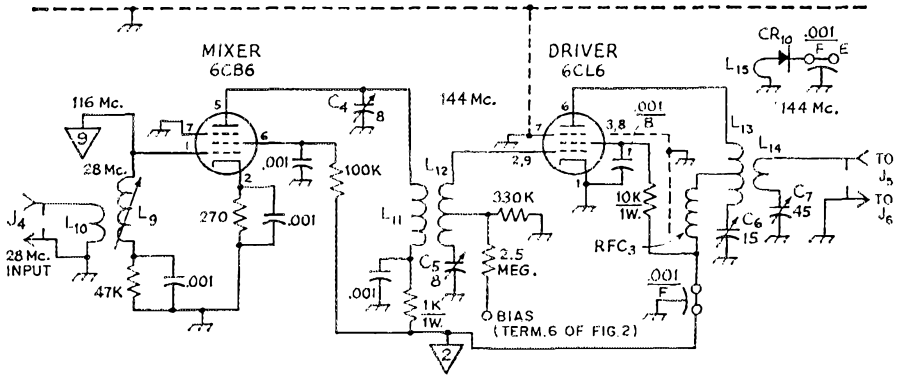


Fig. 2—Schematic diagram of the power supply and 829B amplifier sections, showing metering circuit and a.l.c. take-off network. Fixed capacitors of decimal value are in μf., others are in pf. Resistors are ½-watt unless specified otherwise. Resistance in ohms (K-1000). Capacitors bearing polarity symbols are electrolytic. F—Feedthrough capacitors. B—Button-mica capacitors.

C_8—8-pf.-per-section butterfly (E. F. Johnson 160-208).
C_9—51-pf. variable capacitor (E. F. Johnson 167-3).
C_{10}, C_{11}—Neutralizing capacitors (see text).
CR_1–CR_8—600 p.i.v. 750-ma. silicon diodes.
CR_9, CR_{11}, CR_{12}—400 p.i.v. 750-ma. silicon diodes.
CR_{13}—1N34A diode.
I_1—6.3-v. panel lamp.
J_6, J_7, J_8, J_9—Phono jack.
J_{10}—Coaxial chassis connector.
J_{11}—2-pin male chassis connector.
K_1—D.p.d.t. relay (Potter & Brumfield KT11A, 115 v. a.c.).
L_{16}—2 turns No. 20 insulated wire, ⅜-inch diam., tightly coupled to L_{17}.
L_{17}—4 turns No. 14 wire, ½-inch diam., 1¼ in. long, c.t.
L_{18}—4 turns ⅛-inch copper tubing, ¾-inch diam., 1¼ inches long, with space at c.t. point for L_{19}.
L_{19}—1¼ turns No. 14 insulated wire, ⅝-inch diam., inserted into L_{18} at center.
R_1—50,000-ohm 2-watt control.
R_2—1000-ohm carbon control.
RFC_4—1.8-μh. choke (Ohmite Z-144).
S_1—S.p.s.t. toggle switch.
S_2—2-pole 4-position ceramic rotary switch (single section, non-shorting type).
T_1—Power transformer: 325-0-325 volts at 250 ma., 6.3 volts at 5 amp. (TV transformer usable).
T2—Bias trans.: 120 volts at 20 ma., 6.3 volts at 0.7 amp.



RECEIVING CONVERTER SECTION



TRANSMITTING CONVERTER SECTION

Fig. 3—Schematic diagram of the transmit-receive converter sections. Fixed capacitors of decimal value are in μf., others are in pf. Resistors are in ohms (K-1000) and are ½-watt unless otherwise noted. F—Feedthrough capacitor. B—Button-mica capacitor. See Fig. 2 for heater connections.

C_1–C_2 incl. 8-pf. tubular trimmer (Centralab 829-7).
C_6—15-pf. variable (Hammarlund (MAC-15).
C_7—7-45-pf. ceramic padder (Centralab 822).
$C_{12, 13}$ (see text).
CR_{10}—1N34A diode.
J_1, J_5 incl. Phono connector.
L_1—5 turns No. 20 wire, ¼-inch diam., ¾ inch long; tap 2 turns from cold end.
L_2—5 turns No. 28 wire, close-wound on ¼-inch diam. iron-slug form.
L_3, L_8—4 turns No. 20 wire, ⅜-inch diam., ¾ inch long.
L_4—2 turns No. 20 insulated wire, ¾-inch diam., loosely coupled to L_3.
L_5—20 turns No. 28 enameled wire, close-wound on ⅜-inch diam. iron-slug form.
L_6—2 turns No. 20 insulated wire, on cold end of L_5.
L_7—9 turns No. 28 wire on ⅜-inch iron-slug form.
L_9—18 turns No. 28 enamel close wound on ⅜-inch diam. iron-slug form.
L_{10}—2 turns No. 20 insulated wire on cold end of L_9.
L_{11}—5 turns No. 20 wire, ⅜-inch diam., ¾ inch long.
L_{12}—6 turns No. 20 insulated wire, ½ inch long, with c.t. Mount cold end adjacent to cold end of L_{11}.
L_{13}—4½ turns No. 14 wire, ¾-inch diam., 1¼ inch long. Add c.t. and provide space for L_{14}.
L_{14}—2 turns No. 14 insulated wire, ¾-inch diam., loosely coupled to L_{13}.
L_{15}—1½-inch length (straight) of No. 20 bus, soldered to shield at cold end.
RFC_1, RFC_2, RFC_3—100-μh. 100-ma. r.f. choke.

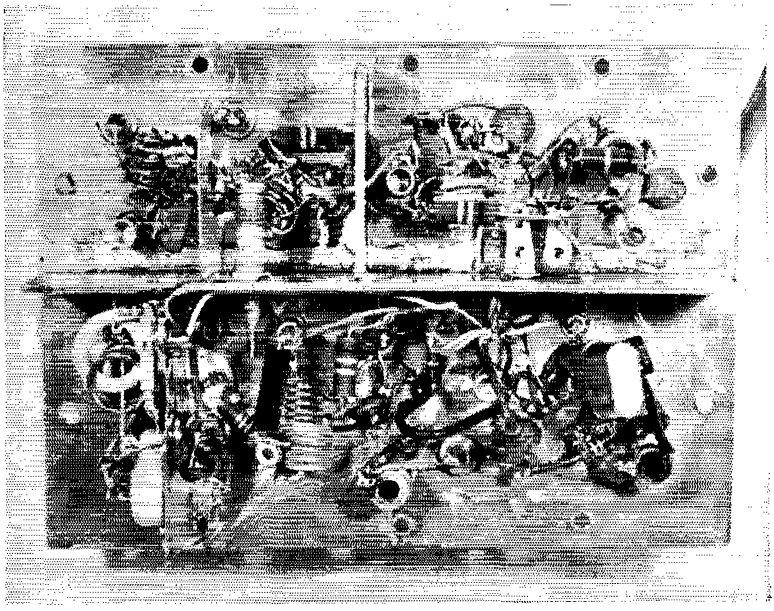


Fig. 4—Under-chassis view of the completed transmitting-receiving converter module, showing parts layout and shield partition placement.

must be taken to make certain that L_9 is tuned to 28-Mc. The output tank must be properly tuned to 144-Mc. with C_4 and L_{11}, rather than mistakenly adjusted to 116-Mc. Because of the high input capacitance of the 6CL6 tube, a series-tuned tank is used, to provide better efficiency. The low-impedance ends of coils L_{11} and L_{12} are placed adjacent to one another, and in line, to assure maximum coupling. Bias for the 6CL6 is supplied through the 2.5-megohm and 330,000-ohm resistors. A shield is placed across the socket of this tube to minimize coupling between the input and output circuits. No tube shield is used on the 6CL6 and it did not require neutralization. The plate tank of this stage is also series tuned, for best efficiency, and is loosely coupled to the grid tank of the 829B stage. The 6CL6 did not require neutralization. Output metering of the driver stage is secured through the use of L_{15} and CR_8. Sampling probe, L_{15}, is a 1⅛-inch long link, placed in the plate tank compartment of the 6CL6.

The 829B (Fig. 2) operates push-pull, Class AB_1. The grid tank is self-resonant, adjusted to peak at 145 Mc. The stage is neutralized by a pair of probes fashioned from No. 14 enameled wire. These leads run from each grid pin to the plates of the opposite section of the 829B. A 1000-ohm resistor is used to carry bias voltage to the grid circuit, rather than the usual r.f. choke.

An automatic level control (a.l.c.) system has been included, which samples and rectifies variations in grid voltage, feeds it back to the a.l.c. bus in the station transmitter and aids in keeping the drive at the proper level. This system serves to increase the effective talk power. A 500-microampere meter and switching circuit are used to measure relative power output, cathode current, grid current, and plate voltage.

Construction

The complete transverter is built on three $5 \times 7 \times 2$-inch chassis bases, to provide ease of wiring and effective shielding. The power supply module includes the power and bias transformers, solid-state rectifiers and filter capacitors. The power resistors and VR tubes are mounted above the chassis to reduce heating. The layout is not critical, although a little planning will minimize wiring problems.

The transmitting and receiving converters are built on a common piece of brass or copper sheet stock, roughly 0.03-inch thick, which is divided into two compartments. Aluminum can be used, but will not permit short ground return paths to the chassis when soldering. In planning the layout, make certain you leave a one-half inch wide margin around the edges of the copper plate.

Begin wiring by starting with the two 6CW4s. Power and signal leads are passed through individual holes which are drilled in the shield partition. A shield, made from thin stock, is placed across the socket of V_1. The 6AK5 mixer stage is located to the right of the partition, with the 28-Mc. jack, J_3, adjacent to L_5 and L_6. (See Fig. 4.) Next, wire the 6U8A oscillator-tripler, soldering the crystal pins directly to the grid and cathode terminals of the tube socket. The 6CB6 stage is wired next and is located in the center of the lower compartment. A short length of coaxial cable carries the 116-Mc. injection signal from the V_{1B} output tank. The 6CL6 with its socket shield, is wired last. The power leads are brought through the 6CL6 socket shield by means of feedthrough capacitors. For good circuit stability, this type of capacitor should be used. They may be secured inexpensively by removing them from war surplus v.h.f. equipment.

Fig. 5 shows the 829B final-amplifier module. The tube socket is centered approximately 2-inches from the front edge of the chassis. The partitions, and lower shield, are soldered directly to the copper chassis. The incoming power leads and a.l.c. components are located at the rear of the chassis. Button-mica capacitors are again used to bypass the leads coming through the shield, to the tube socket terminals. A short length of coaxial cable is used to route the plate-supply voltage under the chassis. Copper straps are used between pins 3, 4, and 5 of the socket, and ground. This insures against instability by providing a low-inductance ground return path for the filaments.

Relay K_1, plus J_8, J_9 and J_{10}, are mounted on the wall of the compartment, above the chassis and the output-sampling circuit is located in the same area. Capacitors C_9 and C_{10} are mounted on the front wall of the compartment. The plate connections are made by using copper straps, which are attached to the 829B pins with machine screws. (See Fig. 5.) Coaxial cable is used to connect K_{1A} to J_8, for isolation purposes.

Tune-up and Adjustment

After making certain that all wiring is correct, the tuned circuits should be checked for proper resonance with a quality grid-dip meter. Next, attach a dummy load to terminal, J_1, with J_2 shorted out. The 28-Mc. output is connected to the station receiver through a short length of coaxial cable.

After applying power to the unit, voltages should be measured to make certain that wiring is correct. L_5, L_7 and C_3 are then adjusted for maximum hiss noise by listening to the receiver. Using a grid-dip meter as a signal source, tune C_1, C_2, L_5, L_7 and C_3 for maximum response. If the signal cannot be found with the receiver, chances are that the oscillator is not functioning properly.

With an antenna connected to J_1, a weak signal can be tuned in and L_2 adjusted for best signal-to-noise ratio. The coupling between L_3 and L_4 is next adjusted for maximum signal response, which occurs when the coils are half-meshed. This tuneup procedure should be repeated several times, to compensate for interaction between the various stages.

Next, we adjust the transmitting converter. A 28-Mc. signal is fed into J_4, using a length of coax line from the pickup wire (C, in Fig. 6) in the station transmitter's grid compartment. A dummy load (such as a 6-volt pilot lamp) is used at J_5. After checking the circuit resonance and voltages, adjust L_9, C_4, C_5, C_6 and C_7 for maximum bulb brilliance. When these adjustments are completed, the 28-Mc. signal is removed. At this point the lamp should extinguish. Similarly, with the 28-Mc. source again connected to the unit, and the 6U8A removed, the driver output should fall to zero. These results indicate that the circuit is operating properly and is delivering output at 144 Mc., rather than at 116 Mc. — or at a harmonic of 28 Mc. The 6CB6 will generate these unwanted responses, if driven too hard.

A few contacts may now be made with the transmitting converter. This will serve as a pleasant break in the construction project before tackling the final-amplifier construction. My first DX was about 80 miles distant, using an indoor antenna.

Preliminary adjustments to the 829B stage are made with power OFF. Grid excitation is fed into J_6 and a dummy load is connected across J_{16}. The grid coil, L_{17}, is then adjusted for resonance at approximately 145-Mc. Similarly, adjust C_8 for resonance of the plate tank. A grid-dip meter can be used for this purpose, with the power off, and with K_1 in the "transmit" position. The neutralization wires are cut so that they protrude approximately 1 inch above the chassis, dressed

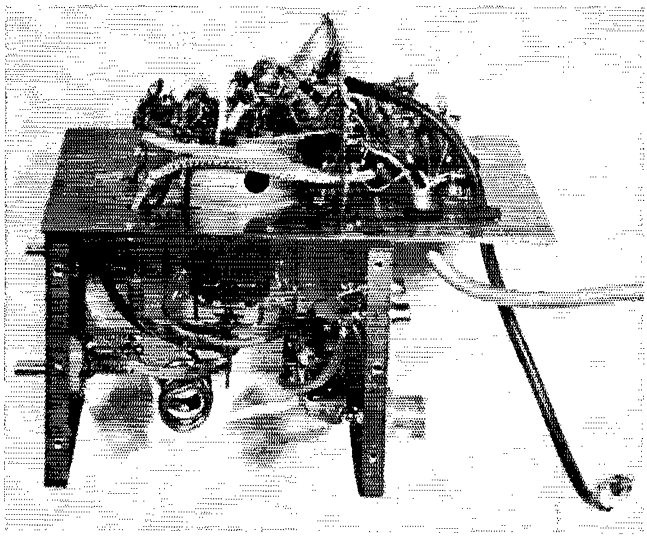


Fig. 5—The 829B amplifier assembly, showing layout of components above and below the chassis.

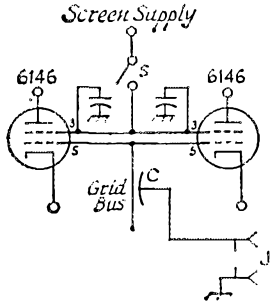


Fig. 6—Schematic diagram showing modification to the Heath SB-400. Switch, S, is added to permit disabling the 6146 amplifier tubes when operating 2-meter s.s.b. It is mounted on the rear apron of the SB-400 unit. Capacitor, C, is formed by placing a pickup wire adjacent to the 6146 grid bus, and provides ample coupling to excite the transmitting converter shown in Fig. 3. A jack, J, is added to the rear apron of the Heath SB-400 to provide an output terminal for this energy.

as tightly to the tube socket as possible, and in line with the center of the tube plates.

The following steps describe the neutralizing procedure: First, the grid excitation is removed from J_6. The relay and bias-control cables are connected to the station transmitter and the bias is adjusted with R_1, for plate current cutoff, about — 40 volts when J_{11} is keyed. The meter is switched to monitor plate current. With a dummy load connected to J_{10}, and the station transmitter on STANDBY, power is applied to the 829B. The plate current should remain at zero. The 28-Mc. exciter is again connected to J_6, turned on, and keyed. Next, C_8 is tuned through its entire range. If the plate current shows a sudden rise, the power is removed and the neutralization wires are trimmed about 1/8 inch. After the power is again applied, the stability should have improved. The bias voltage is reduced and the procedure repeated, each time removing the power while trimming the neutralizing stubs. In the final stages of adjustment, permit a plate current flow of approximately 150 milliamperes. If this point is reached and there is no appreciable change in plate current while adjusting C_8, the tube is properly neutralized. The probes should now be about 1/4 inch above the chassis.

Following completion, a shield is placed around the final-amplifier compartment. The modules are then bolted to the inverted 5 × 7 × 2-inch aluminum chassis bases, which in turn are bolted to one another, and to a suitable panel.

Once the transverter is "buttoned down," and all interconnecting cables are in place, the on-the-air tests may begin. First, the r.f. excitation to the 829B is temporarily removed. The power to the transverter, and station transmitter, is turned on. With the key down, the resting plate current of the 829B is adjusted to 40 milliamperes. With a small quantity of 28-Mc. signal injection, C_8 is tuned for maximum output. The plate current should be adjusted to about 75 milliamperes, with the 28-Mc drive control on the SB-400. At this point, C_7 is peaked through the hole previously drilled in the under-chassis and is again adjusted for maximum output from the 829B stage. The 28-Mc. drive is then adjusted to give full plate current (160 ma.) and approximately 300 microamperes of grid current. Note: The a.l.c. circuit will not function satisfactorily unless the proper grid current is developed.

When operating s.s.b., do not drive the plate current above 100 milliamperes. For a.m. operation, insert carrier until the 829B draws between 75 and 90 milliamperes of plate current. The proper modulation level will cause *no* flicker in plate current. (It is recommended that final adjustments are made with the aid of an oscilloscope, to insure proper waveform.) The modulation level can be brought up until a slight flicker is apparent in the plate current, then backed off until the meter reading remains constant during the modulation cycle, if an oscilloscope is not available.

In Conclusion

The 2-meter transverter occupies a prominent spot in the shack and was given a tremendous workout in recent months. It performed well in a contest, and was a welcome addition to the existing station. It is permanently cabled to the Heath equipment and the change-over from h.f. to 2 meters is a simple matter of throwing three switches, and tuning up.

The 2-meter band was a fascinating discovery, and provides plenty of activity. Won't you join us on s.s.b.? QST

Hamfest Calendar

Nevada — Remember the SAROC Sahara Amateur Radio Operators Convention at the Sahara Hotel, Las Vegas, on January 7, 8, and 9.

New Jersey — The annual Raritan Bay Radio Amateurs Christmas Party will be held at the Community Hall, 9 Krumb St., Sayreville, New Jersey, on January 22. Tickets are $4.75 and are available from WB2NOB, WA2YBT, WA2CHN, WA2CHS, and K2KFE. Price includes dinner and all activities. There will be an interesting guest speaker. For information write WA2YBT, 38 Riverdale Drive, Keyport, New Jersey. Tel.: 566-1934.

New Jersey — The Southern Counties Amateur Radio Association will hold its Annual Installation Dinner on Friday, January 14 at Copsey's Restaurant on the White Horse Pike in Absecon, N.J. All amateurs, XYLs and anyone interested in amateur radio is welcome to attend. Cocktails at 6:30 and dinner at 7:00 P.M. Radio station WFPG of Atlantic City will present its annual "Amateur of The Year" award at this time. For further details contact K2SOX, 2217 Cornwall Ave., Northfield, New Jersey.

New York — The Suffolk County Radio Club, Inc., will hold its Annual Installation of Officers Dinner on January 22 at Land's End Inn, Sayville, Long Island. For information, write WA2KKD, 84 Cornell Drive, Smithtown, L. I., N. Y. 11787.

Q S T
A Magazine Devoted Exclusively to the Radio Amateur

A New Method for the Reception of Weak Signals at Short Wave Lengths †

*By Edwin H. Armstrong, E. E.**

THE problem of receiving weak signals of short wave length in a practical manner has become of great importance in recent years. This is especially true in connection with direction finding work where the receiver must respond to a very small fraction of the energy which can be picked up by a loop antenna.

The problem may be summed up in the following words:— construct a receiver for undamped, modulated continuous and damped oscillations which is substantially equally sensitive over a range of wave length from 50-600 meters; which is capable of rapid adjustment from one wave to another, and which does not distort or lose any characteristic note or tone inherent in the transmitter.

It is, of course, obvious that some form of amplification must be used but a study of the various known methods soon convinces one that a satisfactory solution cannot be obtained by any direct method. In the interests of completeness we will consider the three well known direct means which might possibly be employed, and examine the limitations which apply to each. These three methods are:—

(1) Amplification of the low frequency current after rectification;

(2) Amplification of the high frequency current before rectification; and

(3) Application of the heterodyne principle to increase the efficiency of rectification.

Consider first the method of rectifying the high frequency current and amplifying the resulting low frequency current. Two limitations at once present themselves, one inherent in low frequency amplifiers and the other inherent in all known rectifiers. The limitation in the amplifier is the residual noise which makes it impractical to use effectively more than two stages of amplification. The second limitation lies in the characteristic of the detector or rectifier. All rectifiers have a characteristic such that the rectified or low frequency current is roughly proportional to the square of the impressed high frequency E. M. F. Hence the efficiency of rectification becomes increasingly poorer the weaker the signal until a point is reached below which the detector practically ceases to respond.

The second method of attack on the problem is the amplification of the received high frequency currents before rectification to a point where they can be efficiently dealt with by the detector. This method is ideal on long waves and various methods of inductance, resistance and capacity couplings have been successfully used, but when the attempt is made to use the same methods of coupling on wave lengths from 200 to 600 it results in complete failure. This is because the low capacity reactance existing between the various elements of the tubes causes them, in effect, to act as a short circuit around the coupling means and thereby prevent the establishment of a difference of potential in the external plate circuit. It is, of course, possible to eliminate the short-circuiting by tuning with a parallel inductance but this introduces a complication of adjustment which is highly objectionable and the tuning of all circuits also leads to difficulty with undesirable internal oscillations.

*President, Radio Club of America.

†Presented at meeting of R. C. A. at Columbia University, Dec. 19, 1919. Publication courtesy R. C. A.

The third method which might be used is the heterodyne method to increase the efficiency of rectification. Great increase in signal strength is possible by means of this method, particularly where the signal

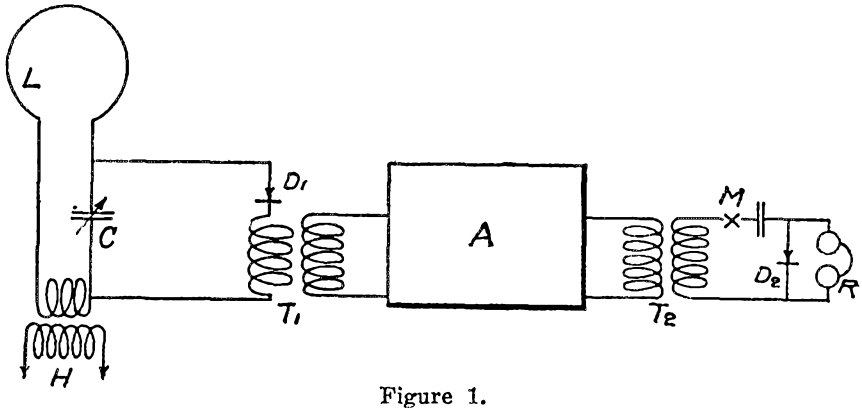


Figure 1.

is very weak but there are certain reasons why it cannot be effectively used in practice at the present time. The chief reason in receiving continuous waves of short wave length is the instability of the beat tone which makes operations below 600 meters unsatisfactory. This disadvantage does not apply to the reception of spark signals but here the loss of the clear tone and its individuality offsets much of the gain due to increased signal strength. In the case of telephony the distortion which always results likewise offsets the gain in strength. It is, of course, undeniable that there are many special cases where the use of the heterodyne on short wave length is of the greatest advantage but the foregoing remarks apply to the broad field of commercial working where the practical aspects of the case greatly reduce the value of the amplification obtained by this method.

In spite of the great difficulties involved in a direct solution great success was obtained by Round in England and Latour in France in the production of high frequency amplifiers to cover effectively a range from 300 to 800 meters. This result was accomplished only by the most painstaking and careful experiment and it represents some of the very finest radio work carried out during the war. Round secured his solution by constructing tubes having an extremely small capacity without increase in internal resistance above normal values and coupling the tubes by means of transformers wound with very fine wire to keep down the capacity and very high resistance to prevent oscillation at the resonant frequency of the system. The effect of the high ratio of inductance to capacity and the high resistance of the

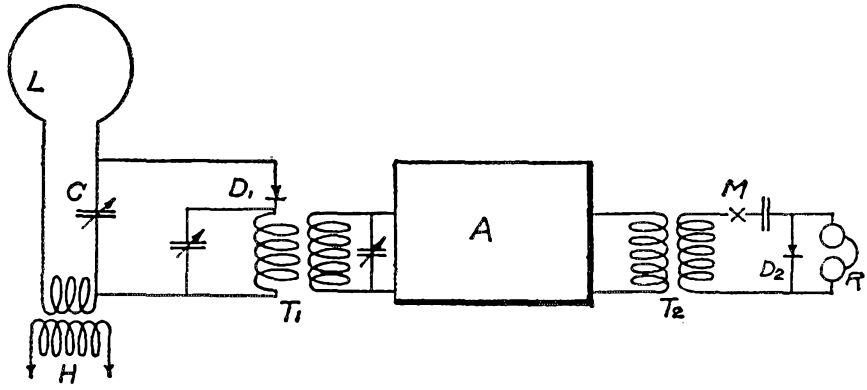


Figure 2.

winding is all to flatten the resonance curve of the system and widen the range of response. Latour solved the problem by the use of iron core transformers wound with very fine wire, the iron serving the double purpose of increasing the ratio of inductance to capacity and introducing

resistance into the system. Both these factors widen the range of response.

It is the purpose of this paper to describe a method of reception evolved at the Division of Research and Inspection of the Signal Corps A. E. F. which solves the problem by means of an expedient. This expedient consists in reducing the frequency of the incoming signal to some predetermined superaudible frequency which can be readily amplified, passing this current through an amplifier and then detecting or rectifying the amplified current. The transformation of the original high frequency to the predetermined value is best accomplished by means of the heterodyne and rectification, and the fundamental phenomena involved will be understood by reference to the diagram of Fig. 1. Here L C represents the usual tuned receiving circuit, loop or otherwise, H a separate heterodyne and D_1 a rectifier. A

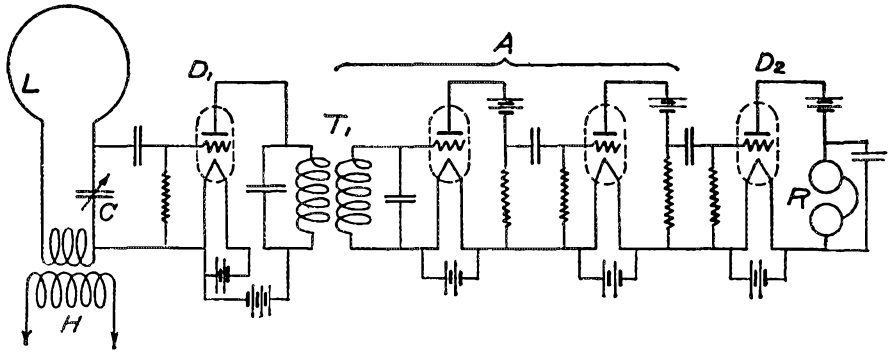


Figure 3.

is a high frequency amplifier designed to operate on some predetermined frequency. This frequency may be any convenient frequency which is substantially above audibility. The amplifier is connected on its input side to the rectifier D and on its output side to a second rectifier D_2 and a telephone or other receiver.

Suppose that the frequency to be received is 3,000,000 cycles or 100 meters and, for the sake of simplicity, that the incoming waves are undamped. Also, assume that the amplifier A has been designed for maximum efficiency at 100,000 cycles per second. The circuit LC is tuned to 3,000,000 cycles and the heterodyne H is adjusted to either 3,100,000 or 2,900,000 cycles either of which will produce a beat frequency of 100,000 cycles per second. The combined currents of 3,000,000 and 3,100,000 (or 2,900,000) cycles are then rectified by the rectifier D_1 to produce in the primary of the transformer T_1 a direct current with a riding 100,000 cycles component. This 100,000 cycles current is then amplified to any desired degree by the amplifier A and detected or rectified by D_2. In order to get an audible tone where telephone reception is used some form of modulation or interruption must, of course, be employed in connection with this second rectification as the current in the output circuit of the amplifier is of a frequency above audibility. While this frequency is only 100,000 cycles and while it is therefore well within the range of practical heterodyning, its steadiness depends on the beats between 3,000,000 and 3,100,000 cycles per second and hence in any attempt to heterodyne it to audibility the same difficulties due to fluctuation would be encountered as in heterodyning the original high frequency to audibility. However, the inability to use the heterodyne on the second rectification is not of great importance because the amplitude of the signal to be rectified is large and hence the difference (as far as signal strength in the telephone is concerned) between heterodyne and modulated reception is not great.

It is important to note here that the value of the heterodyne in the first rectifier should always be kept at the optimum value in order to ensure the carrying out of the first rectification at the point of maximum efficiency. This adjustment, however, is not a critical one and once made it is seldom necessary to change it. The amplifier A may be made selective and highly regenerative if so desired and a very great increase in the selectivity of the system as a whole can be secured. Fig. 2 illustrates the principle involved. This arrangement is substantially the same as Fig. 1 except that the primary and secondary coils of the transformer T_1 are tuned by means of condensers as shown and the coupling between them is reduced to the proper value to insure sharp tuning. This system of connection has all the advantages of tuning to the differential frequency in the manner well known in the art and an additional one due to the fact that since

it is above audibility the musical character of atmospheric disturbances so troublesome in low frequency tuning, does not appear.

So far, the reception of undamped waves only has been considered but this method of amplification is applicable also to the reception of damped wave telegraphy and to telephony with practically equal efficiency and without distortion of any

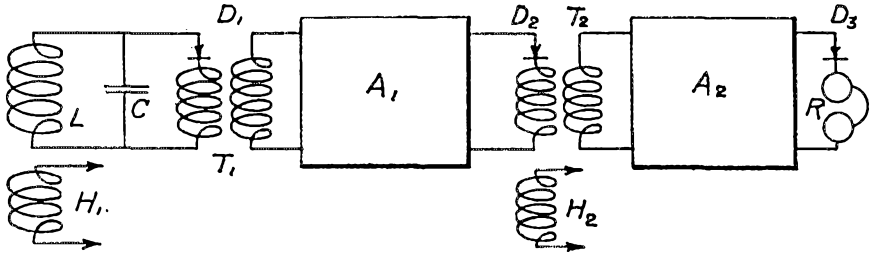


Figure 4.

characteristic of tone. It is somewhat difficult to understand this, particularly in the case of the reception of spark signals as in all previous experience the heterodyning of a spark signal has resulted in the loss of the note, whereas in the present case the individuality between stations is more marked even than on a crystal rectifier.

This is the most interesting point in the operation of the system and the reason will be understood from the following analysis:

a minimum. In ordinary heterodyning the initial phase difference depends on the time of sparking at the transmitter and hence this initial phase difference will be different for each wave train. As the frequency of the two currents are substantially the same and as the duration of a wave train is short compared to the time necessary to produce a complete beat at an audible frequency, this initial phase difference is maintained throughout the wave train. Hence, the different wave trains are rectified with varying efficiency, the telephone current becomes irregular and a rough or hissing tone results.

In the present method of heterodyning the beat frequency is high so that several beats per wave train are produced. As a consequence, the phase angle between the signaling and local currents varies through several cycles and the initial phase difference becomes a matter of minor import-

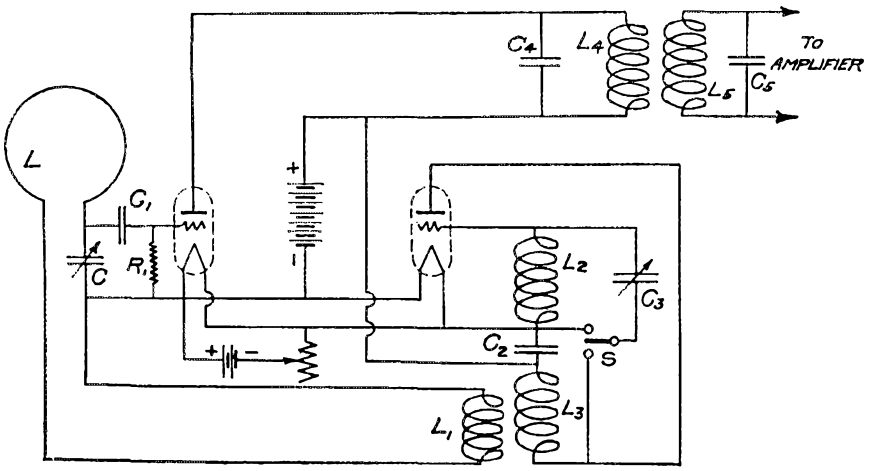


Figure "A"

In heterodyning, the efficiency of rectification of the signaling current depends on its phase relation with the local current. If the two currents are either in phase or 180° out of phase the efficiency of rectification is a maximum; if 90° out of phase

ance. The number of beats which actually occur in practice depends on the beat frequency, the damping of the incoming wave and the damping of the receiving circuit. As the damping of the receiving circuit is almost invariably much less than

the damping of the incoming wave it is the determining factor. In any practical case, however, where the beat frequency is kept above 20,000 cycles there is a sufficient number of beats to minimize the initial phase differences and maintain the characteristic tone.

The phenomena which occur in the reception of modulated continuous wave telegraphy and telephony are substantially a combination of those explained in the cases of undamped and damped wave reception.. The adjustments are made in the same manner as for damped waves and the only precaution necessary in the reception of telephony is to damp the amplifier circuits somewhat to prevent distortion of the speech by excessive resonance.

The arrangement found most suitable for practical working is shown in Fig. 3.

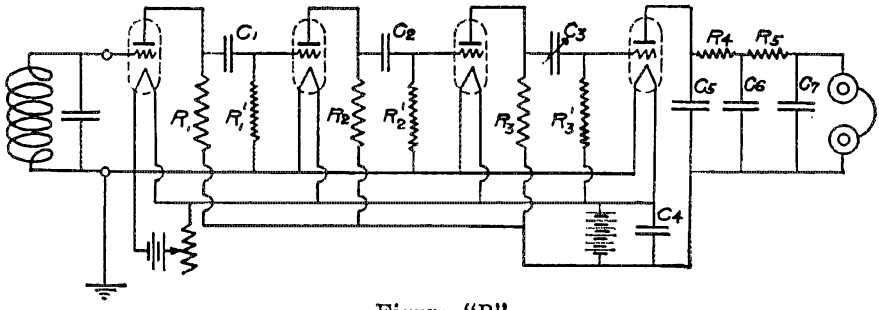


Figure "B"

Both rectifications are carried out by three element vacuum tubes. The amplifier here shown is resistance coupled, although any form of coupling may be used. The tuned circuits L_1C_1 and L_2C_2 are preferably adjusted to some frequency between 50,000 and 100,000 cycles. The circuit LC may be made regenerative if so desired by any form of reactive coupling but the practicability of this depends largely on the amount of time which is available for making adjustments.

In the diagram of Fig. 3 only two stages of high frequency amplification are shown but at least four and preferably six should be used to get the maximum advantage of this method. This is because the transformation of frequency is accomplished only by a certain loss so that something between one and two stages of amplification is required before this is overcome and it is possible to realize a gain. In this figure a separate heterodyne is shown and it will generally be necessary to use it on account of the mistuning which is involved in the use of the self heterodyne. This mistuning is considerable on 600 meters but on the shorter waves it is possible to use the self heterodyne method with equal efficiency as far as signal strength is concerned and a great gain in simplicity, as adjustments have been reduced to the minimum of a single one.

It may be observed here that this method is not limited to one transformation of frequency with one subsequent amplification. If the frequency to be received is 5,000,000 cycles this may be stepped down to 500,000 cycles, amplified, stepped down again to 50,000 cycles, re-amplified and detected as illustrated by Fig. 4. The great advantage of this method of amplification is that the tendency to oscillate due to the reaction between the output of the amplifier and the input is eliminated as the frequencies are widely different. The only reaction which can take place is in each individual amplifier. Hence, the process of extreme amplification is best carried out in stages of several frequencies, the amplification on each frequency being carried as far as possible without loss of stability. As soon as the limit of stable operation is approached, no further amplification should be attempted until the frequency has been changed.

The foregoing descriptions and explanations do not pretend to any save a most superficial treatment of the phenomena present in this method of reception. Lack of time has prevented a careful study and quantitative data only of the roughest sort has been obtained. Sufficient work has been done, however, to demonstrate the value of the method particularly in the case of modulated continuous wave telegraphy and telephony. In this field neither the amplification nor the selectivity can be equalled by any direct method. The practice of this method involves the use of many known inventions but in connection with the production of a superaudible frequency by heterodyning I wish to make due acknowledgement to the work of Meissner, Round and Levy, which is now of record. The application of the principle to the reception of short wave is, I believe, new and it is for this reason that this paper is presented.

(Continued on next page)

While the fundamental idea of this method of reception is relatively simple the production of the present form of the apparatus was a task of the greatest difficulty for reasons known only too well to those familiar with multistage amplifiers and to Lieutenant W. A. MacDonald, Master Signal Electricians J. Pressley and H. W. Lewis and Sergeant H. Houck, all of the Division of Research and Inspection Signal Corps A. E. F., I wish to give full credit for its accomplishment.

ADDENDUM.

For the purpose of facilitating the construction of an amplifier suitable for short wave lengths, Figures A and B are added to the original paper, and such values as can be specified are given. The constants of the loop and heterodyne coils depend, of course, on the particular range which it is desired to cover, but this is readily obtained by trial.

Fig. A.

C = .0005 mfds. max.
C_1 = .0005 mfds.
R_1 = 1 megohm
L_1 = about 1/20 L
C_4 and C_5 = .001 mfds.
L_4 and L_5 = 50 millihenrys
C_2 = .1 mfd.
C_3 = .0005 mfds. max.

Fig. B

R_1 R_2 and R_3 = 50,000 ohms
R_1' R_2' R_3' = 1 megohm
C_1 and C_2 = .0005 mfds.
C_3 = .0005 mfds. max.
C_4 = .1 mfd.
C_5 C_6 and C_7 = .005 mfds.
R_4 and R_5 = 12,000 ohms.

NOTE. The purpose of the filter is to keep the radio frequency currents out of the telephone cords and thereby prevent reaction on the input side of the amplifier with resulting oscillations. This filter is not always necessary and it will frequently be possible to cut out one or both stages.

With an amplifier consisting of six Type V tubes plus two tubes in the frequency transformer, or eight in all, it has been possible to receive the signals of amateur stations in Texas on a three foot loop.

Hartley Research Laboratory,
Columbia University.

— Harry Hick's artistry has filled the pages of QST for fifty years. Harry's first cover, shown here, was in May 1916. He has also furnished art work for the various department "heads" and "hook-ups" inside the magazine. Today, Harry is still doing QST covers, diagrams, and sketches.

MAILING TIMES

QST is scheduled to be issued on the first day of each month. If you do not receive your copy after allowing sufficient time for handling the mail, notify us without fail. However, it is well to keep in mind the fact that second-class matter travels more slowly than first. If you are on the Pacific Coast, *QST* may not reach you until as late as the fifth or sixth of the month. Also remember that there are two mailing times: one on the first, when the magazine is issued, the other about the fifteenth, to fill new subscriptions and missent copies. We hope you will not be too impatient if your copy is delayed a little.

One of the reasons why you may not receive *QST* is that you have moved without notifying us of your new address. Hardly a month goes by but what we are troubled with twenty-five or thirty notices from the postmasters that so-and-so has moved or cannot be found. Second-class matter does not follow you around without paying postage on it. To avoid all this confusion just drop us a line and *QST* will find you.

— September, 1916

DIRECTOR ELECTION RESULTS

Seven of the sixteen offices involved in the 1965 ARRL elections were contested. Ballots were sent during the second week in October to members of record on September 20. On November 20, the last day for receipt of ballots at headquarters, the Committee of Tellers (Directors Anderson, Compton, and Eaton) tallied up these results:

In the Atlantic Division, Director **Gilbert L. Crossley, W3YA,** was elected to his seventh consecutive term by a vote of 2,889 to 2,038 for George S. Van Dyke, Jr., W3ELI. The Delta Division director, **Philip P. Spencer, W5LDH,** ran up a three-to-one majority defeating the present vice director, Franklin Cassen, W4WBK 1,205 to 396 and thus winning a second term. **Dana E. Cartwright, W8UPB,** edged out two other nominees for director from the Great Lakes Division, the post he has held since 1960. Mr. Cartwright received 1,486 votes, Dr. James W. Voorhees, W8EGR, 1,375, and John E. Siringer, W8AJW, 1,228. In the Midwest Division, Director **Robert W. Denniston, WØNWX,** defeated former Director William J. Schmidt, WØOZN by 1908 votes to 511; Mr. Schmidt was director from 1952 to 1956, and Mr. Denniston has been director since then. **Harry Engwicht, W6HC** of the Pacific Division, continues in the directorship he has held since 1955 by posting 1676 votes to 697 for Larry M. Reed, W6CTH.

Two new names join the organizational list on page 8. In the Atlantic Division, **Jesse Bieberman, W3KT,** Chalfont, Pennsylvania, has been elected vice director, collecting 1946 votes to 1531 for Allen R. Breiner, W3ZRQ and 1439 for Colonel Edwin S. Van Deusen, W3ECP, vice director since 1960. OM Jesse has been manager of the ARRL W3 QSL Bureau since 1947, and served in 1965 as an assistant director of ARRL. He is secretary, past president and past vice president of the Frankford Radio Club, and has been teaching a course for prospective amateurs at the Warminster Amateur Radio Society. Mr. Bieberman, age 60, has retired from teaching mathematics in the junior and senior high schools of Philadelphia. Licensed since 1920, he is listed on the DXCC Honor Roll and is a member of the A-1 Operator Club.

Max Arnold, W4WHN, of Nashville, Tennessee, outraced three other men to become vice director of the Delta Division. He had 831 votes; John A. Swanson, Jr., W5PM, 494; David C. Coggio, W4OGG, 157, and Maurice Singer, K5YMM, 106. OM Max works as estimator and purchasing agent for the Clarence Sutherland Company, an architectural millworking firm, and is 47 years old. He has been an assistant director of the Delta division in 1964–1965. He's presently on the Board of Trustees, Radio Amateur Transmitting Society of which he was organizer and first president. He is also editor and publisher of its bulletin, *The Tennessee Ham.* W4WHN first came on the air in 1952 and is a member of the A-1 Operator Club.

Members of the Executive Committee assisted in the ballot counting, and the whole operation was supervised by a Certified Public Accountant from the firm of Ernst and Ernst. Actual ballot counts were verified by a Tickometer, a paper-counting machine accurate enough to be used for counting currency in banks. Director Robert Y. Chapman of the New England Division was present as an observer on behalf of members of the Delta Division who had filed a petition under By-Law 15.

Directors Noel B. Eaton, VE3CJ, from the Canadian Division, Dakota's Charles G. Compton, WØBUO, and Charles J. Bolvin, W4LVV, from the Southeastern were the only eligible candidates for these posts and thus were earlier declared elected, as was reported in the November issue of *QST*. Similarly, six vice directors were elected without balloting, as the only eligible nominees in their respective divisions: Colin C. Dumbrille, VE2BK, Canadian Division; Charles M. Bove, WØMXC, Dakota Division; Charles C. Miller, W8JSU, Great Lakes Division; Sumner H. Foster, WØGQ, Midwest Division; Ronald G. Martin, W6ZF, Pacific Division; and Albert L. Hamel, K4SJH, Southeastern Division.

ARRL ASKS LOW END OF TWO FOR WEAK SIGNALS

The League has filed a petition with FCC asking that the A-1 only segment of the two-meter band be shifted from its present location at 147.9-148.0 Mc. to 144.0-144.1 Mc. The proposed frequency segment is the same one the League had originally asked for when it filed comment in Docket 12485. (FCC's Report and Order in the Docket, released December 3, 1958, established the present segment.)

Most of the successful contacts through Oscar III were on A-1 emission, and amateurs of many countries participated in the project. The Radio Regulations, Geneva, 1959, specify 144–146 Mc. as exclusively amateur, world wide. The frequencies 146–148 Mc. are available in the Western Hemisphere and parts of Asia and Oceania, but are assigned to other services in Europe, Africa, the Near East and the U.S.S.R. The Extraordinary Administrative Radio Conference, Geneva 1963, specifically authorized amateur satellite operation in the band from 144.0 to 146.0 Mc., again on a world-wide basis.

The strength of signals on satellite work is

often minute; thus, if satellite work is to flourish, there should be some area where the weak A-1 signals cannot be wiped out by strong A-3 signals, and this reservation should be worldwide. With nearly three quarters of the world's amateur population being in the U.S. and Canada, other countries will probably follow the lead of these two in amateur satellite matters. Canada has already established a weak-signal reservation for A-1 on the frequencies 144.0–144.1 Mc. The text of the ARRL petition follows.

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

In the Matter of	
Amendment of Section 97.61 (b) (11) of the Rules and Regulations in the Amateur Radio Service (144 Mc/s)	RM-886

PETITION FOR RULE MAKING

The American Radio Relay League, Incorporated, by its General Counsel, respectfully requests that the Commission institute a rule making proceeding to amend Section 97.61 (b) (11) of its Rules and Regulations to read as follows:

"(11) 144.0 to 148.0 Mc/s, type A 1 emission; 144.1 to 148.0 Mc/s, type A Ø, A 2, A 3, A 4, F Ø, F 1, F 2, and F 3 emission."

In support whereof, the following is submitted:

1. Amateur propagation studies and long distance communications in the very high frequency (VHF) portion of the spectrum usually are conducted by use of A 1 emission. The signals are susceptible to interference because of their very low strength. For these reasons, the Commission, by a Report and Order adopted December 3, 1958 in Docket No. 12485, amended its rule to permit only A1 emission in the band from 147.9 to 148.0 Mc/s.

2. The 1959 Geneva Radio Regulations assigned the band from 144.0 to 146.0 Mc/s to the amateur service on a world-wide basis and the band from 146.0 to 148.0 Mc/s to the fixed and mobile services in Region 1 and the amateur service in Regions 2 and 3. The 1963 Geneva Extraordinary Administrative Radio Conference specifically authorized amateur satellite operation in the band from 144.0 to 146.0 Mc/s and removed all reservations from that band which had been noted in the 1959 Regulations.

3. The three amateur satellites placed in orbit to date, OSCAR I, OSCAR II, and OSCAR III, have demonstrated that world-wide communications are possible in the 144 Mc/s amateur band by use of satellites. In the case of OSCAR III, most of the two-way contacts were accomplished by use of A1 emission. It is expected that A1 emission will be widely used in making two-way contacts through amateur satellites to be launched in the next few years. Unfortunately, however, there is no place in the world-wide portion of the 144 Mc/s band where weak A1 signals may not be overriden by other types of emissions. The only place in the band where only A1 emission may be used is from 147.9 to 148.0 Mc/s which is not available to the amateur service in Region 1. Clearance of a portion of the world-wide band is most desirable and necessary for continued experimentation in space techniques by amateurs throughout the world.

4. It is expected that other administrations will adopt similar regulations if and when this proposal is adopted by the Commission. In fact, Canada has already amended its regulations to permit only A1 emission in the band from 144.0 to 144.1 Mc/s.

Wherefore, the premises considered, the Commission is respectfully requested to institute a rule making proceeding to amend Section 97.61 (6) (11) of its Rules and Regulations as set forth above.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE,
INCORPORATED
225 Main Street
Newington, Connecticut 06111

BY ROBERT M. BOOTH, JR.
Its General Counsel

November 17, 1965

PRISON SENTENCE FOR CITIZEN BANDER

Richard P. Greenside, Mattapan, Massachusetts was found guilty of transmitting obscene, indecent and profane language over a Class-D Citizens Radio station by the Federal District Court at Boston, and on November 15, 1965, was sentenced to one year in jail. This is the first trial, conviction and sentencing of a Citizens Band operator in New England, and is referred to by FCC as "the first step in an intensive enforcement campaign to combat the use of improper language." The monitoring and investigation were made by the Boston offices of the Field Engineering Bureau of the FCC and of the FBI.

ANTENNA FORM 401-A NOW OBSOLETE

FCC recently altered its regulations for many "customers" of the Safety and Special Services Bureau, including the Amateur Service, by deleting reference to Form 401-A. Amateurs planning to install antennas not meeting the exceptions of the revised Section 97.45 will be guided by Part 17 of the Commission's rules (part of Volume I of the FCC regulations; $2.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402).

The revised section appears below; there are no substantive changes in it.

§ 97.45 Limitations on antenna structures.

(a) No new antenna structure shall be erected for use by any station in the Amateur Radio Service, and no change shall be made in any existing antenna structure used or intended to be used by any station in the Amateur Radio Service so as to increase its overall height above ground level, without prior approval by the Commission, in any case when either (1) the antenna structure proposed to be erected will exceed an overall height of 170 feet above ground level, except where the antenna is mounted on an existing man-made structure other than an antenna structure and does not increase the overall height of such man-made structure by more than 20 feet, or (2) the antenna structure proposed to be erected will exceed an overall height of one foot above the established airport (landing area) elevation for each 200 feet of distance, or fraction thereof from the nearest boundary of such landing area, except where the height of the antenna does not exceed 20 feet above the ground or if the antenna is mounted on an existing man-made structure other than an antenna structure or natural formation and does not increase the overall height of such man-made structure or natural formation by more than 20 feet as a result of such mounting.

(b) Further details as to whether an aeronautical study and/or obstruction marking may be required, and specifications for obstruction marking when required, may be obtained from Part 17 of this chapter, "Construction, Marking and Lighting of Antenna Structures." Information regarding requirements as to inspection of obstruction marking, recording of information regarding such inspection, and maintenance of antenna structures is also contained in Part 17 of this chapter.

CENTENNIAL CALLS FOR CANADA

In 1967, Canada will be celebrating its hundredth anniversary. As one of many facets, the Department of Transport is agreeable to the furnishings of special prefixes for some special events stations (as for instance at the Calgary Stampede and the Canadian National Exhibition). Canadian clubs and groups desiring to have a special call for a special purpose in 1967 should

get in touch with Director Eaton this month so that details may be worked out with the Department.

COLOMBIA RECIPROCITY

Colombia has entered into an agreement with the United States permitting the amateurs of one country to operate while in the territory of the other, effective November 28, 1965. Other negotiations are in progress, and successes will be reported via W1AW bulletins as soon as the information is released by the Department of State and the FCC. A summary of previous agreements appears on the IARU page elsewhere in this issue.

ANOTHER LEGAL VICTORY

A. G. Schmigel, W3LKV, on November 6, 1964 was denied a permit to erect a 50-foot steel tower at his home in the Borough of Baldwin. He appealed the decision of the building inspector to the Zoning Board of Adjustment. After a hearing the Board again turned him down in a decision issued on January 16, 1965.

The case was then appealed to the Allegheny County Court drawing heavily on the Pennsylvania Supreme Court decision in The Appeal of Lord. The Court, by Presiding Judge Lencher, on August 16, 1965 found in favor of Mr. Schmigel, ordering the Borough to issue the permit. The Court took into consideration the number of structures similar to amateur antenna supports — telephone poles, elevator enclosures, chimneys, ventilators, water towers and TV antennas — already existing or permitted in the Borough. It dismissed the notion that an amateur tower would reduce property values. It drew on the Lord decision in finding once again that amateur radio is an accessory use customarily incidental to residential use of property. Finally, the Court concluded that a limitation of 35′ as applied to amateur or TV antenna supports interferes with the inalienable right of the individual to use his property as he wishes.

Irwin I. Tryon, W3WFR, who was attorney for Seaman, W3IOP, represented W3LKV. The court decision in this case has been added to the ARRL "legal kit" which is furnished free of charge to amateurs or their attorneys engaged in litigation concerning towers and antennas.

LAS VEGAS EXAMS

FCC has added Las Vegas, Nevada to the list of places where FCC examinations will be conducted at least twice a year. Thus, persons wanting full privileges and living within 175 miles (airline) of Las Vegas will have to appear at an examining point for the General Class license, except those eligible for Conditional Class because of physical disability, military service or absence from the country for a year or more at the time of application. The first test will be sometime this month: write to the District FCC Engineer in Charge, Mezz. Floor Room 50, 849 South Broadway, Los Angeles, California 90014 for an appointment and full details.

EXAMINATION SCHEDULE

For the convenience of those planning to take an FCC examination for General or Extra Class license, we present below a tentative schedule of dates and places for the first half of 1966. All examinations begin promptly at 9 A.M. except as noted. IMPORTANT: The rules require that an applicant submit his application Form 610 (January 1964 revision) *in advance*, when he wishes to appear at one of the field points. The application, accompanied by a check or money order for $4.00, should be sent to the Engineer-in-Charge of the district in which the applicant resides. Where the schedule below indicates a choice of dates or places, the applicant may indicate his preference. The District Engineer will then notify the applicant when and where to appear. (Applicants for Novice, Technician or Conditional Class licenses should follow the procedures outlined on page 79 of December, 1963 *QST* or in current editions of the *License Manual*.)

Albuquerque, New Mexico: April 9 at 1:00 P.M.
Anchorage, Alaska 99501, Room 54, P. O. Box 644, U. S. Post Office Building: By appointment.
Atlanta, Georgia 30303, 2010 Merchandise Mart, 240 Peachtree Street, N. E.: Tuesday and Friday at 8:30 A.M.
Bakersfield, California: Sometime in May.
Baltimore, Maryland 21202, 415 U. S. Custom House, Gay & Water Streets: Mondays and Fridays, 9:00 A.M.
Bangor, Maine: May 11.
Beaumont, Texas 77704, 302 Federal Building, 300 Willow Street: Tuesday and Thursday by appointment only.
Billings, Montana: Sometime in May.
Birmingham, Alabama: March 3 and June 2 at 1:00 P.M.
Boise, Idaho: Sometime in April.
Boston, Massachusetts 02109, 1600 Custom House: Wednesday, Thursday and Friday, 8:30 to 10:00 A.M.
Buffalo, New York 14203, 328 Federal Building, Ellicott & Swan Streets: First and Third Fridays, 9:00 A.M.
Charleston, West Virginia: Sometime in March and June.
Chicago, Illinois 60604, 1872 U. S. Courthouse, 219 S. Dearborn Street: Fridays.
Cincinnati, Ohio: Sometime in February and May.
Cleveland, Ohio: Sometime in March and June.
Columbus, Ohio: Sometime in January and April.
Corpus Christi, Texas: March 3 and June 2.
Dallas, Texas 75202, 1314 Wood Street, Room 707: Tuesdays only, 8:00 A.M. to 1:00 P.M.
Davenport, Iowa: Sometime in January and April.
Denver, Colorado 80202, 5024 New Customhouse, 19th St. between California and Stout Streets: First and Second Thursdays, 8:00 A.M.
Des Moines, Iowa: Sometime in March and June.
Detroit, Michigan 48226, 1029 Federal Building: Wednesdays and Fridays, 9:00 A.M.
El Paso, Texas: May 17.
Fairbanks, Alaska: Sometime in May.
Fort Wayne, Indiana: Sometime in February and May.
Fresno, California: Sometime in March and June.
Gettysburg, Pennsylvania 17325, 334 York Street, P. O. Box 441: First and Third Tuesdays, by appointment.
Grand Rapids, Michigan: Sometime in January and April.
Hartford, Connecticut: March 9.
Honolulu, Hawaii 96808, 502 Federal Building, P. O. Box 1021: Tuesday, Wednesday, and Thursday, 8:00 A.M., and by appointment.
Houston, Texas 77002, 5636 Federal Office Building, 515 Rusk Avenue: Tuesday, 8:00 A.M.
Indianapolis, Indiana: Sometime in February and May.
Jackson, Mississippi: June 1 at 1:00 P.M.
Jacksonville, Florida: April 20 and 21.
Kansas City, Missouri 64106, 3100 Federal Office Building, 911 Walnut Street: Thursdays and Fridays, 8:30 to 11:00 A.M.
Klamath Falls, Oregon: Sometime in May.
Knoxville, Tennessee: March 16 and June 15 at 1:00 P.M.

(*Continued on page 140*)

Annual ARRL Novice Roundup

NOVICES, this is your one and only opportunity to participate *as a Novice* in your own operating activity, the Fifteenth ARRL Novice Roundup Competition. Don't miss this chance to operate in this contest specially for Novices. The Novice Roundup begins on Saturday, Feb. 5, 1966, at 1800 local time, and runs *through* Feb. 20, Sunday, 1800 local time. Operating, listening, and logging time must not exceed 40 hours.

ROUNDUP PERIOD

Starts	*Ends*
Feb. 5	Feb. 20
6:00 P.M.	6:00 P.M.
Local Time	Local Time

How to Participate

Just get on the air any time during the two-week period and contact as many Novices and non-Novices as possible, exchanging QSO number and ARRL section. Non-Novices work only Novices, of course. "CQ NR" means CQ Novice Roundup and you can either answer such a call or call "CQ NR" yourself to get contacts. Here's an example. KNØBPO in Minnesota hears KN1QFC in the Western Massachusetts section calling CQ NR.

CQ NR CQ NR CQ NR DE KN1QFC KN1QFC KN1QFC K

KN1QFC KN1QFC DE KNØBPO KNØBPO KNØBPO AR

KNØBPO DE KN1QFC R HR NR 3 WMASS BK

KN1QFC DE KNØBPO R HR NR 1 MINN BK

KNØBPO DE KN1QFC R TNX ES 73 SK DE KN1QFC

On his next contact KNØBPO would send NR 2 (meaning contact number 2) then NR 3, NR 4, etc.

Scoring

A certificate is awarded to the highest Novice scorer in each ARRL section. Complete results will be in *QST* including the scores of those non-Novices that enter as well. To obtain your final score simply add the total of your NR QSOs to the highest w.p.m. from your Code Proficiency certificate. Multiply the sum by the number of *different* ARRL sections (see page 6, this *QST*) worked during the contest. That CP certificate really helps out your score, and you still have time to qualify, so don't miss out. Full details on the Code Proficiency Program are on page 93, this *QST*.

Novices should keep a look out just above and below the Novice frequencies (3700–3750 kc.; 7150–7200 kc.; 21,100–21,250 kc.; 145–147 Mc.) for the higher-power Generals.

Log forms like the one in the sample are yours for the asking simply by writing to: ARRL Communications Dept., 225 Main St., Newington, Conn. 06111. Study the following rules, and then stand by for the fun of your Novice career, the ARRL Novice Roundup Competition! But don't forget to send in a copy of your log to make your entry official; logs must be postmarked by March 4, 1966.

SUMMARY OF EXCHANGES ARRL NOVICE ROUNDUP

Call. KNØBPO.. Section... MINN..... (See page 6 QST)

BAND	TIMES ON OR OFF AIR	DATE, TIME OF CONTACT	MY NR SENT	MY SECTION	HIS NR RCVD	HIS CALL	HIS SECTION	NUMBER EACH NEW SECTION AS WORKED
80	1800	FEB. 3						
		1803	1	MINN.	1	KNØAKM	MINN	1
		1815	2		3	KN9WRX	ILL	2
	1835	1820	3		2	KN9ZDL	ILL	
15	1400	FEB. 6						
		1412	4		15	KN7MNL	NEV	3
	1425	1418	5		7	KN1QFC	WMASS	4

Summary: (Enter below on last sheet used)

Bands used.....80,15.....; Nr. diff. stns. wkd..5.....; Nr. diff. sections...4.....
Total hours operation....1:00.....; Code Proficiency award credit.....10.....w.p.m.
Type transmitter (tube line-up if home-built).....
Receiver.....; Antenna.....

SCORING:

.....5.....QSOs plus....10.....c.p. points times....4.....sections equals 60

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is true and correct to the best of my knowledge.

Signature and call.....
Address.....
.....

This is a sample log form that must be used by all contestants and also shows how to score. You can obtain these forms free by writing to ARRL.

Rules

1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of this *QST*.

2) *Time:* All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but must not exceed 40 hours total.

(*Continued on page 143*)

The Collector-Detector System for Improved Sensitivity

The description offered here is a revised translation by Frank F. Horvath, Deutscher Amateur Radio Club, Besselallee 10, Kiel, Germany, of an article by Hans Joachim Brandt, DJ1ZB, Technical Supervisor of the DARC-Munich, published in *Das DL-QTC*. A slightly different approach to solid-state receiver circuitry is offered in this 3-transistor, ham-band regenerative-detector package. This low-cost unit is tailored to the needs of the operator who engages in frequent operation afield.

A 5-Band, 3-Transistor Receiver*

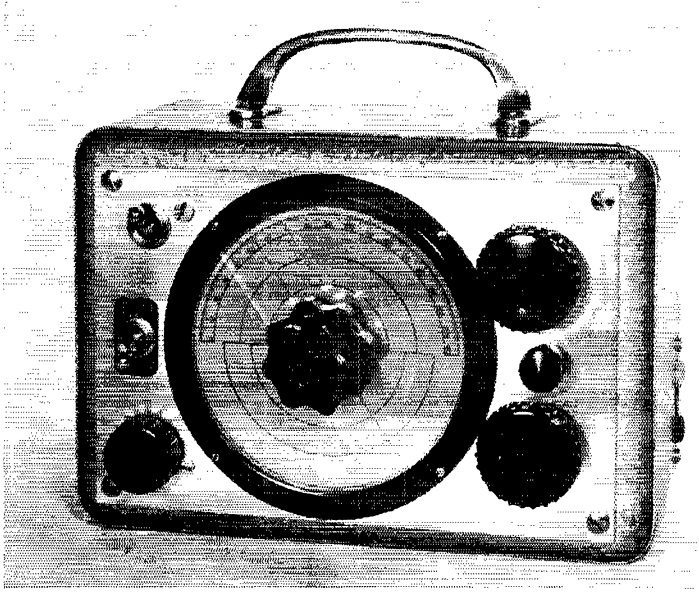
IT MAY seem a bit pointless in this day of sophisticated receiver techniques to talk about something as uncomplicated as a 3-transistor regenerative receiver. Yet, the use of such a device can often be justified because of its compactness, low battery drain, and portability. Old timers can remember the effectiveness of regenerative receivers — especially when copying c.w. Because of this, the circuit about to be described should be of interest to anyone wishing to build an 80- through 10-meter portable receiver.

The circuit designer, DJ1ZB, states that the receiver delivers better performance than comparable vacuum-tube types because of his collector-detector system of demodulation.

Circuit Details

The schematic diagram for the 80- through 10-meter receiver is shown in Fig. 1. The antenna is attached at J_1 and is coupled to the band switch, S_{1A}, through trimmer capacitor C_1. The coils for the various bands (L_1 through L_5) are switched into the detector circuit by the 4-section switch, S_1. S_{1B} switches the feedback taps from the coils, through the regeneration control, C_3, and on to the collector circuit of Q_1. S_{1C} connects the tuning capacitor, C_2, to the coil that is in use. The remaining switch section, S_{1D}, is used for connection between the base element of Q_1 and the capacitance-divider network of the in-circuit coil.

* Reprinted from *Das DL-QTC* (DARC Munich Magazine).



The transistor receiver

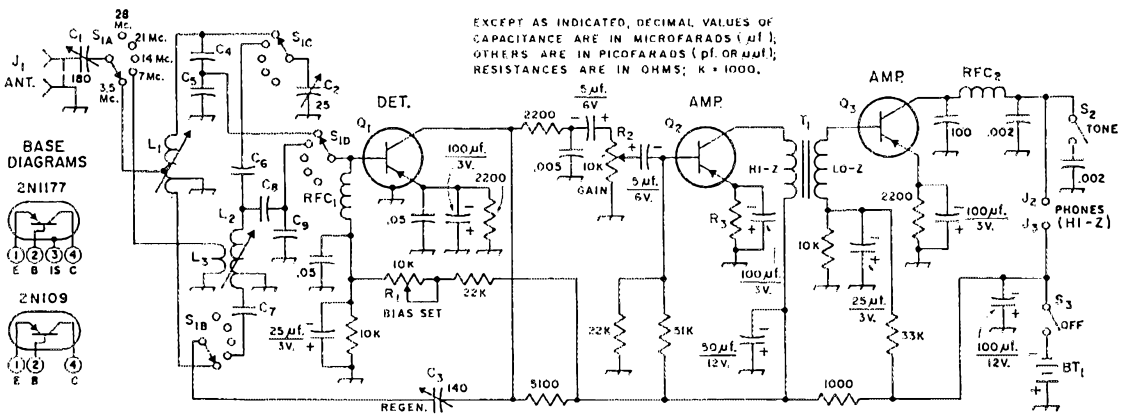


Fig. 1—Schematic diagram of the DJ1ZB receiver. All fixed resistors are ½-watt composition. All fixed capacitors are low voltage disk ceramic except those bearing polarity marking, which are electrolytic.

BT_1—9-volt transistor-radio battery.
C_1—9–180-pf. mica trimmer (Arco 463).
C_2—25-pf. miniature variable.
C_3—140-pf. variable capacitor.
C_4–C_9, inc. (See coil table).
J_1—RCA phono connector.
J_2, J_3—Insulated pin jacks.
L_1–L_3, inc. (See coil table).
Q_1—High-frequency germanium p.n.p. transistor (RCA 2N1177).
Q_2, Q_3—P.n.p. audio transistor (RCA 2N109).
R_1—10,000-ohm linear control.
R_2—10,000-ohm audio taper control (with switch).
RFC_1, RFC_2—2.5-mh. r.f. choke.
S_1—Two-section phenolic rotary switch, 4-pole 5-position type (Centralab PA-1013 usable).
S_2—S.p.s.t. toggle switch.
S_3—S.p.s.t. switch (part of R_2).
T_1—Interstage transformer, primary 20,000 ohms to 800-ohm secondary (Knight 64Z180 usable. Use total secondary).

Examination of Fig. 1 will reveal a slight difference between the input circuits of L_1 and L_2. Optimum performance resulted from making direct connection to L_1 (80 meters) while inductive coupling proved to be more satisfactory between the antenna and L_2 on the remaining bands. For the purpose of clarity, both the 80- and 40-meter coils are shown in the schematic diagram.

Capacitor C_1 is used for increasing or decreasing the amount of antenna coupling to the receiver's input circuit. Antenna resonance effects may tend to "pull" the detector out of oscillation on some of the higher frequencies, causing "dead spots" in the tuning range of the receiver. C_1 can be adjusted to eliminate this condition should it be necessary.

The low input impedance of Q_1 is matched by means of a capacitance divider network which is connected across the detector's base coils. A divider ratio of 13:1 is used on 80 meters, 10:1 on 40, 20 and 15 meters; and a ratio of 8:1 is used on 10 meters.

The regeneration is controlled by C_3, which permits the feedback between the collector and the base coil, L_1, to be varied. On the bands above 80 meters, a series capacitor, C_7, is inserted between the base coil and C_3 to provide a vernier effect when adjusting the regeneration control.

An r.f. filter, consisting of RFC_2 and two bypass capacitors, is installed in the collector lead of Q_3. This is necessary because of r.f. feedback from the antenna during c.w. reception — resulting

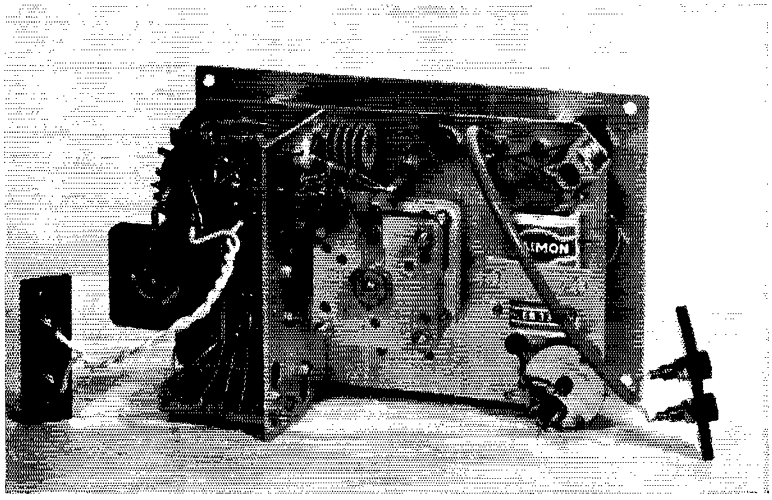


Fig. 2—Rear view of the assembled receiver. The small chassis bracket containing the r.f. circuitry is at the left.

from the regeneration level being set rather high, which in turn causes the detector to oscillate more vigorously than during phone reception. The r.f. being picked up by the headphone leads causes a type of feedback that degrades the quality of the c.w. note if the filter is not used. No output transformer is used between the headphones and Q_3 if high-Z phones are employed (40000 ohms or ter). If low-Z phones are to be used, a matching transformer can be installed in series with the collector lead of Q_3. A 0.002-μf. capacitor can be switched into the circuit by S_2 if additional attenuation of high-frequency audio frequencies is desired. Some attenuation is offered by the 0.002-μf. capacitor already connected between the collector of Q_3 and ground.

The best operating point for transistors Q_2 and Q_3 is established by the base and emitter resistors. The optimum point seems to occur when an IR drop of 2 volts exists across the emitter resistors. The operating point for Q_1 is established by adjusting R_1 for best detector sensitivity.

Analogy

The designer, DJ1ZB, compares his collector-detector to a vacuum-tube plate detector because of certain circuit similarities. The more common transistor detector configuration (base-emitter detector) compares to a vacuum-tube grid-leak detector in that the diode action takes place between the base and emitter (grid and cathode in a vacuum tube) demodulating the incoming signal and permitting amplification of the audio signal by the collector — or plate in the case of a tube-type detector. It was found that by shorting the emitter circuit at audio frequencies with a 100-μf. capacitor, detection took place between the base and collector, causing the circuit to operate like a vacuum-tube plate detector, hence the term "collector-detector."

A reduction in noise figure (n.f.) results when removing the audio component from the emitter. This is because the greater part of the noise generated in a transistor is caused by the base-emitter diode action, which is forward biased. With the collector-detector system very little noise is added to the signal that is passed to the base of the following stage — making the over-all signal-to-noise ratio of the receiver much better. This is desirable during weak signal reception.

Constructing the Receiver

The entire unit is housed in a metal cabinet which measures approximately 4 by 5 by 6 inches.[1] The chassis plates are made from aluminum so that suitable shielding between some of the circuits can be realized. Ground loops, sometimes troublesome when working with circuit-board assemblies, are minimized through the use of metal chassis material — particularly important with this receiver when operating it on the three higher bands. Because of this assembly method, hand-capacity effects are eliminated.

The construction techniques used on the designer's receiver are shown in Figs. 2 and 3, and in the photo on page 51. It can be seen that the entire circuit assembly is attached to the front panel with metal spacers that are approximately 1 inch long. The main chassis plate measures approximately 4 by 5 inches and contains the tuning capacitor, regeneration control, the band switch, tone-control switch (S_2), audio gain control, and control R_1. Both variable capacitors (C_2 and C_3) are mounted on insulating material such as Plexiglas or epoxy circuit board.

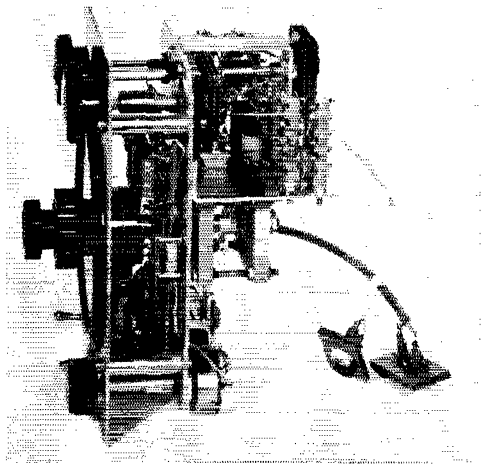


Fig. 3—A look down into the collector-detector receiver reveals the layout of the audio components between the main chassis and the front panel.

The r.f. circuitry is assembled around the band switch and near controls C_2 and C_3. This is accomplished by mounting the circuit components on a second chassis plate that measures about 2 by 4 inches. The smaller plate has a right-angle lip which is used for bolting the small chassis to the larger one as illustrated in Fig. 2.

The audio amplifier stages, Q_2 and Q_3, and their associated components, are installed between the front panel and the main chassis.

Tune-Up and Operation

Once the wiring has been completed, make a thorough check to be certain that there are no errors. After preliminary inspection is finished, attach the 9-volt battery, being careful to connect its negative terminal to the circuitry and its positive terminal to chassis ground.

Apply d.c. voltage to the receiver by placing S_2 in the ON position. Adjust R_1 so that maxmum resistance is in the circuit. With the antenna connected, and while listening to the receiver's output with headphones, adjust the regeneration control C_3 until a growl is heard. Next, the setting of R_1 should be adjusted to a point where regeneration will start smoothly while adjusting C_3. The adjustment of R_1 will be the same for all

[1] The cabinet shown in the photographs is of European origin. Cabinets of simular dimensions are manufactured by Bud Radio and are listed in the Allied Radio catalog. (Bud AU-1029 usable.) Other components used are American substitutes.

Table I

Tuned Circuit Data

All coils are wound on $\frac{3}{8}$-inch diameter ceramic slug-tuned forms (Miller 4400 or equiv.) and are coated with polystyrene Q-dope to enhance stability. Each of the L_3 windings are loose-coupled to their respective L_2 coils by placing them adjacent to the main body of the coil and approximately $\frac{1}{4}$ inch away from it. The single-turn loops are self-supporting between S_{1A} and their ground-return leads. All capacitors are NP0 ceramic or silver mica.

BAND	L_1	L_2	L_3	C_4	C_5	C_6	C_7	C_8	C_9
28 Mc.	None	13 turns No. 20 enam. wire, close-wound and tapped 2 turns from S_{1B} end.	1 turn No. 20 enam. wire. (See caption)	None	None	18 pf.	47 pf.	27 pf.	200 pf.
21 Mc.	None	11 turns No. 24 enam. wire, close-wound and tapped 2 turns from S_{1B} end.	1 turn No. 20 enam. wire (See caption)	None	None	12 pf.	33 pf.	50 pf.	500 pf.
14 Mc.	None	18 turns No. 24 enam. wire, close-wound and tapped 2 turns from S_{1B} end.	1 turn No. 20 enam. wire. (See caption)	None	None	12 pf.	50 pf.	50 pf.	500 pf.
7 Mc.	None	29 turns No. 24 enam. wire, close-wound and tapped 3 turns from S_{1B} end.	1 turn No. 20 enam. wire. (See caption)	None	None	15 pf.	80 pf.	100 pf.	.001 μf.
3.5 Mc.	69 turns No. 28 enam. wire, close-wound and tapped 9 turns from S_{1B} end.	None	None	120 pf.	.0016 μf.	None	None	None	None

bands and will need readjustment only when the battery voltage drops off after extended use.

The coils can be adjusted to provide the desired frequency coverage by attaching a signal generator to the antenna terminal of the receiver and adjusting the coil slugs, one band at a time. A grid-dip oscillator may be used in lieu of a signal generator by comparing the frequency of the received signal against the same signal while tuning it in on a calibrated communications receiver. Once the desired tuning range is established, place a drop of glue on the adjustment screw of each coil to hold it in position.

If greater vernier effect is desired on some of the bands when adjusting the regeneration control, the value of C_7 may be changed experimentally until the desired amount of adjustment range for C_3 is secured. The smaller the value of C_7, the greater the vernier effect.

Performance

Simple receivers of the type described in this article are subject to strong-signal overload when used in the vicinity of powerful broadcast stations. Strong amateur radio signals will tend to overload the receiver in a like manner. Despite these problems, the receiver delivers otherwise excellent performance and is a welcome addition to the equipment carried into the field for portable use. The cost of the unit is nominal and the pleasure of building it can be well worth the time spent on the project. The collector-detector receiver might make a useful addition to your portable setup, requiring only a few nights at the workbench to assemble this handy accessory.

We wish to express our gratitude to Frank F. Horvath, DARC-Munich, for his German-to-English translation of the original DJ1ZB article.

QST

Improve Your Club's Training Program

BY JOHN H. FOSS,* K6KPH

COMMENTS on the Federal Communications Commission Docket No. 15928 indicate, whether justifiably or otherwise, that there is among some licensed amateurs in the U.S.A. a serious lack of understanding of radio theory. Apparently this problem has developed mostly in the past decade or so and may be partially attributed to the present licensing rules. There is, however, at least one other contributing factor — one which may be corrected easily by the amateurs themselves.

During the past few years a relatively new phenomenon has developed within the amateur fraternity: that of the club-conducted school for would-be licensees. Usually such a course is set up to include both code and theory instruction and is taught by one or more of the licensed amateurs in the club. Although the writer has seen no statistics, it may be assumed that these courses are responsible for more and more licensees in amateur radio acquiring the skills necessary to pass the various FCC examinations. These courses form one of the most encouraging aspects of club activities.

Two problems, however, frequently arise in developing such courses, and unless these problems are anticipated and steps are taken to eliminate them, they can and probably will sabotage the most ambitious programs conducted by the most eager personnel. These two problems are unrealistic scheduling and inadequately prepared instructors.

Unrealistic Scheduling

Most courses are arranged for so many hours per night, so many nights per week, for so many weeks, and the publicity issued in advance carries the implication that if one attends every session and does a bit of homework he will qualify for some specified class of license. Such courses devote possibly one hour each evening (usually the first hour) to code training and practice and one hour to theory instruction.

The first three or four meetings proceed on schedule, but soon thereafter a problem develops: some students are much slower in learning the code than are others. A frequent result is that a few minutes of theory time are stolen for extended code practice. Such a modification of the program would not be serious if it occurred only once, but the next week a few more minutes are borrowed, and, after the course is half completed, code is taking 90 to 100 minutes, with only 20 to 30 minutes left for theory. Adding to the difficulty is the fact that it is much easier to mark the progress of the group in code speed than in understanding of theory, so code ability becomes the norm on which future sessions are scheduled. By the time the specified number of sessions have been held, the course has become essentially one in code proficiency, and the student has been left to learn the necessary theory on his own.

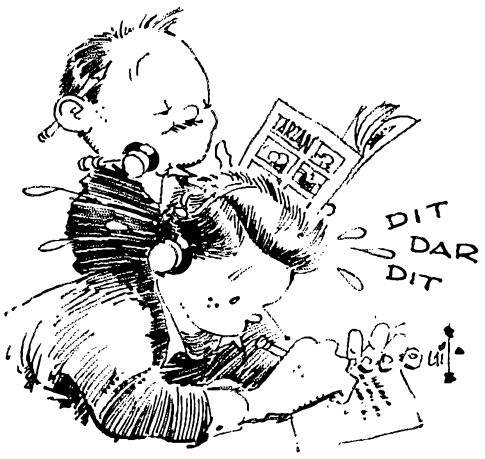
Two unfortunate results follow. First, the student who learns code rapidly loses interest if he is forced to wait until the least able member of the class reaches a certain code speed before the class moves to the next level. Second, since the norm on which the class is judged has become code speed (and, for practical purposes, that alone), the student develops the idea that only code speed is important and that really understanding the theory matters little, so long as one's memory is sufficient to allow him to regurgitate the answers in the *License Manual* and affix them to the appropriate spots on the exam paper, whether he understands what he is writing or not.

The Inadequately Prepared Instructor

Ironically, the instructors who fall into this category are usually amateurs who possess a thorough understanding of radio theory. The difficulty is that the understanding of this theory and the ability to impart that understanding to others are two different assets. While the first certainly is prerequisite to the second, the second does not derive automatically from the first. Good teachers are made and not born, but the making of a good teacher requires some time and effort beyond that necessary to the understanding of the material to be taught.

The inexperienced instructor is likely to fall prey to one or more of the following temptations: (a) to skip around from one facet of the subject to another, with little regard for the logic of building theory step by step; (b) to teach early in the course what he considers most important, whether or not it can be understood thoroughly without a knowledge of even more elementary theory; and (c) to emphasize the latest developments in amateur communications (transistor theory, for example) to the exclusion of more

* Box 38, Rancho Mirage, California 92270



SOME STUDENTS ARE MUCH SLOWER THAN OTHERS

basic material, so that his course will seem "up to date."

The result probably will be that the student will have available several valid and useful pieces of knowledge which he can use up to and including examination time, but which he will lose immediately thereafter, since there is little if any foundation for them to rest upon, and the immediate reason for acquiring them no longer remains. Such miscellaneous bits of knowledge have little use as bases for building additional understanding. The student's dilemma is similar to that of the shipwrecked seaman who, upon finding himself on an island replete with coconut palms, makes an electric coconut opener from parts he has salvaged from the wreck, only to remember too late that there is no electrical power available on the island.

Fortunately, the elimination of these difficulties is relatively easy. Program scheduling can be made more realistic simply by not specifying the exact number of meetings the class will have and by establishing a schedule that can be rigidly observed. For instance, 7:30 to 8:30 might be set as code time, with two instructors (or an instructor with two code machines operating at different speeds). Theory instruction could be scheduled from 8:30 to 9:30 and 9:30 to 10:00 might be marked as an optional period, during which the student may work on code or theory, whichever the instructor feels he needs most. The last five minutes of each hour should be used for a rest break, but five minutes are ample for that purpose. There is little danger that one or two slow students will drag the course on for endless weeks, since those who progress that slowly usually will lose interest and quit by the time the others are legitimately ready for the examination.

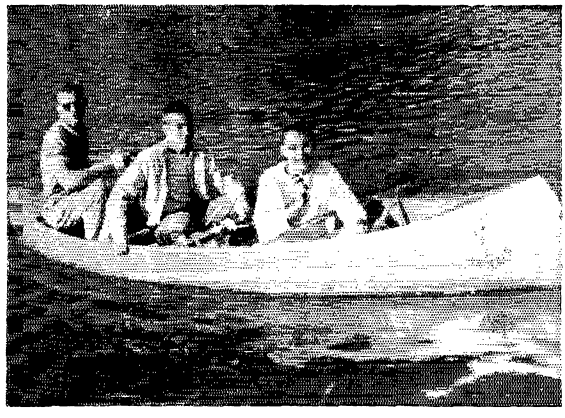
The best way to eliminate the problem of the inadequately prepared instructor is to use a standard textbook, such as *Understanding Amateur Radio*, or, at the very least, to teach the elements of the course in the same order as they appear in such a book. But regardless of which text, if any, is used, it is absolutely necessary that the instructor read *carefully* — within a few weeks preceding the opening of the course — a beginning radio textbook which assumes that the student, at the start, knows nothing whatever about the subject. In addition to providing a logical sequence of developing the theory, this method will eliminate the danger of leaving "loopholes" in the students' knowledge because the instructor forgot to include one or more of the real basics.

While adopting this suggestion might mean "eating humble pie" for the instructor, he will be relieved to some extent of a lack of rapport with the students which otherwise might be caused by his and the students' traveling on planes so far apart that "never the twain shall meet." But simply by his offer to instruct, the instructor is agreeing to meet the student on the student's level. It will cost the instructor some time to be able to do this, but he might well find it the most rewarding time he has spent, not only because of the better course that he will offer, but also because his own knowledge of radio is certain to be increased as a result of his teaching elementary radio to others. QST

Strays

FLASH!.

The United Kingdom and the United States have signed a reciprocal operating agreement effective immediately. The current note covers only the British Isles; separate agreements will be needed for other parts of the Commonwealth and the Crown Colonies. Information on previous agreements can be found in the IARU News department, page 30.



Another unusual mobile, this time mobile from a canoe! The three are (l to r): K9EQY, WA9OWK, and K9KLT and they are operating ten-meter phone from Skokie Lagoons, Winnetka, Ill. *(Photo by WA9DCK)*

PREDICTING SAG IN LONG WIRE ANTENNAS

BY JOHN J. ELENGO, JR.,* K1AFR

WHILE much is said on electrical design of long-wire arrays in *The Radio Amateur's Handbook* and *The A.R.R.L. Antenna Book*, there has been a need for mechanical-design information to assist the amateur in planning the construction of his array. For those of us fortunate enough to have the space required, a problem might well be encountered in choosing wire size and the number of supports required for the type of antenna selected.

If wire were weightless, it would form a straight line in all planes when suspended between two supports, provided some tension force exists in it. Since wire has mass, this mass is acted upon by the earth's gravitational attraction. This causes the wire to assume a form in the vertical plane referred to as a "catenary." Mathematical relationships for the catenary are complex, involving hyperbolic sines and cosines. Cables hanging under their own weight are not loaded uniformly along the horizontal; however, when the wire is fairly taut the load may be assumed uniformly distributed along the horizontal, and the catenary may be mathematically replaced by a "parabola" (the curve formed by cables of a suspension bridge). Since the mathematical relationships for the parabola are less complex, the solution of the problem is greatly simplified, and the error introduced is small.

When the supports of the wire have the same elevation, the distance between supports is called the "span" of the wire. The vertical distance from the supports to the lowest point is called the "sag" of the wire (see Fig. 1). Calculation of the amount of sag to be expected for a given span and wire material and size is simplified by use of the nomograph provided.

The weight (pounds per 1000 feet) and a recommended tension (pounds) for each particular wire material and size may be determined from Table I. (The tensions are based upon a stress level of 6500 pounds per square inch for hard-drawn copper and 15,000 pounds per square inch for copper-clad steel. The stress level is proportional to the wire tension and may be decreased by decreasing the amount of tension applied).

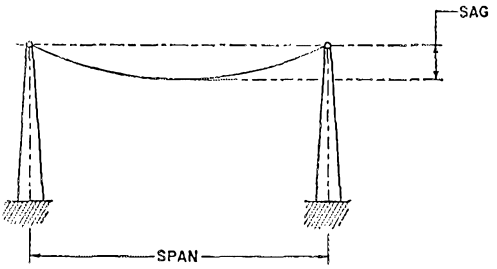


Fig. 1—The "span" and "sag" of a long-wire antenna.

If the calculated sag is greater than allowable it may be reduced by any one or combination of the following:

a) Providing additional supports thereby decreasing the span,

b) Increasing the tension in the wire if less than recommended,

c) Decreasing the size of the wire.

*83 Hillview Ave., Hamden, Conn. 06514.

Table I

Stressed Antenna Wire

American Wire Gage	*Recommended Tension*[1] *(Pounds)*		*Weight (Pounds per 1000 Feet)*	
	Copper-Clad Steel[2]	Hard-Drawn Copper	Copper-Clad Steel[2]	Hard-Drawn Copper
4	495	214	115.8	126
6	310	130	72.9	79.5
8	195	84	45.5	50
10	120	52	28.8	31.4
12	75	32	18.1	19.8
14	50	20	11.4	12.4
16	31	13	7.1	7.8
18	19	8	4.5	4.9
20	12	5	2.8	3.1

[1] Approximately one-tenth the breaking load. Might be increased 50 per cent if end supports are firm and there is no danger of ice loading.

[2] "Copperweld," 40 per cent copper.

Instructions for Using the Nomograph

1) From Table I, find the weight (pounds/1000 feet) for the particular wire size and material to be used.

2) Construct a line from the value obtained above plotted on the weight axis to the desired span (feet) on the span axis.

3) Choose an operating tension level (pounds) consistent with the values presented in Table I (preferably less than the recommended wire tension).

4) Construct a line from the tension value chosen plotted on the tension axis through the crossover point of the work axis and the original line constructed from Step 2, above, and continue this new line to the sag axis.

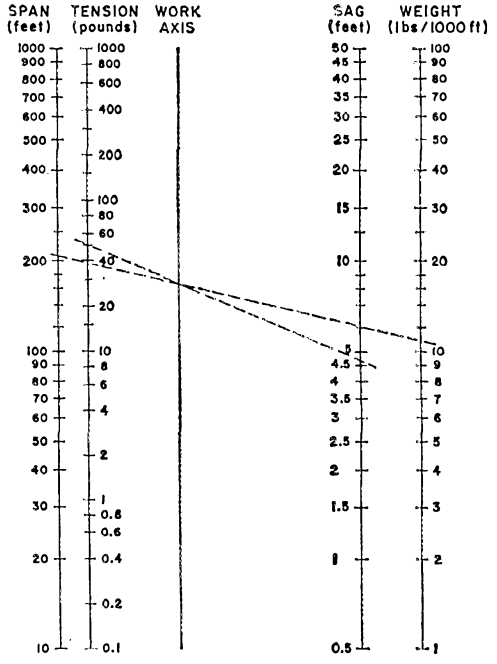
5) Read the sag (feet) on the sag axis.

Example:

Weight = 11 pounds/1000 feet.
Span = 210 feet.
Tension = 50 pounds.

Answer:

Sag = 4.7 feet. QST



Strays

To further interest on the ten-meter band, a group of Cincinnati hams have formed an informal association, the Cincinnati Area Ten-Tuners. The Ten-Tuners work and monitor stations around 28.7 Mc. There is a short business meeting on the third Tuesday of each month at 7:00 P.M. Cincinnati time.

— • • • —

Lt. Cmdr. Robert E. Mickley, Chief Navy MARS and Mr. Edward S. Liscombe, K4KNV, Acting Chief Army MARS welcome the recently assigned Chief Air Force MARS Major Richard B. Wareing, K3AKK (ex W8OUP, DL4PN and F7EB). His last military assignment was in Viet Nam with the 1st Air Commando Squadron. His amateur radio interest include construction and operation of v.h.f. and u.h.f.-s.s.b. equipment. His is also the Chairman of the Copperhead UHF Associates, a contest operating group.

1966

Tentative dates for major ARRL operating activities.

January	*February*	*March*	*April*
8-9 VHF SS 15-17 CD (c.w.) 22-24 CD (phone)	5-20 Novice Roundup 12-13 DX Test (phone) 26-27 DX Test (c.w.)	12-13 DX Test (phone) 26-27 DX Test (c.w.)	16-18 CD (c.w.) 23-25 CD (phone)
May	*June*	*July*	*August*
	11-12 VHF QSO Party 25-26 Field Day	9-11 CD (c.w.) 16-18 CD (phone)	
September	*October*	*November*	*December*
10-11 VHF QSO Party	8-9 Simulated Emergency Test 15-17 CD (phone) 22-24 CD (c.w.)	12-14 SS (phone) 19-21 SS (c.w.)	

1966 ARRL International DX Competition

Amateurs the World Over to Compete for Section and Country Awards

Phone: February and March 12-13

C.W.: February and March 26-27

ANTENNAS ready? Rig debugged? It's that time again for the contest and DX-minded amateur to complete preparations for the "big" one, the 32nd ARRL International DX Competition. Recalling the superb results of 1965 we look to higher phone scores, increased multipliers on 15 meters and fun for all participants. Rules this year remain the same, in accord with popular opinion of both the domestic and overseas amateur.

DX amateurs are reminded that their multipliers per band are based on the following 21 call areas:

Call Area: W/K WA/WB	Call Area: W/K WA/WB
1. — CONN MAINE MASS NH RI VT	*KL7* — ALASKA
2. — NJ NY	*8.* — MICH OHIO VA
3. — DEL MD PA DC	*9.* — ILL IND WIS
4. — ALA FLA GA KY NC SC TENN VA	*0.* — COLO IOWA KANS MINN MO NEBRA NDAK SDAK
5. — ARK LA MISS NMEX OKLA TEXAS	*VE1* — NB NS PEI
6. — CAL	*VE2* — QUE
KH6 — HAWAII	*VE3* — ONT
7. — ARIZ IDAHO MONT NEV ORE UTAH WASH WYO	*VE4* — MAN
	VE5 — SASK
	VE6 — ALTA
	VE7 — BC
	VE8 — NWT YUKON
	VO — NFLD LAB

As you prepare your results this year please record your ideas on a change of status in KH6/KL7 for the DX test. Club groups in both Hawaii and Alaska indicate their desire for a change back to the DX status they enjoyed before statehood. What do you think?

Mechanically the new logging forms should mean an easier recording job for all contestants and you are urged to use ARRL forms and request them immediately. In particular, no W/VE phone or c.w. log will be accepted unless it is accompanied by the new CD-175 checklists. Be sure to send a copy of your log in the required form with a complete summary and checklists to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111, U. S. A. You can obtain free log forms at this address. Logs must be postmarked by April 23, 1966 to be eligible for awards and *QST* listing. All reports, big or small are welcome, as well as operating and antenna photos.

CONTEST PERIODS

Phone Section:

Starts	*Ends*
Feb. 12, 0001 GMT	Feb. 13, 2400 GMT
Mar. 12, 0001 GMT	Mar. 13, 2400 GMT

C.W. Section:

Starts	*Ends*
Feb. 26, 0001 GMT	Feb. 27, 2400 GMT
Mar. 26, 0001 GMT	Mar. 27, 2400 GMT

SUMMARY, ARRL INTERNATIONAL DX COMPETITION

Call..... ARRL Section..... Country.....

○ C.W. ○ PHONE — SINGLE OPERATOR ○ — MULTIOPERATOR ○ — Single Xmtr. ○ Multi. Xmtr. ○

Name..... Address.....

Transmitting Equipment.....

Input Power..... Receiver(s).....

Antennae.....

MULTIPLIERS: W/VE stations show number of countries per band. Non-W/VE's show number of U.S.A. and Canadian call areas worked. DX stations use list below.

	1.8 Mc.	3.5 Mc.	7 Mc.	14 Mc.	21 Mc.	28 Mc.	TOTALS
Multiplier							•
Contacts							

Multioperator stations show all calls.....

Number of different countries worked overall..... Total time on.....

Participating for club award in the.....

•• •

..... x ..... = ...

(Points) (Multiplier) CLAIMED SCORE

•

Total Number of multipliers on all bands.

••

Count 3 points per completed QSO, see contest rule 6a in January QST.

I certify, on my honor, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my belief. I agree to be bound by the decisions of the ARRL Awards Committee.

.....

Operator's Signature and Call

Use space below and on reverse for comments on new countries or new states, score improvement, conditions, interesting experiences, etc. Be sure to enclose your operating and antenna photos for QST consideration. Mail summary, log sheets and check lists (CD-175 for W/VE) to the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111, U. S. A.

.....

.....

.....

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W0	KH6	KL7	VE1	VE2	VE3	VE4	VE5	VE6	VE7	VE8	VO
1.8																					
3.5																					
7																					
14																					
21																					
28																					

CD-93 (R765) Printed in U.S.A.

Sample summary sheet that must accompany all reports.

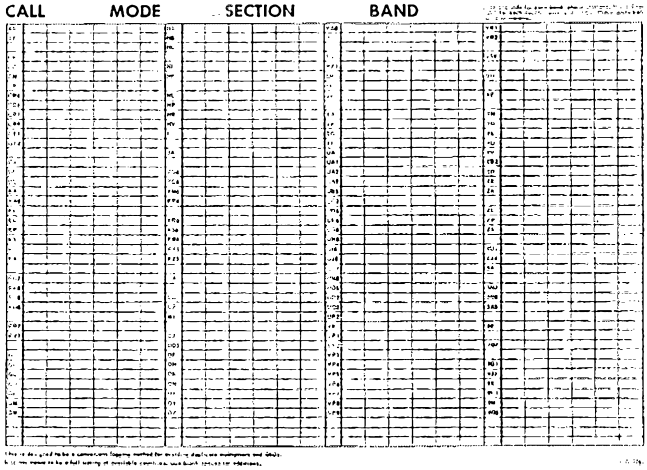
Rules

1) *Eligibility:* Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.

2) *Object:* Amateurs in the 50 United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.

3) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

4) *Entry Classifications:* Entry may be made in either or both the phone or c.w. sections: c.w. scores are independent of phone scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating functions. Multiple-operator stations are those obtaining assistance, such as from "spotting" or relief operators, or in keeping the station log and records.



This new prefix check list is to be used by **all** W/VE participants. Phone stations will note the **first** station in each country while c.w. stations will fill in **all** blocks per country thus maintaining an easy check on countries and quotas. VE's will place their quota balance in the margin. One side will be used for each band. Logs received without this checklist will be returned.

Banned Countries

U.S. amateurs may not work amateurs in *Cambodia* (XU), *Viet-Nam* (3W8), *Indonesia* (PK, JZØ, 8F) and *Thailand* (HS).

Canadian amateurs may not work *Cambodia* (XU), *Viet-Nam* (3W8), *Indonesia* (PK, JZØ, 8F), *Laos* (XW8) and *Jordan* (JY).

5) *Contest Periods:* There are four weekends, each 48 hours long; two for phone work and two for c.w.

6) *Valid Contacts:* In the phone section, all claimed credits must be made voice-to-voice. In the telegraph section, only c.w.-c.w. contacts count. Crossband contacts may not be counted.

7) *Exchanges:*

a) *Amateurs in U.S. and Canada* will transmit a three-figure number, representing the RST report, plus their state or province. (The latter may consist of an appropriate abbreviation.) Phone participants will transmit a two-figure number consisting of the readability-strength report plus the state or province. *Example:* W6LCX, might transmit "579CAL" on c.w., "57 California" on phone.

b) *Amateurs outside* the United States and Canada will transmit six-figure numbers, each consisting of the RST report plus three "power" numbers; the power indicator will represent the approximate transmitter power input. Phone contestants will transmit five-figure numbers, each consisting of a readability-strength report and the three "power" numbers. *Example:* PAØLOU, with 150 watts input, might transmit "569150" on c.w., "56150" on phone. If the input power varies considerably on different bands, the "power" number should be changed accordingly.

8) *Scoring:*

a) *Points:* One point is earned by a W(K) or VE/VO station upon receiving acknowledgment of a contest exchange sent, and two points upon acknowledging an exchange received. Two points are earned by any other station upon receiving acknowledgment of a contest exchange sent, and one point upon acknowledging an exchange received.

b) *Final Score:* W(K) and VE/VO stations multiply total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of W(K) and VE/VO licensing areas worked on one band plus the number of W(K) and VE/VO licensing areas worked on each other band.

There are 21 licensing areas: 12 in the United States (W1-Ø, KH6, KL7), 9 in Canada (VO, VE1-VE8).

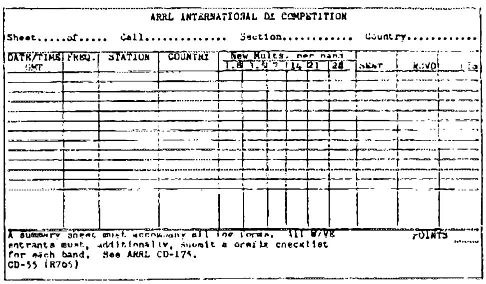
9) *Repeat Contacts:* The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.

10) *Quotas:* The maximum number of points per country per band which may be earned by W, K, KL7, KH6 stations in the *c.w. section* is 18, and contacts made on the same band with the same country after the quota is filled will not count. Thus complete exchanges with 6 stations in one country on one band fill the band quota for that country. The maximum number of points per country per band which may be earned by VE/VO stations *in the c.w. section* is 24, and contacts made on the same band with the same country after the quota is filled will not count. Exchanges with 8 stations in one country on one band are thus permitted Canadian participants. There is *no quota* for stations in the c.w. section *outside* of the U.S. and Canada. There is *no quota* for *any* station in the phone section.

11) *Reporting:* Contest work must be reported as shown in the sample forms. Each entry must include the signed statement. Contest reports must be mailed no later than April 23, 1966 to be eligible for *QST* listings and awards. All DX Competition logs become the property of the American Radio Relay League and none can be returned.

12) *Awards:* To document the performance of participants in the 32nd ARRL International DX Competition, a full report will be carried in *QST*. In addition, special recognition will be made as follows:

a) A certificate will be awarded to the high-scoring single-operator phone and to the high-scoring single-operator c.w. entrant in each country and in each of the mainland U.S. (plus Alaska and Hawaii) and Canadian ARRL sections (see page 6, *QST*) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section or country from which three or more valid multiple-operator entries are received.



Sample of log form that must be used by **all** participants. Notation must be made of new multipliers per band and all band changes must be recorded. In addition, all W/VE entrants must keep up a prefix check-list (CD-175) and submit same with entry.

b) A suitable certificate will be awarded to the operator making the highest single-operator phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three phone entries by members of the club and that these scores are confirmed by receipt at ARRL of the individual contest logs from such members. The highest single-operator c.w. scorer in each club will be awarded a certificate under the same conditions. Only a bona fide resident member, operating a station in local club territory, may compete for club certificates.

c) ARRL will award a gavel to the affiliated club submitting the greatest aggregate phone and c.w. score by its members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL of the individual contest logs from such members. Only scores of bona fide resident members, operating a station (his or another club member's) in local club territory, may be included in club totals.

13) *Judges:* All entries will be passed upon the ARRL Awards Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

14) *Disqualifications:* Each participant agrees to observe the contest rules as well as all regulations established for amateur radio in his country. Violation of any regulation, as confirmed by a single FCC citation or advisory notice or two ARRL accredited Official Observer reports, may constitute grounds for disqualification. Some examples of practices which can result in disqualification: off-frequency (out-of-band) operation, harmonics, spurious emissions, low tone reports in logs, key clicks, splatter, excessive sidebands, W(K) stations working banned countries, interfering with channels handling amateur emergency communication.

EXPLANATION OF DX CONTEST EXCHANGES

Stations in U. S. and Canada Send:

	RS or RST Report of Station Worked	*Your State or Province (or Abbreviation)*
Sample (c.w.)	579	ORE
Sample (phone)	57	Oregon

Stations Outside U. S. and Canada Send:

	RS or RST Report of Station Worked	*Three-Digit Number Representing Your Power Input*
Sample (c.w.)	579	075
Sample (phone)	57	500

January 1941

. . . Ed Handy, W1BDI announces the UHF Marathon for 1941. Special certificates and medallions will be awarded to the top performers. Points are to be scored on the basis of distance, with multipliers for the band used.

. . . A simple and practical scheme for obtaining a.v.c. for c.w. reception is described by Edward H. Weber, W2GRD. Previous attempts to accomplish this have resulted in great loss of sensitivity due to loading of the a.v.c. rectifier by the c.w. oscillator.

. . . The virtues of parallel feed for amplifiers, vs. series feed are pointed out by T. M. Ferrill, Jr. W1LJI. One significant advantage is permitted reduction in physical size of the tank-tuning condenser. Another advantage is the additional safety to the operator in that there is no lethal high voltage d.c. in the tank circuit.

. . . The important role played by radio amateurs in recent heavy November storms in Minnesota and Texas is described by G. K. Pritchard.

. . . The effect of the war on member societies of the I.A.R.U. is discussed by K. B. Warner who points out that despite curtailing of privileges in some countries, the amateur spirit carries on with the continuation of Clubs and publications.

Pocket-size transmitters are illustrated and described by Keith Hayes, W9ZGD and R. T. Lawrence, W8LCO. Both rigs use the multi-purpose 117L7GT tube which combines a half-wave rectifier with a pentode.

. . . Three different types of keying monitors are shown and discussed by Don H. Mix, W1TS. He points out why it is highly desirable to listen to your own fist especially while working to improve your speed.

. . . A well made and efficient electron coupled oscillator is described by Henry E. Rice, Jr. W9YZH with special emphasis on the method of voltage regulation. The final result is professional in appearance and works as well. It is called the VARI-ARM 150.

. . . High fidelity in phone receivers is still popular and Herbert Brooks, W9SDG has some suggestions on A.F. amplifiers. — *WIANA*

Strays

***QST* congratulates . . .**

VE2NK, who was presented the Order of Municipal Merit by Mayor Wilfrid Hamel of Quebec City during the "Vin d'Honneur" held by the city in honor of the ARRL Board Meeting there May 21-22, 1965, and . . .

W3JAB, who now has been designated as chief executive officer of Western Union, in addition to its presidency for which we congratulated him in August, and . . .

Dr. Virginia Downing, WNØMMG who is the recipient of the 1965 Woman of the Year Award of the National Council of Auxiliaries of the American Medical Center, and . . .

ARRL member Prof. Juvenal Dias da Costa Vidal, who was chosen "Visiting Lecturer of Physics" at Ball State University, Muncie, Indiana. The program is part of the Partners of the Alliance organization which is related to the Alliance for Progress program, and . . .

Lewis Blain, WA7BEU/W6EBS, who was promoted to Resident Engineer, Southern California Edison Co., at Boulder Dam, Nevada, and . . .

Lou Hippe, W6APQ who just completed a one-man art show of paintings at the Fashion Square at Bullock's in San Fernando Valley.

Hints and Kinks For the Experimenter

ROTARY SWITCH CONTACTS

A badly-burned rotary switch contact, especially on a piece of commercial equipment, was considered a major catastrophe until I found a method of easily replacing a switch contact. Recently, the same technique was applied when I modified a Viking Challenger. I added a contact to a blank space on one of the Challenger's switches.

First, find a replacement contact of correct size either on a discarded switch or an unused contact on the switch to be repaired or modified. Remove the replacement contact by carefully grinding off the head of the rivet with a small hand-held grinder (Moto-Tool or similar). Remove the damaged contact in the same manner. Make a small bend at the tip of a 6 or 8-inch piece of tinned wire and solder it to the replacement contact as shown in Fig. 1A.

Feed the wire with the attached contact through the proper hole in the switch wafer and snug the contact into position. Make sure the new contact lines up properly with the rotor section. Apply a sparing amount of epoxy cement between the contact and the switch wafer. Snug up the contact to the wafer and bend the wire over where it comes through the hole in the wafer. Clamp the new contact to the wafer with a heat sink, bobby pin, or paper clip to hold it in place until the cement dries. Apply a reasonable amount of cement to the lead on the opposite side of the wafer (See Fig. 1B). Let it stand overnight to allow the cement to dry. Then, using a heat sink to protect the cementing job, solder in the tinned wire lead from the new contact. — *Gerald R. Neuman, WA0DIL*

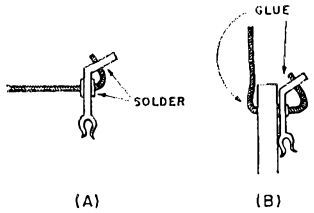


Fig. 1—To add or replace a rotary switch contact, (A) solder a wire lead to the new contact, and (B) glue it to the switch wafer.

CHECKING RESONANT FREQUENCIES

To check a coil and capacitor combination to see if it will resonate at a desired frequency, set up a variation of the old wave trap. Connect the coil and capacitor in parallel, and put them in series with the antenna lead to your station receiver. Find a signal close to the desired frequency and tune either the coil or capacitor, whichever is variable. At resonance, the signal in the receiver will be attenuated. When you use the tuned circuit, remember that tube and wiring capacitance in a circuit will add a few picofarads that were not there when you checked it, so a little retuning will be required. — *Julian N. Jablin, W9IWI*

REMOVING SLUGS FROM GREENLEE PUNCHES

Prying the screw out of a Greenlee punch after it has been used is an exasperating job at best. A compression spring may be inserted in the die of the punch to facilitate ejection of the slug without the use of a screwdriver or other prying tool. — *NASA Technology Handbook SP-5010*

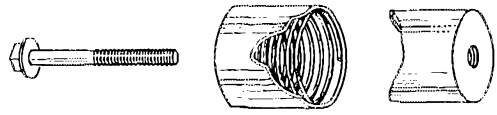


Fig. 2—To facilitate the removal of the slug from a Greenlee punch after use, a spring is mounted inside the die.

HEAT-DISSIPATING PLATE CAPS

Excellent heat-dissipating anode connectors can be made from the aluminum anode-cooling fins taken from discarded 2C39A tubes. These heat sinks are held in place with cap screws and can be removed from the rest of the 2C39A with an Allen wrench. It is necessary to rebore the inner wall of the finned cap to an appropriate diameter that will permit it to slip over the plate cap of the tube with which it will be used. These heat sinks offer greater area for heat dissipation than commercial units because of their larger size.

A hole should be drilled and tapped in the top of the heat sink to mount a soldering lug for the plate connection. Similarly, a set screw should be placed in the collar of the assembly to secure the unit to the tube's plate cap. — *W1CER*

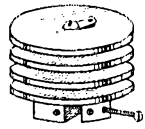


Fig. 3—A heat-dissipating anode connector is made from the cooling fins of a 2C39A.

QSL HOLDER FOR MOBILE

An envelope glued to the inside back cover of the Minilog makes a convenient location to keep QSLs on long trips. — *Bill Allen, WB2TSA*

LOW-COST PISTON TRIMMERS

MANY builders of v.h.f. equipment desire to use piston trimmers in various parts of the circuit. Commercially-manufactured units are quite expensive. Homemade units can readily be fashioned from surplus slug-tuned coil forms by removing the powdered-iron slug and replacing it with a similar length of brass or aluminum rod. The rod can be drilled and tapped to accept the same stud that held the original slug. After the stud is threaded into the new slug, a drop of glue can be placed at the junction of the two units to fasten the stud.

The outer element of the capacitor can be made from flashing copper or brass shim stock, as shown in Fig. 4. This operation can be performed on a mandrel that is slightly smaller in diameter than the main body of the coil form used. By doing this, the outer plate of the capacitor will fit snugly over the coil form when attached. Larger-diameter coil forms will permit greater values of maximum capacitance. — *WICER*

Fig. 4—W1CER's method of making piston trimmers from slug-tuned coil forms.

AUDIO LIGHT METER

A CADMIUM sulphide photocell plus an oscillator module shown in the photograph will enable a sightless operator to test and tune his transmitter. The light-sensitive probe can be used to watch a light-bulb dummy load, a twin-lamp indicator, or a neon-bulb tester. K2SEQ has found many non-radio uses for this tester, including determining if the lights are on in his apartment and picking out light or dark shirts and socks.

The oscillator is a commercial item constructed on a 1¾ x 2-inch circuit board. One resistor in the circuit determines the frequency of the oscillator. The photocell, a unit which has 10 megohms resistance in the dark, dropping to about 75 ohms in bright light, is wired in parallel with the frequency-determining resistor in the module. The meter is constructed in a small plastic box. A 1-inch hole is cut in the box for the speaker. A short length of lamp cord is used to connect the oscillator to the photocell which is housed in the outer shell of a phone plug. A cardboard diaphragm with a 1/16-inch hole in the end is slipped over the end of the probe when the meter is used in very bright light; otherwise, the oscillator will be above the audible range.

The meter is used in a manner similar to a Geiger counter. As the probe is turned toward a source of light the tone from the speaker will rise in pitch. Perhaps you have a blind friend who could use such a device. — *Julian B. Anderson, K2HTG*

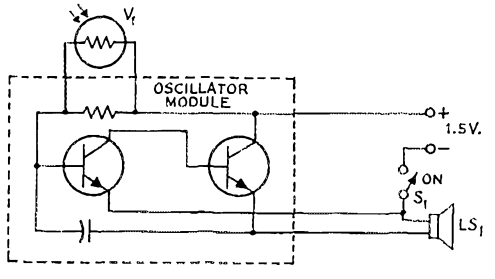
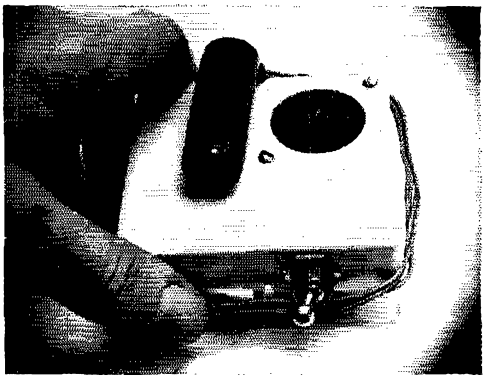


Fig. 5—Diagram of K2HTG's audio light meter. The oscillator module is Lafayette 19 R 1513.
LS1—1½-inch speaker (Lafayette 99 R 6035).
V1—Photocell (Lafayette 19 R 2101).
S1—S.p.s.t. switch.



The completed light-level meter. The phone-jack cover houses the photocell.

PRINTED-CIRCUIT CLEANING TOOL

A SIMPLE tool made from a typewriter eraser can make the job of cleaning printed-circuit terminals easier. A pencil-type typewriter eraser is sharpened to give a tapered point. The eraser in Fig. 6A has a hole made in the end with an ice pick so that it fits down over a pin or connector. The other tool shown in B has a locating pin inserted into the eraser to aid in cleaning around a hole in the circuit board. — *NASA Technology Handbook SP-5010*

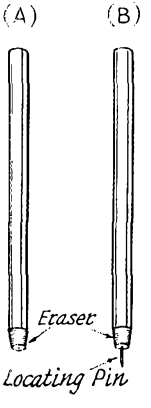


Fig. 6—A tool for cleaning pin connections on a printed circuit board (A), and one for cleaning holes in a board after a component has been removed (B).

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Changes Versus Improvements

WHEN things go wrong, when nothing seems to work right, when everything you do seems to have the wrong effect, when almost nobody agrees that the way you are doing it is the best way to do it, when everybody seems to be working at cross-purposes — what do you do? Make a change?

Maybe. But not necessarily. There is little point to making a change unless there seems to be a good chance that the change will effect an improvement; and changes, by themselves, don't necessarily do this. So why start all over again to achieve something no better than you had to begin with?

Often we amateurs make the mistake of attacking sound principles just because they are not properly put into effect, and of coming up with criticism which, while constructive enough, is conducive only to change, not to improvement.

You want some f'instances? Well, as often as not whether a change is just a change or is also an improvement is a matter of opinion. In the thirties, there were many who considered the five-point system of traffic handling better than the Trunk Lines. In the fifties, there were many who liked the Trunk Lines better than NTS. Every change fosters some opposition, and those who oppose them are usually pretty stubborn in their opinion that the change was for the worst when majority opinion seems to indicate that it was for the better.

Take NTS, for example. For over fifteen years, the system has been under attack because it "just won't work," but during that time it has shown steady improvement, more acceptance and participation, increased efficiency. Proposals for changes in the basic system have been studied, considered and finally set aside (not the same thing as being discarded) because they were subject to the same basic inherent faults as NTS itself — failure on the part of participating amateurs properly to execute the basic principles.

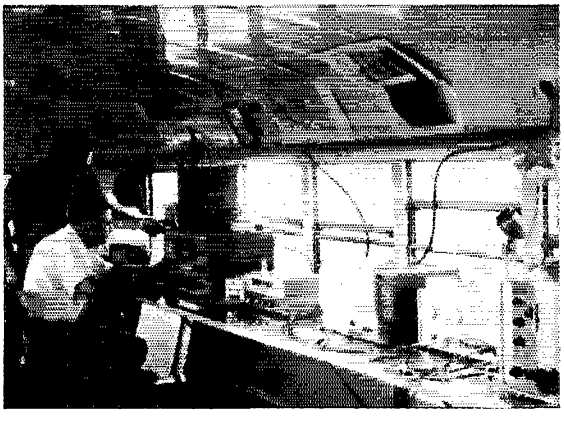
Take the NCEFs. There have been almost as many proposals for changes in these as there have been criticisms made, each proposal altogether different from all others; and regardless of the faults of the present NCEFs, no one has yet convinced us that any change would result in any more increased usage than we now have.

Take the amateur distress call. When we were 99% c.w. and QRR was available, it was fully accepted. But when QRR became an International Q signal meaning something else and we added an extra R, it was no longer acceptable, especially on phone. We cast about for something better, but nothing seemed to meet with enthusiastic fraternity acceptance. The adoption of QRRR for c.w. and "CQ Emergency" for phone was arbitrary, and we shall see whether or not this has acceptance.

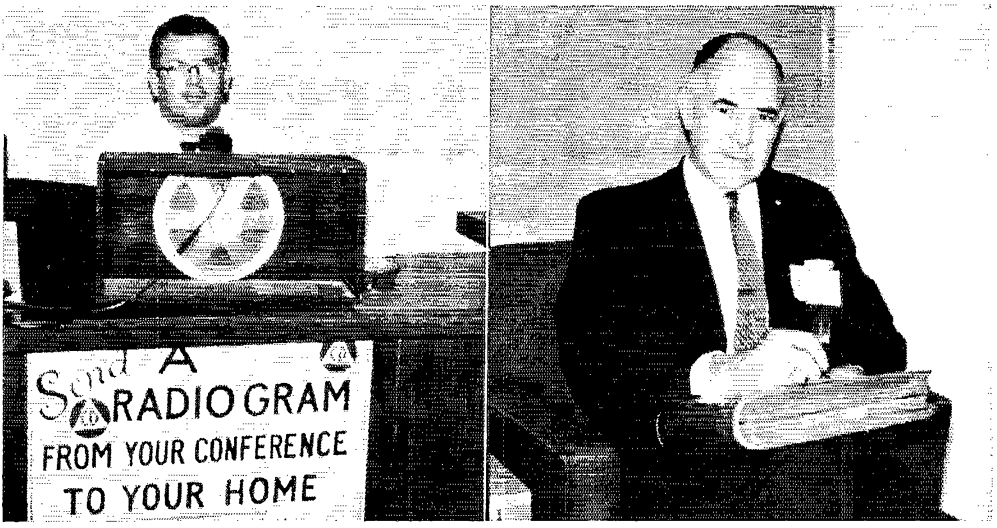
Take the phonetic alphabet, a favorite topic for debate at club meetings and any gathering of operating amateurs. Before WWII, place names were popularly used for phonetics. During the war the joint Army-Navy (JANAP) phonetics became popular (by order), but immediately following the war amateurs expressed a distaste for anything military and the League set up its own phonetics. They were hardly ever used — amateurs used what they were accustomed to, whether they liked them or not. Later, the ICAO alphabet popularized Bill Shakespeare's Romeo and Juliet on the phone bands. The JANAP alphabet is still widely used, but not recommended by anybody. The League has reluctantly accepted Romeo and Juliet (which is more than the Montagues and Capulets did), but hates to drop its own phonetics which were gotten up by popular demand just after the war. You still hear a number of different alphabets being used. Is the ICAO alphabet better, or just a change for the sake of change?

You can drag out almost any old skeleton and find many cases of changes made without, in the

* National Emergency Coordinator.



The Oswego County, N.Y. RACES members purchased a retired school bus and converted it into a communications van. The equipment is operable on low as well as v.h.f. bands and monitors for local police and fire are used. An additional monitor for the utility company freq. is planned. Pictured are K2DUR, R.O., and WA2GRT, 6 meter net manager at the operating position.
(Photo by WA2SOO)



At the annual conference of the United States Civil Defense Council in Las Vegas, Nevada, last October, the Clark County RACES installed an amateur station to handle messages for the delegates, c.d. directors from all over the U.S. That's WA7DJX (left) at the controls. At right is Don Meserve, WØWYK, chairman of the Communications Committee for the Council. Don is also a member of the Amateur Radio Sub-Committee, National Industry Advisory Committee, and is a former member of the ARRL headquarters staff.

eyes of many amateurs, any significant improvement. Some of these may have been too hasty, some brought about by overwhelming popular demand without enough time for mature thought and consideration. It is unwise to act hastily, whether this be caused by enthusiasm, pressure, popular opinion, or fear — or all four of them linked together. It is much better to take time to think things out, discuss them, get all possible viewpoints.

Whenever a proposal for a change comes up, we try to ask ourselves (and you) these questions: (1) What's the matter with the old system? (2) How *little* change can we make and still effect the desired improvement? (3) Are there any ulterior motives involved in the proposal? (4) Any selfish motives which do not apply to all? (5) Is it likely that the changed system will receive any better support than the one to be changed?

This last question is a vital one. If the present system were properly supported, would it not accomplish the desired objective? So many of the things we aim for are basically sound, if only we amateurs would support them. If a change will bring more support, it may be worth making for this reason alone, even if it is *not* any more basically sound. But *will* it? How do you know, how can you tell? All you can do is "have a feeling." So it is best to go slow, carefully ponder advantages and disadvantages. When the chips are down we may not have time to do this: so let's do it now, when we can get the greatest benefit from it. — *W1NJM.*

Diary of the AREC

We have received an additional report on the Colorado floods in June.

Even though a sheriff's posse was turned back by the high flood waters, WØGVT was able to make his way to Deertrail, about 35 miles from Denver, where he was the only means of communication to the outside world. WØACD was the c.d. NCS in Denver when a call from WØGVT alerted the crew that a boy in Deertrail had the symptoms of appendicitis. The local army hospital was called and a doctor was able to prescribe some tests to determine the exact nature of the malady. When it was discovered that the boy did have appendicitis, he was rushed to where a car could take him to a hospital near Kansas. — *WØFSH.*

— • • • —

Tornadoes were sighted on Sept. 14, in Calhoun and surrounding counties in Michigan, and AREC members were alerted by EC K8AEM. The area was buffeted by rain, hail and high winds. The weather bureau advised that the storm had passed and city officials prepared to go home, but reports from amateurs indicated that the main part of the storm was yet to hit the area. The officials decided to stick it out, and sure enough, the main portion of the storm did hit a short while later, taking with it most of the communication facilities, power lines and caused extensive property damage. At this point, the AREC net went into full operation, providing communication for any and all services needing their help. Those amateurs reported to have participated are: *W8s* APG NZ NXY DUH NVH YAN, *K8s* AEM CIS UCY IXU YVE DKT GTZ NEY UCQ DWM JGY TDF RFJ, *WA8s* NTO MKU LRA LRC FJC LTJ HOV CZJ FLV and K9GLL. — *K8AEM, EC Calhoun Co., Mich.*

— • • • —

September is the month for forest and range fires in California, and this September was no exception.

In Marin Co., the Red Cross asked that the communication set up be alerted on Sept. 17 to provide communications for fighters of a range fire that swept into that county from Sonoma Co. The station at Red Cross headquarters, W6SG operated by WA6AUD, was activated during the afternoon and functioned until that evening when the fires were brought under control and only a standby crew was required to watch for any possible outbreaks. Active in Marin Co., were W6CYO, K6OVV, WA6FJY and *WB6s* AID PVV.

When a forest fire burned down the telephone lines between Napa and Vallejo, Calif., on Sept. 16, WA6TRH and WB6KGX established contact on the 2 meter NCEF and then moved to another frequency to continue the communication. The local radio station was contacted and lines of coordination were set up so that all possible communications could be handled through the two stations. Less than an hour after the original net was established, the Vallejo

AREC had WB6OTH set up in the Red Cross building and on the air. WB6NTA operated from Napa and WB6FMN went to the Red Cross there and relayed traffic via his mobile rig. Since most commercial means of communication were disrupted, traffic totals were high for the 22 hour operation. Twenty stations were known to have participated.

—•••—

While WA6MOV was serving as NCS for the WCARS Net on Sept. 27, an emergency call from a commercial ship was heard on the net frequency. Neither WA6MOV nor WA6TBZ could copy the station well enough, so WB6JFF and WB6ENT took over and relayed the information that two vessels, the *Lois B* and *Good Hope*, were off the coast of Cedros Island, some 600 miles from Los Angeles. One of the passengers aboard *the Lois B* was in need of medical aid, but that ship's radio equipment was inoperable and the radio operator had a broken leg sustained during a storm and was unable to repair the transmitter. WB6JFF contacted the coast guard and relayed the information. At his point, however, JFF had to leave for work and W6VX took over, maintaining communication between the *Good Hope* and the coast guard station. The color of the ships and their location were given to coast guard officials so a rescue plane could be flown to the island the patients brought back to the mainland. — *W6VX.*


Award of Merit

DENVER RACES

This certificate of merit was awarded to the members of the Denver, Colo., RACES in recognition of their work during the floods in June. KØOVQ and WØEXT, radio officers, accepted the award on behalf of the members.

—•••—

When W6OOZ was taken ill on Oct. 12, he was rushed to a Burbank, Calif., hospital. Upon learning that he might need a transfusion of a rare type of blood, his wife appealed to WA6HOF for help. WA6HOF contacted W6BXW who broadcast an appeal via one of the Los Angeles two meter repeaters, W6MYK, WB6NCF, WB6LNE and WN6PHB responded with information as to possible locations of this blood type. WA6USL/mobile with W6BXW, drove 90 miles from Burbank and brought the blood to the hospital. W6OOZ improved slightly after the transfusions and thanked them all for their assistance. Unfortunately, his condition worsened and he passed away about a week later. — *W6QIW, Dir. Southwestern Division.*

—•••—

When K2AYQ learned of a fire at the Saratoga Springs, N. Y., hospital, he immediately monitored the local AREC net frequency where he found WA2IJI and WB2FQP standing by. W2OP, the AREC's Red Cross Ass't. EC, was contacted and informed of the fire. Five other stations checked in during the course of the three hour alert, but their assistance wasn't required, and the net secured. — *K2AYQ, EC Glens Falls, N. Y.*

—•••—

Fifty-two SECs reported for September, representing 21,309 AREC members. This is 15 more SECs and 5,000 more AREC members than last year. How about you other 22 SECs? Let's have some reports please? Those Sections reporting were: Ill., N.N.J., Tenn., N.C., Ind., Iowa, Nebr., N.Y.C.-L.I., Los A., Miss., Alta., Mont., Sask., E. Pa., S.C., B.C., Man., W.N.Y., Ga., N. Dak., S.F., E. Bay., S.V., Orange, Hawaii, E. Mass., W. Pa., Ariz., Kans., Wyo., Wis, Mich., Ala., E. Fla., Wash., Nev., Ohio, Utah, Minn., Mo., Ont., N. Mex., Ark., W. Va., S. Tex., Va., S. Dak., Okla., Ore., E.N.Y., S.C.V., Mar.

National Traffic System

We hear quite a bit, these days, about third party traffic agreements between the U. S. (or Canada) and other countries. The list is growing rapidly, and along with reciprocal operating privileges is likely to continue doing so. As of this writing, we have agreements for exchanging third party traffic with twenty different countries; Canada has agreements with nine (see Oct. '65 *QST*, page 98).

Now and again in NTS nets we get asked "What is the route to Peru?" or some other country outside the League's field organization. When we are forced to reply that we don't know of any, frequently the reaction is indignation that NTS has not established some provisions for handling traffic to and from this country. As often as not we get stuck with the message and have to try to peddle it on one of the NCEFs, or eventually service the originating station indicating our inability to handle it.

From time to time we hear of individual stations who are capable of handling such traffic through special schedules, and when we do we try to route any such traffic their way; but this is not "system." It may fail any time the operator of one of the stations involved has an equipment breakdown, a power failure (yes, it *can* happen!), gets sick or has to leave town on business. There may be times when you know who might *take* such a message with a good chance of getting it through, but this isn't exactly our conception of a "route."

The obvious way to handle such traffic would be to get on one of the NCEFs and call a directional CQ. Stations in those countries interested in handling traffic could establish a practice of listening occasionally on these frequencies. Directional or specific-place CQs can be useful in other parts of the bands, too, for that matter. Or do some listening on DX bands at the times DX is coming in, maybe you'll hear a station in the desired country who is willing to take your traffic.

Suppose we did decide to go ahead and set up a system for handling such traffic, how would we go about it? Well, first of all we would have to have participation by amateurs in the countries concerned. Without this, we are stymied from the start. Once we have it, and once the message gets relayed to a station in that country, its further disposition is completely out of our hands. Their internal system for get-


In late June, AREC members from Campbell, Mo., held one of their semi-annual get togethers at the home of their EC, WØYHT. Pictured are: (front, l. to r.) WØHOQ and family, KØWJB and family and WAØBIL and family. (Back, l. to r.) WAØGBV, WAØGVX and WØYHT and XYL.

ting the message delivered is entirely up to them. We're available for assistance and advice, of course, but we can't organize their NTS for them; we have a big enough problem with our own.

Then there are several other basic precepts that have to be set out, such as: (1) Are we to be concerned only with traffic between the U.S. and the other countries, or with interchange of traffic among all the countries? (2) If the latter, someone is going to have to untangle the legal aspects. For example, the U.S. may handle third party traffic with Peru and Brazil, but are amateurs in these two countries permitted to handle traffic with each other? If the former, we have less to worry about. (3) Depending also on the answer to this first question is the matter of whether or not our system for international traffic handling is to be a net or a system of special schedules tied in with NTS. If the former, one NTS representative to the net each time it meets should do the trick — or perhaps one from each NTS area. If the latter, we'll need an International Traffic Corps similar to our TCC to meet the requirements. (4) Should such a net, if one is established, include emergency planning in its regular traffic-handling? Obviously, several such nets are already in operation and additional consideration to this problem is being given in the Caribbean area by XE1CCP, XE1AX, 6Y5EM and Western Fla. SEC W4MLE. (5) How about language difficulties? In the U.S. third-party list alone there are five principal languages. Do we handle traffic in all five of them? (6) If we establish a net, what band should we use? Probably 20 meters daytime would be best, but at certain parts of the sunspot cycle we may have to move to other bands. (7) Phone or c.w.? We could probably get better coverage on phone, but can you imagine a non-Spanish-speaking amateur trying to handle a message in Spanish on *phone*? If we're going to handle traffic for the general public, we'll have to do it in their language.

Setting up provisions for handling of international third party traffic, therefore, is not so easy as it sounds. Offhand, it might be better to set up a couple of our NCEFs — say 14,050 and 14,225 kc. — as "International Traffic Exchange" frequencies and try to get all concerned to use them for this purpose, until or unless the traffic load reaches the point where further consideration of a more elaborate system for handling such traffic would become desirable. *WINJM.*

October reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
1RN	62	637	.374	10.3	92.2
2RN	58	529	.932	9.1	95.1
3RN	58	736	.393	12.7	98.3
4RN	62	1045	.421	16.9	96.3
RN5	74	1472	.424	19.8	92.5
RN6	60	1110	.450	22.0	99.4
RN7	29	405	.365	14.0	72.3
8RN	72	650	.230	9.0	83.3
9RN	29	464	.638	16.0	94.8
ECN	31	236	.267	7.9	75.3
TWN	49	440	.204	10.7	62.9
EAN	45	2682	1.145	59.6	98.9
CAN	29	1299	1.013	44.7	100
PAN	31	1241	.641	40.0	98.9
Sections[2]	2217	15384		6.9	
TCC Eastern	178[3]	973			
TCC Central	125[3]	646			
TCC Pacific	1131[3]				
Totals	2906	30,430	EAN	9.5	CAN
Records	2023	25,368	1.072	12.3	100

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

[2] Section and Local nets reporting (75): MDD MDDS (Md.-D.C.-Del.); MTN (Man.); WVA Fone; NJN NJEPTN (N.J.); LREN KTN (Ky.); Iowa 75; PTN (Maine); LAN (La.); FMTN Gator (Fla.); AENH AENM AENP AENR AENT AENB (Ala.); NCNL NCSSB NCCW (N.C.); GBN (Ont.); OQN (Ont.-Que.); EMINN (E. Mass.); MISS (Miss.); CN CPN (Conn.); ILN (Ill.); BUN (Utah); TSSBN TPN TN TN ETPN (Tenn.); MON MEPN SMN MTTN MOSSB (Mo.); OZK (Ark.); WMN (W. Mass.); NL1 NYCLIPN (N.Y. C.-L.I.); BENN WSBN (Wis.); Colo. High Noon; WPA EPA PTTN EPEPTN (Pa.); SCSSB SCCW (S.C.); SSZ OLZ (Okla.); IMO (Ind.-Mich.-Ohio); NCN SCN (Calif.); BN OSSN (Ohio); VSNL VSBN VSN VN (Va.); GMN (Vt.); RIN (R.I.); NTN (N. Tex.); VTNH (Vt.-N.H.); QMN Wolverine (Mich.); MSPNE MSN MJN (Minn.).

[3] TCC functions not counted as net sessions.

October was the best month NTS has had in a long time. We broke the Sessions, Traffic and Rate records and set a new record for the number of Section/Local nets reporting. In addition, only four nets went below the 90% mark in representation. Pretty good, eh? Let's not, however, sit on our laurels. How about *all* Section/Local net managers reporting to us as well as to your SCM each month.

At this time, NTS's part in the SET appears to be highly successful. We handled more traffic than last year, and in less time, too. We hope to have the details in an early issue of *QST*.

W1BVR kudos Conn., R.I. and W. Mass. for perfect representation this month. WA2GQZ reports that condx are starting to give 2RN headaches with the late session. K3MVO comments that 3RN is just about holding its own with the poor condx. A 4RN certificate was issued to W4LUV. For the first time since he took over as RN5 manager, K5IBZ has a waiting list for net assignments. RN7 had to change their meeting time to 0230Z because of condx. W9QLW has issued 9RN certificates to WA9MIO, WA9QCS and WA4TPB. Wyoming has finally shown up on TWN comments K7NHL. Now if they would only be more regular. CAN had a good month despite the long skip and everyone is taking it in stride sez W9DYG.

Transcontinental Corps: W3EML comments that October was a pretty fair month. Excluding the SET, traffic was down a bit, but performance was definitely up. W4ZJY is back in the saddle and has issued a TCC certificate to K0GSY. Dave sez band condx have been presenting some problems, but this is nothing to the TCC crew. W7DZX is looking for anyone interested in handling the J to D skeds during the week.

October report:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	178	90.5	2653	937
Central	125	75.6	1671	646
Pacific	162	68.5	2262	1131
Summary	465	78.3	6586	2750

(*Continued on page 150*)

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

FULL TIME

3550	7100	50,550
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 transmissions for *any* purpose (except calling for emergency help) the first five minutes of each hour.

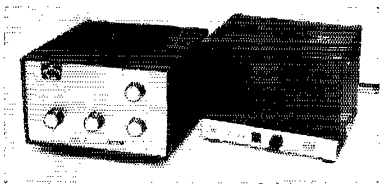
Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become *full time* frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require 8s 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.

• Recent Equipment —

WRL Galaxy 2000+

Linear Amplifier



WHILE nostalgic recollections of 6-foot-high relay racks and massive power supplies serve to illustrate the "old," Galaxy Electronics aptly demonstrates the "new" with the miniaturized 2-kw. p.e.p.-input linear amplifier. Designed for neat appearance and table-top operation, the unit can be operated in the 80-, 40-, 20-, 15-, and 10-meter bands. Although the amplifier is intended for use with the Galaxy III[1] and Galaxy V transceivers, it can be used in combination with any s.s.b.-c.w. exciter that is capable of delivering approximately 100 watts of output. The amplifier is rated at 2 kw. input (p.e.p.) for s.s.b. operation and 1 kw. input on c.w. or RTTY.

The general compactness of the r.f. package is made possible by the use of ten TV horizontal sweep tubes (6HF5s) rather than the large power-type transmitting tubes that are used in some other equipment. The power supply is contained in its own cabinet and is smaller than the r.f. assembly. The interconnecting cable between the amplifier and power supply is sufficiently long to enable the operator to tuck the power unit away in a spot that is not immediately associated with the operating position.

[1] "Recent Equipment," *QST*, October, 1964.

About the Circuit

Because the 6HF5 tubes are high-perveance units, high values of d.c. voltage are not required in order to develop the legal power-input figure. During s.s.b. operation, the 6HF5s are supplied with 800 volts d.c. On c.w. or RTTY, the plate voltage is reduced to 600 volts by repositioning a jumper plug which is located on the outside of the power-supply case.

The amplifier is operated Class AB_1 at all times with a resting plate current (no signal) of 300 ma. During s.s.b. peaks the plate current indicated by the meter may exceed 1 ampere. Fixed bias is supplied to the amplifier grid circuit through the automatic linearity system network (a.l.s.) illustrated in Fig. 1. This unique system is built into the bias circuit to prevent any deterioration in the intermodulation distortion level of the amplifier. Here is how it works: The input and output envelopes of the amplifier are sampled by diodes CR_1 and CR_2, which each

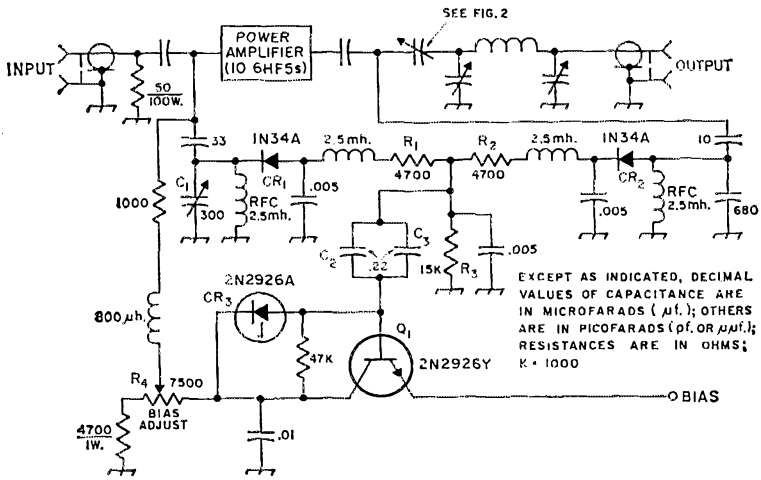


Fig. 1—A schematic diagram of the Galaxy amplifier's a.l.s. system. The input and output waveforms are sampled by CR_1, and CR_2, then rectified. If the waveforms are not identical, an error signal occurs across R_3, changing the operating point of Q_1, which in turn varies the bias supplied to the amplifier grid circuit. The change in bias shifts the amplifier's class of operation from AB_1 into the Class A region when nonlinearity occurs. The charge in operating condition tends to hold the intermodulation distortion level at a low value.

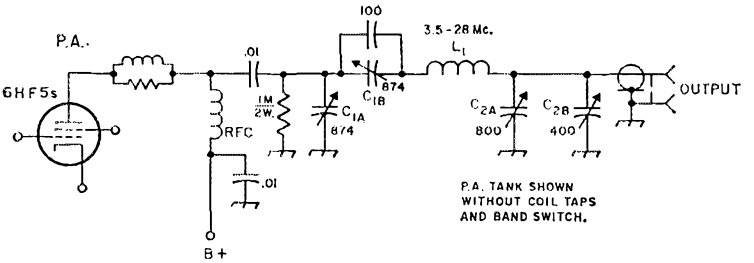
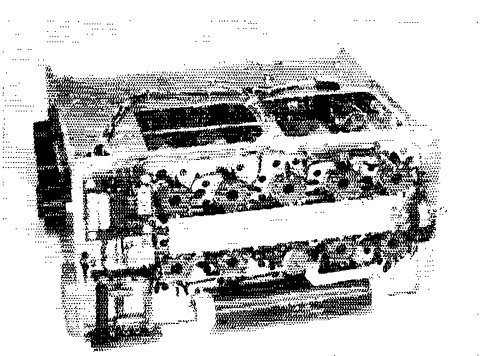


Fig. 2—The p.a. tank, showing modified pi-network arrangement for matching the low-value plate load impedance of the amplifier tubes to the nominal 50-ohm antenna impedance. Series tuning is used at C_{1B} to permit practical values of inductance to be used at L_1. If a conventional pi-network configuration were used, L_1 would consist of only two or three turns at 20, 15, and 10 meters. C_{1A} and C_{1B} are ganged, as is also the case with C_{2A} and C_{2B}.

receive the same amount of signal, but are connected for opposite polarities. If the amplifier's input and output signals are such that the diode sampling networks "see" equal envelope voltages, no error signal will exist across R_3 in the interconnecting resistor network R_1, R_2, and R_3. This condition establishes a steady operating point for transistor Q_1, permitting the regular Class AB_1 bias to be applied, through Q_1, to the grids of the amplifier tubes. However, if the output signal from the amplifier is not an exact replica of the input signal, an error signal will exist across the resistor network and will shift the operating point of Q_1, changing the value of bias that reaches the grids of the amplifier tubes. Under ordinary operating conditions this change in bias is in the direction which moves the operating point of the tubes into the Class A region, thereby reducing the distortion in the amplifier. If at any instant the output signal is not the same as the input signal, the bias is lowered until the two signals are the same. The Zener diode, CR_3, prevents Q_1 from sending the tubes too far into the Class A region. The control system, not too unlike the Collins envelope distortion cancelling circuit, has shown its effectiveness in actual practice by permitting the amplifier to produce a clean signal under all operating conditions tried by this writer.

Because of the low plate impedance of the parallel-connected tubes, and the resulting higher-than-average C/I. ratio required in the tank circuit, a system of series tuning is used in the output tank of the amplifier. A look at Fig. 2 will reveal a variation in pi-network layout that permits using a physically closer-to-normal value of tank-circuit inductance than would be possible with a conventional pi network. The reactance (inductive) of C_{1B} and L_1 in series is less than the reactance of L_1 alone, so the reactance needed for proper matching can be obtained by adjustment of C_{1B} even though L_1 by itself is fairly large. The method shown in Fig. 2 is particularly necessary for operation on 20, 15, and 10 meters if a coil of practicable dimensions is to be usable.



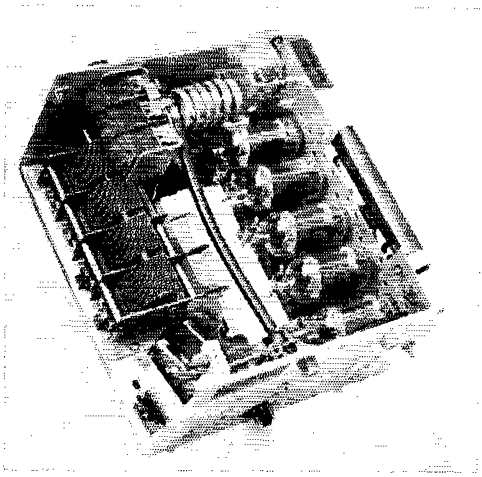
Bottom-chassis view of the Galaxy amplifier. The circuit board at the upper left, containing the trimmer capacitor, is the a.l.s. network. The wide strip of silver-plated metal mounted between the two rows of tube sockets is a low-inductance grid bus. The large 50-ohm resistor at the bottom of the picture is in parallel with the input terminals of the amplifier and serves as a load for the exciter.

Some Other Features

The power supply, included in the package price of the amplifier, employs solid-state rectifiers in the high- and low-voltage and bias sections. The supply can be activated either by the function switch on the front panel of the amplifier or by a remote-control line from the exciter. Through selection of jumper terminals in the power supply, the amplifier can be used with 230- or 115-volt primary input. Operating voltage for the cooling fan, housed in the amplifier assembly, is supplied from the power unit through the interconnecting cable to the amplifier.

Protection against TVI is offered by a built-in low-pass filter which is prealigned at the factory to attenuate those frequencies that lie above 40 Mc. Maximum attenuation of harmonic energy is designed to occur at Channel 3 and Channel 6. If, however, TVI is more significant at Channel 2, or in the Channel 7 to 13 region, the filter can be retuned from outside the cabinet.

A meter located on the panel of the amplifier permits monitoring plate voltage, plate current



Top-chassis view of the Model 2000+ amplifier. The heavy-duty silver-plated tank inductor is visible near the front panel. The orderly layout of this equipment contributes to its compactness.

in the TUNE mode, and plate current while operating. Also on the front panel, LOAD and TUNE controls are accessible for adjusting the plate tank circuit.

No tuning adjustments are required for the input of the amplifier since a 50-ohm resistor is used as a broad-band load for the exciter in that section of the unit.

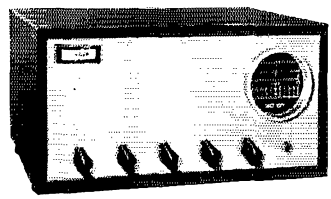
The amplifier contains a "switch-through" feature that permits it to be used with most transceivers. This is made possible by a 6-volt a.c. relay which is contained inside the amplifier chassis, and which switches the antenna around the amplifier for receiving. When transmitting, the relay is activated by a control line from the transceiver (most transceivers have spare relay contacts for this) and connects the antenna to the output of the linear amplifier's pi network, at the same time turning on the amplifier's power supply. Through this medium, VOX or push-to-talk operation is possible.

The cabinet motif matches that of the Galaxy III and Galaxy V transceivers. The front panel is finished in brushed satin chrome and the outer cabinet is coated with a contrasting dark wrinkle paint. — *WICER*

Galaxy Model 2000 + Linear Amplifier

Height: 6 inches.
Width: 10¼ inches.
Depth: 11¼ inches.
Weight: 55 pounds.
Power Requirements: 115/230 v.a.c., 60 cycles.
Price Class: $500.
Manufacturer: World Radio Laboratories, Inc., 3415 West Broadway, Council Bluffs, Iowa 51501

Singer Metrics Panadaptor



THE Metrics Division of the Singer Company is now marketing an improved version of their Model PR-1 Panadaptor. In addition to improving the breed, Singer has lowered the price — something that doesn't happen too often these days. The Panadaptor samples the output of a receiver's i.f., usually at the mixer plate, and displays any signals up to 100 kc. either side of the frequency the receiver is tuned to. The display is frequency vs. signal strength on a 3-inch scope tube. The PR-1 has a nominal input frequency of 450–470 kc. or, with realignment, 500 kc., but is useful with other i.f.s if the adaptor described by K1MFQ is used.[1]

The PR-1 has an input sensitivity of about 200 microvolts, so the pick-up at the receiver mixer may be just a loop around the mixer tube. A compensation control is used to adjust the bandpass characteristics of the Panadaptor to the selectivity curve of the receiver's front end. Either logarithmic or linear i.f.-amplifier response can be selected. By using the logarithmic presentation relatively weak signals can be viewed in the presence of very strong ones which, with linear response, would overload the Panadaptor. The i.f. stage, V_3, is made to function as either a logarithmic or linear amplifier by means of the circuit shown in Fig. 1.

The Panadaptor has an audio output from the detector for headphones so that the operator can monitor any signals he sees. This feature is useful initially for setting up the Panadaptor with the receiver by monitoring a broadcast station, and for band monitoring on v.h.f. The bandwidth of

[1] See the Hints and Kinks section, *QST* for December 1965.

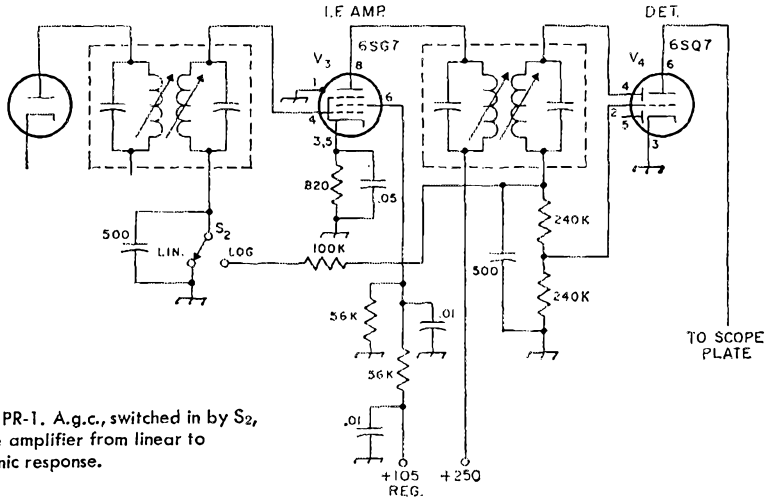
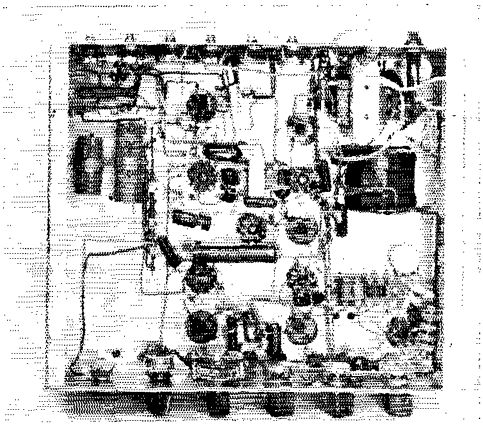


Fig. 1—I.f. amplifier of the PR-1. A.g.c., switched in by S_2, is used to change the amplifier from linear to logarithmic response.



Bottom view of the Panadaptor. The controls on the rear of the chassis are: brilliance, focus, vertical centering, horizontal positioning, synchronization, and sweep pad. The power supply is located in the upper right corner, and the i.f. section is at the center.

reception is variable from 200 kc. down to about 5 kc.

The PR-1 is mainly useful as an operating aid for spotting signals or clear spaces in the band, but it will also serve as an analytical instrument for examining modulation percentage, splatter, key clicks, frequency deviation, and a host of other things. All of these tests are covered in the instruction manual, with drawings of what to expect and pointers on how to adjust the Panadaptor. The resolution is 4–4.4 kc. depending on the sweep width used.

The unit is housed in a black wrinkle cabinet with a light gray front panel. The controls located on the panel include: center frequency adjust, sweep width, input compensation, and gain, plus the LOG-LIN switch and the headphone jack. — *W1KLK*

SINGER METRICS PR-1 PANADAPTOR

Height: 7 inches.
Width: 14 inches.
Depth: 12 inches.
Weight: 20 lbs.
Power Requirements: 115 volts a.c., 50–60 c.p.s., 60 watts.
Price Class: $150.
Manufacturer: Metrics Division, The Singer Company, 915 Pembroke Street, Bridgeport, Connecticut.

Strays

The Lawrence (Kansas) High School Chess Club is interested in arranging on-the-air chess meets with other high school chess clubs. If interested, write John Moore, WAØDVE, 715 Lawrence Ave., Lawrence, Kansas.

—•••—

You young squirts should be ashamed of yourselves complaining about being too old to keep up with amateur radio. K6CRA, recently an "Operator of the Month," celebrated his 92nd birthday last May. He says he can still keep up with the fastest of the operators with his electronic keyer and mill and, as he puts it, "my old glass arm is as good as it was 75 years ago when I worked for the United Press in New York City."

—•••—

J. W. Wittenberg of Princeton, New Jersey, has hit upon a novel way of trying for better QSL response from overseas hams. When sending cards and letters to a foreign QTH, it is suggested that the U. S. ham use old commemorative 3¢ stamps. Mr. Wittenberg, whose street address is 40 Deerpath, can supply these old commemoratives. He says that because many overseas hams are avid philatelists the chances of quick responses are greatly enhanced.

Correspondence From Members-

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

KNOW-HOW SHARED

The recent articles on RTTY by K8DKC are the finest I have seen in 20 years of reading *QST*.

Let's hope that now you will be able to persuade other leading amateurs to follow Irv's example and share their hard-won know-how with the rest of us. — *Mark Mandelker, W9ECV/2, Rochester, New York*

Kudos to Ted Crosby for his work in designing the HBR receivers. It is very rare in this day and age that someone gives you something for nothing, or at least almost nothing.

Ted has made some claims in his articles as to the performance of these receivers. They are gross understatements; the HBR receivers must be heard to be believed. Their performance just cannot be touched except by the higher priced commercial units. I hope more people will realize that the HBR-13C is not just fill for *QST* pages but a sincere offering for all those who are intelligent enough to grasp it. Thanks, Ted, for a wonderful receiver *anyone* can build and be proud of. — *R. L. Reincke, K2OSY/6, Downey, California*

NOVICE TO NOVICE ADVICE

I would like to give some advice to prospective Novices. Last year I received my Novice license, although I did not have a receiver or a transmitter. My code speed was the bare minimum of 5 words per minute. I memorized the *License Manual*; in actuality, I had no knowledge of theory. In the six months after I got my ticket I made 2 contacts, with a borrowed transmitter, a ten-foot antenna hanging out of my window, one crystal and a code speed of 4 words per minute.

I am now ex-WN2PTL without even a chance of bettering myself for another couple of months. I should have had my station set up, my code speed up to at least 10 words per minute, and a working knowledge of theory — and so should you. — *Mark Berman, N. Massapequa, L. I., N. Y.*

EMERGENCY COMMUNICATIONS

I would like to express my appreciation for "It Seems to Us — Emergency Communications" in the October issue of *QST*.

This should be of special interest to all radio amateurs because if the occasion should ever arise, we should know what to do. There are special programs for disaster and emergency situations; every radio amateur should be in some program of this kind. — *George T. Reid, W5GWQ, Killeen, Texas*

MEETINGS AND DRY DRILLS

With regard to the article by S. E. McCallum, K4URX (p. 27, *QST* for October), I would say that it read as if the events had actually happened, like a novel. George Wilson, W4OYI, should be commended on his excellent emergency drill and fine imagination. It certainly demonstrated how a routine drill can be both exciting and valuable in pointing out weaknesses in an emergency net. Articles such as these will keep the membership aware of how important an emergency net can be and perhaps show others not presently participating in AREC that it is not all meetings and dry drills. — *Lindsay Cleveland, W4IZI, Chapel Hill, N. C.*

DX CONTEST COMMENTS

I made the ARRL DX Competition this year and I am glad I did; I am a convinced partisan of the contest. I could make only 376 contacts and could work only 40 hours, but I am sure that I'll do better in 1966, God willing. I am proud to appear in *QST* and have it known by others that I was in the contest, but that is not all. There were states I hadn't contacted that I have now, and there were hams who did not have YN cards and who will have them in due time. I think the contest should stay, and stay as it is: two weekends. You have no idea how hard it is at times to contact VEs, Alaska and Hawaii at some time of the day. Again, I think the 2 weekends should stay. — *Dr. Tomas Pereira, YN1TP, Managua, Nicaragua.*

GET ON FREQUENCY

During the last several years of operating in the various c.w. bands, I have noted that many amateurs do not seem to realize the importance of working close in frequency to the other station.

This has resulted in a lot of poor contacts for me and the other stations involved. I have often asked the other ham to zero beat my frequency but this does not always help; it is surprising how many do not seem to know how to accomplish this.

What they should know is that with a selective receiver, half a kc. or so can mean the difference between a fairly clear spot on the band and a frequency already occupied, and the station calling CQ is using the particular frequency because it sounds favorable to him.

Of course, a good portion of the offenders are newcomers, but not all can be excused for this reason.

If the fellows would go to the trouble of getting on frequency before calling, they would have a much higher percentage of 100% QSOs and would cause much less interference to other stations in the process. — *Bob Immell, KØMLM, Swink, Colorado*

FIRM SUPPORT

I renew my membership in the League with a firm belief that it is doing everything in its power to better our amateur fraternity. — *Bill Cali, WB2PUX, Mount Vernon, New York*

NEVER SAY DIE

Today I received the coveted WAS certificate and I hasten to thank you for it. It will occupy a prominent spot on the shack wall.

I especially appreciate receiving it unfolded and also want to thank you for the prompt return of my

QSLs. I'm only Asia away from WAC, so I hope to be able to write to you again very soon. — *Robert H. Lauzon, WB2NSD, Pittsford, New York*
P.S. I'm very happy there's a "B" in my call. Hi!

VE4, WHERE ARE YOU?

Several times a month U. S. amateurs ask me (I operate c.w.) what province I am in, after they know what my call is. Come on, fellows, let's look at our maps when we QSO. Everyone should know that VE4 means I am in Manitoba. The payoff came a few weeks ago when a U. S. ham said, "FB Al on city and province, but what state?" Ham radio increases a knowledge of geography for most of us, fortunately, but I pity the few who do not even know where their signals are going! — *Al H. Mierau, VE4OT, Flin Flon, Manitoba, Canada*

GIVE HONEST REPORTS

On October 29, I heard a CR6 calling CQ on fifteen meters and, having worked him before, I wanted to thank him for his QSL and wish him well. In the course of our contact I gave him a signal report of 479. This was not exactly true as there was a detectable flaw to his signal, but I did not consider it pronounced enough to mention.

Subsequently, on November 3, I again heard the same CR6 calling CQ, but he was hardly recognizable. This time his signal was occupying about six kc., was squashing and plunking and making all sorts of other unnomenclatured sounds.

Perhaps if I had given him an honest evaluation of his signal the first time he could have averted this trouble. I have no idea how stringent his licensing authority is, but I feel that he might be kept out of trouble and would surely enjoy his operating time more if someone would give him an honest report.

The last I heard, a friendly W8 was giving him a resounding 599 . . . — *Ray Traver, W.A2LJM, Poughkeepsie, New York*

HIGH-SPEED CODE

Congratulations to KH6IJ for a very interesting article ("High-Speed Code") in the November issue of *QST*. Those of us who have worked him in contests realize that he knows what he is talking about. — *Robert Linker, W9FNX, Villa Park Illinois*

OLD FRIENDS

Sure glad to see the list of old friends in the story about the ARRL Directors ["Men Who Made League History," November, 1965, *QST*, page 37]. It brings back many happy memories.

My own chief claim to fame (?) is getting the Great Lakes Division established during my term.

One error in the Central Division listing — my correct call is W8AVH with a "victor" not an "uncle." — *John Kiener, W8AVH, Cleveland Heights, Ohio*

[*Sorry, John — one of us couldn't read his own writing! While we're on the subject, W. H. Smith, a director at large from February 28, 1917 until December 5, 1919, had the call 9ZF. Also, we would enjoy hearing from those former directors who are still around, and would like a list of their calls held since serving on the Board so our records can be brought up to date. — Editor.*]

Seasons Greetings From the Hams of the ARRL/QST Staff

Bob Rinaldi	K1AFC
Jean Peacor	K1JV
Charles Utz	K1QNF
Gary Awsiukiewicz	WA1DEM
Roland B. Bourne	W1ANA
F. E. Handy	W1BD1
Pete Chamadian	W1BGD
Doug DeMaw	W1CER
Phil Gildersleeve	W1CJD
Jean DeMaw	W1CKK
Laird Campbell	W1CUT
George Grammer	W1DF
Byron Goodman	W1DX
Gary L. Foskett	W1ECH
Sam Harris	W1FZJ
E. P. Tilton	W1HDQ
Helen Harris	W1HOY
Lewis G. McCoy	W1ICP
R. L. Baldwin	W1IKE
J. A. Moskey	W1JMY
Doug Blakeslee	W1KLK
John Huntoon	W1LVQ
George Hart	W1NJM
A. M. Wilson	W1NPG
Murray Powell	W1QIS
Don Mix	W1TS
Perry F. Williams	W1UED
L. A. "Pete" Morrow	W1VG
R. L. White	W1WPO
C. R. Bender	W1WPR
Walter Lange	W1YDS
Ellen White	W1YYM
Miriam Y. Knapp	W1ZIM
Lillian M. Salter	W1ZJE
Stan Israel	WA2BAH
John Troster	W6ISQ
Rod Newkirk	W9BRD
Maxim Memorial Station	W1AW
ARRL Headquarters Operators Club	W1INF

Strays

ANNUAL QCWA QSO PARTY

February 18–20, 1966

The annual QCWA QSO party is being sponsored by the Oklahoma Chapter of QCWA and starts at 2200 GMT Fri. Feb. 18 and ends at 2200 GMT Sun. Feb. 20. Only members are eligible for the QCWA Plaque and Certificates presented by the National Headquarters. Only contacts with other members will count towards these awards. Certificates of Achievement will be presented to winners in the United States and foreign countries. In addition to the above, the Oklahoma Chapter will present an award in keeping with the occasion. There is no point scoring (or multipliers) involved, this is primarily a party to renew old acquaintances and see how many members you can contact.

Logs must show date and time in GMT, contact number sent and received, station worked, RS(T), frequency, QTH of station worked, first name and QCWA number. Suggested frequencies (plus or minus 5 kc) are: c.w. 3540 3566 3790 7005 7030 7100 14,100 21,110 28,110; a.m. 3810 3950 7230 14,240 21,340 28,900; s.s.b. (lower sideband) 3805 3995 7205 7295; s.s.b. (upper sideband) 14,315 21,410 21,440 28,690; RTTY 7105 21,140.

Your logs should be in the mail before March 15, 1966 and sent to the QSO Party Chairman: Mr. Orin Gambill, W5WI, 3710 East 36th Street, Tulsa, Oklahoma 74135.

THE ANTENNA RANCHERO

BY JOHN G. TROSTER,* W6ISQ

Just look at them aerials, Marge. Ain't they a sight?"

"A 'sight' is right. Our house looks like a square rigger rounding the Horn . . . with all sails set."

"I tell ya Marge, them new rotaries is gonna fracture Charlie's crystal this sweepstakes. Yeessss ma'am! He only edged me out last year by a measly 42,000 points as it was . . . but then I worked *only* 23 hours . . . and I'll bet you a fur-lined tube socket he worked the whole 24 . . . just like him to pull a sneaky like that. This year though . . . uummmpppphhhh . . . Mister Charles's gonna get it."

"You say that every year. Well, come on. We've got to meet the realtor in 10 minutes."

"Guess them beautiful aerials was worth all the . . . ahhhh . . . realtor? You mean real-estate-man kind of realtor?"

"I told you all about that new house *again* yesterday. Now hurry."

"What's this new house business, Marge? You never said nothin' about a house. And if you think I'm gonna move outa here only two weeks before sweepstakes you're . . ."

"I've asked you to look at this house at least 10 times in the past three months. But you wouldn't listen. Sooo, I made an appointment to see it."

"Marge, I tell you I ain't gonna move."

"Get in the car."

"How could you do this to me. Ya seen me out there all summer tweekin' them aerials for sweepstakes. And just when I get 'em finished and ready to clobber Charlie, you wanna move! Hey, where we goin'? Kinda pretty up here . . . can see the bay . . . hmmmmm."

"It's a nice house and there isn't much yard work. You could spend *all* your time on that radio."

"Say . . . yeah . . . not a bad view up here. Careful goin' around them curves, Marge. Sayyyy . . . ya can see the bridges now . . . yeah . . . maybe right after sweepstakes."

"And this house has a big room in the attic."

"Ooohhh nmmyyy . . . we're really getting up there. Hey, where is this place anyway?"

"That one up there with the oak trees."

"That place clear up . . . way on top!! Marge, you mean the highest place up there?"

"That's the one."

"Well ya never told me this house was on the highest hill in the county."

"You wouldn't listen. You were too busy fiddling with those aerials and mumbling about Charlie."

"Magosh! Will ya look at that view. Yeeeiii . . . I can work the east coast line-of-sight from here. Now, lessee . . . I can swing the 80 meter dipole from the chimney to that tree for east-west . . . just right for sweepstakes. And then between them two trees for . . ."

"How do you like the color of the house?"

"Maybe for temporary . . . 'till I get the big tower up, that is, I can run a couple of 40 meter jobs from the house over to . . ."

"You see, there's hardly any yard."

"Maybe I should make it a ground plane on top of the roof for 40. Chhheeee . . . I'd hafta put a red light airplane beacon on top."

"Here comes the real estate man now. 'Good afternoon, Mr. Newhouse. I brought my husband to look at the house and . . .'"

"We'll buy it, Newhouse."

"*Buy* it? Jack, you haven't gotten out of the car yet."

"Yes, Marge, I said '*buy* it' . . . *now*. Ohhhh, Charlie me boy, you're gonna get it good this year."

"Well, ahhhheeumm . . . ahhh, Sir . . ."

(*Continued on page 108*)

* 45 Laurel Ave., Atherton, Calif.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Time to blurt out something maudlin about what a great DX year 1965 was, and why '66 will be even better. This seems hardly necessary, though, assuming most of our few readers to be equipped with short-wave receivers. Among several DX headlines vying for current attention, perhaps that of most significance to the greatest number of amateurs is this shortie: TEN IS BACK!

Erratic north-south long skip kept a few South and Central Americans with us on 10 right through the sunspot minimum. This transequatorial stuff is peanuts compared to the east-west transoceanic skip we've been missing. Hardly sufficient to keep most of the gang from temporarily passing up 28 Mc. for more productive DX doings on lower frequencies.

"On October 10th I worked ZS1AB on 28,618 kc. at 1512 GMT," comments W6KAD. "Signals were about R4-S2 both ways on an otherwise dead band." More Africans started working into the U.S.A. around the same time on 10, and Europe-Australia QSOs were reported. KG6APJ comes through the "How's" mail slot with the first new-era report of truly DXtensive 28-Mc. action:

> Ten is open! On October 23rd I contacted K6ERV at 2344 GMT, and the following day I worked WA6IPY at 2318. In addition to those Sixes, the first recorded Guam-U.S.A. openings in about seven years (and first Guam-Stateside s.s.b. contacts ever) I've worked K8ZST/KH6, KW6EJ, VK4LT, 9M4LP and have had about 250 JA contacts. Most of this was near 28.6 Mc. with a C'E-200V and 4-400As, an SX-115 and a two-element quad 65 feet high.

Besides the thousands of operators who will be moving back to 10 for increasingly solid DX and transcontinental QSOs, the 28-Mc. renaissance is obviously a looming boon to those who stay behind. That 1700-kc. range, a spread roughly equal to all our lower ham bands combined, will help considerably to ease the frantic lower-frequency squeeze.

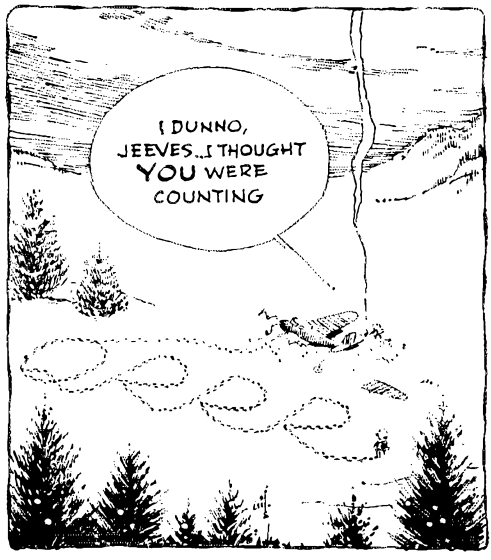
As we cautioned in this space last June, don't immediately rush onto 10 with the expectation of filling your logs with vast varieties of easy DX. Not yet. But who knows? Europe may break through solidly almost any day now, and when that North Atlantic path cracks open on 28 Mc., *happy* new year!

What:

That northeastern W/K/VE power fadeout last fall made us wonder for a while if Gus, Don, Chuck, Harvey, Angus, Vic, Lloyd, Iris and all the astronauts had simultaneously shown up from brand new countries at 2220 GMT, November 9. A couple thousand synchronized on-and-off-again kilowatts — well, you know why an army breaks step crossing a bridge, and how a rifle shot can trigger an avalanche. Guess we're in the clear, though, for there were few cries of anguish over rare stuff missed at that time. . . . This is a multiband month for the "How's" Bandwagon, so we'll give 14 Mc. a rest and hit the open DX road for such scenic spots as

40 phone, which is giving a DXcellent account of itself to W3ZNB, K1BPJ, WAs 5IIS 6TZN, WB2MJD, W. Kilroy and clubs constituents: CX2CO, DJs 2MM 2YA 6QT 0NO, DLs 1JR 1UR 4AN 7AA, FG7XL, many Gs, GCs 2FMV 8HT (7090) 0800 GMT, GI3CDF, GW3s EHN NWV 7, HB9ZY, HP1JL, HR1s AW 6, RB 7, RP, HZIX, JA2BTV (45) 20, KC4s USB 6, USK 7, USP 5, KG4AA 4, KJ6BZ (259) 6, KL7s FKZ 7, FPI 5, KP4s ACQ BY CL CLB WT, KS6BD 7, OA4RQ 6, OD5BG (40) 20, OH0NI (40) 8 non-s.s.b., OX3JV (45) 23, PJs 2AA 8, 2MI 3CD, PY1AGI, SV1s AB (52) 21, BII (45) 21, CC (45) 21-22, TG9s EP 9, FP 6, TI2s JIC PZ 8, VKs 2AVA (40) 19-20, 2DO 7, 2NN 8, 3AC/m 7, 3BM 7-21, 3RJ, VPs 1AB 2LD 8, 5AR (229) 5, 7DH (260) 23, 9AK, W4PSD/KP4/m 5, XEs 1CCW 7, 2GGK 7, YU3LB 7, YVs 5AFH 5BMR 7, 9AA, ZD8s HL 4, WZ (96) 6, ZLs 1AGO 9, 1CI 1KG 8, 2BCG (75) 7, ZS1JA (97) 5-6, 4X4s FA IX, 5Js 3LR 4RCA, 6Y5OF and 7X2AH (47) 20, practically all via single-sideband.

40 c.w. fans suffer less from SWBC raucousness, so Ws 1AYK 1ECH 2APH 3HNK 3ZNB 4GTS 6KHS, Ks 2UPD 7QXG 8HLR 8YSO 9UIY, WAs 1CYT 3AZA 4OYX 4SRS 4UMX 5IIS 6EGL 6TZN, WBs 2CON 2LDX 2MJD 6NBU 6NXK, KP4COR and s.w.l. R. Johnson lap up CEs 1DN (14) 7, 2CR (14) 6-7, CM2BL (4) 6, CN8s BU (10) 23, FT, COs 2BO 2PY 2RL 5EG, CRs 6AI 6EI 7CD 7CI (3) 4-5, DMs 2AIO 2ATL 2BTO 2CEL 3BJL 3POG 4UBO 4AK 6AN, EL2AE (10) 23, F9UC/FC, FG7s XF (10) 23, XJ, HA1KSA, HIs 3PC (5) 8, 8RVD, HK3s ASJ (7) 11, RQ (5) 4, HP1IE (7) 11, HR1RD (18) 8, JAs 1ADN 1EQM (6) 11, 1HLR 1ISL 1KZP 1MJA (18) 9, 1MML 1QQX 1RHL 2BUR 3EAO 4BJO 7AZL 8CKC 9AAV 9RY 9YL 0CCE 0SI, K1CZH/KM6 (7) 12, KA2PG (8) 15, KB6CY (11) 7, KL7s PI (10) 3, WAH, KM6DJ (10) 13, KP4s CKX COR, KS6BR (6) 11, KW6EK (12) 10, KX6BQ (4) 6, KZ5TD, LZs 1B1 (9) 8, 1KAB (3) 15, 1KDZ 1KSK (4) 23-3, 1SS (3) 15, 2KSK (4) 0, 2ZA (5), OA4s NUO (5) 11, U, OXs 3BB (10) 1, 5AX, PJ2ME (6) 5-11, PYs 1CIP 1CPR 2CFK 7AKQ (12) 1, 7PO, PZ1CM (25), SPs 2IU 7IIX, SV1YY (3) 4, TI2PZ (8) 2, UAs 2AR 22-23, 2CD 2, 0AW 0ER (15) 14, 9VB (8) 1, UB5QS (7) 2, UD6BV (1) 1, UF6LA (5) 1, UH8DC (10) 23, UP2KBA 23, UT5BP, VE8s BB (8) 4, NO (4) 0, VKs a-plenty including 0TO (4) 11-12, VO1HQ, VPs 2AZ 23, 3YG (10) 10-11, 4LT (5) 7,



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

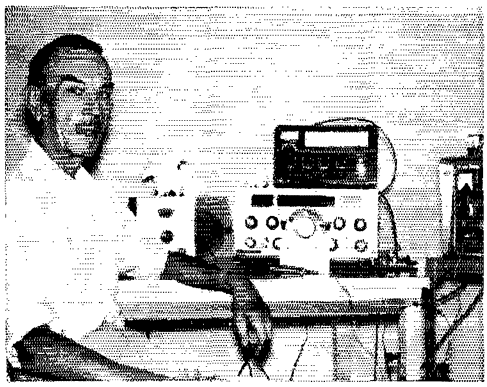
4VU (13) 4, 5AR (4) 10, 5GC (8) 12, 6AK (10) 10, 6GC (10) 4, 6PJ 7NQ, VRs 1S 4ED (7) 11, WL7FCN, XE1EK, YN3KMI, YOs 4XF (12) 3, 6AW 9KJD (10) 3, YU3BUV, YVs 1AB 4OV 4NR 5CBT, ZD7IP (7) 1, ZK1BU (6) 10, many ZLs, ZS5s BF (15) 15, QU (1) 23, UR (4) 5, 4U1ITU 22, 4X4s DH 22, NV (10) 1, NXM (15) 1, QA (7) 2-4, 5A1TE (7) 7, 5H3JJ (2) 4, 5W1AZ (14) 8, 5VZ8CM (1) 0, 6O6BW, 7Z2AH (5) 5, 9G1FQ (10) 4. 9H1AF, 9Ms 4MT (10) 14 and 6DH . _ . _ . _ WA6EGL, stationed in the Philippines, reports good 7-Mc. signals from our Stateside Novice gang, including WNs 5MOX 5MVC and 6PVA.

75 phone promises plenty of multipliers for the ARRL DX Contest next month, already offering sideband signals from DJs 1NY 6, 5BV 7, 6QT 0NO, DLs 1UR 8UI, EA7ID, EI6AK, Fs 2MO 2ZW 9RY/FC 22, Gs 2PU 7, 3GFI 6, 3KPV 6, 8PO 6, GB3RS 19, GIs 3CDF 3OQR 6TK 7, GC2FMV 22, HB9AFI, OA4KY 7, OH0s NF NI 20-22, ON1UN, OX3JV 22, OZs 4FA 5BW 6, PA0TR 6, PJ3CD, SMs 5AM 7, 6CKU/mm, TI2IO, VKs 2AVA 19, 3KD 6, VPs 2VD 3TH 5AR 7CC 9AK 22, XE1NNN 7, YNs 3KM 4JG, YVs 3BTS 6, 5AFH 5AS 9AA, ZB2AM 19, ZD8AR 7, ZLs 2BCD 7, 4AM 7, 4HM 4LM 6, 3A2BF 21-22, 4U1ITU 22, 4X4IX 20 and 7Z2AH, most of these lurking just below 3800 kc., others just below the 3700-kc. marker, according to club sources and monitor W. Kilroy.

80 c.w. treats WIs AYK BVP ECH, K1EYY, WAs 5IIS 6TGH 6TZN and s.w.l. Johnson to EA8CY (8) 7, GW3NAM 2, numerous Gs, HA1KSA, HI3PC (5) 1, OAIs FM (5) 10, PZ U, OK1s ANG MG, OZ7CF, PX1CR (8) 0-1, SPs 6IP 7HX 8MJ, UAs 1KBA 2KAW 0KAF, UB5s BU ZE, UC2s KAA WP, UD6AM, UP2KNP, UQ2KAA, VK2QL, VP5AR, VR4ED (7) 11, XE1AX, YO5KAI, YU1MV, ZLs 3FQ 3IS 3OX 4IE, 5VZ8CM 23, 6Y5BB (5) 5 and 7G1A (5) 23 . _ . _ . _ Novice DX on 80 is a rarity but WN1FEH caught up with YN6RAM on 3715 kc. in the wee hours.

10 phone, as we earlier remarked, builds up a robust following that includes Ws 5ERY 6KAD 8YGR, K8-YSO, WAs 5IIS 6TZN 9BGK, WB6s NBU NXK, KG6-APJ and Mr. Kilroy because of CXs 2CO* (595) 18-19, 3BH* (683) 22-23, 8AAW*, EA8BO (600) 20, ELs 2AK* 8AF*, FG7XL*, FO8BI* (555) 23, HCs 1EW* (650) 22, 8FN* (650) 0, HI8XAL*, HKs 1ZU 0AI*, IT1CAI (278) 16, K8ZST/KH6*, KG6APJ* (600) 23-0, KP4s AFM CL, KS6BO* (613) 21, KW6EJ*, LUs 1DAB* 1DTJ 7GM* 8DSF*, PJ3CJ* (695) 21, PY2PA*, VK1LT*, VO2HA, VP2VD* (395) 18, VS9AWR*, XE1s CU* IZY JJA (700) 0, NNC, YNs 1MAV 6AQ 22, YS1SAM* 21, YVs 1PM 5ACM 9AA, ZD8s AR* (607) 20, RD* (600) 15, WZ* (600) 22, ZEs IJE* (535) 12, 2JA (200) 12, ZSs 1AB (618) 15, 6JK*, 5A3TX*, 5H3JJ* (590) 16, 9J2FJ* (553) 12 and 9Q5TJ* (600) 15, the profuse asterisks denoting s.s.b. radiations . _ . _ . _ **10 c.w.** shares some of the 28-Mc. limelight thanks to GI3IIGV, OH2OW, OZ3GW, SL3AE, UA2ACV, ZD7IP (28), ZSs 1AC (51) 17, 6D 6MM 8E, 7X2AII and 9G1FQ.

15 c.w. is bound to start performing like 20 if 10 comes to life, so Ws 1ECH 3HNK 4GTS 8YGR, Ks 1QGC 5DZE 8HLR 8YSO 9YOE, WAs 1CYT 2WIJ 4YDR 5IIS 6TGH 6TZN 7ASM 7BOA 7BOB 9BGK 9IBT, WBs

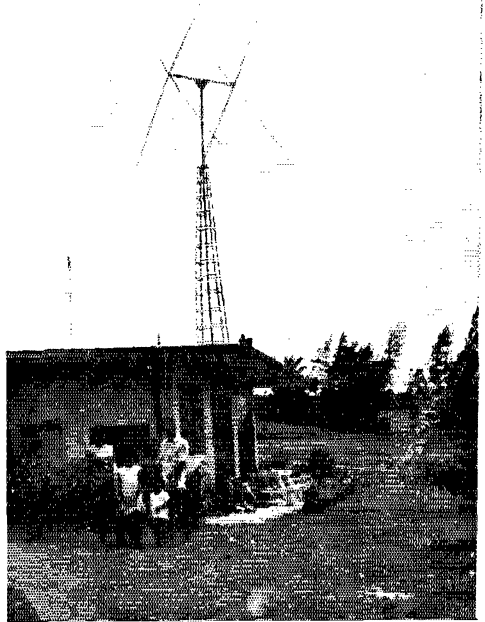


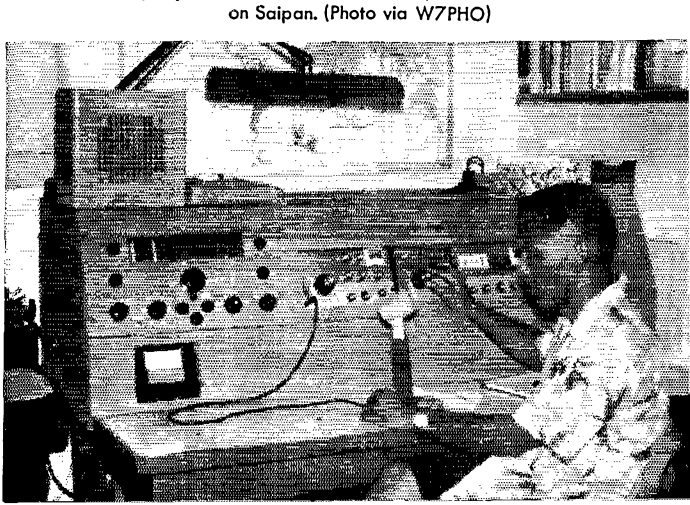
5Z4IR aims his KW Viceroy, 2B and ZL-Special skywire Statesward from Nairobi most evenings on 20 sideband. (Photo via MP4BEQ)

2CON 2LDX 6MEQ 6NBU 6NXK and tuner Johnson, soon due for his own ham ticket, cram their logs with CEs 1DN 2CR 3BM (150) 1, 3RY (108) 20, CM2WS, CN8BU (45) 19-20, COs 2BO 5EG 8CO (55) 22, CPs 1EA 5EZ (41) 18, CRs 6EI 6FW 6HG 6HH (80) 19, 6JA (100) 19, 7IZ (60) 18, CX2FD, DI2DR (20) 16 of the *Meteor*, EA6BD (63) 17, EL2s AQ D 20, ET3USA (35) 13-19, FR8WW, FG7XX, FL8s MC (50) 15, RA (64) 18, FO8s BI (52) 22, BJ (90) 0, GCs 2FMV (52) 16, 3KCE, GD3TNS (58) 14, HC2SB, HI8XAL, HMs 1AB 1BB 1DE (46) 0, 1DF 2BV (33) 22-23, 5BG (58) 23, 5BZ (44) 23, 5CO (50) 8, 5CY, HP1AC, JAs 1ACA 1BYA 1CYV 1DII 1FAF 1IBX 1KSO 1LPZ 1MCU 1TIH 2CIR 2FBA 3ABF 3BCC 3EGE 3ENQ 3EOP 3GPY 3GZN 3HUV 3IVC 5ADR 6AJW 6BXA 6CUX 6DLX 7BMK 7CVB 7RF 8TQ 8ZO 0CCE 9CJ 9YCW, KGs 4AA 6AAY, KM6DJ, KP4s BPW (44) 0, CKX (44) 15, KR6s BQ (20) 9, MM (35) 9, UI, KZ5s TD TX (65) 1, LUs 1BB (45) 0, 2DZ (94) 2, 8DQ (45) 17, MP4TBO (35) 12, OA6AN, OD5LX, OK2ZP (49) 17, OH0VF, OX3UD (20) 19, OY2H, PYs 1BTX 1MCC (95) 0, 2GFK 3BOQ 4IF (95) 23, PZ1CP, SU1TM (45) 17, SV0s WEE (51) 28, WO (40) 20, TI2LA (55) 17, TJ8SA, TL8SW (5) 15, TN8AF (69) 12-19, UA0KCA, UB5KAK 15, UO5-KBR (45) 12-13, UR2KAN, VK0KH of the dee-cep south, VPs 2KJ 3MV 4TR 5NK (30) 21, 7NS 8HJ (80) 20, 9FF, VRs 2DK (40) 22, 6TC (66) 22, 9AMD (58) 18, VU2SV, WH6FOO, WP4CPG, WS6BR (150) 1, XEs 1FE (45) 1, 1MMI (94) 0, 1VV (50) 0, 2EEL, YV4OP, ZB2s AJ (74) 13, AM, ZC4TX (40) 19, ZDs 7IP (21) 13-14, 8BC 8WZ (48) 18-19, ZE3JO, ZLs 1AJU 1AMO 1HW (50) 21, 3IS (55) 23, ZSs 1OU 6AAC 6IW 8C (40) 16, 8E, 4W2AA, 4X4s NV NVE (50) 16, PC (40) 18, UL, 5As 3TX 5TX (20) 16, 5R8CB (80) 18, 5VZ8CM 20, 6W8s BF (70) 19, DD (70) 18-19, 7G1A, 7O7LC (20) 15-16, 7X2s AII (35) 17, WW, 9G1FQ, 9HIs AB (66) 12, AD 16, AE (15) 15, AF AG (55) 16-17, R (85) 18, W (50) 19, 9J2IE (111) 17, 9K2AD (70) 14, 9Ms 2OV 4MX, 9Q5s QR (49) 18 and TJ.

15 Novice DXers are due for a better break in '66. WNs 4ZAS and 9PKR saw the old year out with CN8MI, CR6CK, DJs IJE 4KO 5YQ, DL4KW, DM4WKL, Fs 2PO 3BE 3BR 5AS 5AU 8KA 8MZ 9IF, Gs 2NN 2PN 3FQZ 3UDL, HB9GN, JAIs DIO NLX, KR6BQ, LU6DJX, OE6GA, OHs 2VV 6NH, OK3KGI, ON5s

KG6SB is a choice item on 15 and 20 with potent 4-400s. Jim, a permanent Marianas resident, works for the FAA on Saipan. (Photo via W7PHO)





AQ FC IF, OY2J, SM6CAW, SPs 3BLG 6CAW 6RT, WH6FQR, ZL3JO, 5R8CB and 5U7AC.

15 phone is very much *in* and it's good to see the sideband set making their move on 21 Mc. as indicated by asterisks in this amalgamation of reports from Ws 1ECH 3HNK 8YGR, Ks 1QGC 8YSO, WAs 4SRS 4YDR 6HTJ 6TGH 7ASM 9BGK 9IBT, WBs 2CON 2LDX 2MJD 4ANP 6NBU 6NXK, VE1SK and s.w.l. Kilroy: CEs 2GI 23, 3XG, CN8MZ, COs 2DL/CO4 (293) 23, 8HT, CRs 4AD 18, 4BC (350) 20-21, 5SP* (380) 22, 6AN 21-22, 6DA* (350) 20, 6DX* (350) 20, 6FF* 7BM 18, 7FF* (245) 19, CTs 1DU 1EE* 1JJ* (375) 20, 1MZ (215) 21, 2GT* (400) 18, CXs 2CC* 4AAQ* (407), 8AAW* (420) 22, 8BI 8BN* 19, EAs 1GJ 8BO (267) 20, 8BQ* (321) 18, 8EI* (300) 17, 8ES (350) 20, 9AZ* (388) 16, EI2AV (290) 17, EL8AF* (418) 14, EP2BU* (396) 17, ET3USA* (372), FG7XL* (375) 13, FM7WI, FR7ZI* (408) 14, GC3MLR* (350) 18, GD3RFK* (380) 15, HCs 1CY* 1JQ 1SM* 6GM, HI7RXB* (431) 0, HK3AZ, HP1CH, HR1RP*, IS1s RUA* (390) 16, VAZ* (310) 18, JAs 2BFC* (370) 22, 2BSM (370) 23, 5BDZ 7HK, KG4AA, KJ6DA*, KM6CE*, KP4s BAL CMP* (416) 18, CNO* CS PT, KS6s BH* (406) 17, BV*, KV4s BQ* (413) 21, CM* (415) 15, CX* (400) 12-13, KX6s DC* EI* (400) 22, KZ5s AY BT EZ* 18-19, LD TD*, LUs 1DAB* 3DRH* 6MP 8NM, LX1DO* (405) 14, MP4s TBJ* (400) 13, TBO* (280) 13, OAs 1W* (430) 19, 4DH 1 4cS* 20, 4SG, OD5s BZ* (410) 14, EG* (360) 16, PJ2s AP MI* (410) 13, SD* (350) 22, PYs 2BTE* 2DLC* 5RX, PZ1CM, SVs 1AB* (382) 15, 1BH* (380) 17, ØWF* (400) 14, ØWT* (300) 16, TG9s EP* (350) 1, OP* (420) 16, TL8SW* (236) 19, TN8BK (248) 18-19, UQ2AN* (380) 13, VKs 2ADE 9JO* 9PL* (390) 23, VPs 2AR 2AX 2DAA 2SY (280) 15, 2VD* (400) 20, 3HAG* 3MV* (403) 22, 4RS 6BW 6LX 7CC* 7NS* 9AK* 9BP 9EP*, VS9s AFR* (375) 17, AWR* (420) 17-18, PCZ* (320) 17, WA4QKY/KG6I* (389) 22, XEs HG ITK IZG 2CA 3MF*, YA1AN* (149) 12, YNs 1MAN* 18, 4CWH 4JAB, YO9CN* (400) 14-15, YVs 1RL* 5BTA 9AA*, ZB2s AC* (400) 18, AP 15, ZC4s JU* (380) 13, MO (365) 13, ZD8AR* (420) 13, ZEs 1EO 2JA (345) 12, ZL1s CA GJ, ZP6BB* (377) 21, ZSs 1CP* 1JD* 1JX* 1TZ* 1YX* (400) 17, 2AR* 3HT* 4F* 4OF* (360) 16, 4OT* 5CC* 5JY* 6AE* (400) 16, 6AOU* 6AOW* 6AQD* 6AYI 6AZO* 6BS* 6IQ* 6RA* 6TE* 8E (380) 16-17, 9G (265) 19, 4X4QG* (400) 17, 5As 3TX* (375) 13-14, 4TI* (400) 20, 5TJ (300) 16, 5H3s JJ* (390) 11, JR* (430) 18, 5Js 4RCA* 5LR* (417), 5R8AS* (412) 16-17, 5x5IU*, 5Z4s IX* 18, JW*, 7Q7s BN* (380) 19, PB1D* (360) 18, 7X2BB 12, 9G1FL, 9H1R (145) 10-11, 9J2s BA* (405) 20, FK* JC, 9L1s HX JW* (430) 19, 9Q5s AA* NT QR*, 9U5s IB (300) 19, ID* (381) 17, 9X5s AV (360) 20, CG* (412) 19, MH* (383) 19-20 and VF (323) 19.

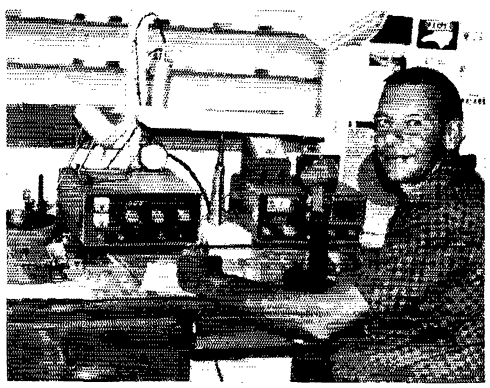
160 c.w.'s late-autumn DX warm-up produced an encouraging number of transatlantic QSOs. "Contacts across the pond have been made every week end," reports W1BB. "Some periods have been good, others very poor with a hang-on of warm-weather QRN." Getting in their 1.8-Mc. licks on the far side were Gs 3CFV 3ERN 3EGT 3OQT 3RBP 3RLF 3RMN 3RTY 3RTY 3RZW 3SCP 3SED 3SGC 3SYS 3TYL 3UKV 4PF 5MP 5RP 6BQ 8PO, GM3TMK, DL1FF and others . . . . This month's 160-Meter Transatlantic & World-Wide DX Test dates fall on the 2nd and 16th — details on pp. 105-106, November 1965 *QST*. And don't forget that W/K/VE 1.8-Mc. DX veterans are invited to take the January 9th week end off to permit top-band newcomers to get across. All 160-meter workers on our side are urged to keep the top four or five kc. of the 1800-1825-kc. segment clear of transmissions when the long rare skip is in, for that's where much European DX hangs out. Such co-operation will be widely appreciated, OMs.

Where:

AFRICA — ZD7IP tells W1BGD that mail arrives St. Helena only every two months by boat, so leave us not get too antsy. He does QSL thoroughly via London . . . . W6BAF requests self-addressed stamped envelopes, or just sufficient postage, from W/Ks seeking his 9J2AB QSL services . . . . According to W6YMV via W1BPY, ZE1JE's cards have been delayed for a year or more due to problems arising from Rhodesian independence developments as well as heavy family duties. Mollie promises to catch up on QSLing soon . . . . W8BRL learns that G2IO will handle G3WNF's St. Helena QSLs, probably as ZD7RII . . . . LIDXC's *DX Bulletin* has it that Gus's November c.w. contacts from 5VZ8CM can be confirmed through Hammarlund, other 5VZ8CM QSOs through W1YDO . . . . The *Bulletin* also notes lack of mail service to Marion island which forces ZS2MI QSL aide ZS1CZ to obtain log transcripts from Charlie via radio. Meanwhile QSLs for all QSOs by previous ZS2MI operator Wynand have been issued . . . . 5A1TK tells W9OGY his local mail situation is rough enough to cause loss of many outgoing QSLs. If no show in due time, reapply.

ASIA — "Response is tremendous on HM1AB's QSLs, and logs are coming in on time," declares W7VRO. "John postmarked one pack of logs at three P.M., October 12th, his time, and I received it at 11:30 A.M., same date, three and one half hours before he mailed it." That's fast, all right, even after conversion to more logical Greenwich Mean Time — ho! . . . . W3HNK now has those overdue log transcripts from 4X4s RD and UH . . . . QSLs have been printed for the April-May '65 doings of HZ1AT/8Z4/8Z5 but so far G8KS has received no QSO data . . . . Gus's log page for September 12, 1965, was delayed but other JY74 data enabled W2GHK & Co. to complete the bulk of his Jordan QSLing in October . . . . KA5ZS (W6UWL) has his records with him in Viet Nam and welcomes QSL inquiries through the address in the listings to follow.

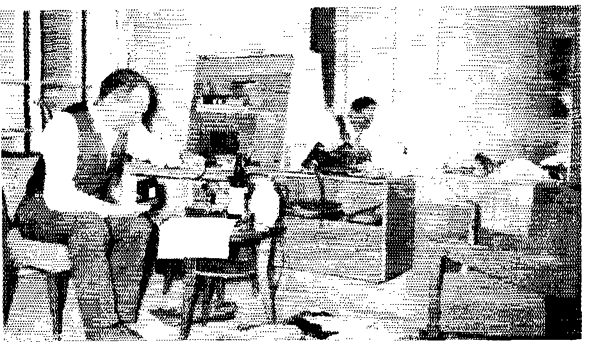
OCEANIA — K3SWW/KG6 gives us the Guam slant: "Remind your readers to be sure to use proper ZIP code numbers, especially on military addresses. The KG6 bureau has been receiving many cards for Lloyd and Iris of KG6SZ/KG6SZ/KC6, etc., but these should go to *Yasme* Foundation, P.O. Box 2025, Castro Valley, Calif. I've passed the outbound 4000-QSL mark for 18 months of K3SWW/KG6 activity and am on my eighth logbook."



HR2ABC is a popular fellow on 14- and 21-Mc. s.s.b. with his SB-33, SB-1LA and cubical quad. Art declares, "San Pedro Sula's mountain-surrounded valley is an amazingly good radio location."

S.w.l. reports continue to swell Conrad's ARRL Bureau shipments from W3KT . . . . From KR6UD: "I'm no longer OARC secretary but I expect to remain the club's QSL and awards manager for some time to come." KR6-UD's civilian status means an Okie stay longer than the usual KR military stint . . . . "We still await receipt of lost logs from VK9s DR and XI," wrote W2GHK of Hammarlund in late October. "Duplicates are supposedly in the mails." . . . . ARRL Assistant Secretary W1ECH hears from VR1A, QSL chief for the Gilberts: "I am able to forward QSLs for VR1s B G N and S. Cards for other VR1s and VR3s cannot be redirected, however, as there are no forwarding addresses. You might mention that, except for the call VR1RO issued many years ago, no two-letter VR1-VR3 call suffixes have been issued."

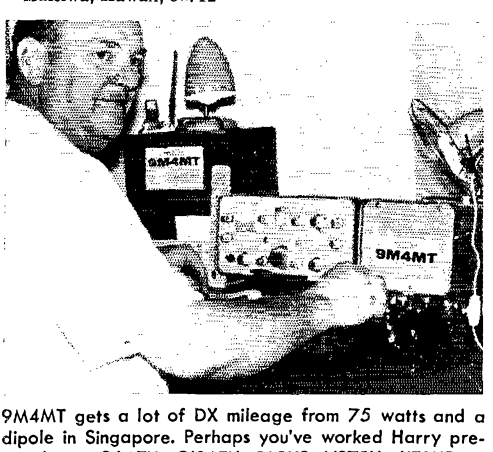
EUROPE — W1ECH relays word from DL2CT (GW3-PSM): "The DL2 bureau address is Box 125A, RAF, Butzweilerhof, BFPO 19, via London, England, but please note that the DL2 prefix is also used by German nationals. New British, Belgian and Canadian forces stations in Germany are issued call signs in the DL4-5 sequence. DL5s XE and XF are the first of these." DL4USA's WB4BFI supplies this new address for the DL4-DL5 QSL Bureau: MARS Radio Stn., HHD 12th Sig. Gp., APO, New York, N. Y., 09046 . . . . HV1CN QSOs made by IT1ZGY on October 13th-14th can be confirmed via W4VPD who handles all DXpeditionary confirmations for IT1s TA1 and ZGY . . . . G3UKI promises 100-per-cent QSL response for QSOs with GB2USA, direct if requested, otherwise via bureaus . . . . VE4SK desires International Reply Coupons from W/Ks, s.a.s.e. from VE/VOs, along with QSL requests for TF3EA QSOs . . . . W8TRN says that *stamp collector EA6BD really goes for U. S. commemoratives* . . . . SVØWG urges QSLers to use the most complete addresses available, especially when mailing to military stations. "I've lost many QSLs simply because the Army Post Office could not identify 'SVØWG', even with the correct ZIP code number." *E.g.*, include rank, name, squadron, division, etc., whenever possible . . . . LA5FG writes in behalf of club station LA1H, "We've been out of QSLs for some time, but in the near future about 1500 stations will receive our cards." . . . . OK1ADM's Stateside QSL tender is K4ZJF commencing with November, 1965, contacts. Milt will receive logs monthly and requests the usual s.a.s.e. courtesy from W/K applicants.



G5KW/YI demonstrates that a DXpedition need not necessarily be a grueling, rough-and-tumble, insect-bitten ordeal. Here Ken leisurely troubleshoots his receiver in a comfortable Baghdad hotel suite. (Photo via K8RTW)

HEREABOUTS — This month's "QSLers of the Month", nominated for especially snappy pasteboard production by "How's" correspondents Ws 6KHS 8YCR, Ks IQGC 3UPY, WAs 6GNA 8MAT 9BGK, WBs 2CON 6CEP 6KIL and 6MEQ, includes CO6AH, CT3AQ, DJ9LS, DU7SV, EL2AD, FP8CK, G3s APZ HFP SXZ, GM3UDJ, GW3FSP, HB9KC, HC6GM, HI8XAL, HM5s BF BG, HROK, IT1AGA, JAs JDX 3ADX/mm 3JM 7JI, JY7, K3SWW/KG6, KB6CY, KC6SZ, KG6SZ, KP4PT, KV4-AA, LUs IXAF 2JAV, OD5s BZ EG, OKs 1GT 3KAG, OZ7G, PA0WDW, PJ2ME, PY2BZD/0, PZ1BD, SM5-BYG, UAs 9MN 0KFG 0TD, UG6AD, UT5s BY RS, VKs 3AWP 4WO 5TC 9GC, VPs ITA 2AO 2KJ 3MV 5AR 5GC, VRs IS 4ED, VS9s ARV MP, WB6QOE/VP9, XEs IEEI 2EEL, YO8DD, 4S7NE, 5W1AZ, 6O6BW, 7Q7PBD, 9H1AG and 9M4JV, plus QSL agents Ws 2CTN 2GHK & Co., 2UOX 4SSU 6RGG 8WC 8ZCQ, Ks 2HLB 9ECE and WA8GUA. Anybody's back *you* want patted here? . . . . . *Help*! W6KHS needs QSL tips on KC6BO '64, UB5GB, UP2BZ, VR3E '63, 4X4ON/5; W7UVR will settle for 9Q5DM data; K3SWW/KG6 hunts hints on EA8CM and 5A1TG of '64; K3ULY is stuck on JA7BJL; and WA2LJM wants the word on 7G1A . . . . . Overseas DX ops in need of QSL managerial assistants are invited to consult with volunteers Ks 2MYR 3YBB 7TNW, WAs 4YDR and 9IBT. K3YBB's new address is 215 Skyline Dr., Feasterville, Penna., and K7TNW would prefer Pacific applicants . . . . . K1KDP, through W1ECH, wants it known that he's no longer associated with YN3KM QSL considerations . . . . . The new VE8RZ, as listed in the group of addresses to follow, is not to be confused with the previous holder of the call, one G. Bean . . . . . K2QIG/4 passes along 6Y5HH's vow of 100-per-cent QSL . . . . . DXCPR's *D'Xer* calls attention to new U. S. postage commemorating the International Telecommunications Union centenary, an H-center emblazoned with the radio code . . . . . We see that ex-VE8RG, now back at school as VE7IG, formerly signed PJ5MF, VP2s KT and VS . . . . . "I'm now managing QSLs for the Stann Creek, British Honduras, ham community," advises VE3ACD, referring particularly to VP1s HB JKR and LB. "The customary self-addressed envelope and *loose* U. S. postage will be greatly appreciated." . . . . . K3UPY suggests K3EDX as possible help toward VP6BW's verifications . . . . . "VP8s AD BK BO BY CI CW FJ GJ GX HF HK HR HU IC and ID no longer are in the Falklands and should be QSLd via RSGB," notifies CX2AM through K4YYL . . . . . HI8XAL discourses comprehensively on D.R. QSL matters: "Radio Club Dominicano has been receiving QSLs for HI8s DGC and SPG, active in years past, but since passed away. RCD's QSL manager, HI8WSR, asked me to forward information to your readers that the whereabouts of their logs are not known, so regrettably QSLs confirming QSOs with these gentlemen are not and will not be available. The club also receives cards for HI3MSP, recently a Silent Key; however, in his case QSOs may possibly be confirmed by routing cards to HI3AV's *Callbook* address. During the political turbulence many U. S. GIs operated from here without Dominican licenses, choosing calls on their own. Among these were HI8s CLU PFK RLH XAA XAK XJL and XPS, and all stations operating with W/K/WA prefixes 'portable HI4' or 'portable HI8'. All of these should be handled through K4FFB for QSL purposes, not through the QSL bureau here which has no way of handling them. Additionally, HI8PFK cards can go to K7VWJ, and HI8-XPS cards to K7EKE. Dominican Telecommunications has recently issued bona-fide licenses to K7VWJ (HI8XND) and to WA8DDH (HI8XJN). Anyone working these two stations can QSL to their respective home QTHs. HI8s XAC and XPH are two more bona-fide Dominican-licensed stations and can be QSLd to MAAG, U. S. Embassy, Santo Domingo. HI8XMT is another new licensee (home call WA3COE) and can be QSLd through M. Taylor, U. S. Embassy, APO, New York, N. Y., 09478. HI8XHS has been and still is bona fide, with his *Callbook* address being okay for QSLs. As for myself, HI8XAL, K9WIE continues as my QSL manager for W/Ks only; the rest can QSL via Box 1087, Santo Domingo. HI8XAD (KØBJG) can be QSLd through the U. S. Embassy, Santo Domingo." . . . . . VERON's *D'Xpress* suggests K1IMP as a step in the right direction toward confirming late-November QSOs with VP2s AC and SY . . . . . We should periodically point out that "How's" has no space to duplicate data known to be available in the *Callbook* quarterly magazine, nor can we normally repeat information appearing in recent columns. QSL managers may be relisted after six months if there is current evidence that such data is still valid. As for the individual specifications we'll take up right now, remember that each datum is necessarily neither "official", complete nor accurate.

CN8FV, W. Wooten (W1NTH), USNTC, Box 9, FPO, New York, N. Y., 09544 (or c/o Hammarlund DXpedition, Box 7388, GPO, New York, N. Y., 10001)
CN8FS, % Hammarlund DXpedition, Box 7388, GPO, New York, N. Y., 10001
CO2BO, % OK3HM, Box C22, Piestany, Czechoslovakia
CP5AY, P.O. Box 15, Cochabamba, Bolivia
CT2GF, % RCP, P.O. Box 538, Lima, Peru
EL6E, % Holy Cross Mission, Kailahun, Sierra Leone
ex-EP2DS (to W9AUM)
FK8AZ, P.O. Box 637, Noumea, New Caledonia
FP8CQ (to W4GSM)
GB2USA (via G3UKI)
GW3DZJ (via W3HNK)
HI3s AV MSP, HI8s CLU PFK RLH XAA XAC XAK XAL XHS XJL XJN SWT XND XPH XPS (see preceding text)
HP3MC, Box 92, Armuelles, R.P.
HR2GK, C. Kuether, Aptdo. 17, San Pedro Sula, Honduras
HS1S, C. Sykes, OSD/ARPA RDFU, APO, San Francisco, Calif., 96346
ex-HS1X, C. Anderson, W1FAX, RFD 4, Hillside Av., West Scarborough, Me., 04074
HV1CN (see preceding text)
I0FGM (via I1s BER LCK or LCT)
I1KDB (to I1KDB or via ARI)
K6TXU/KH6, L. Rucker, 59-779 Kamehameha Hwy., Haleiwa, Hawaii, 96712



9M4MT gets a lot of DX mileage from 75 watts and a dipole in Singapore. Perhaps you've worked Harry previously as G3ATH, GI2ATH, DL2XS, VS7PH, XZ2HP or ZB2A. (Photo via WB6KVA)

K7s LMU/HC8E LMU/TI9C (via W4ECI)
KA5ZS, Lt. Col. Z. Sprague (W6UWL), USMC, H&HS-1, MWHG-1 (G-4), 1st MAW, FPO, San Francisco, Calif., 96601
KB6CY (via W2CTN)
KR6MH, S/Sgt B. Brooks, Camp Hansen, Sub Unit Hq. Co., H&S Bn., FMF, PAC, FPO, San Francisco, Calif., 96601
LA1H (via LA5FG)
LU7s ZA ZC (via LU4DMG)
OD5BZ (via W8ZCQ)
OD5EE, Box 1217, Beirut, Lebanon
OE9ZUH (via G2DHV)
OK1ADM (via K4ZJF)
ONs 5ZQ 8IR (via G2DHV)
ex-OQ5RL-OQ0RL (to KP4COR)
PJ5s BC BD (to KØs GZN GZO)
PY7AMF, P.O. Box 842, Recife, Pe., Brazil
TF2WJK, H. Maus, H-2, FPO, New York, N. Y., 09571
TF3EA (W/K/VE/VOs via VE1SK)
TG9s WP OP (via CRAG)
TI2GK (to HR2GK)

TJ1AC (via DJ2BW)
UG6AD, G. Kurgin, Tamantsev 18-30, Yerevan, Armenian S.S.R., U.S.S.R.
VE3BCU/W4 (to 6Y5BB)
ex-VE8RG, R. Beck, VE7IG, 8644 Montcalm St., Vancouver 14, B.C., Canada
VE8RZ, J. Robitaille, Box 1433, Inuvik, N.W.T., Canada
VK2APK (via W4NVB)
VK9GN, P.O. Box 73, Ukarumpa, T.N.G.
VP1s HB JKR LB (via VE3ACD)
VP2s AC SY (see preceding text)
VP2GLE, Grande Anse P.O., Grenada, W. I.
VP2ML (via VP2AL)
VP2VD (via W4PJG)
VP6PJ (via W2CTN)
VP7DJ, E. Kasprzyk, jr., RCA, % PAA Carter Cay, Patrick AFB, Fla., 32925
VR1s B G N S (via VR1A)
VS9AFR, R. Ford, 47th Royal Dragoon Guard, Aden, BFPO, via London, England
VS9MP (via W2CTN)
VS9PCZ (via RSGB)
W6UWL/3W8 (to KA5ZS)
W7s FKS/KH6 UJ/KH6 (via W7LVN)
WA1EAV/VP9, V. Richardson, Bailey's Bay, Hamilton, Bermuda
WA4QKY/KG6, R. Hanna, APO, San Francisco, Calif., 96415
WB6QOE/VP9, J. Hendricks, 1604th Civil Eng. Sqdn., Box 2177, APO, New York, N. Y., 09856
XE0s ICQ 1CS (to K6s ICQ ICS)
YN3KM, J. Murphy, Box 14, Leon, Leon, Nicaragua
YV4NR, P.O. Box 524, Valencia, Venezuela
YV7CQ, Calle Urica 35, Carupano, Sucre, Venezuela
ZB2AP (via W2CTN)
ZD8RD, R. Dawson, RCA/MTP Comm., P.O. Box 4187, Ascension, Patrick AFB, Fla., 32925 (or via WØMLY)
4W2AA, % Hammarlund DXpedition, Box 7388, GPO, New York, N. Y., 10001
4X4s UD UH (via W3HNK)
5H3JR (via W2SNM)
5H3KE (via WA8FRV)
5J5LR, P.O. Box 6149, Cali, Colombia
5R8AS (via W6ZPX)
6Y5BB, Dr. H. P. Stockwell, P.O. Box 72, Mona, Jamaica, W. I.
9H1AB (via RSGB)
9H1AG, E. Gibbins, 7 Howard St., Sliema, Malta (or via RSGB)
9H1R (via W2CTN)
9J2AB, via H. Spaulding, W6BAF, 301 E. Buffington St., Upland, Calif.
9M2BM (via RSGB)
9Q5YK (via DL9YK)

Don't thank Jeeves & Co. for the preceding suggestions — thank **Ws** 1AYK 1BGD 1WPO 1WPR 2DMJ 6KHS 7UVR 7VRO 8TRN 8YGR 9LNQ, **Ks** 1QGC 2QIG/4 2UPD 3UPY 4FTZ 4YYL 6SWW/KG6, **WAs** 1APY 2LJM 6GNA 6TGH 9BGK 9IBT, **WBs** 2CON 2MJD 6MEQ, **VE3ADV**, **VP7DJ**, DARC's *DX-MB* (DLs 3RK 9PF), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4LVV), International Short Wave League *Monitor* (12 Gladwell Rd., London, N.8, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WB2HXD), 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.), Ontario DX Association *Long Skip* (VE3FXR), Puerto Rico Amateur Radio Club *Ground Wave* (KP4DV), VERON's *DXpress* (PAØs FX LOU TO VDV WWP) and West Gulf DX Club *Bulletin* (W5IGJ). Got some gist we missed? QRV, OM. Like. K.

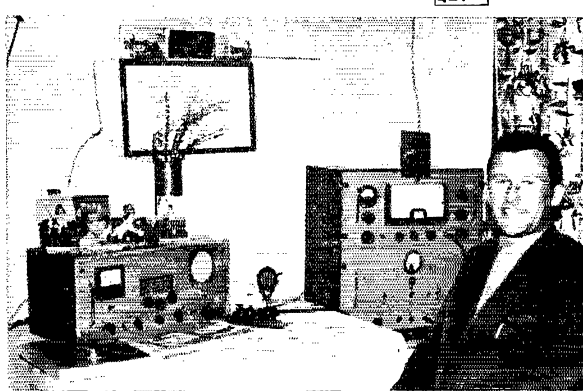
Whence:

AFRICA — VQ8AI discusses Mauritius matters with ARRL's W1BDI: "Of the 23 hams listed in a recent *Callbook* seven have left the Colony, including VQ8s AM and BS. Nine others are practically QRT; one, VQ8BX, is now a Silent Key. VQ8s AZ and BZ work only phone, and VQ8AD keeps busy as QSL manager. I regret not being able to hear my W/K friends during our winter months due to very bad conditions but the November-January period should bring better openings." Raoul pleads for carefully timed calls and short QSOs when those good VQ8-U.S.A. days do come along . . . . . "Received my Morocco license in October as CN8FV," confirms W1NTH via W1WPO of the ARRL DXCC Desk. "Two other Navy men here are CN8s FS and FT." . . . . G3FNF tells W8BRL he hopes to sign ZD7RH for a year or more. By the way,

OHØNI likes a good rag chew now and then but DXers hunting the Aland islands usually keep Sigurd busy with that "break-break-break" routine. (Photo via W9OGY)

W8BRL has a red hot QTH — check your *Callbook* . . . . . Contacts with ten CR7s in at least six Mozambique states may qualify you for a certification mentioned by CR7HC to K2MYR . . . . VP7DJ says the addition of ZD8JPL makes about eight Ascension actives. Gee, seems like only yesterday that one Andrew Boa was listed as the only ZD8 extant. ZD8s HL RD and WZ intend more DXpeditionary passes in the Caribbean region when opportunities arise . . . . . Africa addenda via the clubs press: ZD5s M, 21-Mc. c.w., and R, 14,118-kc. s.s.b. at 1800 GMT, keep Swaziland swinging' . . . . "Don't know just how much longer I'll be in the C.A.R.," says TL8SW on 20 c.w. . . . W4BPD expected to start his Stateside stay by Christmas after rare African DXertions commencing with a solid 5VZ8CM stopover. . . . VQ9HB served up fresh Agalega to the lads on 20 phone and c.w. as VQ8BFA in November. . . . EA7JQ and associates, possibly aided by URE (Spain) and Hammarlund facilities, hope to deliver more r.f. from Ifni and/or Rio de Oro henceforth. . . . 7Q7PBD expects to keep dishing it out till April, particularly on 15 meters, then QRT for the U.K. . . . That ZD7IP c.w. 20-watter frequents 7007 kc. and multiples thereof through 10 meters, also 7001 kc., and a large Vee helps.

ASIA — ARSI (India) announces the Gateway of India award, a certification available world wide on the basis of QSOs with five VU2s in the society's western zone (states of Majarashtra, Gujarat, Kerala and the Laccadives) dating on or since November 9, 1957. The diploma is offered in memory of the late VU2SX. VU2MD can supply full details . . . . . W6UWL (KA5ZS) is on temporary assignment in Danang but 3W8 hamming is out of the question at present. "Perhaps before I rotate next summer," hopes Zane . . . . . Erstwhile OARC secretary KR6UD found enough time between paperwork duties to file for his own Okinawa DXCC . . . . . "Getting settled in my new Maine QTH," writes ex-HS1X as W1FAX. "Still need a tower to get above the trees for contacts with my buddies in Asia." . . . . . W1ECH finds another YL for your distaff DX collection, one Larisa of UAØDJ in Khaborovsk . . . . . 1W2AA (HB9AET) knocked off for Geneva last month, according to W2GHK & Co. . . . . 9N1MM is rockin' again around 14,125 kc. at 1330 GMT . . . . . New or renewed FEARL(M) memberships are held by KAs 2DE (W7QOH), 2LK (W6SLF), 2SA (W1BAF), 2SR (WØIDF), 7AB (K1KTH), 7WM (W1IIG), 8JT (K5RYN) and 9AS (WAØGSA). QST



YU3AT is widely worked with a 60-watter and 11-tube inhaler in Ljubljana. You may have contacted Martin under his former call, YU3FMC. (Photo via WA9GQA)

The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

Solid State and the V. H. F.

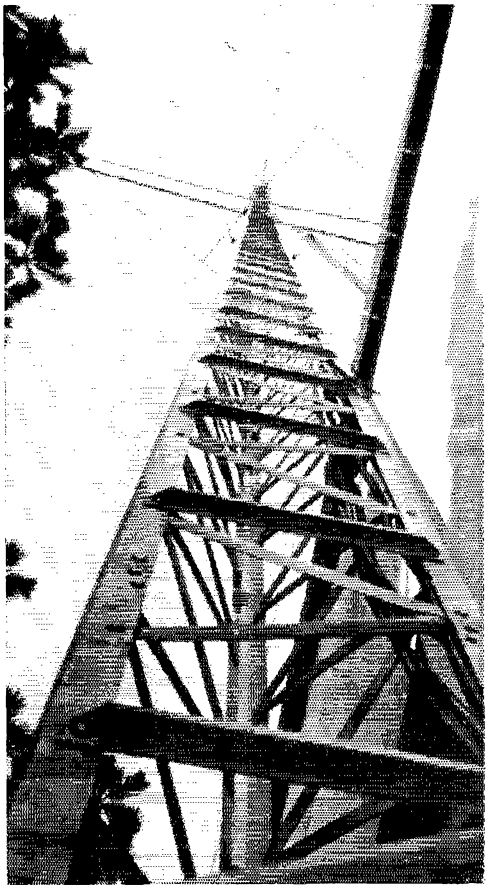
It is just a little over six years since Freddy Maurer built the transistorized oscillator used as the primary frequency control at W1BU. The oscillator, buried in its six-foot hole in the ground, has performed faultlessly ever since. In terms of service life this is certainly no record. After all, one of our Eimac 150Ts, obtained second hand in 1938, is still performing satisfactorily. The point is that for a very modest investment we have a top-notch frequency standard which has not varied sufficiently to warrant mention.

In the six years since, we have tried many of the new solid state devices as they became available. Many of the devices tried did not perform as satisfactorily as the old fashioned vacuum tube. However, progress continues and it is presently possible to replace the vacuum tube in almost every v.h.f. application. Naturally enough the solid state performance generally shines first in the u.h.f. range where tubes are running out of performance. After all, you can obtain better than usable noise figures from tubes at 50 Mc. At 144 Mc., you can just about break even if you try hard enough but from there on up you fight a losing battle. The transistors available today not only outperform the best in vacuum tubes but they are available at a fraction of the cost. An RCA 2N3478 for instance, will yield a noise figure of better than 5 db. at 432 Mc. and costs about $2.00 at the local parts store. The equivalent vacuum tube just doesn't exist. Six of these transistors, two as r.f. amplifiers, one mixer, three in the crystal oscillator and harmonic multiplier string will make a 432-Mc. converter which cannot be outdone with anything less than a parametric amplifier! And the whole thing will run on a 9-volt battery and fit in your pocket. An ideal solution to feedline loss is to put the r.f. amplifier in Polyfoam and mount it at the antenna. The d.c. can be fed up the i.f. cable and tr. switching can be accomplished with quarter-wave stubs and diodes.

The advantage of solid state does not stop at 432 Mc. nor with receiver front ends. A lately announced germanium transistor available for something like eighteen dollars will yield noise figures in the 4 db. region at 1296 Mc. and around 2 db. at 432 Mc. For local oscillator and low-power exciter work the transistor field is full of "better than the expensive type" models. It is true that transistors are less forgiving than vacuum tubes when you put the voltages on the wrong places. Not as bad as they used to be however. And the ones I've been playing with can stand a reasonable amount of tr. relay feedthrough without damage. If you are talking in the five-watt-or-less range, you should be talking in terms of transistors or varactors or both. If you are looking for stable frequency control or s.s.b.-heterodyne exciters, you should be talking transistors. After all you have to get familiar with transistors so you will be ready for the next step. Thin films and microelectronics, anyone?

November Leonids Best Ever

Picking up a hint from *Sky and Telescope* for February, 1962, regarding possible enhancement of the long-dormant November Leonids meteor shower, we ran a warning note for meteor-scatter enthusiasts in August, 1962, *QST*. Evidence continued to pile up that this shower was, indeed, coming alive again, so a footnote regarding its potential



102-foot tower at XE1PY. Rusty has antennas and kw.s on 50 Mc., 144 Mc. and 432 Mc. Catch him on 14.204 Mc. week-day mornings to arrange skeds.

* P.O. Box 1738, Arecibo, Puerto Rico 09613.

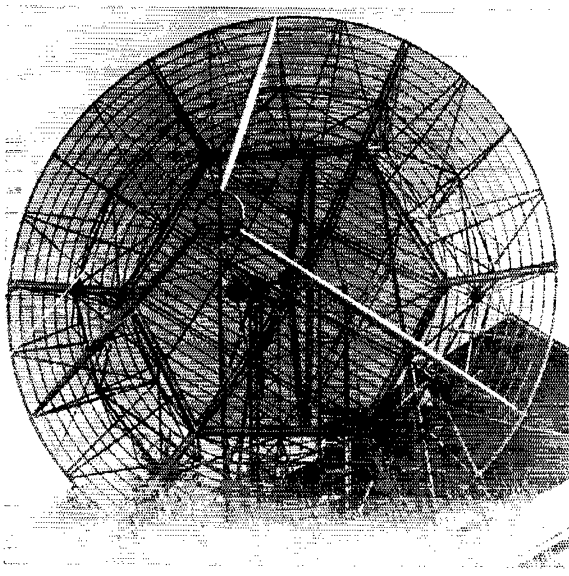
for 1965 was added to the meteor shower calendar in the new ARRL *V.h.f. Manual* (p. 23). This was enough to tip off many of the better 2-meter men, and those who arose early Nov. 15–18 were rewarded with m.s. signals the likes of which have never before been recorded in 2-meter history.

In the last-minute summary below, stations listed were worked, unless reported as heard. There were many interstate firsts, and signals staying in as long as 4 to 7 minutes, readable on voice as well as c.w., were common.

K1OYB, Portland, Maine: K4SJF K4QIF W4WNH W4VHH, latter also worked by K1MTJ. Heard W8YIO W4CKB W9AAG. K1OYB and K1MTJ both run 100 watts and small beams. *W1AZK, Chichester, N. H.:* W4VHH W5UGO, Tulsa, Okla., 1365 miles (m.s. DX record?) W4WNH W4AWS. *WA2FGK, Somerville, N. J.:* W4WNH K5WXZ W5UGO W4AWS. Heard W5CUA W9IFA. Beam stuck west! *W4AWS, Orlando Fla.:* W1AZK W4WNH K4QIF K3OBU W3RUE WA2FGK. *W4WVH, Germantown, Ky.:* K2HLA WA2FGK K1OYB W4AWS W1AZK K5IQL K5TQP W5NU (Maine to New Mexico, in one morning!) Heard W1JSM W4CKB K4QIF W5CUA W9IUE W9UGO WØENC. *K4QIF, Salisbury, N. C.:* W4AWS W4WNH K1OYB K1ABR. *K7VII, Scottsdale, Ariz.:* W5UGO W9WDD WØDQY W5UKQ W7LHL W7UAB W5RCI WAØFDU 8 states, 5 over 1200 miles! *K7ICW, Las Vegas, Nev.:* K5WXZ W5UGO W7UAB WØENC W7JRG. *WØPHD, Warren, Minn.:* W7PUA/2. *W9IFA, Carrollton, Ill.:* K5WXZ W5NU W5CUA WØEYE.

50 Mc.

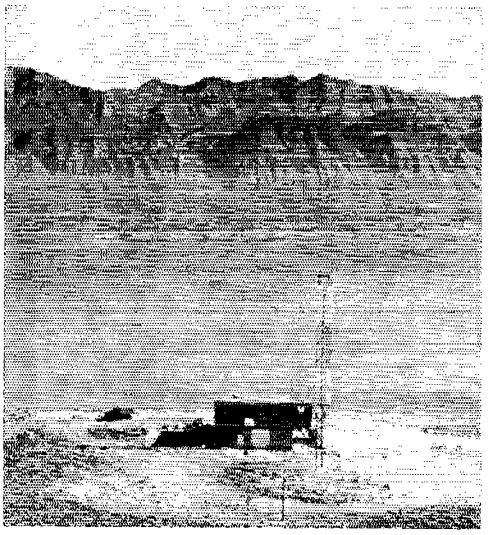
K3MSG, WA2SUY, WB2JHK and WB2TBX all report skip conditions during the last week of October with 4s, 8s, 9s and 0s being heard. K3QCQ wants skeds with anyone interested in scatter work on 50 Mc., especially stations in Vermont, Maine, New Hampshire or Rhode Island. Stations in the southern states apparently observed different openings than the 2- and 3-land boys. WA4STJ and W4FP in Florida noted skip on 27th of October with Jim hearing stations in 1, 2 and 8 lands, and Tom hearing Texas and southern California. Tom, W4FP, sez that the Texas and California signals came in much stronger with his beam in vertical position rather than horizontal. In North Carolina, WA4FJM caught the end of an opening on the 31st into 1 land. In Tennessee W4WQZ and K4KYL agree that the last week or so of the month was pretty good with signals fair to poor from 1, 5, 7, and 0 lands, but Jim (K4KYL) also reports hearing California and Michigan. The 6s go along with end of the month reports with WA6WKF reporting a contact with VE6AFQ on the 27th then contacts with Washington. October 26, 27, 28 and 29 were good for contacts into Oregon, Washington, Montana and South Dakota sez Al, WB6BBH. K7ICW in Las Vegas reports: "A significant opening observed here on October 27 when all call areas were worked except 1 and 2 lands with good signals. Al goes on to say that "s.s.b. work is almost entirely replacing c.w. for iono/m.s. here on the west coast. It is hard to find c.w. on the low end these days. Tropo-s.s.b./c.w. work to southern California has tapered off somewhat due to the increased seasonal noise level and weak signals available but K6GJD, WB6GKK, K6IBY, WA6JZN and WA6AKM still get through." WA9KKH reports hearing K7SUC/7 and K7BHF on October 23 from Utah, and W9IPO, (also in Illinois) observed skip conditions on the 4th, 16th, 23rd and 30th. Stations heard were in Michigan, Colorado, Texas, Maryland and North Carolina. Out in Iowa, Jim, WØPFP, worked Colorado and Texas on the 24th of October and Virginia, Baltimore, Pennsylvania and others in New England on the 31st. In Minnesota, KØOST reports no openings observed during October but Jim does have his 50-Mc. s.s.b. transmitter completely debugged and works great. Jim sez there isn't much s.s.b. activity in his area but a number of people are talking about building s.s.b. gear.



How to polar mount a dish W1TQZ fashion. 18-foot parabolic reflector with the 432-Mc. feed in place.

144 Mc. and Up

Out in California one of the old timers of v.h.f. has come forth with the word that he soon hopes for success with moonbounce gear for 1296 and 432 Mc. John, W6NLZ, sez that although his 15-foot dish is a bit small he expects good results as the gear gets whipped into shape. Tests from KP4BPZ caught John with troubles of all kinds but he did hear them and sez their activities are a big inspiration. "The only thing missing on 1296 now is a new converter but I have made up a bread board which will soon be repacked to fit the rack. Would like to stress the regular schedule business on two and six meters. They don't set records but they do provide a platform of activity around which the newcomers can gather. A real good example is two meters. Each Sunday morning at 8:00 A.M. I work K7ICW. Now and then we can't make it but most of the time we can." You sure have something there, John. We've noticed from A1's reports that your contacts are more or less a sure-fire thing these days. John is also active on 220 Mc. and is always looking for new contacts on that band. In Los Angeles WB6IOM writes that he is continuing work on a 7650 amplifier for 1296 Moonbounce. He sez he is getting about 200 watts out but he can't understand what happened to the other 200 watts. The tube is supposed to put out 400 watts and although everything looks good the tube just won't deliver more than 200. Any suggestions anyone? Skeds are continuing



Utah Relay Club 2-meter relay station is installed in a former TV station atop Lake Mountain, a 7700-foot elevation overlooking Utah Lake, near Orem. Coverage of the entire Great Salt Lake Basin and up into southern Idaho is anticipated.

with W6HPH (80 miles) on 1296 and signals are about 20 to 40 db. over the noise across this path. 1296 Mc. activity is growing in Florida, too. Jim Hagan, WA4GHK tells us that he and Jack, K4NTD hope to be making two-way contacts before you read this. One-way transmissions over the 75-mile path have been consistently good. Others in Florida preparing for 1296 Mc. work are WA4BYR, W4VWH, W4NKN and K4IXC. Jim also reports that 220 Mc. seems about dead in his area but he's still interested and would like to keep skeds on any bands between 1296 and 144 Mc. At Bryn Mawr, Pennsylvania, K3ADS has been busy with antennas. He has recently erected a new 16-element 432-Mc. colinear for T.V. and a 32-element colinear for 1296 Mc. at 80 feet. K3KFL has also installed a 32-element colinear for 432-Mc. T.V.

The word from Connecticut is that Ed, W1HDQ, is on 432 Mc. every night that he is at home (Canton) from 9:00 to 10:00 P.M. EST and longer if conditions warrant. Ed recently built a new two-stage transistor preamp. for 432 Mc. and says it's working very well. From Newington WA2BAH/1 writes that his present standing on 220 Mc. is six states in three call areas and about 200 miles. Stan tells us that during the September contest he operated in Maine with W1UGQ and they worked 30 stations on 220 Mc., most of them on c.w. (11 sections). Rig used was a 4X150A to 11 over 11 and about 160 watts. Doug is presently using this rig with one eleven element beam in Branford, Connecticut and he's looking for skeds on 220 Mc. Golly! New England is coming through to us this month with v.h.f. news for the column. W1OOP sez that on September 19 and 22 when he worked K2AOP and K2GRI, 432 Mc. appeared to be open a bit. On the 23rd, K2CBA and friends arrived in Hank's front yard with a 96-element 432-Mc. beam (90 inches wide by 91 inches long by 16-6 element yagis high when pointing up) on the roof of Jud's car. On the 28th, W1OOP, W1HIV and K1IIE put the beam up on the telescoping tower on the back of the two-meter 32-element array. (Bet that is a sight to see!) W1HIV did the pole work. (That's natural, too!) Tests showed it was 4 db. better than the 21 element Array in the clear directions. Through the top of the hill it is 6 db. better because it can be cranked up about 20 feet higher, though still in the trees. On October 17, Hank had a three-way contact on 432 Mc. with K2UUR and W2MDE. On the 18th, the band was dead at 9:00 P.M. and hot at 10:00 P.M. when W1OOP worked W7PUA/2, W2BLV, K2HQL, WB2EGZ, K2DZM, W3GGR, W3CGV, W3HFY, WA2EMB, W3UJG, W3MFY, W3ZFW, K3UJD, and W3AIR. From Medfield, Massachusetts, W1HIV writes us concerning news at W1BU. "In an effort to increase our totals on 220 and 432 Mc., we are readying the u.h.f. antennas and hope to be on nightly within the next few weeks. The weekend of October 16 and 17 we participated in K2MWA's 432-Mc. moonbounce test. On the morning of the 16th we heard and worked K2MWA. A radar signal was also heard by participating stations (very slow rep. rate). On the morning of the 17th, K2MWA was heard and worked again. Another signal was distinctly heard about 1 kc. below K2MWA sending a series of dashes. No call was heard. Echoes were obtained at W1BU on both tests and could be heard in the 2.1-kc. position of the 75S-1 and were positively banging through in the 50-cycle audio filter. Receiver consisted of a parametric amplifier, two-stage transistor preamp., crystal mixer, transistor preamp, 75S-1 receiver and 50-cycle audio filter." It all sounds like you're keeping busy, Pat, and making it pay off, too.

A flurry of v.h.f./u.h.f. activity is the way that W7PUA/2 describes the 432-Mc. activity in mid October. Bob sez that at 2100 on the 18th, the ls were beginning to build up and by 2130 W1OOP was 30 over 9 and was working 3 land. At 2220 Bob (W7PUA/2) worked W8YIO in Manchester, Michigan. On the 19th, Bob worked K2ACQ and K2LGJ. He then got on 144 Mc. and worked W8QOH in Cincinnati. Sez the fellows seemed to be working all through the south to South Carolina and southwest to Kentucky on 144 Mc. W7PUA/2 is still looking for meteor scatter skeds with stations to the west and south on 144 Mc. We are delighted to receive some news from a real old timer on the v.h.f. bands, Art Bates, W5ML. Art sez: "Have 250B single end tripler on 432.015 Mc. into a 32-element extended colinear about 55 feet up. Am rebuilding the converter for receiving right now but should be back in business come early spring." Good to know that you'll be back on 432 Mc., Art. The gang will be looking for those Louisiana contacts with you. 220 Mc. report received from W2SEU tells us that on September 12 he worked K1UGQ/1 in Maine and on October 20 ground wave was good into Connecticut, Rhode Island and Massachusetts on 220 Mc.

Exceptionally good conditions were noted on 144 Mc. by a number of the 144-Mc. operators during October. WB2KLD in New Jersey particularly noted October 18 when he heard a total of 13 states on 144 Mc. with Ohio, Michigan and West Virginia being new ones. Tom sez he had no contacts because apparently the stations at the low end of the band were not tuning above 145 Mc. He's also wondering whether the good conditions were in anyway connected with the comet then nearing the sun. In New York, WB2OCF notes good conditions from October 17 through 23 and lays these conditions at the door of the comet. WA2RAT sez that October 18 was "Great" and he worked W8WEN in Ohio on phone and K8BHH and K4QIF on c.w. on 144 Mc. W2LVQ heard stations in Pennsylvania, Ohio,

North and South Carolina, Georgia and Tennessee on October 19 and 20. Had a contact with W4OKA in Memphis, Tennessee. (The comet was mentioned again in this report.) WA4BMC, who is a traffic enthusiast, tells us that traffic was started on 144 Mc. in Miami intended for Pensacola, in other words from one end of the state to the other. The message took eight hops but got stuck at Lutz, just north of Tampa, where it deadened from want of another relay station. The nets on 144 Mc. in Florida have been working on this project for some months now and will try again in the near future. Have you fellows remembered the 41 states on 144 Mc. W8 man who recently changed QTHs? He is now K4GL, recently W8PT. Jack wants to know who needs South Carolina on 144 or 432 Mc. He'll be back in business within a few weeks. From Louisiana, W5ML sez he has Motorola p.p. 250Bs class AB_1 linear. Maximum input about 480 watts on c.w. and 300 watts on A2 and A3. Art has two antennas up 60 feet, one 14-element skel. slot and the other a 16-element colinear, which he sez still beats anything else he's ever had up. Frequency is 144.040. If anybody would like a sked in Louisiana, Art is ready and willing and his address is Box 301, Vivian, Louisiana.

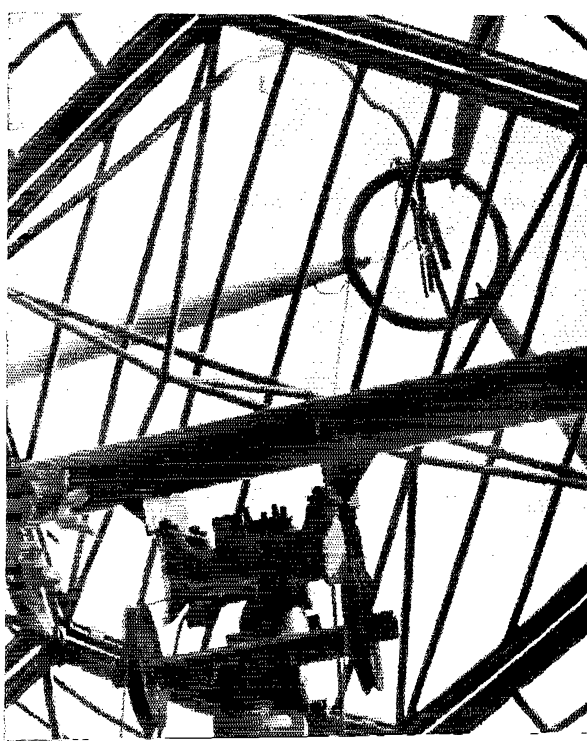
Interesting report from W6DNG that he and OH1NL are continuing their monthly skeds on 144 Mc. and so far have heard each other in some identifiable form during each sked. He sez they need about 10 db. to make this a practical circuit and they are both working on it. Most work on both ends has been done in the receiving equipment with noise still being the barrier. WB6NFT would like to try meteor scatter work and is available for skeds with anyone above 145 Mc. Jim runs 135 watts on c.w. with an 8-element beam 60 feet up. The receiver is an HQ-110 with nuvistor converter. He'd also like some tropo skeds with southern California. K7ICW reports meteor scatter results during October produced no QSO but a non-shower test with K7ZIR in Oregon surprised him with a number of pings and short bursts on October 24. Al sez: "Observation of entrance of comet Imeka-esaki on October 19 and 20 into the field of the sun may have produced additional meteors to the Orionids shower. Perceptible solar noise increased one half hour before sunrise on October 19 on my sked with WØENC on 144 Mc. We were both watching for any variation from the norm that might be caused by the comet. Wonder if anyone else noticed any abnormalities?" (You may have noticed remarks earlier in the column regarding the comet, Al.) News from Nevada sez that K7WPQ, W7AKE and K7ALG are operating on the 146.94-Mc. f.m. frequency in Las Vegas. K7RKH is working K6TSK in southern California on two-meter s.s.b. Two reports from Harrisonville, Missouri. KØFPC reports working W5SWV in Denison, Texas on October 10 and KØJWN notes that two meters was pretty good during October with good groundwave on a number of occasions and increased activity.

V.H.F. DX

The moonbounce bug has bitten VE2LI deeply and has led him into making the decision of doubling the size of his 96-element array to 192 elements. He may even go further than that and come up with 256 elements! This on 420 Mc. However, George is also interested in 1296-Mc. moonbounce work and wonders who is working on the same project and how good the chances are of contact. He hopes to have 50-watts output and a 4-foot dish on 1296. Sez George: "On tropo things have been the usual quiet band with only W1QWJ heard fairly regularly. Occasionally, bursts are heard from W2MDE and a short burst was heard from W2CCY. It seems that 250 miles over a reasonable path is not too difficult but 350 miles has to have the help of a good opening. It will be interesting when we once again get aurora to check if this can be used at 432 Mc. I know of nobody that has tried it." Sounds like George is still all by himself on 432 Mc. in the Montreal area but as any good v.h.f. man is not easily discouraged. Good luck George!

From Ontario, Canada, VE3DSE sez that conditions in his area (Toronto) on 144 Mc. have been quite good since about mid July. On July 13, he worked W2AZL W2AMJ and W2QHZ with good reports. On the 28th he worked W8DDO in Michigan. The best dates in August were August 9, 11, 13 and 14. On the 14th, Gus worked W3BDP in Delaware for the fifth new state since mid-July. September 6 brought contacts with WA9KRT in Indiana and W9AAG in Illinois plus VE2WT in Montreal who runs 35 watts to a single 8-element beam. VE3DSE now has a total of 12 states in seven call areas running 25 watts. "Antenna system is 32 elements 50 feet up and fed with Heliax. Receiving with homebrew 417A converter and 75A2. Operate mostly c.w. on 144.030 with some phone on 144.105. Have had no luck at all toward W1 land and would like some of the boys there to keep an ear open. Now building 829B for about 100-watts input and by end of the year will have a pair of 4CS250Bs on the air running the now legal 1 kw. in Canada. Also working on 432-Mc. converter and transmitter. Transmitter will have 5894 pushing a pair of 4CS250Bs to legal limit on c.w. and antenna for the present is a 21-element yagi fed with half-inch Alucell." Sounds as if VE3 land is really serious about the whole thing, too! Glad to hear it and hope to work you from KP4 land on 144 Mc.

From XE1PY/XE1P (everybody knows Rusty!) we have the following: "I've put up an 8 over 8 on



Getting a 28-foot parabolic reflector ready to mount at W1IGJ. (Where do those W1s get all those dishes?)

two meters at 110 feet, running a kw. c.w. and about 750 watts a.m. Am still waiting for the 7/8 foam Helifax to get the losses down but hope to have it shortly. With this I hope to give some of those 5s another country on two meters. The rig will be up to a full gallon soon. Am starting work on 432-Mc. gear and will put up a 60 degree horn on polar mount 4 meters on a side which I will increase to 8 meters if and when I can obtain adequate materials. The transmitter will be about 40-watts out to start but am trying to get stuff for a kw. Six has been fair and have had about 400 QSOs stateside this year. All districts except 6 but a few VEs. Nothing to the south at all." Very good to hear from you Rusty and hope you keep the news coming.

V.h.f. Code Practice

Amateurs in the vicinity of Kalamazoo, Mich., can get code practice nightly, except Thursday, by listening to W8ELW on 147.55 Mc. Transmission is with tone modulation, to enable those whose receivers are incapable of good c.w. reception to copy the code readily. Speeds of 4 to 14 w.p.m. are sent, beginning at 8:35 p.m.

This code practice is run in connection with an Adult Education Program of the Kalamazoo Central High School, where W8ELW is conducting Amateur Radio classes. He is assisted in the transmitting of the practice by W8EMD.

Utah Relay Club 2-Meter Repeater

After more than a year of concentrated effort by its ten charter members, the Utah Relay Club now has a 2-meter repeater in operation atop 7700-foot Lake Mountain, near Orem, Utah. The repeater site is a former TV station building, now leased by the club for repeater use.

Now that the system is operational, the club is accepting applications for membership. An open meeting will be held January 15, at 7 P.M., in the Alta Room of the Ramada Inn, 1000 South State St., Salt Lake City, to provide information on the repeater and the club for all interested amateurs.

The situation of the repeater is such that it provides coverage of most of the populated areas of Utah and southern Idaho, and its availability for extended-range communication should do much for v.h.f. interest in this region. Officers of the Utah Relay Club are Robert P. Brickey, W7QAG/W7ABU, president and trustee, Lovell A. Killpack, Jr., vice president, and Keith R. Anderson, secretary-treasurer.

2-Meter Activity in the Soviet Union

Some indication of 2-meter activity and progress in the Soviet Union can be gained from the Russian magazine, *Radio*. Joseph Zelle, W8FAZ, looks over this publication regularly, and he extracted the following information from the July, 1965, issue.

In the USSR, UA1DZ has worked 26 countries on 144 Mc. He is closely followed by UP2ON with 23, and UR2BU with 22. UP2KAB and UA1MC have 18 apiece, and UP2ABA, UP2KNP and UR2CQ have 15. UR2KAC has 14. The list of prefixes worked includes 27 different "countries."

A tabulation for Ukrainian stations gives the total number of contacts, the number of different stations worked, and the best DX on 144 Mc. for each station. The total contact figure is of interest primarily in connection with the number of stations worked, and it indicates that a lot of rag-chewing must take place on 144 Mc. The total time covered by the records is not given, but it is assumed that this is the grand total of QSOs. UB5KNM is the leader in this department, with 4761 contacts, though he is well down the list in stations worked, and DX covered.

Call	*Stations worked*	*Best DX, miles*
UB5KDO	198	810
UB5KNP	136	123
UB5KYU	130	302
UB5DNQ	115	302
UB5KNM	112	247
UB5DBE	88	222
UB5KYE	85	123
UB5DOM	48	1100

There are 15 calls on the original list, with the balance all in the lower brackets of both contacts and DX worked. Note that UB5KDO and UB5DOM have some pretty fair DX to their credit. It is well-known that a number of v.h.f. enthusiasts behind the Iron Curtain are keen for meteor scatter skeds, and this mode of propagation figures prominently in the records compiled by the leaders. QST

Strays

This was the second year that the Amateur Radio Council of Arizona placed station WA7AOW on display at the Arizona State Fair in Phoenix. Operation was on 80 through 2 meters and over one thousand stations were worked. Antennas were mounted atop a thirty-foot tower situated one hundred feet above the fair's grandstand roof! Shown in the photograph are Barry Goldwater, K7UGA, and Helen Gibson, K7UJV, helping out with the operation. Spectators watched the goings-on through a large plate glass window. Also on hand during the fair was Southwestern Division Director Shepherd, W6QJW.

—•••—

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.

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

1966—The Great Year

It's New Year's resolution time again and here is a suggestion for YLs everywhere. Let's resolve to talk more! It's often said facetiously that women are inclined to do a fair share of talking. Yet, were we to fire up our rigs and do just that in 1966, we could make the coming year a great one in YL communications.

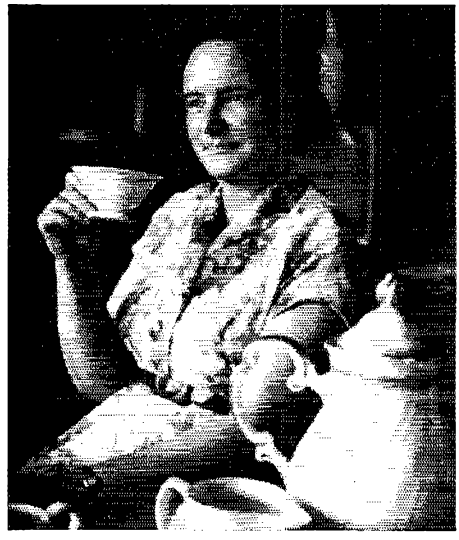
A surprising number of letters requesting information on YL certificates, how to join YLRL and for news of any YL activities are received frequently from all corners of the globe. Many radio operators are interested in YL activities and will be delighted to hear you talk more about them. All are not fortunate enough to receive the latest radio magazines and must rely on what can be learned via the air-waves.

All licensed YL radio operators are eligible to become members of YLRL, the Young Ladies Radio League. The YLRL is the only international womens' radio organization in existence and enables women all over the world to become better acquainted.

Organized in 1939 by a handful of interested YLs, YLRL has numbered as many as 1000 members. Their goal for the coming year is to see the membership double. This can easily be accomplished if we all stick to that resolution and just talk a little more.

YLRL sponsors and provides awards for the YL/OM contest, the YLAP, for many YL certificates, *i.e.* YLCC, WAC/YL, WAS/YL and DX YL. As a member, you also receive their *Harmonics* publication which includes news from YLs all over the world.

Last month's column mentioned YLRL's DX Adoptee plan in connection with the cordial greeting extended to G2YL while visiting in the U.S. Nell was greeted royally by many different YL groups from coast to coast. Nell had been a friend to many YLs through her YLRL membership for years. Many such happy stories can be told as the result of adopting a DX YL.



Ursula, DL3LS, has been WRONE's DX adoptee for six years. She and her OM, Henry, DL1RA, have been licensed since 1949. Courtesy of K1IIF.

Peabody, Mass. was the scene of the WRONE fall luncheon meeting which was well attended by these 37 smiling members.

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

Baylarcs who gathered in honor of the visit of their DX adoptee, G2YL, are: front row (l. to r.) WA6ALK, WB6GID, W6QMO, Norine Dodge, WA6PTU; center row (l. to r.) W6BDE, G2YL, WA6PKP, WA6LIZ, WA6OGK, WA6GQC, WA6UAH; back row (l. to r.) WA6DPN, K6ZKH, K6BGM, W6PCN, K6USC, K6AIU, K6SZT, WN6PJL, WA6QQH, WA6JGR.

In 1961, YLRL published a directory of YLRL activities which included a list of all members. At that time, six DX YLs were listed. The 1965 list included sixty-nine DX YLs and the number has no doubt grown since publication of that list in June.

YLRL's DX adoptee plan has had a considerable effect on this tremendous upswing of interest among YLs all over the world. The plan was begun because of money exchange difficulties between countries and has proven very successful and meaningful to many. Any YLRL member or club can sponsor, or adopt, a DX YL and find that many great pleasures will be the result.

To quote from a letter to YLRL's International Chairman, K1LCI, from Bobbie, ZE7JK: "I wonder how many of your girls in the U.S. realize what it means to us DX YLs to be invited to join your sisterhood. We are, of course, members of the worldwide fraternity of amateurs and are very proud to be so, but whoever thought of your adoption scheme really deserves our unending and heartfelt thanks. So many of us are like voices crying in the wilderness — in Salisbury here we have 3 YLs on the air, but owing to the diversity of our interests and the distances apart that we live, we see very little of each other. But, through your wonderful scheme we feel ourselves a very personal and intimate part of the YLs of the States and the world in general."

Further information regarding YLRL membership can be obtained from the President, Kayla Bloom, W0HJL, or from any of the 1966 officers listed in Nov., 1965 *QST* on page 98.

Let's talk more about all YL activities! Let's participate more! We can make 1966 the greatest year yet for YL communications!

Rules 17th Annual YL/OM Contest

Time:

Phone — Sat., Feb. 19, 1966, 1300 EST to Sun., Feb. 20, 1966, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

C.W. — Sat., Mar. 5, 1966, 1300 EST to Sun., Mar. 6, 1966, 2400 EST. (1800 GMT Sat. to 0500 GMT Mon.)

Eligibility: All licensed OM, YL and XYL operators throughout the world are invited to participate.

Operation: All bands may be used. Cross-band operation is not permitted. Note: This does not mean you cannot work a station in the DX portion of the band. You must use same band and mode.

Procedure: OMs call "CQ YL." YLs call "CQ OM."

Exchange: QSO number, RS or RST report, ARRL section or country. Entries in log should also show band worked at time of contact, time, date, transmitter and power. (ARRL section list available for s.a.s.e. to YLRL V. Pres.)

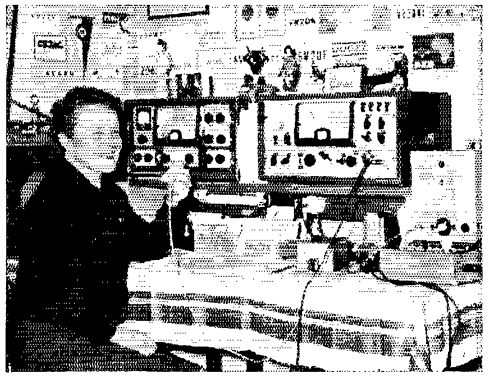
Scoring: (a) Phone and c.w. contacts will be scored as separate contests. Submit separate logs.

(b) One point is earned for each station worked, YL to OM or OM to YL. A station may be contacted no more than once in each contest for credit.

(c) Multiply the number of QSOs by the number of different ARRL sections and countries worked.

(d) Contestants running 150 watts input or less at all times may multiply the results of (c) by 1.25 (low-power multiplier).

(e) S.s.b. contestants running 300 watts p.e.p. or less at all times may multiply the results of (c) by 1.25 (low-power multiplier).



HB9YL, Anne, also a DX adoptee, was the first licensed YL in Switzerland. She and her OM, HB9TT, keep their homebrewed station very active on the air. Courtesy of both K3BTT and K5OPT.

Logs: Copies of all phone and c.w. logs, showing claimed scores and signed by the operator must be postmarked no later than March 21, 1966, and received no later than April 11, 1966, or they will be disqualified. Please file separate logs for each section of the contest. Send copies of logs to Edie McCracken, K1EKO, P.O. Box 285, Westwood, Mass. 02090.

Awards: 1st place phone: YL — Cup OM — Cup
1st place c.w.: YL — Cup OM — Cup
The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to high place c.w. and phone winners in each ARRL district and country. No logs will be returned. Be sure it is a legible copy of your log you send for confirmation.

Chain Reaction

W6TCN, K6SDS and K6POC are all YLs, all related and what's more, all owe the joy of becoming radio amateurs to one OM, Stan Saueressig, W6ESW. Stan's enthusiasm managed to spark his mother's interest in amateur radio which has since developed somewhat of a chain reaction.

In 1940, Stan's mother, Mary Peffly, W6TCN, became licensed. During WW II she worked for the Signal Corps and since has pursued a most active amateur radio career. One of the Los Angeles YL Club's charter members, Mary is also the founder of the Great-Grandmother Award. She has many certificates and has been on all bands and modes. Currently, she operates mostly 40-meter s.s.b. She enjoys making and painting her own QSL cards. You'll hear Mary operating weekends from Pine Valley, Calif. using her original call. During the week she uses W6CEC, a recently acquired second call, from Long Beach.

Joan, K6POC, owes her interest in ham radio to Mary, who taught her the code and gave her the Novice test in 1955. Six weeks on 40-meter c.w. was all it took to really sell Joan on ham radio and at this point she took and passed her General exam. Shortly thereafter, the chain reaction grew to include Joan's mother, who became K6SDS. Except for family skeds, Joan's radio activities were curtailed somewhat for a few years because of a busy career as an airline stewardess. In 1959, she and Stan, Mary's son, were married. The day that she worked Japan with only 25 watts c.w. and a long wire, Joan was bitten by the DX bug. Now a well known top DXer, she has contacted 265 different countries and is striving toward 300. A member of the West Gulf DX Club and the YL International Sidebanders, Joan operates on 15 and 20 meters both c.w. and s.s.b.

Until Joan's mother, Alice Zaruba, K6SDS, retired from the Los Angeles Board of Education last winter, her main ham activity consisted of family skeds. This kept up her code speed and provided fun at the same time. Alice now lives in Pine Valley, Calif. and has become another very active YL using a new Swan 140 and working toward her WAS and YLCC.

This reports only part of the chain reaction, however. Certainly someone sparked Stan's interest in the beginning!

DXCC YLS

The October, 1965 list of DXCC YLs continues to grow.

Cert. No.	*Issued*	*Call*	*Total*
1407	Dec., 1951	VK3YL	247
5791	Sept., 1961	K4MTY*	
7535	Jan., 1965	K8VUR	232

* Sybil Allbright, ex-K4MTY and W1BAF, is now KA2SA and the only YL holding a KA call at the present time. She has worked toward DXCC from many different QTH's since her OM, Capt. London Allbright, KA2LK, is in the U.S.A.F. While stationed in S. C., they both made an all-out attempt to complete 100 confirmed contacts and at departure time, Syb lacked 1 QSL. At this point, her OM was sent overseas; Syb went to California. Fortunately, his tour of duty took him near a DX amateur station whose card Syb had hopes to yet receive for that grand total of 100. We all can hope for cards, but not always add such a personal touch! You guessed it, her 100th card was personally delivered to her in Calif. upon her OM's return home. They now operate mostly s.s.b. between 14,250 and 14,300 kcs.

YL Club News

The Portland Roses began their 11th year by electing the following new officers: Pres., Lill Pullen, W7GRC; V. Pres., Donna Gettman, W7QKU; Secy., Bettie Mayer, K7BED; Treas., Pat Ziegler, W7NOK; Pub. Chr., Dorthie Mallison, W7REU.

TYLRUN — Texas Young Ladies' Roundup Net celebrated their 12th birthday in November and the following officers were elected for 1966: Pres., Helen Harvey, K5YFC; V. Pres., Pearl George, W5COT; Secy-Treas., Julie Young, K5JFJ; Pub. Chr., Irma Huebner, K5TZU; Grapevine Editor, Cory Needles, K5UKK.

Coming Events

The annual Midwest YL Convention will be held May 13, 14 and 15 at the Flying Carpet Motor Inn just outside Chicago, Ill. The motel is adjacent to O'Hare Airport and conveniently located near the principal expressways leading into Chicago. The LARKS, hostess club for the event, are hard at work on plans to make this a shindig YLs will long remember. Registration is $2. until April 1; $2.50 later. Available from: Diane Price, K9TRP, 6123 N. Rockwell, Chicago, Ill. 60645.

Alice Zaruba, K6SDS.

Joan Saueressig, K6POC.

Mary Peffly, W6TCN.

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
LILLIAN M. SALTER, W1ZJE, Administrative Aide GEORGE HART, WINJM, National Emergency Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards ELLEN WHITE, WIYYM, Ass't. Communications Mgr.
GERALD PINARD, Club Training Aids PETER CHAMALIAN, W1BGD, Communications Asst.

About DXCC. People keep telling us that we've been in a sun-spot depression, that conditions have been punk, that better days are coming. Sometimes it's hard to believe that we've been in a slump, especially when you look at what has been happening to DXCC. This month the Honor Roll listing alone occupies a good half-page of space, a year ago it occupied perhaps a third of a page, two years ago about a quarter of a page. The number of endorsements for DX-chasers a little further down the ladder has grown at the same rate. Now, with better DX conditions just around the corner, more openings on 21 and 28 Mc., longer openings on 14 Mc., what will happen to our *QST* listings of DXCC activity? Every prediction is that they will get longer and longer, and soon out of bounds in both administrative workload and magazine space.

In order to handle this increased DXCC activity, ARRL is streamlining procedures in a number of areas. This will result in more expeditious handling of your DXCC certificate and endorsement applications and thus better service for everyone.

First of all, the annual December listing of all "current" DXCC participants (those who have submitted certificate or endorsement applications during the previous 24 months) will be continued, including the separate Honor Roll. The Honor Roll will also be carried in the June issue of *QST* each year. Applications for endorsement stickers will be accepted only in lots of 20, for those with totals below 300, or in lots of 10 above 300. Note that this month's listings are alphabetical by call sign. This procedure will be continued in the future. No more fumbling around in the listing to see how you or your buddy stacks up. Finally, because it is no longer necessary to encourage phone operation through the awarding of a separate DXCC certificate for phone, and because the participants on the "combined" and "phone-only" list are pretty much the same fellows, a separate certificate for phone will not be issued after December 31, 1966. After that date there will be but the one DXCC certificate whether you work all 100 countries on c.w., phone, RTTY, or whatever.

With this streamlining, we think we will have little difficulty in handling the upsurge of DXCC submissions that we expect in the months to come as a result of many of our newer amateurs enjoying the improving DX conditions.

The New Year — 1966. What's in store for amateur operators? We can each speculate. The year may offer different opportunities to different groups. Propagation conditions seem definitely on the upward path for 1966. The *versatile* amateur operator should, of course, take advantage of each frequency band he is entitled to use. During the present winter and in recent years "skip" conditions on 80 and 40 have plagued the nets. Wider band use can circumvent this! To be able to switch to v.h.f. and 160 will prove a boon to all who have this trouble. We urge and recommend some auxiliary equipment, if necessary, for these bands to permit you to get the most use from all the bands in '66. It will mean efficient operating and maximum results in traffic handling and casual work. To the traffic man and DX'er, the v.h.f. operator and RTTY enthusiast, to *all* who like to find some new and interesting operations and to work with optimum signals for practical distances covered may we say *"Use that band switch."*

A New Year's Resolution. The following is practically standing operating procedure for every good amateur station. Please observe an injunction from Op. Aid No. 11: for local contact use local frequencies; bandswitch! make operations clean-courteous-concise, pass on accurate honest signal reports and include tactful mention of any signal defect. On request we'll send Operating Aid 11 giving this and other points for efficient occupancy, and also Op. Aid 9A if you don't have one in the operating position. The latter can be a guide to message form, precedences and some of the most-used abbreviations.

Which Goal to Work For? What we each get from amateur radio in the New Year will be strictly in proportion to what we put into it. There are questions we should ask ourselves if we are to look for new attainments, recognitions or goals. A fellow needs to dedicate his efforts to a new attainment to get a new experience. Are we in a rut? Have we ever held an SCM appointment, a net membership, ORS, OPS, OES, CP certificate, WAS or DXCC? Have we emergency powered equipment? Do we belong to a local communications group for organized disaster assistance? Whatever we *have* done, '66 is not a year to rest on our laurels.

For Novice and Technician. There's a "spot" activity this month that you shouldn't miss, the VHF Sweepstakes, January 8 and 9.

Follow the rules, as set forth completely in December *QST*, and let us know how you make out. For all who can work 50 Mc. and the higher bands, this is *your* contest. This is a proven top interest activity, with a chance to give your station a real work out. We can almost guarantee that you will add new states and ARRL sections to your v.h.f. contact record. We need you also, and you need to have *regular* operating organization connections. For your longer term success and constructive part in amateur radio, we invite your participation in the organization and support of net operations in the v.h.f. bands. There's an OES Appointment from one's SCM for those who report activity regularly, a recognition for consistent effort. It's an old fashioned idea that the v.h.f. appointment is *only* for the fellow reporting "propagation phenomena". OES also is definitely for all who exemplify and demonstrate the workability of six and two-meter nets and their *communications potential*. You will all want to be in this.

More and more reliance will be placed on *operative nets* in the v.h.f.'s. You can't help but enjoy the fraternal side of working closely with a group. Having an objective capability for handling formal communications puts an operation a cut above just rag chewing; it creates a potential capability for traffic and public service work. We're hopeful more and more nets will be on a more-than-once-a-week basis and will cover lots of city and country areas! Wherever possible we suggest that such nets find one or more members to be a liaison or connecting link to the daily-operating h.f. section net, too. This gives novices advantages of the inter-connection to the National Traffic System. One last word if you are holder of a Novice license, count on getting into that Novice Round-up (in February). The details of the coming activity then are announced in full elsewhere in this issue.

Field Day Rules Again. In June '65, *QST*, we brought up the suggestion of a bonus for FD groups in the '66 FD to meet certain "spirit of Field Day" objectives. K5QIN reports that his group *tried* the new rules and it made the group operation a much greater success. He urges that *set-up time* for Field Day equipment be made a part of the 24-hour operating period as a way to insure that groups make this factor part of their advance planning and the FD test. Little comment came from others. We shall now appreciate prompt comment to be evaluated as a guide to future rule-making. To get a "bonus" FD groups and clubs might be required to meet, perhaps, three of five objectives (1) at the site to start with no existing poles, towers or pre-established man made antenna supports (2) a home built transmitter in use (3) setting up accomplished in less than 6 hours (4) no commercial power for *any* purpose during operating hours (5) no special electronic devices used to pass transmitters between operating groups to stay in same transmitter class. May we hear from all interested Field Day groups on this matter? How many bonus points? Which of the points would you most like to see incorporated? All or none of 'em? Here are K5QIN's views:

"Our AREC group tried those rules originating with the Los Alamos Amateur Radio Club this year and found FD a much better success than ever before. We set up our whole operation in two hours from the time we arrived at the site. This was accomplished by careful planning and having everyone at the site to assist in setting up. Result: we have now several hams trained in the fine art of setting up, instead of only a few. (The few bugs in our preparations were corrected).

"I feel very strongly that rules of this type should be put into effect because Field Day is a primary training exercise for AREC members. *The set-up time of Field Day should be made a part of the 24 hour operating period.* This insures that all groups taking part make an attempt at *advance planning*. . . . I also feel 24 hours of operating time may be a little too long. It may be desirable to have one starting time for the whole country to further the competitive aspect but on this you are in a better position to judge. . . ."

Failure to Identify. Improper station identification rates quite high on the list of things for which amateur operators receive citations and advisory notices from FCC. The lesson for all is *not* to drop off a prefix or numeral, and to be sure *both* the call of station worked and your identifying call are given, and at the intervals prescribed in FCC's Sec. 97.87. RTTY specialists in amateur radio might take a hint from many voice-operated stations that use a 10-minute timer to avoid citations for failure to identify

RESULTS, SEPTEMBER FREQUENCY MEASURING TEST

The September 8, 1965 FMT, open to all amateurs, brought entries from 310 participants who made a total of 988 measurements. Of these 127 ARRL Official Observers submitted 401, and 183 Non-OOs made 587 readings. All taking part have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed showability of the highest order in Frequency Measurement.

Following is a report of the standings of the FMT leaders in this test. In consideration of the minimum possible error, due to "doppler" and unavoidable factors, we accredit as of equal merit all reports where computations show 4/10ths parts per million or higher accuracy. Our direct comparisons with the umpire's readings otherwise establish this order of listing.

QST will announce details on the next ARRL FMT.

Observers	*Parts/ Million*	*Non-Observers*	*Parts/ Million*
W1BGW W2PZI W4JUI W6GDO WØYTQ	(0 to .4)	W1PLJ K2IYC W4HER W4UWH K6ALH W6CDF K6RTD W6SPB W8LZY WØAIG R. Ireland	(0 to .4)
W2AIQ	1.1		
KØBRS	1.1		
W4NTO	1.5		
W2BVE	2.2		
W6GQA	2.3	WA2ANU	.7
K3FEJ	3.3	K3RZX	.8
W1FFH	3.4	W6NCP	.8
W3RDZ	3.8	K6MIZN	1.1
K3CYA	4.1	W8UPW	1.1
WØLBS	4.9	W5PSY/8	1.1

at proper intervals. Observer reports and intruder watchers trying to identify interlopers in our bands are handicapped (and comment) about the RTTY'ers who fail to identify properly to meet the ten minute requirement.

Report Your VHF Traffic. Reporting traffic whether handled on v.h.f. or h.f. is important, so that your call and results will be set down in Station Activities. This action has a net result making a summation of our efforts reportable for the nation. *Every amateur* is cordially invited to report and form cards to facilitate the report of message-handlings on a monthly basis are freely available, gratis, on request to Headquarters. Send us a radiogram and we'll send you three or four of these forms and a list of the numbered-text messages. Many more messages are being handled now on the v.h.f.s. Each station knowing the procedure and participating and reporting is eligible for ARRL's OES (Official Experimental Station) Appointment.

— *F. E. H.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Oct. Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPL	79	3454	3325	129	6987
K0ONK	134	2027	2000	18	4179
W3CUL	193	1963	1590	291	4037
W7BA	8	1152	1034	114	2308
WA2RUE	111	906	863	72	2042
K6EPT	126	847	512	335	1820
K7TCY	34	618	492	100	1244
W3EML	103	592	430	20	1145
W7DZX	11	587	506	21	1125
WA4SCK	22	537	532	10	1101
W6WPF	6	520	486	34	1046
WA9CCP	122	445	311	5	883
K9IVG	18	413	346	13	790
K5TEY	33	440	312	2	787
WA9CNV	7	392	265	89	753
W6RSY	23	352	102	246	723
W1CRX	137	292	249	18	696
W7HMA	10	321	342	0	673
K8QKY	77	303	263	10	653
W1BGD	10	318	216	102	646
W8UPH	16	316	265	46	643
W5NAR/0	27	310	284	14	635
WB6BBO	64	288	255	11	618
W0JKT	88	266	224	36	614
W6ZJB	9	298	289	5	601
K0GSY	18	267	284	1	600
W4BMC	371	116	95	15	597
WA9NFS	30	265	246	36	577
W4NAIL	86	375	80	8	549
WB6JUH	22	264	221	40	547
W6YKS	4	273	259	5	541
W9DYG	32	272	218	6	528
WB6GMM	8	269	187	63	527
W1PEX	105	212	186	18	521
W0OHJ	5	258	258	0	521
W6LGG	21	270	214	3	508
WA7EBR	31	243	221	10	505
W6VNQ	22	243	232	6	504
W6TYM	23	233	236	9	501
Late Reports:					
K3ZYP (Aug.)	179	186	21	172	558
WA3CFV (Aug.)	20	247	173	94	534

More-Than-One-Operator Stations

W6YDK	7097	417	391	26	7931
W6IAB	948	1415	988	432	3783
K6MCA	299	851	810	20	1980
KR6GF	892	36	10	20	958
W4BOW	140	327	324	4	795

BPL for 100 or more *originations-plus-deliveries*

WA8CXY 339	WA9CCQ 127	WA4YSE 108	
K5MBK/5 189	W1BDI 126	VE4QX 106	
WA4AGH 185	W2OE 126	W2URP 105	
W7APS 177	W8BZX 119	WA4NEV 105	
K4NMZ 176	WA3CFV 118	WA4URN 105	
W0ZWL 149	W6UDL 114	WA9GJU 104	
WA7CFY 143	K3RZE 112	WA8CFJ 102	
K4YSN 134	K9WMP 111	K4KJD 101	
K9IMR 134	WA9MKF 110	Late Reports:	
VE3DRF 133	WA3CBL 109	WA9CNV (Sept.) 112	
WA2UCP 129	K1CLM 108	W2ZRC (Sept.) 101	

More-Than-One-Operator Stations

KR6D1 265	W6CXO 229	WB4ABF 116
	KØLIR 138	

BPL medallions (see Aug. 1954, p. 64) have been awarded to the following amateurs since last month's listing: WA5INZ.

The BPL is open to all amateurs in the United States, Canada, and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

DXCC NOTES

In order to streamline administration of DXCC and provide better handling of applications for certificates and endorsements, the following changes are being made.

1) After this issue, the Honor Roll listing will be carried in the June and December issues of *QST*. A listing of endorsements and certificates earned below the Honor Roll level will continue in each issue, and the over-all listing will continue in the December issue as at present. All listings will be alphabetical by call sign, under the appropriate country total, as illustrated in this month's Honor Roll listing.

2) Effective March 1, 1966, applications for endorsement stickers will be made in lots of 20 for those whose totals are below 300, and lots of 10 for those with totals over 300. For example, if you have 120 confirmations now credited, you should not make further application until you have 20 more cards, to reach the total of 140. If you have 125 confirmations now credited, you should not make further application until you have 15 or more cards, to reach the total of 140. In both cases, your next application would be when you had enough cards to bring you a total of 160. Should you have a total of 303 now credited, an application with seven cards would be accepted, as it would bring you up to a 310 total. *QST* listings will be shown at the appropriate 20 (or 10) card endorsement levels.

3) Further card submissions from those on the Honor Roll will be accepted only during the months of March and September, for the June and December Honor Roll Listing. If you have enough new cards to bring your corrected total up to that of the last-place station on the previous Honor Roll listing, you may submit them during March or September without being held to the 10-country limitation specified in paragraph (2) above.

4) Up until December 31, 1966, separately-endorsed DXCC certificates will continue to be issued for phone. Each DXCC application after that date may include cards indicating work by any legal mode, but a separate DXCC certificate endorsed for phone will not be issued. Effective January 1, 1967, all endorsements for any DXCC certificate will be issued regardless of mode of operation. That is, if you have a phone DXCC certificate, your applications for further sticker endorsements to your countries total may include both c.w. and phone contacts — no distinction will be made by ARRL.

See "Operating News" this month for further background.

—•••—

Announcement is hereby made of three additions to the ARRL Countries List. The additions are as follows: *Spratly Islands, Ebon Atoll* and *Cormoran Reef*.

Spratly Islands is territory with historic claims by four different countries but territory in the possession of no one country. This territory is located approximately 775 miles northeast of Singapore in the South China Sea.

Ebon Atoll is located in the Marshall Islands group at 167 degrees East and 4 degrees North. Confirmations for operation from Ebon Atoll made under permission from either Ecuador or the U.N. Trust Territory will be accepted for credit.

Cormoran Reef is located in the Western Caroline group at 134 degrees East and 8 degrees North. Operations from Cormoran Reef made under permission from either Costa Rica or the U.N. Trust Territory will be accepted for credit.

Confirmations for contacts with all three of these additions may be submitted for DXCC credit starting March 1, 1966. Confirmations received for these listings before March 1, 1966 will be returned without credit.

DX CENTURY CLUB AWARDS

Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given including deleted countries. All totals shown represent submissions received through October 31, 1965 and are shown alphabetically by call.

CX2CO....316/336
HB9J......316/339
W1BIH....316/339
W1JYH....316/338
W2AGW....316/339
W3GHD....316/339
W3KT.....316/339
W4DQH....316/339
W4GD.....316/336
W8BRA....316/338
W8EWS....316/339
W8PQQ....316/332
W9RBI....316/340
G2PL.....315/337
G3FKM....315/331
G4CP.....315/338
PY2CK....315/337
W1FH.....315/340
W1GKK....315/339
W2JT.....315/333
W2TQC....315/333
W2ZX.....315/333
W3GAU....315/337
W4QCW....315/331
W6AM.....315/339
W6CUQ....315/339
W6YY.....315/334
W7GUV....315/337
W7PHO....315/332
W8BF.....315/335
W8HGW....315/339
W8JBI....315/333
W8JIN....315/339
W8MPW....315/332
W8UAS....315/335
W9LNM....315/337
WØQVZ....315/335
4X4DK....315/332
CE3AG....314/337
K3UPG....314/337
W1CLX....314/336
W2BXA....314/337
W2LPE....314/334
W2LV.....314/332
W4AIT....314/336
W4ML.....314/333
W5AFX....314/338
W8KIA....314/337
W9HUZ....314/333
W9NDA....314/337
WØDU.....314/335
DL3LL....313/328
K2BZT....313/329
LU6DJX....313/336
W2BOK....313/329
W2SUC....313/329
W2WZ.....313/335
W3JNN....313/336
W3LMA....313/334
W5ABY....313/329
W5CKY....313/331
W5KC.....313/335
W5MMK....313/333
W7GBW....313/336
W8LKH....313/332
WØAIW....313/335
WØELA....313/335
DJ1BZ....312/329
G3AAM....312/335
OE1ER....312/333
W1HZ.....312/329
W2ZGB....312/327
W3ECR....312/328
W4OPM....312/326
W4TM.....312/333
W4VPD....312/328
W6CYV....312/329
W6GPB....312/332
W7ENW....312/335
W8DMD....312/333
W8KML....312/332
WØBFB....312/329
DL7BA....311/327
G8KS.....311/328
K2DCA....311/327
K4LNM....311/324
K6EVR....311/327
K6ENX....311/327
KV4AA....311/324
VE3CFG....311/324
VE7ZM....311/334
W1ME.....311/333
W1MV.....311/327
W2AYJ....311/329
W2DEC....311/326
W2LAX....311/327
W2OKM....311/328
W2TP.....311/319
W2UVE....311/328
W4LYV....311/330
W4PLL....311/325
W9AMU....311/327
WØNTA....311/330
WØSYK....311/328
5Z4AQ....311/328
DJ2BW....310/326
I1AMU....310/328
K2LWR....310/322
K2OEA....310/325
W1HX.....310/329
W1ZW.....310/326
W2FZY....310/322
W3RNQ....310/327
W4OM.....310/331
W5UX.....310/324
W8DAW....310/333
W8IRN....310/327
WØQDF....310/326
DL6EN....309/323
HB9MQ....309/325
K4AIM....309/322
ON4DM....309/327
PAØFX....309/328
W2FXN....309/322
W2HTI....309/323
W2NUT....309/324
W2SAW....309/325
W2SSC....309/324
W2TVR....309/326
W2YTH....309/326
W3WGH....309/323
W4GXB....309/329
W4MR.....309/328
W6EPZ....309/329
W8PUD....309/325
WØQGI....309/324
DL1IN....308/323
DL3RK....308/324
G3FXB....308/325
K2UVU....308/320
VK3KB....308/330
W2GUM....308/329
W2PCJ....308/324
WA2IZS....308/324
W3CGS....308/326
W3JTC....308/330
W3NKM....308/324
W5KBU....308/325
W5OLG....308/328
W5QK.....308/318
W6BZE....308/327
W6WWQ....308/324
W7AC.....308/331
W8NGO....308/324
W9GIL....308/324
WØPGI....308/322
HB9TL....307/322
K4RPK....307/315
K5TJL....307/315
K5BGB....307/319
W1BAN....307/319
W2DOD....307/324
W4BJ.....307/318
W4ZRZ....307/312
W6TZD....307/327

Radiotelephone

CX2CO....316/336
W3RIS....316/340
PY2CK....315/337
W2ZX.....315/333
W4DQH....315/336
W6YY.....315/333
W7PHO....315/332
W8BF.....315/335
W8GZ.....315/337
W8HGW....315/336
4X4DK....314/331
PY4TK....313/329
W2JT.....313/326
W3JNN....313/333
W9JJF....313/329
W9RBI....313/335
W1FH.....312/332
W8PQQ....312/328
WØAIW....312/332
5Z4ERR....312/333
W2BXA....311/332
W6AM.....311/334
W8KML....311/331
DL3LL....309/324
G2PL.....309/328
G3FKM....309/322
I1AMU....309/327
ON4DM....309/327
W4QCW....309/321
TI2HP....307/328
W3GHD....307/324
W3KT.....307/325
W9NDA....307/326
G8KS.....306/319
K4TJL....306/314
W2HTI....306/320
W9WHM....306/321
WØQVZ....306/320
K4AIM....305/318
W2GLF....305/318
W2OKM....305/320
W2TP.....305/320
WØJYW....305/320

New Members

W4BHG....243
OK3KAB....207
SP6ALL....153
W3ZNB....151
K4SMX....150
KØBUU....134
VE8AA....112
K4IEP....111
K8YTY....111
VE3BJK....110
W1BGD....110
KØZGC....109
UW3AM....109
K9MWE....108
WØJQQ....108
WAØKDI....108
K4CK....107
PY1BTX....107
WAØAHL....107
K5LMG....106
OK1IQ....106
UB5PG....106
UA3KET....106
WA4KXC....105
K1DNW....104
K4SWO....104
LA8D....104
WA3BHY....104
OH1NM....103
UV3TQ....103
SM5CON....102
WA4NBC....102
WB2JYN....102
G3FLS....101
K3FGO....101
K1OGA....100
K3SMN....100
K6PJT....100
K9GEL....100
KG6AIU....100
OK3CAU....100
TF2WBZ....100
UA3BK....100
WA8ETX....100
WAØBGU....100

Radiotelephone

DJ5AA....206
DL7EN....202
K1AQI....170
W2BRK....155
K2KER....151
VE3EDR....139
OHØNI....129
JA1CYV....112
WA4WAO....111
OK3EA....110
K4IEP....109
OK3KAB....109
WA5LJU....108
WØJQQ....108
W6PQT....107
W8FOV....106
WØCQT....106
YV3KV....106
W5KTW....105
W4BHG....104
W2ONK....103
W2URM....103
WA3BHY....103
VE3FKL....102
K9BTU....101
ZD8JC....101
G3RHM....100
W6JKJ....100
W6KWU....100

Endorsements

W5CE....321
WØMLY....320
W6ANN....313
OK1FF....311
W2FXA....310
W6KSM....310
W5WZQ....309
W1MQV....302
W1OJR....300
W1VG....300
W6TXL....300
G3KZI....290
K4SCT....290
W2PDB....290
WA6TGY....290
K8IKB....290
W9HLY....290
I1ZL....281
W8IBX....280
W8YCP....280
W7BGH....276
W8YCP....273
G2FFO....271
VE7CE....271
WA2RAU....271
W7AUS....271
YV5BBU....271
W5KTW....270
W8KIT....270
W9IHN....270
W6REH....266
LA6U....265
W4QVJ....264
W7HDL....264
W6NWI....263
W6PQT....252
DL1IA....251
OH2YV....251
K7ADL....250
LA5YE....250
W3KDF....249
K1IMP....244
W1IKB....243
W4VMS....241
W2VYX....240
W9QQW....240
UC2AR....237
F3AT....234
W8LAV....234
WB2HXD....233
K8VUR....232
W3PH....232
HB9TT....231
G3JOC....230
OK3EA....230
W1DGJ....230
W1GDQ....230
W1BPY....221
W4SNU....221
W9MZP....221
WØNGF....221
W2LJF....220
W4BRB....217
ON4QJ....213
VE3DDR....212
WA2JBV....212
K8AJK....210
VR2DK....210
W2MEL....203
SM5BVF....201
K2KBI....200
W4GHP....200
W7MX....200
W9WNB....192
DJ2SR....190
PY2BGL....190
SM5AM....190
W7JWE....190
W8RCM....190
VE6ABP....186
OK3IR....183
VE3EUU....183
WA4FKJ....183
DL7DE....181
K1GAX....181
W8NAN....181
SM5BIU....180
W4OMW....180
W2HUG....178
VE3ACD....174
W9MCJ....173
W1LBA....172
W2JSX....172
K3JLI....171
WA2BRI....171
K3LJZ....170
K9WJU....170
K9YOE....170
LA5ID....170
W1GOG....170
KØTYO....160
W4ZXI....160
W7FUL....160
K4GLA....156
UA1DI....156
OK1ADP....155
UB5DQ....155
K2HVN....153
VE7BFN....153
F9EP....151
K5LIL....151
K2AFY....150
WØGTO....150
K3AMI....149
WB6AKZ....148
W2LWI....143
K4ZJF....141
WB6GVV....141
WA8CZH....141
UI8LB....140
K4HPR....140
W1DDO....140
W1MRQ....140
WA2ZKO....140
W9IGW....140
K2GTF....138
SM5ARQ....133
W1CSP....131
EA3IH....130
WA4LXX....130
K8BPX....130
W9FRS....130
KØMLM....130
WA4WAO....128
W7RVM....127
K5BZU....125
WA9NHI....121
DJ8IF....120
K3EKO....120
K4LDR....120
K9VYT....120
VE3DKE....120
VE3CLK....120
WA2CUI....120
W3AG....120
WA4FDR....120
W5EIL....120
KA2CM....119
WB6LZI....117
VE7AC....116
W3HNK....115
K4THA....114
WØNCK....113
W1ATP....112
K1QPN....111
UB5FL....111
K1EWL....110
K1LDK....110
K1QGC....110
K1ZND....110
K2DDK....110
K4KLR....110
WA2BEX....110

Radiotelephone

K4HEF....303
PY4CB....300
W1CLX....300
W9LNM....300
W2PTM....281
W4SSU....281
W9UZC....280
WØMLY....273
WA2ELS....271
W8BGU....262
PAØSNG....261
YV5BFT....261
W4FPS....260
W6REH....260
K4ASU....256
WØLIL....251
LA5YE....250
W4HUE....241
WA2EOQ....241
IT1TAI....240
WA2HOK....240
W1DGJ....230
K8VUR....225
9M2DQ....223
W4BXG....222
W2LEC....220
PAØEEM....215
WB2HXD....211
W3BSC....211
K1IDW....210
K2YLM....210
W4VMS....205
VE3RE....201
DL6PC....200
K6HZP....200
SM5CZY....200
WA4JOS....191
CE3WN....190
I1BRN....190
W9JT....190
WØGEK....190
W9QQN....188
K1IMP....183
VE3EUU....183
W4PLL....183
K4FTZ....180
K2JMY....179
VE6ABP....179
SM5VS....175
K8AJK....174
VE2ANK....174
W2JSX....172
W8LAV....170
VE3CJ....166
W3PN....166
LA5ID....165
I1LX....163
VE3ACD....163
KØYEF....162
K3HHY....161
K1HVV....154
WØOMH/5....152
W1BPY....151
W2CES....151
W5NXF....151
W1BAB....150
W6WNN....150
W9DNE....150
WA5KBK....150
K1INO....149
K8IKB....142
W9GXH....142
W9ADV....141
K8GOP....140
W2PDB....140
WA2FQG....140
W5VBE....134
WA2OJD....131
WB6GVV....127
WA2JBV....123
KØBUR....12[illegible]
VE3BSJ....120
I1YRK....113
W5NW....110
WB2HIZ....110

OCTOBER CD PARTIES

If it keeps up at the current accelerating rate it looks as if 200-K rather than 100-K will have to be the future "cut-off" point for the c.w. CD Party! The October Parties were very well attended with fine scores in both sections. Eight broke 200-K c.w. and ten broke 20-K on phone. Highlights include a welcome turnout of all California sections, unbelievable 80-meter activity, a good turnout on 15, better than average phone participation and if you missed Connecticut you just weren't there! The Hq. crew (both modes) amassed over 800-K and all reported an enjoyable time working the CD gang. The October Parties and the excellent results surely portend a great SS report later this year.

The following *high-claimed* CD party scores show claimed score, number of QSO's and sections. Final results will appear in the January '66 *CD Bulletin*. — *W1YYM*

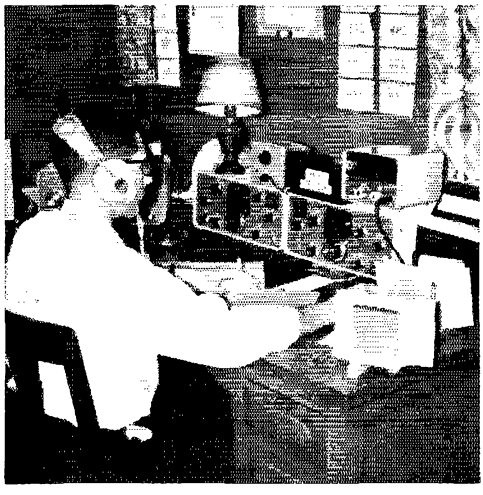
C. W.

K1WJD....251,130-754-66
W1BGD....236,610-710-66
K2EIU/5...235,620-707-66
W9AQW....228,360-692-66
W9RQM....227,465-672-67
K4VFY....221,100-654-67
WB2ALF...219,120-658-66
K2AJA....201,500-613-65
W9YYG....196,625-600-65
K5OCX....195,160-568-68
W4DVT....185,130-554-66
K1YKT....179,840-556-64
W2SZ[4]....170,100-536-63
K7CHH....169,600-524-64
W3EIS....169,325-515-65
W9LNQ....164,125-500-65
K3YQI....161,820-517-62
K2PHF/6..156,000-473-65
K1ZND....154,940-501-61
K8BPX....152,460-462-66
W6TYM....150,400-465-64
W6ASH....147,875-445-65
W1YNP/6..145,600-441-65
W8VPC....141,215-456-61
K1AEG....139,995-459-61
WB2FIT...137,970-438-63
W1DYE....136,800-451-60
K3GUR....135,160-430-62
W2ZVW....133,560-417-63
K3HNP....131,700-434-60
K4RAD/2..130,800-434-60
K4SXD....130,095-407-63
WA5IIS....129,920-420-64
WB6FHH/6 128,320-396-64
WB2CPV...128,100-417-61
K4IEX/4...123,480-385-63
W4LK.....122,240-382-64
K9UIY....118,610-405-58
W4WHK...118,400-365-64
W7BAJ....116,870-370-62
WA8GYT..115,995-400-57
VE7BDJ...115,935-386-59
K0GSV....115,010-366-62
W3MSR....114,000-393-57
WA9AUM..112,690-376-59
VE3OU....112,690-377-59
W3KUN....112,005-386-57
K0AZJ....111,935-363-61
K0YIP....111,935,360-61
W1AW[2]....111,000-338-60
W7AYY....110,720-340-64
W4BLE....110,700-366-60
WA3EPT[3]..107,100-335-63
W8RYP....107,985-356-59
W2DMJ....106,720-361-58
WA1FAV...106,020-365-57
W1ECH....105,810-329-63
WA9NFS...105,560-360-58
WB2KSG...103,250-316-59
WA8HVR..101,790-345-58
K8HKB....101,185-337-59
W4KFC....100,340-339-58
K2S1L/8..100,005-332-59
W1MX(K3OAE, W4YAC, WA8ENO)
217,600-674-64
W8FAW (WA8CZH, W8FAW).168,025-511-65
K8TIG (K2SIL, W8CQN)
152,790-456-66
K1VDL (K2UFT, K4VDL).199,325-595-67

PHONE

W1BGD....39,375-168-45
W2SZ[4]....32,285-150-41
K2EIU/5...29,315-136-41
K2AJA....26,600-133-38
W9RQM....26,600-133-38
W9AQW....26,240-128-41
K0YIP....24,400-115-40
W0JBK....21,600-120-36
WB2EMJ...20,340-110-36
K2PHF/6..20,160-105-36
K4BSS/4...19,795-105-37
W1ECH....18,700-103-34
K8BPX....18,480- 97-38
W9NPC....17,675- 95-35
WB6FHH/6.17,205- 88-37
W1PYM/6..16,920- 89-36
WB6FHH/617,205- 88-37
K8TIG....16,335- 92-33
W1PYM/6..16,920- 89-36
W2ZVW....16,610- 97-32
K8TIG[5]....16,335- 92-33
WB2EDU...16,170- 98-33
K1AFC....13,920- 83-32
K0JPL....13,745- 84-31
W9EGQ....12,705- 70-33
WA9LWJ...12,460- 89-28
K2QDT....12,400- 76-31
WA0EMS..12,045- 73-33
K9IVG....10,730- 72-29
W0ZLN[6]....10,560- 64-33

[1] WA2YLL, opr. [2] W1WPR, opr. [3] K3GJD, opr. [4] WA2PJL, opr. [5] W8CQN, opr. [6] WA0CWV, opr.



Top CD phone and second high c.w. with excellent scores both modes is W1BGD, Hq./Conn. Pete's contest enthusiasm is coupled with operating ability *and* service (see a few of his BPL cards on the wall). A clue to the excellent c.w. turnout is BGD's first hour contact rate—80 QSO's!

Briefs

The November *QST* Field Day report erroneously recorded the Antelope Valley ARC's score. The call used was W6YDQ/6.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are in GMT)

Jan. 6: CP Qualifying Run —W6OWP
Jan. 8–9: V.H.F. Sweepstakes
Jan. 15–17: CD Party (c.w.)
Jan. 18: CP Qualifying Run — W1AW
Jan. 22–24: CD Party (phone)
Feb. 4: CP Qualifying Run — W6OWP
Feb. 5–20: Novice Roundup
Feb. 11: Frequency Measuring Test
Feb. 12–13: DX Competition (phone)
Feb. 16: CP Qualifying Run — W1AW
Feb. 26–27: DX Competition (c.w.)
Mar. 12–13: DX Competition (phone)
Mar. 26–27: DX Competition (c.w.)
June 11–12: V.H.F. QSO Party
June 25–26: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Jan. 8–10: Arkansas QSO Party (p. 116, last month).

Jan. 22–24: Virginia QSO Party, Roanoke Valley Amateur Radio Club (p. 122, this issue).

Jan. 29–30: Louisiana QSO Party, Lafayette Amateur Radio Club (p. 97, this issue).

Jan. 23–24, 29–30: Twelfth Annual VE1 Contest, New Brunswick Amateur Radio Assn. (p. 136, this issue).

Feb. 5–6: Tennessee QSO Party (next month).

Feb. 12–13: N.Y.C.-L.I. QSO Party (next month).

Feb. 18–20: QCWA QSO Party, Quarter Century Wireless Assn. (p. 73, this issue).

Feb. 19–21: Vermont QSO Party, Central Vermont ARC (next month).

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Jan. 18 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Jan. 6 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 on the evening previous to the date given. *Example:* In converting, 0230 GMT Jan. 18 becomes 2130 EST Jan. 17.

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 Sunday, 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 Nov. *QST*
Jan. 3:	*It Seems to Us*, p. 9
Jan. 13:	*The Basic Helical Beam*, p. 20
Jan. 19:	*The Dipper*, p. 26

Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Jan. 26:	*Cathode Bypass*, p. 38
Jan. 28:	*Grid-Leak Bias*, p. 38
Jan. 31:	*Voltage Amplifier Circuits*, p. 38

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.
WIDE-BAND F.M. 52.525 146.94 Mc.

GMT CONVERSION

To convert to local times subtract the following hours:
ADST −3, AST −4, EDST −4, EST −5, CDST −5, CST −6, MDST −6, MST −7, PDST −7, PST −8, Hawaiian −10, Central Alaska −10.

OPERATOR OF THE MONTH

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

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

K1LMJ	W6ZH
K1MDK	K7YNO
W1RAN	W8CQB
W1WRZ	K8VDV
K3FKU	WA5DXA
WA4EWK	WB6ONT

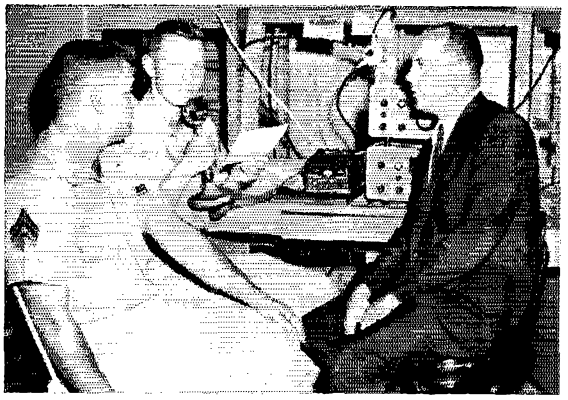
W1AW SCHEDULE, JANUARY 1966

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 December 31 and January 1.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
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.pm. TThSat., 5-25 w.pm. MWFSun.**					
0330–0400[4]	.....	.....	3.555	7.080	1.805	7.080	3.555
0400	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	3.625	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]	14.100	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) and code practice on 1.805 3.555 7.08 14.1 50.17 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82 3.945 7.255 14.280 50.17 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625 and 14.095 Mc.
[4] Starting time approximate. Operating 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.
[6] W1AW will listen for Novices on band indicated before looking for other contacts.

Station Staff: W1QIS W1WPR W1NPG. *All times/days in GMT, general operating frequencies are approximate.



WA4KPM and K9PME are visited at W4PFC by James J. Lawlor, executive secretary of the international Eye Bank's Washington division. The recreation station at the Marine Corps School, Quantico, Virginia is the Capitol area's terminus in the "Eyeball Net" which meets every morning to exchange info on supply and demand of corneal tissue among eye banks. (USMC photo by Sgt. Eugene Bender.)

Strays

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 amateur radio stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

SCM AREC ORS CP SEC OBS TCC OO

Station Activities

PAM WAS NTS WAC

OES AIOPR EC DXCC CLUBS RM OPS RCC

• 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. V.H.F. PAM: K3OBU.

Net	*Freq.*	*Local Time*	*Days*
DEPN	3905 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

Renewal: K3GKF as OO. Congratulations on the good performance in the Oct. SET to all who took part. All stations should run on Zulu time to avoid mixups in skeds. K3NHL still is adding new countries to his DXCC totals. K3YHR has a new HW-12. WA3BQT is having transmitter troubles. All antennas should have been put in good shape to stand the rigors of the coming winter. Traffic: W3EEB 242, K3NYG 42, K3YHR 26, K3UXQ 23, WA3DYG 20, K3UHU 14, W3IYE 11.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3YVG, K3MVO. PAMs: WA3BYH, W3SAO. EPA C.W. Net had 471 QNI with 490 QTC. PTTN had 331 QNI with 249 QTC. The EPA Emergency Phone & Traffic Net had 356 QNI with 189 QTC. The above totals all include SET traffic and sessions. WA3BYH is the new PAM and net manager of the EPA Emergency Phone & Traffic Net. K3YVG and W3FGQ are OPSs. K3RZE earned the BPL medallion. W3EML has been out of work since August because of a bad foot infection. W3BFK has just gotten over the chicken pox. We welcome W3CDB, ex-K2OOK, to our section traffic nets. Bob is formerly from New Jersey and the OM is W2RG. The Coplay Boy Scout RC has 58 students in its new radio class. The newly-organized St. Charles Seminary RC is under the direction of WA3ALD and WA3AYN. WA3BSV is attending Penn. State University. WN3BSU is now General Class. K3KXJ would like to hear from the Philadelphia area working u.h.f. or microwave. K3WEU, instructor at INGLIS House, home for incurables reports 6 Novices looking forward to General. K3HTZ is working s.s.b. DX during college slack time. W3ID reports wind damage to his 80- and 2-meter antennas. New officers of the Germantown RC are K3QKN, pres.; K3ZZN, vice-pres.; K3SKP, treas.; K3ZAA, secy. W3LUW, club trustee, has acquired an XYL. K3NOX has the Heathkit SB-200, SB-300 and SB-400 lineup. K3YVG and K3UIU have joined the RTTY group. WA3BBI is on the bands with a DX-100. K3RCM has a TCZ. WA3BZO added a Tri-Bander. K3MDG has a new SB-400. The recent SET showed an increase in traffic handled over previous years but countywise and at a section level was a setback over other years. As we prepare to close the books on another year, let us wish each of you a Joyous Holiday Season and a Happy and Prosperous '66. Traffic: (Oct.) W3CUL 4037, W3EML 1145, WA3CBL 472, K3MVO 401, K3PIE 399, WA3CFV 378, W3AIZ 338, K3MYS 217, W3ELI 181, K3YVG 175, K3RZE 156, W3ZRQ 148, K3FHR 142, K3HNP 116, WA3BYH 105, W3JKX 101, W3CDB 94, W3FGQ 92, K3YQJ 90, K3ZSK 89, K3PWM 85, K3WEU 76, W3VAP 72, K3KXJ 63, W3MPX 60, K3MHD 54, K3KTH 49, K3HKW 40, WA3CKA 39, W3NNL 39, K3LPT 37, WA3BBI 32, W3OY 32, W3BUR 27, W3QDW 25, K3KKO 19, W3RV 19, W3CBH 15, W3KJJ 12, WA3CCC 11, K3MDG 11, K3RLO 9, WA3CXZ 5, W3BKF 4, W3PVY 3, WA3BJQ 1, W3EU 1, W3ID 1. (Sept.) WA3CFV 94.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, W3QCW, W3UE, W3ZNW. PAMs: W3JYZ, K3LFD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*Ave.*
MDD	3643	0000Z	Daily	35	627	17.9
MDDS	28200	0130Z	Daily	22	4	0.8
MEPN	3820	2200Z	M-W-F	21	63	3.0
MEPN	3820	1700Z	S-S			
MSTN	50150	0100Z	Daily	30	51	1.7

Note change in time for MSTN to 0100Z. Results of the Sept. EMT were excellent with W3CYA, W3ECP, K3EIY, K3GUR, K3IPX/3, W3PYW, K3URZ and W3ZUH participating. W3ZUH led with 11 p.p.m. average for 3 frequencies. *Emergency*: K3URE and W3RKK conducted tests for the Red Cross in Baltimore using 6 and 10 meters. W3WTW is building up the AREC or-

ganization in Montgomery Co. W3MCG, K3QDD and K3TJE report specific operation in the SET. *Gear Shift*: K3FKY needs a 14-Mc. coilset tor his HRO jr. K3LFD's new 80-meter antenna is up—his linear is down. W3QCW put up a new 80/75-meter dipole. K3IPX/3 built a power supply for his Swan. WA3BNL is sporting a new Galaxy 5 transceiver. K3VCG is sold on 100 per cent break-in. K3LLR has antennas for 160, 80 and 6. W3CDG is happy with his new HQ-170A-VHF. *Operating*: K3URZ worked JA and 6Y5 (is that a tube or a country?). K3ZSX worked France between sessions of MSTN and MDD. WA3CBC has an active 2-meter net going on 145.2 Sun. at 1300Z. WA3AJR also has a 2-meter AREC net on 145.66 Mc. Sun. at 2000Z. WN3DKQ took a "two-er" to the Boy Scout Camporee in Prince Georges Co. W3CDQ was pleased with the YLRL anniversary party and is looking forward to a visit from G2YL. W3CQS *is after an* ORS appointment. *Congratulations*: W3UE celebrates 50 years of ham radio in Dec. *Personal*: WA3CRA's code speed overtook his writing speed so he had to learn typing. K3GJD has a harmonic (blessed-event type). K3GZK finds his radio time somewhat diluted by photography and W3EOV finds a similar result from a course in navigation. K3RNY has been off the air because of business trips. W3JZY has been hospitalized but is up and around again. Traffic: (Oct.) K3JYZ 230, K3TJE 170, K3FKY 167, W3LBC 166, W3TN 159, W3QCW 129, K3IPX/3 115, K3GZK 99, K3UFV 97, K3QDD 88, K3LFD 79, K3VHS 71, K3URZ 67, W3MCG 57, WA3BNL 56, K3UXY 56, W3UE 35, K3NCM 34, K3ZSX 26, K3LLR 22, W3WTW 21, W3ZNW 20, K3URE 17, W3EOV 16, K3ZIX 16, WA3CBC 15, W3CDG 12, W3RKK 11, W3CQS 10, WA3AJR 7, K3VCG 6, W3PRC 4. (Sept.) K3VCG 4. (Aug.) K3ZYP 558.

SOUUTHERN NEW JERSEY—Acting SCM, Edward G. Raser, W2ZI—Traffic was very light over the section networks on Oct. 9 and 10 during the SET. No reports so far have been received from the ECs. I would like to see more ORS and OPS appointees in this section. All you have to do is to write me, or state on the air that you would like to become one of the official family. N.J. Emergency Phone & Traffic Net reports: 31 sessions, 576 stations and 161 traffic for Oct. The Annual Net Dinner at Bahars Tavern on Rt. 33 held Oct. 23 was attended by 29 members. SCMs W2CVW, N.N.J., W3ZRQ, E. Pa., were guests. K3BG, the ex-SCM of S.N.J., also attended. K2SHE had her OPS appointment renewed. She is the only YL member of NJFN and is doing a good job on traffic work. W2BZJ has a new SR-300 receiver. W2VCX and K2CPR participated in the Frequency Measuring Test of Sept. 8. K4RAD/2, in Princeton, has been appointed OO Class IV. W2RG still is pounding away on the CD/DC Nets faithfully. W2BAY is having a ball on 160 meters. W2IU wants more stations up on 160 interested in traffic. Perhaps we will appoint him PAM-160 meters if he will accept. The deadline for your monthly reports to me is the 6th *of each month*. Please try and get them in on time. The New Jersey Phone Net Roster dated Sept. 1 is now available. Send SASE to W2ZI, the Net Manager, for a copy if interested. WA2DVU, WB2EJR, W2YPZ are new NJFN appointees in the section. Traffic: (Oct.) W2RG 119, W2ZI 32, W2YPZ 20, W2EWR 10, WA2KAP 8, K2SHE 8, W2BZJ 5. (Sept.) W2ZRC 132, W2GIW 10, W2BEI 5.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ZRC. PAM: W2PVI. RMs: W2RUF, W2EZB, W2FEB. NYS C.W. meets on 3670 kc. at 1900, ESS on 3590 kc. at 1800. NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 kc. and 3993 kc. (s.s.b.) at 0900 Sun. and 3510.5 kc. at 1930 Wed., TCPN 2ND call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. Sun. at 1000 and 3670 kc. at 1700 Sat. Happy New Year! Let's all resolve to be A-1 operators and to support our local ARPSC. Congratulations to BPLer W2OE. Appointment: WB2ERK as ORS. Endorsements: W2RQF and K2MQN as OPSs. Congratulations to the Limestone Radio Society on becoming affiliated with ARRL. The Six Meter Mobile Assn. of W.N.Y. provided its eighth consecutive Halloween patrol to Kenmore-Tonawanda. Participants were K2TVB, K2OZM, K2DSN, WA2DGL, WA2IMW, WA2INR, WA2HBT and WA2SHM. Sept. F.M.T. participants were W2PZI, WA2ANU, W2FMU, W2OSL, K2KTK, WA2UFI, WA2RHW, W2GOR and WA2TDG. WB2QAP has a new HT-32A, HT-33A and SX-101A. W2UYE, ex-W8AYI, is active after a long layoff. He operates a Valiant. Many thanks to all who participated in the SET. W2RUF vacationed in Florida. W2UVE got married! Wonder how that will affect his 310/327 Honor Roll standing. 146.94 Mc. is in fact a New York State RACES frequency. Genesee, Niagara, Orleans, Monroe, Erie, Wyoming, Livingston, Chautauqua, Cattaraugus and Allegheny Counties ran a special test using a portable repeater. 26 stations, including 19 mobiles, demonstrated solid coverage. The f.m. boys in Erie, Niagara and Wyoming deserve special credit for a real effort. The SIARC held its October meeting at the WROC Broadcast Center. WB2GNC made the arrangements. The Third Annual Peanut Whistle Net Banquet was attended by 39. The Kodak Radio Club has just been organized. Ghost Patrol reports also were received from the Corning ARA and Chemung AREC. The Fulton ARC held its Annual auction. The RAGS held a radio Old-Timers Night. W2ZIA and W2PPL presented programs at recent RAWNY meetings. The RARA held its annual auction with K2UXF as auctioneer. W2RPO spoke at the ARATS on transistors. The Chenango Valley ARA also held an auction with WA2PQK presiding. Traffic: W2OE 358, W2RUF 262, WB2GAL 133, WB2ERK 128, W2MTA 128, W2FEB 120, W2SEI 106, WA2IHP 78, K2DNN 39, W2ANV 33, W2RQF 32, W2ZRC 32, W2UYE 31, WA2FOJ 30, W2FCG 27, K2OFV 24, K2MQN 19, W2PNW 7, WA2GLA 4, W2EMW 2.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—Asst. SCM: Robert E. Gawryla, W3NEM. SEC: K3ZMH. PAMs: W3TOC, K3VPI (v.h.f.). RMs: W3KUN, W3MFB, K3OOU, W3UHN. Traffic nets: WPA, 3585 kc. 0000 GMT Mon. through Sun. KSSN, 3585 kc. 2330 GMT Mon. through Fri. Your SCM is now receiving nominations for the "William G. Walker, W3NUG" Memorial Award. Clubs and individual amateurs are invited to send in their nominating petitions for the amateur in *Western Pennsylvania* who they believe has contributed the most throughout 1965 toward amateur radio in the section. A brief history of the amateur and of his contribution to ham radio should be forwarded to this office between Jan. 1 and Jan. 31, 1966. Who is your nominee? A plaque award with accompanying certificate will be presented to the outstanding amateur selected as the winner by the awards committee. Selection of the winner will be based solely on those activities by the individual closely exemplifying those of W3NUG while he lived. Somerset County *ARC has elected* WA3BKF, pres.; K3UAB, vice-pres.; K3PQK, secy.-treas.; WN3CMO, club reporter. K3RCI needs 3 more states for 80-meter WAS. WA3BSK put up a new cliff-dweller antenna. K3SOG works s.s.b. with a new HT-37. W3LEZ joined MARS. The Uniontown ARC elected K3OQP, pres.; W3BTR, vice-pres.; W3CAV, treas.; W3UUZ, secy. WA3DHU moved to New York, K3UTL to Philadelphia. New officers of the Etna ARC are W3TZW, pres.; K3UTQ, vice-pres.; W3OVM, secy.; K3LKP, treas.; W3TVW, act. mgr.; W3TOC, trustee, K3OTY, director. The Two Rivers ARC's officers are W3SYR, pres.; K3QHM, vice-pres.; WA3AOQ, secy.; W3OFM, treas.; K3MMO, act. mgr. Steel City ARC shows W3BVQ, pres.; W3SVJ, vice-pres.; W3ZDW, treas.; W3KGF, rec.-secy.; W3ZGI, corr.-secy. New Novices are WN3ELB and WN3ERW. The "PENOWVA" Net now operates at 8 P.M. each Thurs. WA3BGE acquired his CP-20 certificate. K3QQO and WA3BIW joined the Etna ARC. Traffic: W3KUN 386, K3PYS 144, K3ZMH 104, W3LOS 76, W3SMV 50, W3AUD 40, W3GJY 33, K3SOH 32, K3KMO 31, W3OEO 24, WA3AKH 21, W3IYI 20, K3SMB 12, WA3DHU 11, W3LOD 8, W3UHN 8, W3YA 8, WA3DGI 5, K3EDO 4, W3KNQ 3, K3ZYK 3, WA3BGE 1, K3FNG 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: George Neshed, W9LQF. SEC: W9RYU. RM: W9EVJ. PAMs: W9VWJ, WA9CCP and WA9KLB (v.h.f.). Cook County EC: W9HPG.

Net	*Freq.*	*Time*	*Oct. Traffic*
IEN	3940	1400Z Sun.	
ILN	3760	0100Z Daily	235
NCPN	3915	1300Z Mon.-Sat.	651
NCPN	3915	1800Z Mon.-Sat.	564
ILL PON	3925	2200Z Mon. Sat.	

The new officers of the Kiswaukee Radio Club (DeKalb.) are W9HQN, K9KID, K9CZX and K9HHK. *WA9LCU received his General Class license. K9HON* has a Swan 350 on the bands. WA9FRX is bringing in the 6 and 2 with an Ameco. Many announcements have been received from various clubs regarding code and theory classes. Prospective amateurs are asked to contact the local groups for the time and place of the meetings. The Joliet Amateur Radio Society held an anniversary party at its club house Nov. 27 and W9RCJ gave all those present a copy of the club's history which he authored. My XYL has asked me to thank the numerous friends who sent cards and flowers to her during her recent serious illness. K9PAK is now mobile with a

new SB-23. W9ZND and WA9GWS are kw-ing on 2 meters. W9HPG spoke at the Nov. 1 regular monthly meeting of the Starved Rock Radio Club. W9KEZ, W9IDGV, WA9HHH, W9JUV, K9VVL, W9VBV, W9-HPG, K9RAS, W9REC, W9VOX, W9WGQ, K9WMP, W9WYB and W9QKE participated in the League's Sept. Frequency Measuring Test. K9BQQ, net manager, reports that the Interstate Single Sideband Net had a traffic total of 557 for the month. The Ninth Regional Net scored 413 messages for the same period. Worth Township provided 2- and 6-meter communications for its local police during the Halloween season in an effort to curb vandalism. WA9HIM was elected president of the St. Rita High School Club. K9FXQ has a new 2-meter beam. The Elgin ARS held a message party in the lobby of the local theater for overseas traffic to boys in the service. K9IFE is recuperating from a recent illness. The York Radio Club elected WA9HJM, K9INQ, WA9NQM, WA9AJF, K9VGT, W9-OKT and W9QKE as officers for the coming year. W9HOA has a new Drake T4-X to go with his R-4. W9ERU is moving his antenna farm and looking for a nice hilltop. The Chicago Suburban Radio Association held a banquet Nov. 20. WA9GQK has built a homebrew transmitter for 80, 40 and 20 meters. K9UOV has a new Galaxy V transceiver. K9WMP has finished building his SB-200 linear. WA9CNV is using a Drake T4-X for traffic. WA9MAG has a Drake R4 and hopes for DX on s.s.b. and c.w. WA9CCP, WA9CNV, WA9-NFS, K9WMP and WA9CCQ are recipients of the BPL award. Traffic: (Oct.) WA9CCP 883, WA9CNV 753, WA9NFS 577, K9KZB 423, K9WMP 242, WA9CCQ 130, K9AVQ 120, W9NXG 65, K9BTE 54, W9JXV 47, K9-BQQ 42, W9EET 42, K9UOV 38, W9DOQ 31, WA9GUM 31, W9IDY 22, K9RAS 21, W9QET 19, WA9AJF 16, W9PRN 14, K9HSK 12, W9SMD 10, W9HOT 7, W9LNQ 6, W9YYG 4, K9DQU 3, WA9KLB 3. (Sept.) WA9CNV 374.

INDIANA—SCM, M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: K9WET.

Net	*Freq.*	*Time*	*Oct. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily, 2300 M-F	231	K9IVG
ISN	3910	0000Z Daily, 2130Z M-Sat.	531	K9CRS
QIN	3656	0000Z Daily	188	WA9BWY
RFN	3656	1400Z Sun.	150	WA9IZR
PON	3885	1300Z Sun.	27	K9EFY

K9GLL, PAM of the Hoosier v.h.f. nets, reports Oct. traffic of 67. WA9HCE mgr. V.H.F. PON reports Oct. traffic of 61. W9QLW, RM if 9RN, reports that Indiana was represented 100% in Oct. K9IVG made the BPL. QIN Honor Roll: K9VHY, K9HYV, K9DHC, W9IRY, W9QLW, WA9QCS, W9RGB, WA9BWY, W9BHR, W9-HRB and K9WWJ. The GIBARC and Evansville ARS will supply communications for a Sports Car Rally in January. W9LBE now is on 2 meters. WA9MYF and WA9NJZ made General Class. W9FJI now is sporting a Johnson 6N2 plus a five-element beam. New officers of the Michigan City ARC are K9SFY, pres.; K9HYV, vice-pres.; K9AIP, SECY.; K9OQO, treas. Please note the change of time of the RFN c.w. net. The RFN phone net meets on 3910 Sun. at 1800Z. *Amateur radio exists because of the service it renders.* Traffic: (Oct.) K9IVG 790, WA9BWY 418, W9JOZ 418, W9QLW 333, W9ZYK 232, K9HYV 141, K9VHY 84, W9BHR 78, K9-CRS 64, W9YYX 61, WA9QCS 59, W9BUQ 58, WA9-JWL 58, W9SNQ 56, WA9BVS/9 53, K9ZLB 52, W9RGB 51, K9RWQ 48, WA9LUG/9 45, K9GLL 38, K9WET 35, W9CC 28, K9EFY 27, WA9GJZ 26, W9FJI 24, WA9GKF 24, WA9CJR 22, W9EJW 21, W9FWH 20, WA9CHY 19, K9KTL 19, W9RTH 17, WA9BGI 16, WA9BRD 16, WA9MYF 10, W9DZC 9, K9FPA 9, K9ILK 9, W9BDP 8, K9BSL 8, W9HWR 8, W9DOK 6, W9URQ 6, K9DHJ 5, K9IIV 5, K9QVT 5, K9UHQ 5, WA9DBK 4, W9ZZR 3, K9GHN 2, W9TKK 1, K9RFW 1. (Sept.) WA9NJZ 178, W9VAY 78, WA9MYF 10.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. PAMs: K9IMR, K9HJS, W9NRP. RM: Looking.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
BEN	3985 kc.	1300Z	M-Sat.	23	100	29	W9NRP
BEN	3985 kc.	1800Z	Daily	31	579	165	K9HJS
WSBN	3985 kc.	2330Z	Daily	31	1302	439	K9IMR
WIN	3535 kc.	0045Z	Daily	31	278	107	W9KQB
SWRN	50.4 Mc.	0300Z	M-Sat.	21	362	10	W9CHU

Net certificates went to K9RCK, WA9NWH and KØ-HSC for WSBN, W9BRV, W9LYX, K9UTQ and WAØ-JKT. New appointments: K9ZMQ as EC for Manitowoc County; WA9MIO as ORS; W9NUW and K9UTQ as OPSs; K9FWF and WA9PBW as OESs. Renewed appointments: K9KJT, W9QQQ, K9QKG and W9SZL as ECs; K9IMR as PAM; W9RQM as OPS, OES and ORS; K9LGU as OPS; W9NRP as OBS; W9KCR and K9GDF as OOs. The Milwaukee County AREC, in co-*operation with the Columbia* and Sauk County AREC, assisted with a Boy Scout hike at Devils Lake. WA9-MIO received a 9RN certificate. Milw. School of Eng. ARC officers are WA1BWF, pres.; K9ZPZ, vice-pres.; WA9BFH, treas.; K9UQN, secy. The Ozaukee County AREC participated in the SET with the C.D. and Red Cross. FMT results: W9BCY, 8, W9CHD 9.4, W9RKP 41.1, K9MKC 113.8 and K9GDF 137.4 p.p.m. error. The Wisconsin section will miss W9SAA, who passed away. W9KQB is a member of TOPS of England. W9YSZ has a new 80-40 trap dipole. K9MKC led the OOs with 28 notices. BPLers W9DYG, K9IMR and WA9CJU. Traffic: W9DYG 528, K9IMR 430, WA9CJU 177, K9HJS 151, WA9MIO 86, K9UTQ 80, K9GSC 74, WA9LWJ 62, W9-NRP 57, W9GOC 47, WA9NBO 44, W9CBE 43, W9KQB 42, W9YT 41, W9BLQ 18, K9QKU 18, W9IRZ 17, K9-RCK 17, W9KRO 14, W9AYK 13, K9DJY 12, W9QQQ 6, W9RTP 3.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØTCK—SEC: WAØBZG.

Net	*Freq.*	*Time*	*Days*	*RM-PAM*	*QNI*	*QTC*
MSN	3595 kc.	0030Z	Daily	WØISJ	253	69
MJN	3595 kc.	0100Z	Daily	WAØIDZ	143	46
MSPN	3820 kc.	1805Z	M-Sat.	KØQBI	950	176
MSPN	3820 kc.	2300Z	M-Sat.	KØFLT	604	249
MSPN	3820 kc.	1500Z	Sun.	KØQBI		
MSSB	3805 kc.	1730Z	M-F	WØHEN	568	50
MSSB	3812 kc.	0045Z	M-F	WØHEN		
MSTN	50.4 Mc.	0430Z	M-F	WAØDWM	610	4
MSTN	50.4 Mc.	0200Z	Sat.	WAØDWM		

Congrats to WAØIIJ, new *EC* for Renville Co. OES KØOST has been transferred to California by the Navy and will be operating W6BYC from Oakland. WAØIEF worked Antarctica on his newly-erected TA33 antenna. The St. Paul ARC again is conducting code and theory classes. The Mankato ARC received a plaque from the Mankato and North Mankato Mayors in appreciation of work done in the April floods. WØLIG now is able to operate from his room in Mercy Hospital where he is convalescing, thanks to WAØs ILX, EDN, BYJ and BYJ's two brothers, who moved his station to the hospital. 51 stations reported SET activity to the SEC. Thanks to our SEC, the RMs, PAMS, OOs, ECs, OBS, OES, NCS stations, traffic operators and all others who worked to promote the interest of amateur radio this past year. Also to the AREC members and to those who were able to assist in one or more of several emergencies that hit us this spring and summer. WAØJKT and WAØMKF made the BPL in October. Traffic: (Oct.) WAØJKT 614, WAØIIJ 352, WAØMKF 204, WAØKQU 115, WAØEPX 80, WAØBYO 68, KØFLT 68, WØISJ 64, WAØBZG 57, WAØEDN 49, WAØFUR 49, WØHEN 49, KØQBI 44, WØTCK 42, KØPIZ 37, WAØIDZ/Ø 31, WAØIEF 28, WAØDVH 25, WAØFCJ 25, KØLWK 20, KAØDFT 13, KØZKK 13, WØENY 11, KØSRK 10, KØICG 8, WØWLG 8, KØVPJ 8, WAØIUJ 7, KØZRD 7, KØIGZ 6, KØIKU 6, WØSZJ 6, WØUMX 6, WAØKFJ 2, WØFKC 1. (Sept.) WAØ-FUR 6, WAØHRM/Ø 3.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. PAM: WØCAQ. OBS: WØPQW. The SET in the Grant Forks area under WAØBIT took on blizzard proportions and for two hours kept six mobiles and three fixed stations busy handling the situation. W2YTO/Ø finally persuaded a new quad to stay up under the stress of N.D. winds. WØWWL has joined the DXers going along in that mobile with the new Swan 350. WØPHH has a receiver now that will let him listen on 160. WØYCL is the new Ramsey Co. EC. WØBIH, WØNVK, WØDNJ and WØPQW are owners of Swan 350s. WAØAYL and WAØBIT have been pushing traffic through the Interstate S.S.B. Net on 3985 kc. every night. WØCGM and WØRGT got a new T4X rig; also WØAYA and WØNVV plus an HT-4 exciter. WAØ-ILI is a new call in Grand Forks from Nebraska. WNØMSJ has a new Drake 2B and is working for the Conditional. KØCND put up new 80-40-and 20-15-meter dipoles and reports that the N.D. Post Office Net, which metes Sun. at 9 and 5 P.M. on 3845 kc., needs a station to check in from Fargo and Grand Forks. WØPHC is recovering from a bout with surgery. Join the North Dakota Weather Net at 7:15 A.M. on 3996.5 kc. WØCGM reports that the Navy MARS has 43 members and operates on 4015 kc. on s.s.b. WØDM has an SR-150 which has been modified for 500 watts. The

N.R. RACES Net reports 378 check-ins, 43 informals and 32 formal messages. Mon.-Fri. 6:30 P.M. CST. 3986.5 kc. The Goose River 160-Meter Net reports 134 check-ins, 4 informals and 1 formal. WØLCL's XYL and WØEFJ had a birthday and the following were present at the home of WØEFJ and WAØMND to celebrate: WAØGRX, WØAYA, WØHNR, WØPHH, WØHUL, WØVBE, WØNVV, KØBTM, WØORV, WØOLV. WØNVK was a guest from Minot. Traffic: WAØAYL 136, KØITP 110, WAØBIT 50, WØDM 15, WØCGM 8, WØWWL 7, WØEFJ 3, KØCND 2, WØGRX 1.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW —SEC: WØSCT. RM: WAØAOY. Martha Shirley reports a daily average QNI of 17 for Oct. on the Weather Net. WAØMFZ reports working Dennison, Tex., on 75 meters with metered 2 watts output. WØCUC has moved to Cedar Rapids and is working for Collins. The SFARC, has sent a package of ARRL *Handbooks* to WØDKJ, who is teaching in the University of Seoul. Anyone interested, his address is M. M. Hasse, U.S. Educational Commission in Korea, Dependents Mail Section, APO, San Francisco 96301. A new call in Sioux Falls is WAØNMJ, the daughter of WØFNM. The time of the Sioux Two Net is now 0300Z. Traffic: KØGSY 600, WØZWL 452, WØSCT 85, KØVYY 63, WØFJG 33, WØDJO 24, KØTNM 22, KØTXW 14, KBSW 8, WØFJZ 6, KØYJF 6, WØJCE 5, K1CAU 4, WAØCKH 4, KØKOY 4, WAØBJW 3, WAØJLH 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN— SEC: W5NPM. PAM: WA5GPO. RM: K5TYW. NMs: WA5IIS, K5IPS, WA5IINN. I'm honored to be elected SCM for Arkansas and shall endeavor to maintain the close knit organization set up by W5DTR. WA5AVR has been elected president of the U. of A. Radio Club with K5SGH, vice-pres.; WA5CAA, secy.; WA5FHR, treas. WA5KUB has been appointed AEC for Craighead county. WA5KJT is the new Sat. NCS for AFN. Ollie reports working DX on 10 meters. WA5CBL/WØKON moved back to Benton and returned to the air Oct. 1.

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*Time*
OZK	3790	0100Z	Daily	31	115	678M
RN	3815	0001Z	Daily			
AFN	3885	1200Z	Mon.-Sat.			

Needed: Applicants for appointments as Key City EC for Little Rock, EC, ORS, OS, OES, OBS, and OO. If you can qualify and do not have an application form let me know. Traffic: W5DTR 98, K5TYW 75, WA5-IINN 66, WA5KJT 64, W5MJO 40, WA5LSF 33, K5VBF 14, K5GKN 10, K5EDH 4.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM— SEC: K5KQG. RM: W5CEZ. PAM: W5TAV. V.H.F. PAMs: WA5KHE and W5UQR. W5BUK found it necessary to resign as SEC. K5KQG, your new SEC, is in the process of preparing a State Emergency Plan. If you want to help, contact K5KQG at 217 Bellaire St., Houma, La. It is sad to report the passing of WA5JWE/ K5RDL, of New Iberia. K5HFI reports the Natchitoches group has returned to regular meetings. K5EGW has a new SBE-34 in his car. K5UEZ is installing TV antennas. The CENLA Club has started code and theory classes with W5JHF and W5GVH as instructors. W5GKT and K5ANK are proud grandparents again! WA5JQJ is putting an FB signal on 2 meters. W5FEC reports 2 meters is quite active from the Alex area. LAN, under the able leadership of WA5FNB, was active every hour of the recent SET. W5CEZ has recovered from eye surgery. WA5KQN and WA5LGO are the proud possessors of LAN net certificates. K5WOD is pushing the new radio club in Springfield. WA5DES request reports on his OBS transmissions Mon., Wed. and Fri. at 5 P.M. on 7195. W5MXQ still pushes on c.w. and s.s.b. WA5KHE is back on 2 and 6 with a new rig. WA5EID lost the top of his tower during "Betsy." WA5MJM has a new transmitter and WA5LYP is active with the East Jefferson High School rig. W5CEW has had transmitter trouble. W5BV continues to enjoy the morning round table held on 3900 with W5BUK Als. W5UQR lost all power in "Besty" but put up a 6-meter beam 30 feet the next day and with emergency power attempted to contact New Orleans. W5EA reports the same old seven and six. K5OKR reports into RN5 as La. representative three times weekly. W5GHP, K5USU and WA5KIC head up a committee preparing a disaster plan for New Orleans. W5LDH got favorable publicity for us after "Betsy." W5SW is new EC for Terrebonne Parish, while W5TDY and W5MCC will share the honors for Lafourche Parish. Yours truly now has a 3-k.w. power plant. W5JFB reports a 2-meter opening for 48 hours the weekend of Oct. 8. John made two c.w. contacts with Central and Eastern Florida using only a skewed wheel up 35 feet and running 75 watts. Traffic: (Oct.) W5GHP 427, W5CEZ 125, WA5EID 110, WA5FNB 93, K5OKR 70, W5PM 53, W5MXQ 51, WA5DES 41, W5EA 34, WA5LGO 7, K5KQG 2. (Sept.) WA5HGX 84, K5-KQG 79.

LOUISIANA QSO PARTY

January 29-30, 1966

The First Annual Louisiana QSO Party sponsored by the Lafayette Amateur Radio Club will start at 1400 GMT Saturday January 29 and end at 2200 GMT Sunday, January 30, 1966. All bands may be used, c.w. and phone (phone classified as both a.m. and s.s.b.). The same station can be worked and counted for QSO points on each band and each mode. Louisiana stations score 1 point for each contact (including contacts with other Louisiana stations). All others score 1 point for each contact with a Louisiana station. Louisiana stations multiply total QSO points by number of different states, Canadian provinces and countries worked. All others multiply total QSO points by the total number of different Louisiana parishes worked. Louisiana stations give QSO number, RS(T) and parish. Others give QSO number, RS(T) and state, province or country. Suggested frequencies are: 3600 3910 7100 7230 14,000 14,300 21,100 21,400 28,100 and 28,700. In Louisiana, certificates will be issued to the 1st, 2nd and 3rd place scorers. Other stations outside Louisiana will be issued certificates for highest scoring stations in each state, Canadian call area and each country. (Note that a minimum score of 50 points is needed to win). Logs must show dates, times, stations worked, exchanges sent, exchanges received, bands, modes and scores claimed. Logs must be postmarked no later than February 28, 1966 and sent to Louisiana QSO Party, care of Bill Allen, W5NQR, 155 Karen Drive, Lafayette, Louisiana 70503.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM— SEC: W5JDF. W5ODV, WA5FII, K5TJG, WA5CAC, K5ZFM, WA5KMF, WA5NPP and others have done a fine job in getting the new Miss Sideband Net on the band. Miss. Net schedules: Gulf Coast Sideband Net, 3925 kc. at 1730 CST daily; Miss. Sideband Net, 3888 kc. at 1815 CST daily; Miss. C.W. Net, 3647 kc. at 1845 CST daily; Miss Magnolia Net, 3870 kc. 1900 CST, M-F. New officers of the Biloxi ARC are W5BW, pres.; WA5KXB, vice-pres.; W5QYX, secy.; W5ODR, treas. New appointments: W5ODV as PAM; WA5NPP, W5-BW as OPSs; W5BW as ORS; K5TYP as OBS; WA5-KMF as OO. A new Novice in Columbia is WN5NWZ. W5IZS, W5EPT, K5GSY, K5PPI and others are really working with the RACES Net. W5BW had fun working Miss. on 80-meter c.w. mobile to New Jersey and back. The Tombigbee ARC did a fine job, first in the state on Field Day, thanks to K5DZE and others. WA5JHX and WØWNF/5 really are banging away on 29 Mc. every night. K5DZE has DXCC now. W5CUC is going all out for DX with his new beam. K5UYP is back in Meridian with a complete Collins setup and a very fine signal. K5RRG really racked up the score during the recent C.W. C.D. Party with a new 70-ft. high all-wave dipole. Traffic: W5JDF 161, W5ODV 61, W5WZ 51, WA5FII 40, W5BW 35, K5WUX 4, WA5KMF 2.

TENNESSEE—SCM, William A. Scott, W4UVP—

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
TNSB	3980 kc.	M-Sat.	1830C	26	1188	111
ETPN	3980 kc.	M-F	0640E	21	368	23
TN	3635 kc.	Daily	1900C 2030C	56	327	163
TSN	3635 kc.	M-W-F	1900E	13	47	27
TPN	3980 kc.	M-Sat. Sun.	0640C 0800C	31	1043	198

Sorry to report the close of the TSN because of lack of QNI. Thanks to WA4IBZ, W4YAU and K4SXD for being faithful net controls for this net with two missed sessions in six months. Stations holding appointments are reminded that monthly reports are due by the 7th to the SCM. Have enjoyed recent visits with the Oak Ridge and Cleveland Clubs. K4UWH report c.w. stations were needed during the SET. W4WQZ reports the 4th version of the 6- and 2- s.s.b. rig still has bugs. W4SHI made a trip to LA-Land and W4VQE to S.V. W4VJ now is QNI the Inter-Continental Net. Traffic:

W4FX 458, W4OGG 344, WA4GQM 271, WA4IBZ 161, W4PQP 133, W4MXF 124, K4RCT 115, K4UWH 52, W4-UVP 46, WA4JVU 27, K4VOP 24, W4SGI 19, WA4YNF 16, W4LLJ 15, W4VTS 15, K4UMW 12, W4TZB 11, K4-SXD 7, WA4CGK 6, W4VJW 5, WA4BNH 3, K4BTY 2, W4VJ 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO. SEC: K4CRX. PAMs: W4HEJ, WA4RDE, K4YZU, V.H.F. PAM: K4KZH. RM: W4BAZ. Appointments: WA4VCN as ORS. Endorsements: WA4AGH as OBS/OPS; W4ADH as OBS/OES/OPS; K4DZM as ORS; K4YZU as PAM/OPS; K4QIO as OPS; WA4OMH as OES.

Net	*Freq.*	*Days*	*EST*	*Sess.*	*QNI*	*QTC*
EMKPN	3960	M-Sat.	0630	23	378	117
MKPN	3960	Daily	0830	(not received)		
KTN	3960	Daily	1900	31	962	355
KYN	3600	Daily	1800/2000	72	463	319

W4BAZ is the new RM, assisted by WA4DYL. WA4GHQ reports a QNI of 36 for the Lexington 6-Meter Net on 50.3 at 2200 EST Tue. and Thurs. St. Mary's College Radio Club has ten members with K4ZRA chairman. W4JUI is almost QRT because of a heavy work load. WA4OMH reports mostly local work on 6 and 2. W4-WNH worked some MS during the Geminids shower and has a new 432-Mc. helix antenna. W4JUI made a perfect score in the Sept. FMT; W4CMP also did well. Kentucky nets and operators are to be congratulated on the fine job during the 1965 SET. K4HSB is in college and has dropped his EC appointment. WA4TJS has organized a radio club at Rowan County High School. New Owensboro Club officers are W4OYI, W4PFQ, WA4-MXD, W4TOY and W4VJV. Traffic: WA4AGH 416, WA4KFO 197, W4RHZ 179, W4BAZ 160, WA4TPB 147, WB4ABF 146, WA4DYL 137, WA4GMA 105, K4YZU 103, WA4IJM 88, W4KJP 58, WA4SOM 31, W4BTA 30, W4CDA 28, W4OYI 26, W4YYI 18, WA4VCN 17, WA4-DXA 16, WA4TTE 16, K4HOE 14, WA4IMF 9, WA4-ZIF 9, W4SZB 8, WA4GHQ 7, W4JUI 4.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8ELW, K8QKY, W8EU, K8-KMQ. PAMs: W8CQU, K8LQA, K8JED. V.H.F. PAMs: W7YAN, W8CVQ. Appointments: W8QFQ as EC; W8-FAW, W8PBO, WA8PIM, W8SH as ORSs; W8AHV and WA8DPO as OPs; W8AHV as OBS; W8SH as OES. New officers: Motor City RC—K8VGW, pres.; W8CQB, vice-pres.; K8ZJU, secy.; K8DPM, treas.; W8BEZ, trustee of W8MRM. Grand Rapids ARA—WA8DNZ, pres.; WA8AAT, vice-pres.; WA8DHS, secy.; WA8-KEP, treas.; K8JMA, trustee of W8DC. Wayne State Univ. RC—W8GTL, pres.; K8HLR, vice-pres.; K8-TWW secy.; K8VQI, treas. Central Mich. V.H.F. Club—K8ROT, pres.; WA8GRI, vice-pres.; WA8GBG, secy.-treas. Huron Valley ARA—WA8CXF, secy.; K8JDM, trustee. The Huron Valley ARC 2-Meter Net started Nov. 1 at 0030 GMT. W8ELW sends code practice nightly except Thurs. on 145.5 at 0145 GMT. No information has been received on the Lansing and Paw Paw 50-Mc. Nets. WA8MUY is sponsoring a Detroit 6-Meter C.W. Net which meets each evening at 0145Z on 50.550, and can use A2 on 51.000. K1LSW, ex-W8GEB, a well-known Cleveland/Detroit ham, died Nov. 1 of a heart attack. K8UIZ got his B.S. Degree in E.E. from the U. of M. and is now working for Collins in Cedar Rapids. WA8-CXF silk-screens her own QSL cards. WA8MEE is going to Lawrence Institute of Tech and has a new HO-10 Monitor Scope. W8DSE built a Heath "tweet" lunch box. W8DQL made Amateur Extra Oct. 22. W8AAM says, "no luck with verticals." W8WNX has a GSB-201 linear and runs a kw. WA8PYL built an SB-300 and a SB-400, using both as a transceiver. W8QFQ has more antenna space at the new address. The MCRC set up a 6-meter a.m. station at Veteran's hospital, for Thanksgiving and Christmas with the call W8ADR. W8EKY is home from the hospital and OK. When last heard from K8NYP was in Italy. W8ZMN is working for Felton Radio of Escanaba. WA8JWP has a new HW-12 and W8ZMI is using a Swan-175 he bought for his son. K8MQO now is at M.S.U. After 18 years, ex-W8BBX/W8ADU is back as WA8PYL, K8QKY BPLs again. Traffic: (Oct.) K8QKY 653, K8KMQ 308, K8LNE 269, K8NJW 236, W8CQB 180, WA8BQK 173, K2SIL/8 166, WA8PIM 120. K8ZJU 99, W8BEZ 95, W8YAN 87, W8-RTN 84, W8QQK 63, W8EU 60, K8GOU 56, K8TIG 56, WA8MQT 55, K9RHU/8 52, W8UFS 50, W8ELW 47, WA8CXF 46, W8EJR 44, W8FX 44, WA8LRC 35, W8-PBO 33, K8WQV 29, K8HLR 28, K8JED 27, K8JJC 26, K8KBN 26, W8AUD 24, WA8ENW 23, W8TBP 22, WA8-CZJ 19, WA8HGE 15, WA8MGM 12, W8SS 11, W8MIRM 10, WA8HDM 9, WA8MEE 9, K8PYW 9, W8AHV 8, K8-QLL 7, W8DSE 6, W8DQL 4, W8PJS 3, K8VDA 3. (Sept.) K8LNE 323, WN8QLY 58, K8ZJU 29, K8KBN 28, WA8CXF 18, W8IWF 7, W8AHV 5, K8AEM 2, WA8NPF 2.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ, K8BAP and K8-UBK. WA8NEG joined the Silent Keys. We are fortunate in receiving another new club bulletin, Newark ARA's *NARA News*, which tells us K8NTP and K9-ZNH/W8DOQ joined the Silent Keys. WA8IGJ put up a 40-ft. tower with a 6-meter beam on top and the club has now affiliated with the Ohio Council of Amateur Radio Clubs. Massillon ARC's *MARC Newsheet* says the club's 1966 officers are W8OYL, pres.; WA8LRM, vice-pres.; and W8YHU, secy.-treas.; and W8YNB spoke on microwaves. We received Findlay RC's *The W8FT News*, which may be the last one as W8OTK is giving up the editorship, and it mentioned that between 1500 and 2000 attended the hamfest with K8CEN, WA8-EKE, K8WOV, and Jeanne Gee earning prizes. A program held by the Seneca RC was on Unknown Equipment. Inter-City RC's *IRC News Bulletin* states the club heard K8ERV discuss the design of the Drake R-4 and W8YTP, aided by W8QFJ, started code and theory classes. Indian Hills RC's *Smoke Signals* reports the club held a Halloween Party. Toledo's *Ham Shack Gossip* tells us that W8UEL is the new Lucas County EC, taking the place of K8TVW, who recently became a Silent Key; WA8RLN, WA8RLT, WN8RSN and WN8-RTE are new hams in the Toledo area, includes a piece of poetry by W8UPH and now I know why he hasn't made BPL lately; W8BXM is back to work after an operation; WA8RPL visited in Tennessee and while there entered the VA Hospital, W8STF was in the hospital; W8GJS visited in Michigan; the stork brought K8CYL another baby girl; K8SCW moved to Florida; WA8OMC moved to Austintown and W8EWW talked to the Toledo RC all about tornados. The Babcock & Wilcox RC saw two movies "Maryland" and "This is Ocean Fishing." Southeast ARC's *Ham Fax* informs us that W8DAE, your Asst. SCM, spoke on traffic-handling and the club has started code and theory classes. An appointment made in Oct. is K8BWT as EC. The Shaker Heights High School ARC was organized with WA8-NNR, pres.; WA8NQC, vice-pres.; and WA8NQE, secy.-treas. From what information I have received, Ohio had a successful Simulated Emergency Test. Miami County ARC started new amateur classes with 38 enrolled and W8JTF teaching theory. W8CHT thanks Ohio amateurs for their support of 8RN during the SET. W8ENM has a new T-4 receiver. W8BZX, W8-UPH, WA8CFJ and WA8CXY made the BPL in Oct. The Ohio S.S.B. Net had 1846 QNIs and 1026 QTCs in Oct. K8SOW moved to Florida. Traffic: (Oct.) W8UPH 643, W8RYP 428, WA8CFJ 409, WA8CXY 358, W8DAE 354, W8BZX 283, W8CHT 255, K8LFI 205, K8DHF 168, W8FSM 164, K8LGA 122, W8ENM 114, WA8AUZ 113, K2UBK 107, WA8JXM 104, K8DDG 103, W8HNP 99, WA8FSX 88, K8YDR 80, W8MGA 69, W8QCU 59, K8LGB 47, W8DQD 38, W8OUU 36, K8DYR 32, W8CXM 24, WA8CKY 23, W8LZE 23, K8BPX 21, W8LAG 14, WA8KPN 9, W8FGD 8, K8HKB 8, W8NAL 8, W8WUO 7, W8LBX 5, WA8FKD 3. (Sept.) WA8AJZ 55, K8HKB 14, K8LB 10.

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. Congrats to W2URP on making the BPL with 105 originations plus deliveries. Sorry to lose OO K2LSX, who has moved to the N.N.J. section. However, we gained WA3DHU/2, an OES who moved here from W.Pa. Good luck to you both. WB2HZY reports 20 new countries and two continents during Oct. W2ZSJ, K2LSX, WA2OJD, WA2PBX and WB2OGN were active during the Sept. FMT. The New Rochelle Club heard a speaker from Squire-Sanders describe its new equipment. At the Albany Club plans were made for their annual dinner party in December. W2VP is a new member of the QCWA and found out he is eligible for a 50-year certificate. Congrats. Hudson Division Director W2TUK was speaker at the Schenectady Club recently. Schenectady Co. EC, K2IOW, reports its AREC exceeded the 1964 score during the SET. WA2TEQ won his "tower argument" with the City of New Rochelle. The Poughkeepsie area is heard on 146.94 Mc. wide-band f.m. with mobiles, base stations and repeater station on Mt. Beacon. All appointees are reminded to check the date on their certificates.

AS MENTIONED in previous articles, the solid state HRO-500 receiver incorporates a number of unusual circuits which are new to many amateurs. We've previously discussed, for example, the *tunable* six-pole filter used for versatile steep-skirted selectivity with passband tuning in the 500 cps and 2.5 KC positions, and the phase detector used to phase lock the high frequency oscillator to the crystal-stable output from the spectrum generator.

THE SPECTRUM generator itself uses a device termed an *interrupted oscillator* to provide harmonic enrichment of the output from the 500 KC master oscillator, and a discussion of the principle of oscillator interruption as used in the HRO-500 may very well be helpful in home design and construction.

THE PROBLEM which faced our advanced development team during the design of the HRO synthesizer was to use the harmonic output from a single stable crystal oscillator to provide the equivalent of separate crystal oscillators for each of 60 500 KC bands — in order to build a receiver with a frequency range never before attained — five kilocycles to 30 Mc. with identical tuning rate and calibration over the entire range.

THERE WAS no possibility of simply using the raw harmonic output from a 500 KC crystal oscillator for direct HFO substitution. Quite apart from the problem of getting sufficient harmonic amplitude at the higher frequencies, the tweets generated from countless mixer products of strong 500 KC harmonics would make the output from the receiver sound like a cat fight in an aviary.

THE SUCCESSFUL design approach, of course, was to build a spectrum generator incorporating an interrupted oscillator, which produces high-amplitude harmonics of the 500 KC crystal oscillator only in the frequency range desired for each band. Lower and higher order harmonics than those desired are so low in amplitude that they can easily be controlled. To further assure spectrum purity, the desired harmonics thus produced are not used for direct HFO substitution because of the impossibility of obtaining selectivity at higher frequencies sufficient to introduce only the one desired harmonic into the first mixer of the receiver — without also introducing three or four more unwanted harmonics 500 KC apart on each side of the desired harmonic. This is the reason for the phase lock portion* of the synthesizer, which is used to phase lock a conventional tunable high frequency oscillator to a single discrete harmonic output from the spectrum generator. The now phase-locked tunable HFO is thus crystal stable, and *its* output is used for injection into the first mixer because of its purity. The two most important goals are thereby achieved — the equivalent of a separate crystal-controlled H.F. oscillator for each of 60 500 KC bands, and with the exception of two discrete birds at 2.75 and 3.0 Mc., spectrum purity such that all spurious responses are below the equivalent of one or two microvolts!

BUT BACK to the interrupted oscillator which makes the spectrum generator possible . . . the problem is to produce a small cluster of high amplitude harmonics of a 500 KC oscillator at a given much higher frequency — and to substantially reduce the amplitude of other harmonics which are higher or lower than those in the desired range.

ASSUME THAT a group of 500 KC harmonics is desired at 30 Mc. A free-running oscillator (stability unimportant) is designed to produce output at approximately 30 Mc. If this oscillator is interrupted with a 500 KC pulse (obtained from the 500 KC oscillator) in such a way that at each starting and stopping point the phase angle of the original waveform is identical, a very interesting thing happens. If the free-running oscillator was originally operating at a frequency of, say, 29.81 Mc., *there will no longer be any output at this frequency.* Instead, there will be strong outputs at each harmonic of the 500 KC interruption frequency in the vicinity of 29.81 Mc. Of more importance, the amplitude of these harmonics will be many times greater than that of the original harmonics of the 500 KC oscillator. So we've got what we wanted — a discrete group of high amplitude harmonics at a much higher frequency, with higher and lower order harmonics very low in amplitude.

THE OPERATION and theory of the HRO-500 spectrum generator is, of course, rather more complex than the brief description above. For example, the interrupting 500 KC pulse must be rectangular in waveform, and must be separately generated from the output of the 500 KC master crystal oscillator in order to preserve the stability of the master oscillator. In addition, the spectrum generator must be bandswitched and tracked, since five discrete groups of spectrum output must be produced over a range from approximately 7 to 33 Mc. Hopefully, we plan to make the theory and operation of the entire HRO-500 synthesizer the subject of a full length article in *QST* within the next few months. But perhaps in the meantime, the idea of using an interrupted oscillator to control harmonic generation may be helpful for that project you have in mind right now. And if you'd like a really effective demonstration of how it contributes to the performance of the most advanced amateur receiver in the world, then why not twiddle a few knobs on the HRO-500 the next time you visit your National dealer.

MIKE FERBER, W1GKX

* See *National Page*, December, 1964, for more phase-lock information.

If your appointment is ready to expire, send your certificate to the SCM for renewal. Traffic: WA2VYS 194, WB2HZY 178, W2URP 175, WA2JWL 76, WA2LJM 67, K2SJN 61, W2BXP 46, W2ANV 33, K2AJA 19, WA2WGS 9, WB2CPV 6, WA2DXB 4.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. Section nets:

NLI	3630 kc.	1915 Nightly	WA2EXP	— RM
VHF	145.8 Mc.	2000 TWTh	W2EW	— PAM
VHF Net	146.25 Mc.	1900 FSSnM	W2EW	— PAM
NYCLIPN	3932 kc.	1600 Daily	WB2IWB	— PAM
NLS (Slo)	3630	1845 Nightly	WA2RUE	— RM

NYC-LI AREC nets: *See Dec. 1965 column for schedules.* It is with deep regret that we note the passing of K4GG/W2GG, the father of W2TUK and WB2DQB. Remembered for his many accomplishments in his 50 years of amateur radio, he was perhaps proudest of his most recent achievement, WN2CZU, jr. operatr of W2TUK, to whom he taught the fundamentals of amateur radio this past summer. K4GG, "Mr. 14.290," will be missed by his many friends in the amateur fraternity. BPL certificates were awarded to WA2RUE and WA2UCP. New appointments: W2JTZ, WB2DZZ, WB2SLI as ORSs; W2JTZ, WB2AEK as OPSs; W2JTZ, WB2PAU, WB2POZ, WB2RBA as OBSs; WA2DHF, WB2QXH, WB2RGR, WB2TBX, WB2TPS as OESs. K2UMM advanced to Official Observer Class I. K2MQW, 5-Towns RC, not only whomped the daylights out of W2YKQ, Lake Success RC, but everybody else in the 5-transmitter class this past Field Day. WA2UCP was active in the Boy Scoust 8th Jamboree of the Air while working with two troops in Brooklyn. WB2EUH reports that school has become a sticky wicket, but he's still on top! WA2FTS says he's qualified for WAC. WB2EMJ worked a KJ6 with his broken reflector type quad. WB2RBA won his first bunny-hunt on 6 meters with LIT-BARC. Manhattan AREC/RACES has been holding drills with walkie-talkies, according ot WA2AQQ. WB2PNS picked up a new HA-225 receiver and Globe Scout 680 and hopes to open a branch of the Confederate States Rebel Net Fri. nights. K2GKU says ya better hustle if you want to get into the Queens 10-Meter AREC. Send your application to W2IAG. Listen, W2PF was working this guy, W6WY, the other day when suddenly it dawns that this is old ex-2WB of Brooklyn that 2PF last worked on spark back in the twenties! W2BCB's faithful old receiver finally flipped and blew its paper condenser after 26 years. WB2IPO has a new homebrew Big Wheel on the roof about 35 feet up. WB2BKS sends in a vote of thanks to K2OVN, WA2GAB and the Kings 2-meter gang for a fine SET this year. K2DGI has a new 80/40 inverted "Vee" gracing the hollowed (or was it hallowed) roof. Nassau 10-meter AREC issued Achievement Awards to WA2HUF, WB2JJW, K2JGZ, W2EHA, W2FWV, K2TVR, K2CPA, WB2BJG, K2DGI, WB2FDY, K2SDM, K2ORA and W2GPQ. W2LGK would like to hear from some of the 1941-era NLI guys. WB2AWX, Asst. EC for a.m., and K2PSQ, Asst. EC for s.s.b., are looking for new members for the Kings 10-Meter Net. WA2RKK has a Twoer set up in the mobile. Received a Form 1 card from WA2PJL that was circa 1938, or about seven years before he was a pup. WA2KSP is looking forward to a visit from his son, WA2SAR, who is in the Air Force. W2QPQ, formerly of Jamaica, is now W9IWI in Skokie, Ill. W2BOT is on the mend after an operation. Hey, the *Spurious Radiations* of the Rockaway ARC has gone to offset printing and is a neat looking little paper. WA2TAQ and the Rockaway boys are to be congratulated! Traffic: (Oct.) WA2RUE 2042, WB2HWB 295, WA2UCP 224, W2EW 220, W2GKZ 104, WB2EUH 81, K2AAS 80, WA2EXP 74, WA2FTS 54, WB2NGZ 53, WB2EMJ 50, K2UAT 48, WB2AEK 37, WB2MLN 31, W2DBQ 30, WA2QJU 28, WB2RBA 24, WB2PNS 15, W2EC 12, WA2AQQ 11, WN2TCS 11, WB2AWX 8, W2-BCB 6, WB2IPO 6, W2PF 6, WB2BKS 5, W2GP 5, K2KYS 4, K2DGI 2. (Sept.) WB2EUH 118.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW. SEC: K2ZFI. NNJ Official Bulletin transmissions broadcast:

6:30 P.M. 7140 kc. MF K2UCY
7:30 P.M. 145,700 kc. TThSN WB2UCS
7:30 P.M. 21350 kc. TW WB2QGB
9:00 P.M. 145,080 kc. MThSt. WB2OYK
10:45 P.M. 51150 kc. MWSt K2KDQ
7:30 P.M. 146,800 kc. TTh K2UCY
11:00 P.M. 50100 kc. MWF K2OKA
6:30 P.M. 21,350 kc. F WB2QGB
9:00 P.M. 145242 kc. MWF WB2KLD
9:00 A.M. 145,300 kc. Sun. K2UCY

Write to W2CVW for a complete version of these schedules. In addition to those reported last month, W2WHB and WA2ZKT sent messages during the SET. New appointments: W2OPB as ORS. Your SCM and SEC wish you a prosperous New Year and would like to see activities reach a new level in 1966. We also would like to remind you that this was written in November, so please send any announcements *two months* in advance. WB2QFZ is a teacher at James Caldwell H.S. and has the following students: WB2NVE, WN2SBL, WN2SBM, WB2SBK, WN2SBJ and WB2SBN. WB2QFZ and WB2-SBN are congratulated on the receipt of their General Class licenses, as well as WB2SRY, WB2RLA and WB2SAF. The Irvington RAC meets in the Community Bldg., Irvington, Mon. at 7:30 P.M.; formal meetings 8:30 P.M. the 1st and 3rd Mon., code and theory classes the 2nd and 4th Mon. of the month. WB2OYK has changed his OBS schedule to Mon., Thurs. and Sat. at 9:00 P.M. local time on 145.08 Mc. Roger would like to receive news items from hams in the Rutherford area. WB2KPD has a new TX-62 and beam. WN2SAG, WA2WXH and WN2RSS have new antennas. The East Coast V.H.F. Society Hamfest will be held Feb. 6 in Saddle Brook. The Jersey City RC meets the 4th Mon. of the month at the Red Cross Bldg., Jersey City, and conducts a net at 9:00 P.M. local time Tue. on 146.5 Mc. WA2UDT now has 16 states on 2 meters. Good luck to WA2PWI, who has moved to N.H. WN2PIH is studying hard for his General. K2RDX has been measuring the pattern of a 44-element 432-Mc. beam. Northern New Jersey is proud to have the *first four highest scoring* Field Day groups in the nation. The New Jersey Emergency Phone and Traffic Net held its Annual Dinner in Hightstown Oct. 23 with the following N.N.J. operators in attendance: WA2CCF, W2CVW, W2HIA, W2IGL, WB2IYO, WA2KMO, K2MFX, W2NHJ, W2PEV, WB2-QLF, W2SJI, K2SLG, WA2TEK and K2VNL. The New Jersey Net held its annual business meeting at the QTH of WA2BLV, with W2ZVW, W2HZJ, WA2UPC, K2VNL, WB2AEJ and WA2KIP in attendance. WB2AEJ was elected net manager for 1966. Copies of the *Northern New Jersey Section Operating Schedules* are available upon request. A self-addressed stamped envelope would expedite delivery. Traffic: (Oct.) WB2AEJ 337, K2VNL 292, WB2JWB 231, K2ZFI 118, WB2OHK 113, WB2FIT 107, WB2KSG 96, WA2TEK 92, W2CVW 89, WB2HLH 38, K2UCY 27, WB2BCS 23, WB2KLD 17, K2AGJ 16, K2SLG 16, WB2QGB 13, W2PEV 12, K2EQP 8, W2OPB 8, W2DRV 6, K2MFX 6, WB2QLF 4, WA2-CCF 3, WB2ICH 3, WB2IYO 3, WA2TAF 3. (Sept.) W2DRV 12, W2ZAL 4. (Aug.) W2DRV 16, WA2UOO 1. (July) WA2UOO 6.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, WØNTB—SEC: KØBRE. We are looking for thirty new ECs. If your area does not have an EC and you can qualify, please apply to our new Section Emergency Coordinator, "Bus" Rowley, KØBRE. The SET is now history. Post-mortems indicate that our thinking and planning is too late and too little. However, we are proud of the groups who did participate. Thanks to those who could find the time to do so. Nets for Oct.: 160M, QNI 765, QTC 17, sessions 31; 75M net, QNI 1217, QTC 98, sessions 26; Hamilton County net QNI 371, QTC 6, sessions 31. Traffic: WØLGG 508, WØNTB 114, KØASR 51, WØBKR 27, KØTDO 27, WAØDYV 24, KØEVC 20, KØKAQ 9, WAØDAG 8, WØQVZ 7, WØNGS 6, WØEMA 4.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. RM: WAØJII. V.H.F. PAMs: WØOHJ, KØVPH.

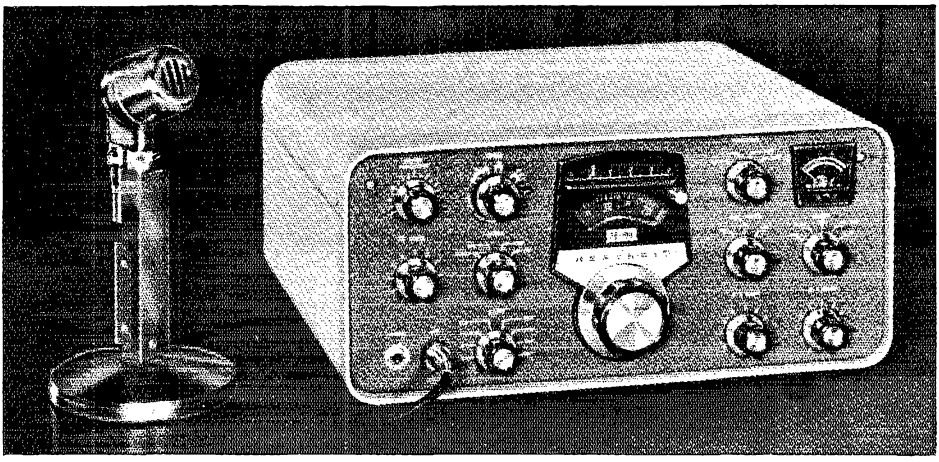
Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI*
QKS	3610	1830 CST	Daily	47		85
NCSs: WØBYV, WAØFCO, KØBXF, W5NAR/Ø, WAØJII						
KPN	3920	0615 CST	M-W-F		13	124
		0800 CST	Sun.			
NCSs: KØGII, KØJMF, KØGZP						
KSBN	3920	1830 CST	Tue.,Thurs.		52	154
			Sat.	13		
NCSs: KØEMB, WAØCCW, KØLPE, KØLHF						
KWN	3920	1800 CST	Mon.-Sat.	25	11	261
Kans. EC Net	3920	1300 CST	Sun.			

Appointments renewed: KØLHF as EC; KØBXF, WØBYV as ORSs, WØWFD, KØLHF as OPSs; WAØDZI as OES; KØLHF as OBS; WØWYK, WØDEL as OOs. KØSSM is trying to start AREC movements Zone 1, northeast corner of the state Wed. 1230 CST 3920 kc. Zone 6, Johnson County, provided outstanding communications in the American Royal Parade in the Kansas City area. Like W5NAR/Ø, once again KØYRQ is studying (?) at K.U. BPLers: WØOHJ and W5NAR/Ø

(Continued on page 106)

An Invitation...

Compare The Heathkit SB-100 With Any Other Make of SSB Transceiver

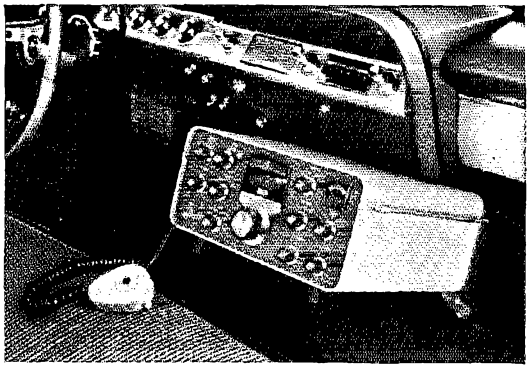


180-Watt, 80-10 Meter SSB Transceiver.....$360.00

• Full five band transceive SSB & CW operation, 80-10 meters • 180 watts P.E.P. SSB-170 watts CW • Switch selectable Upper/Lower sideband/CW operation • Operate PTT & VOX • CW with built-in sidetone • Can operate crystal control in the transmit mode with variable tuning of receiver or can operate crystal-controlled transceive mode–excellent for net control • Separate offset CW carrier crystal • Triple action Level Control™ • Built-in 100 kc crystal calibrator • Enclosed relays for quiet, trouble free operation • Heath SB-Series LMO (Linear Master Oscillator) provides truly linear tuning with 1 kc dial calibration–less than 100 cps per hour drift after warm-up–400 cps accuracy • Perfect companion for HA-14 KW Kompact or SB-200 final amplifiers • Fixed station operation with HP-23 power supply–mobile with HP-13 & SBA-100-1 mobile mount for quick plug-in/quick disconnect mobile installation • Fast circuit board assembly • Simple alignment–requires only a VTVM or VOM, a dummy load and a broadcast receiver

If you are considering the purchase of an SSB transceiver, we urge you to read every word on the next two pages before deciding.

An Invitation... Compare the Heathkit SB-100 With Any Other Make of SSB Transceiver



Heathkit SB-100—The SSB Rig You've Been Waiting For

The Newest And The Hottest Of The SB-Series! Here's a complete 80 through 10 meter 180-watt SSB transceiver. It includes all of the high-performance features you've read, heard talked about, or experienced on the already famous Heathkit SB-Series Amateur Radio Equipment . . . plus 5-band coverage with fast, simple bandswitching and tune-up . . . alternate "remote" power supplies for fixed or mobile operation . . . new Heathkit Switch-Board™ coil and bandswitch assembly . . . and a new ALC control circuit (TALC™) that allows even greater variation in speech level. All this and more in the new SB-100!

Here's Engineering That Sets The Pace For The Industry! The Heath SB-Series crystal filter features a 6 pole lattice filter (6 individual crystals) to produce a superior 2 to 1 shape factor for sharper receiver tuning . . . greater sideband suppression. The filter pass-band is symmetrical . . . for identical characteristics on both upper and lower sideband signals . . . and for optimum SSB reception with steep skirts for adjacent signal rejection. What's more, the entire filter assembly is hermetically sealed to retain its published specifications just as they were when "checked out" at the time of production. Compare these specifications with any other SSB filter on the market!

Improved Heathkit Techniques Produce Better Than Factory Assembled Results! The new Heathkit Switch-Board™ coil and bandswitch assembly virtually eliminates the troublesome point-to-point wiring of tuning circuitry . . . eliminates the critical job of "lead dressing" required in "wired" circuitry. Here the assembly procedure is simplified further by a removable switch shaft which enables easy "stacking" of the individual Switch-Boards. Switch-Board construction is a new step forward in achieving electronically stable circuit construction, plus ready accessibility to tuning coils.

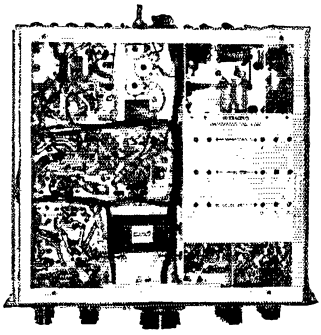
Power Consistent With Maximum Versatility. 180 watts P.E.P. is the best transmitter power level for most hams. This power level permits using the right tubes for the job and does not require eliminating useful features to pay for increased power. The SB-100 produces a "bare-foot" signal comparable to the higher power transceivers and is ideally suited for driving a grounded grid linear for a really big signal without the problems of excessive drive.

TALC™ (Triple Action Level Control) Sets New Standards For Automatic Level Control. Control from three separate circuits is combined in TALC™ to provide greater speech compression . . . allow for even more variation in speech level . . . and boost the performance of the SB-100 still higher.

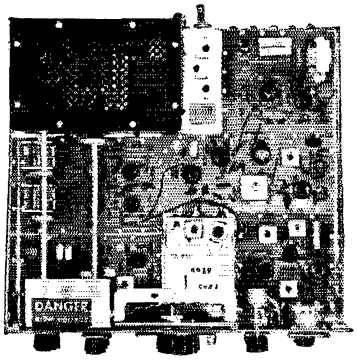
Operating The SB-100 Is A Pleasure . . . Like Driving A Fine Automobile! Select the band, dial the frequency, peak-up the preselector, and tune. Receiver and transmitter bandswitching is simultaneous. The preselector control peaks up the driver. Final tuning is quick, sure, and positive. And for CW op's who prefer headphone listening, there is a separate headphone level control to adjust the headphone audio level independently of speaker volume. In addition, the transmitter and receiver are always on the same frequency . . . no "leap-frogging" around the frequency when you're working round tables.

Order The SB-100 For The Best Value In SSB Transceivers . . . Regardless! We invite comparison of the *complete* SB-100 specs on the next page with those of any other make SSB transceiver. Also consider circuit design as related to inherent stability, use of quality components and fine mechanical construction, cost of companion power supplies and linear amplifiers, band coverage in view of increasing 10 and 15 meter activity, ease of circuit familiarization with regard to possible maintenance, and resale value. You will agree that the SB-100 is the best investment you can make in amateur radio equipment. (Recommended for hams with previous electronic or kit construction experience.)

Kit SB-100, 23 lbs., $36 dn., $31 mo.....**$360.00**
SBA-100-1, Mobile Mounting Kit, 6 lbs.....**$ 14.95**
GH-12, Mobile PTT Mike, 2 lbs.....**$ 6.95**
HDP-21, Communications Microphone, 4 lbs...no money dn., $5 mo.....**$ 29.40**
Kit HP-13, DC Power Supply, 7 lbs ...no money dn., $6 mo.....**$ 59.95**
Kit HP-23, AC Power Supply, 19 lbs....no money dn., $5 mo.....**$ 39.95**



Better than factory assembled!—sectionalized circuit board construction, a minimum of point-to-point wiring, the use of pre-assembled wiring harnesses, plus the personal care given to kit assembly assure the quality you demand.



Just how hot can a SSB transceiver be?—Heath SB-Series leads in amateur radio electronics. Modern circuitry, select components, ample shielding, and the rock-stable Heath LMO give the SB-100 pace-setting high performance.

SB-100 SPECIFICATIONS—Receiver section: Sensitivity: Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **SSB selectivity:** 2.1 kc minimum at 6 db down, 5 kc maximum at 60 db down—2:1 nominal shape factor—6:60 db. **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:** 35 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 and headphones in CW mode. Approx. 1000 cps 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 cps 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 7.3; 14.0 to 14.5; 21.1 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megacycles). **Frequency stability:** Less than 100 cps per hour after 20 minutes warmup from normal ambient conditions. Less than 100 cps for ±10% line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Dial accuracy—"resettability":** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps after calibration at nearest 100 kc point. **Dial mechanism backlash:** Less than 50 cps. **Calibration:** 100 kc crystal. **Audio frequency response:** 350 to 2450 cps. **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; OSC Mode switch; Meter switch; RF Gain control; Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-trip; 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; 600 ohm output; 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:** 14⅞" W x 6⅝" H x 13⅜" D.

Buy Now—Use This Order Blank

FREE 1966 HEATHKIT CATALOG

See the wide array of Heathkit Amateur Radio Equipment available at tremendous do-it-yourself savings! Everything you need in "mobile" or "fixed" station gear with full descriptions and specifications . . . Send for FREE copy!

Heath Company, Dept. 9-1
Benton Harbor, Michigan 49023

HEATHKIT®

☐ Please send FREE 1966 Heathkit Catalog.

☐ Enclosed is $_____ plus shipping.

Please send model(s)_____

Name_____

Address_____

City_____ State_____ Zip_____

Ship Via:

☐ Parcel Post ☐ Express Collect ☐ Freight

☐ 20% Included, C.O.D. ☐ Best Way

All prices & specifications subject to change without notice. AM-160R

PRESENTING THE COMPLETE

MARK I LINEAR AMPLIFIER

Five Band, 2000 watts PEP input. Uses two Eimac 3-400z or two Amperex 8163 triodes.

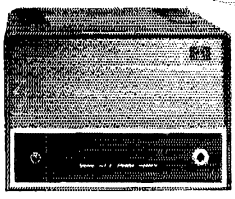
PRICE $425

TUBES $ 68

SWANTENNA 5 BAND MOBILE ANTENNA

Remote switching from inside car. 500 watt rating.

MODEL 55 . . $95



MATCHING AC SUPPLY

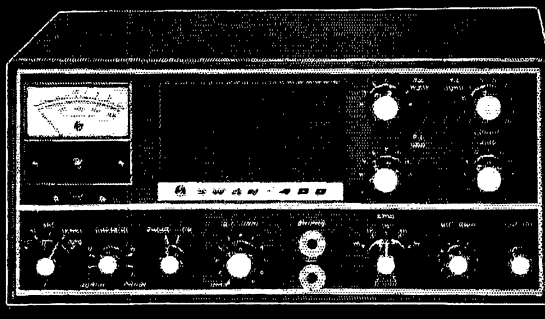
with speaker, phone jack.

MODEL 117-XC $85

MODEL 230-XC for 230 volts $95

DC MODULE Converts AC supply to 12 volts DC for portable or emergency operation.

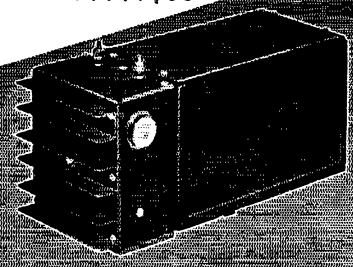
MODEL 14X $55



MODEL 400 SSB TRANSCEIVER 5 BANDS 400 WATTS

Includes many deluxe features. Designed to use the highly stable, full coverage Model 420 VFO in fixed station, the miniature Model 406 VFO for mobile, or the Model 405 for MARS operation.

$395



12 VOLT DC SUPPLY

For mobile or portable operation. Negative ground standard. Positive ground available on special order.

MODEL 14-117 . . $120

PLUG-IN VOX UNIT

for either transceiver

MODEL VX-1 $35

CRYSTAL CALIBRATOR

KIT $19.50

SIDEBAND SELECTOR

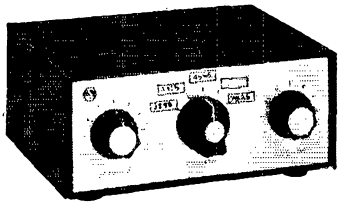
KIT $18

Kits for Model 35 only. Model 400 i cludes these features

SWAN SPEAKS YOUR LANGUAGE

ASK THE MAN WHO OWNS ONE

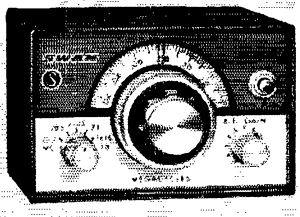
SWAN LINE



MARS OSCILLATOR

5 fixed channels, pre-set and locked to any frequency. May be used directly with Model 400 Transceiver or with Model 350 and Model 22 adaptor.

MODEL 405 . . . . . $45



MOBILE VFO

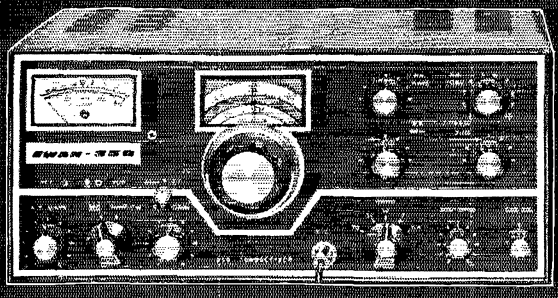
Miniature size. Covers phone bands. Makes it possible to trunk mount the transceiver.

MODEL 406 . . . . . $75

REMOTE CONTROL KIT

For trunk mounting of transceiver.

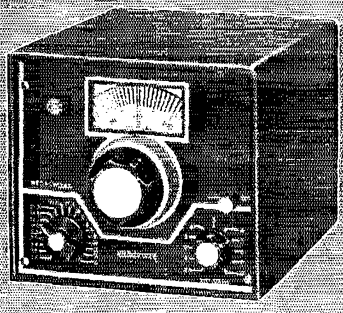
MODEL RC2 . . . . . $25



MODEL 350 SSB TRANSCEIVER
5 BANDS 400 WATTS

Built in full coverage VFO with 5 kc calibration. The greatest transceiver value ever offered the radio amateur.

$395



FULL COVERAGE VFO

20 ranges, 200 kc each, 2 kc calibration. Matches 350 and 400 transceivers in size & styling.

MODEL 420 . . . . . $120

DUAL VFO ADAPTOR

Provides for the addition of second VFO for separate control of transmit and receive frequencies. May plug into either 350 or 400 transceiver.

MODEL 22 . . . . $25

Happy New Year
from all the gang
at SWAN

FOR COMPLETE INFORMATION *SEE YOUR DEALER*

SWAN ELECTRONICS CORP.
Oceanside, California

Traffic: (Oct.) W5NAR/Ø 635, WØOHJ 521, KØHGI 118, WAØJII 83, KØEMB 72, WAØEMQ 68, KØBXF 58, WØFTB 50, KØLHF 39, WAØCCW 38, KØLPE 34, KØGZP 31, WØBYV 24, KØJMF 12, KØGII 11, KØPSD 9, WØFDJ 5, KØJDD 5. (June) WAØEMQ 93.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK —SEC: WØBUL. WAØLYE is a new OPS. WAØFLL renewed as OBS and PAM (V.H.F.). SEC WØBUL received reports by radio during the SET from 11 ECs, 8 reports of extra traffic net sessions, and individual participation messages from 75 stations in the section. KØAXU was active from Red Cross Hq. and had a 6-meter link to KØLIR for h.t. traffic net outlets during the SET. OO reports were received from KØGSV KØHNE and WØQWS; OES from WAØFLL, KØFPC and KØJWN. WAØDGG is now Extra Cl. KØYIP got DXCC. KØLGZ received a Worked-All-Mo. certificate and a new keyer. W7LIJ/Ø is a new in Mexico. WØAMO, WAØEMS and WAØFLL are organizing a new ham club in K.C. WØEEE held an antenna party with help from the local fire department. WAØDSE, WØAIG and WØSUD participated in the Sept. FMT. KØDEQ and WAØFMD receive MON net certificates. KØUOE received a citation from the Navy for his participation during the flood crisis. KØJPS has a new rotator for the beam. WAØLPY and son, WAØJZK, have a 2B receiver. MNN (3580, P.M. CST) and MSN (3715, 9 P.M.) need more check-ins. C.w. ops take note.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2345Z	M-W-F	13	234	149	WØBUL
MON	3580	0100Z	Daily	31	216	277	WØWYJ
SMN	3580	0400Z	Daily	25	56	255	KØAEM
MNN	3580	1900Z	M-Sat.	26	52	19	WØOUD
MSN	3715	0300Z	Daily	31	44	7	KØONK
MoSSB	3963	2400Z	M-Sat.	26	570	189	KØTCB
MoPON	3810	2100Z	M-F	21	283	156	WØHVJ
QMO	3580	2200Z	Sun.	5	22	31	WAØFKD
MTTN	3940	2330Z	M-F	20	277	108	WAØEMX

Traffic: (Oct.) KØONK 4179, WØWYJ 433, WAØFKD 297, KØLIR 221, WØHVJ 137, WØBUL 129, WØYO 120, KØFPC 115, KØAEM 105, KØJPL 100, KØOYV 96, WØOUD 94, KØAXU/Ø 82, WØHTO 73, KØHNE 62, WØZLN 55, KØIOG 53, WAØEMS 48, WAØFMD 41, WØEEE 40, KØYGR 38, WAØCHH 35, WAØDGG 34, WØTPK 31, KØLGZ 30, KØTCB 25, KØJPS 19, WAØELM 16, KØYIP 16, WØRTO 15, KØTGU 15, KØWOP 15, WAØDKT 12, WAØLYE 9, WAØFLL 7, WØBVL 6, KØDEQ 6, WAØBGU 5, WAØDGT 5, WØGQR 5, WAØJLJ 1, WØKIK 1. (Sept.) WØZLN 4.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Monthly net reports: Western Nebraska Net, WØNIK, QNI 471, QTC 233. Nebraska 160-Meter Net, WAØCBJ, ANCS, QNI 125. Nebraska C.W. Net, WAØGHZ, 1st session QNI 157, QTC 59. 2nd session QNI 138. Nebraska Morning Phone Net, KØUWK, QNI 672, QTC 39. Nebr. Storm Net, KØJXN, 1st session QNI 552, QTC 11, 2nd session QNI 855, QTC 18. Nebraska AREC Net, WØIRZ, QNI 156, QTC 11. Nebraska AREC C.W. Net, WAØEEI, QNI 20. The net now meets at 0000Z Sat. on 3782 kc. Nebraska Emergency Phone Net, WAØBID, QNI 1345, QTC 101. The 160-Meter Net is in operation again nightly on 1995 kc. Remember, the Nebraska AREC Calling and Emergency Frequencies are 3982 kc., 29.600 Mc. and 145.350 Mc. WØNYU is completing work on making RTTY Official Bulletins available. Watch this column for time and frequencies. Traffic: WAØDOU 293, WAØGHZ 253, WØNIK 199, WØLOD 98, WAØEEI 50, WAØBID 46, KØJFN 46, WAØBOK 42, KØFRU 36, WAØGVJ 35, WØGGP 34, KØRRL 28, WAØAES 25, KØJXN 25, KØOAL 19, KØHNT 18, WØMTI 17, WØKGQ 15, WØFQB 15, WAØBIE 14, WØAGK 13, WØBFV 13, KØFJT 12, WØVEA 12, WAØIXF 11, WØVRE 11, WØHOP 9, KØKRK 8, WØRJA 8, WØUKD 8, KØDGW 7, WAØEXD 7, WØLJO 7, WAØFNY 6, WAØHSX 6, KØQVN 6, WØWKP 6, WØFBY 4, KØUWK 3, WAØHRX 2, WØPQP 2, KØVTD 2, WØYFR 2, WAØJAV 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Fred Tamm, K1GGG—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. V.H.F. PAM: K1RTS. Net reports: (Oct.)

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	372	582
CPN	3880	M-S	1800	32	481	162
		Sun.	1000			

CN high attendance: W1ZFM, K1ZND, K1LMS. CPN reports 52 sessions, 162 messages, 481 QNI. High attendance: K1LMS 28, K1EIC 27, W1YBH 27, W1LUH 26, K1EYY 24, K1SRF 24, WA1CBW 23, K1DGK 21, W1FVU 20, K1YGS 20. The SET kept our section nets busy and helped W1BDI and W1BGD to make the BPL. The 18th Annual Hamfest in New London was hosted by the Tri-City Amateur Radio Club as successfully as ever, with Director W1QV as general chairman of the event. Officers of the newly-formed Connecticut Council of Amateur Radio Clubs are W1WHQ, pres.; K1IZD, vice-pres.; K1PRM, treas.; K1VII, secy. The council has ten clubs as charter members. Your club should contact W1WHQ for more information. Congratulations to W1PRT on his appointment as SEC. K1MOT is back on CN after 4 years in the Navy. K1WJD won first place in the CWA New England QSO Party. K1HTV is getting ready for Oscar IV with a new 4CX250 2-meter rig. W1ECH is "intruder watching" for commercials on our bands. OBS K1AFC keeps skeds on RTTY. Congrats to K1QPN on his recent marriage. WA1FGN likes 20 and 15 DX and says as WAØHYG he did not fare as well in Colorado. Appointments: W1RFJ and K1DQC as ECs for Stratford and Newington respectively. W1ECH as OO; K1EIC as OPS; K1EIR as ORS: K1EIR as OBS. Endorsement: K1NTR as ORS; K1HTV as AREC member. Net certificates: CN —W1ZL, W1ZFM, WA1APY, K1LMS, K1EIR, K1RQO, K1EYY. Reports received: W1ECH, W1BGD, K1QGC as OOs, WN1DUV/1 as OES. FM tests: K9KNZ/1, WA1CYT, W1BEA. Traffic: (Oct.) W1BGD 646, K1ZND 404, W1EFW 385, W1ZFM 315, W1BDI 263, WA1APY 256, W1NJM 232, K1RQO 183, K1LMS 182, W1YBH 148, W1ECH 78, W1AW 72, K1GGG 49, K1LFW 46, WA1DIU 34, W1QV 32, K1EYY 27, W1BNB/1 26, WA1CBW 23, W1CTI 18, K1SRF 16, W1FVU 12, K1NTR 12, K1YGS 10, W1CUH 9, W1OBR 8, WA1BER 6, K1UQQ 6, W1-CHR 5, W1WEE 2. (Sept.) K1NTR 12.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—SEC W1AOG, received radiograms from various groups in the SET. W1ZLX is a new OO. W1ALP had LO-Nite at his QTH with W1s AOG, DOM, ZSS, OFK, ZLX, K1PNB and XYLs. W1s WAJ, VAH, AYG, BGW, IKU, ZLX, PLJ, K1s, QDR and WJD took part in the Sept. FMT. Our sympathy to W1OT on the death of his wife. W1CZV, ex-W1IBC, are Silent Keys. W1SS was made a life member of the No. Eastern States 160-Meter Assn. W1DFS had G2UF at his QTH and W1s INC, ALP, AOG, EAE and K1KED and XYLs met him there. K1LZV worked Bermuda on 160. W1OSQ is working down on the Cape. W1DEI moved to N.Y. State. K1URX and K1YHU have a new baby girl. A group of us met at the Quincy Y and it looks like the South Shore Club will start up again. The T-9 Club met at WITYP's QTH. W1VAH is DXing on 40-meter c.w. W1AOG, W1LVK and K1AUP stood by to help out with radio at the bad fire of the Medford H.S.; also W1s YOM, QXB and JVZ at a fire in the Melrose H.S. K1IQA is on 75. K1TSH moved to Somerset and has a 6-meter Squalo. W1ALB still is traveling. K1KTC is back in the hospital. W1THT is having trouble on s.s.b. W1NTX has an all-band vertical antenna. K1YUB, busy at college, says the YMCA Club has two new hams. WN1s FHJ and FIQ. W1AEC sold some of its gear at auction to help build a new club station. WA1DHQ has a 2-meter transceiver. W1ATI has an HW-12. K1TLB moved to N.Y. W1OFY is busy with nets and OO work. W1PSG, our EC, has W1s BJE, MVM, NCT, NRZ, ZBE, K1s ACM, FSE, YSR, ZOB, WA1s BLS, BLT, BMP, CEG, EVO, EVP and EVQ working with him. W6HME/1 Norwood is on 20 s.s.b. The Wellesley ARS held a meeting with its C.D. Director speaking on "C.D. and Ham Radio." K1WHM is attending Hebron Academy in Maine. The Framingham Club held a forum on problems with electronics gear. W1LFM is pres.; K1DVJ, secy. W9ZEY is working in Norwood. W1ZBL is now W8GOC. W1WMH will be back here in July. WA1DWZ, now General, has a DX-35 on the air. The 6 Meter Crossband Net had 21 sessions, 359 QNIs 31 traffic. BPLers: W1s PEX, CRX and K1CLM. W1VUE got married in Fla. and K1GVR in N.H. WA1DLT has a TA-33. W6RVZ says that K1KBO is busy programming ionospheric experiments at h.f. and v.h.f. K1CMS and K1ILA are leaving for Mexico in Jan. WA1s DEC and DED are taking W1ZLX's classes at MIT. WA1DJC says the Friendly Rag Chewers on 3850 at 1300 EST has two VEs now. W1CDN is tied up with duties at Fort Devens. W1BVP has concrete anchors and a base for the tower. Appointments endorsed: W1ACB as OO; W1AOG as SEC and OBS; W1s WU and NJL as ORSs; W1s JSM, YYZ, PSG and AR as ECs; W1s AR and NJL as OPSs; W1JSM as OES. W1NJL is busy at Colby College, Maine. W1WU has a new "V" beam and keeps a sked with W1DIU and W3FK. The Quannapowitt RA had an auction. The Yankee RC had two ARRL films. Middlesex ARC is now a member of FEMARA. W1PEX went on a long trip to Japan. W1CRX is the new

(*Continued on page 110*)

SS-1R

The New 701 Series SS-1R is Greater than Ever

The SS-1R, with its unique approach to receiver front-end design, has been called a major advance in HF receiver art. Continuing engineering improvements now incorporated in the 701 series make the SS-1R greater than ever. For example:

Sensitivity has been improved by 3 to 6 db. Typical production units measure 0.25 μv for 10 db S+N/N.

Sideband Stability is even better; USB and LSB BFO frequencies are now *crystal-controlled* while retaining variable BFO for CW.

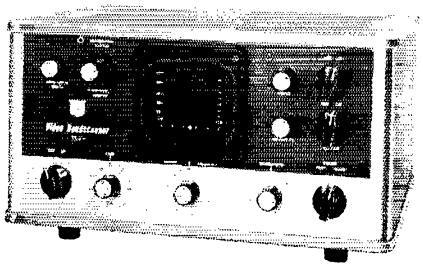
Sideband Quality is clean and distortion-free over a tremendous range of signal strengths (from a microvolt to as much as a volt!). An improved product detector (employing a 6BY6) combined with an i.f. cathode-follower (now a 6AV6) to drive the a.g.c. circuits has increased the already large dynamic range of the SS-1R.

Reliability and Performance Stability have been improved through 1) redesign of a simpler, rugged dial-drum and display mechanism, 2) use of precision glass and ceramic piston trimmers in all critical circuits, and 3) an effective quality – assurance program throughout production and test.

Plus: Crystals for full 10 meter coverage provided.
Improved super-durable sand-blasted finish for the rugged extruded cabinet.
Superior SS-1R Speaker quality.

SPECIAL FEATURES: Freedom from Cross Modulation and Overload • Extreme frequency precision with digital readout in kilocycles. Slow (10 KC per turn) manual tuning rate provides precise tuning of sideband signals • Motor Drive of tuning mechanism for fast traverse of band • 5.0, 2.5 and .35 KC Selectivity with 2:1 60/6 db skirt characteristic • Crystal Lattice Filters • Special Hi Q IF Circuits • Autocalibration of amateur bands to WWV • Choice of AM, USB, LSB or CW modes • Provision for use with the unique SS-1S Noise Silencer and with dramatic new SS-1V Video Bandscanner.

SS-1V, Video Bandscanner. This unique oscilloscope display unit, when used with the SS-1R shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. Provision is made for transmitter monitoring or analysis.



Squires – Sanders, Inc.

MARTINSVILLE ROAD / LIBERTY CORNER • MILLINGTON, N.J. 07946

The Antenna Ranchero

(Continued from page 74)

"Mr. Newhouse, I said we'll take the house . . . *right now*! Immediate possession. Give him a check, Marge, and get the key. Don't bother me with the details. I got lots a planning to do . . . Maybe I can get up that 80 meter affair before dark. . . ."

"Pardon me, Sir . . . I'm sorry, but I sold this house about 15 minutes ago."

"I'll put the 20 meter tower over at this corner and the . . . you *sold* it?? How could ya do a thing like that to me when ya *knew* I was gonna buy the whole top of this mountain for my Antenna Farm? I've *got* to have this house, and not a day to lose. Here, I'll up the ante . . . give ya a grand more than the other people."

"I'm sorry, the house is sold. The papers are signed. It's gone."

"Well, let me talk to the people who bought it. Maybe I could bribe . . . ahhh . . . talk 'em outa the thing . . . offer them more than they paid . . . quick profit . . . yeah. This is *very* important . . . I mean with my Antenna Farm here and sweepstakes and Charlie and all . . . not a minute to spare. Wonder if a 160 meter rotary would be practical up here."

"Well sir, the gentleman who bought the house is still here. I'd be glad to introduce you, but I'm sure he won't change his mind. Ohhh, there he is now . . . up there on the chimney . . . 'haaallllooooooo up there . . . can you come down a minute?'."

"Sorry, Mr. Newhouse, too busy. I've only got two weeks to plant this whole mountain top full of wires for my new Antenna Ranchero. Here, catch this wire and walk it over to that oak tree, will ya?"

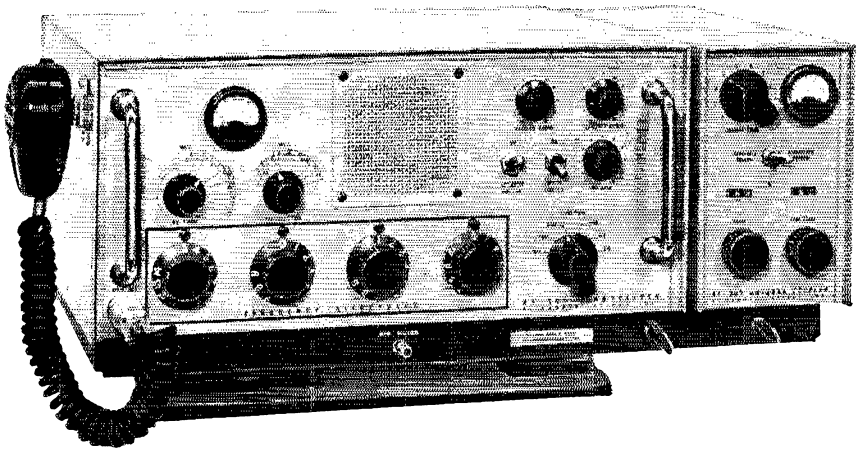
"You see what I mean, Sir. I just don't think Mr. Charles wants to sell." QST

Strays

On page 67 of *QST* for January, 1964 and page 6 of *Fifty Years of ARRL* there is a photo of Hiram Percy Maxim which had run in the Hartford *Times* on January 17, 1914. The other person in the photo, not identified at the time, dropped in at headquarters for a visit recently. He's the Reverend Arthur E. Paterson, D.D., who in 1914 was the wireless reporter for the *Times* and was a League member a few months later, operating a spark station with the call SB from Middletown, Conn. Eighty-two years young, Dr. Paterson is contemplating the acquisition of an amateur license. [They *always* come back, boss. — *Jeeves*]

— • • • —

The Boy Scouts of America have just published a new edition of the Radio Merit Badge pamphlet, based on the revised requirements. Some of the material was prepared by RCA Institutes and most of the remainder by the ARRL headquarters staff. The booklet can be obtained for 35c at stores which sell Scout supplies and uniforms; at local Scout Council offices; or from the National Council, B.S.A., New Brunswick, New Jersey 08903.



This HF Single Sideband Transceiver meets Full Military Requirements and is available off-the-shelf at a commercial price.

It is the RF Communications Model RF-301

Now nomenclatured AN/URC-58

The Model RF-301, SSB Transceiver was designed by RF Communications as a company product without government support. It was designed to be used by military customers in military applications. Now in production, it can be bought in quantities from one unit up with short delivery (averaging 30 to 90 days) at a very modest price. The RF-301 costs about one-third of that normally paid for military transceivers with similar characteristics.

RF-301, SSB TRANSCEIVER

Brief Specifications

Frequency Range: 2 to 15 Mc
Synthesizer: Can be tuned to 1 Kc increments. Provisions for unlocking synthesizer and tuning continuously.
Power Output: 100 watts p.e.p. and average
Stability: 1 part 10^6 standard, 5 parts 10^8 optional
Modes: USB, LSB, AM, CW. Also FSK with adapter.
Power Input: 115/230 volts, 50/60 cycles standard. 12 or 24 volt DC with additional built-in module.
Size: 7¾ x 17 x 14¾ inches • **Weight:** 59 pounds

Please contact us for further details.

rf

R F COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE • ROCHESTER, NEW YORK 14610

Billerica EC. WN8RSL was in Boston on a trip. The EM2MN had 21 sessions, 156 QNIs, 94 traffic. Traffic: (Ont.) W1CRX 696, W1PEX 531, W1EMG 334, K1CLM 314, K1PNB 131, K1GKA 112. W1AOG 77, W1OFK 68, W1DOM 58, K1VPJ 52, WA1DLT 32, W1JDP 24, K1KBO 17, WN1EAT 14, W1ZSS 14, W1CTR 13, K1BGK 10, K1CMS 8, WA1DED 8, WA1DWZ 7, WA1DEC 6, K1VOK 4, W1CDN 1, WA1DJC 1. (Sept.) WA1CRR 14, WA1BDY 7, W1BVP 2.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1QIG. PAM: K1WQI, K1ZVN. RM: K1TMK. V.H.F. PAM: K1OYB. Traffic nets: Sea Gull Net, 1700 to 1800 and 2000 to 2100 Mon. through Sat. on 3940 kc. Pine Tree Net C.W., daily 1900 on 3596 kc. WN1DTZ passed the General Class exam and will be on the nets and all. K1MTJ passed the v.h.f. news and things still are going good; it may be real good this winter. DX seems to be quite good on many of the bands; the southern exposure is keeping skeds up here and seems to be getting squared away. It is real nice to hear a lot from Russ, our former Pine Tree Limited. He sure is a lot of help on the *news* for relay. K1ZVN will be helping as OBS and will be on most nets and modes so all can get the Official Bulletins as they are available. The Maine AREC in the SET looked good with more and better operations. Hope it looks as good on paper. Many of our former operators are scattered all over the world and are looking for old friends on different bands. Keep the news coming. Traffic: K1TMK 153, K1ZVN 62, K1WQI 55.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: W1ALE/W1TNO. PAM: K1APQ RM: W1DYE. The GSPN meets on 3842 kc. Mon. through Fri. at 2330Z and Sun. at 1430Z. The VTNH Net meets on 3685 kc. Mon. through Fri. at 2330Z. W1MHX, of Bedford, has been appointed ORS, and we welcome John to the c.w. net. A GSPN certificate was issued to K1PCZ. VTNHN certificates were issued to K1HK and W1MHX. Endorsements: K1DWK as EC and K1HK as ORS, OPS and OO. K1PQV will be on phone soon as Sid is completing his modulator. WA1BEB checks into the VTNH Net often from Maine. W1EVN reports reactivation of the Monadnock Radio Club Net on 50.444 Mc. Tue. evenings at 7:30. The Merrimack Valley AREC Net celebrated its 5th anniversary at Concord. K1SHC is chief of the Lincoln Fire Department. K1PIA is attending Rensselaer Poly Tech. W1DYE and K1UZG mailed the first edition of the VTNH Net *Newsletter* and is looking for new and old members. K1AEG has a new vertical antenna. K2EPP has moved to Nashua. Happy New Year to all. Traffic: (Oct.) W1DYE 212, W1ALE 86, K1BGI 35, K1HK 26, W1MHX 21. (Sept.) W1AIJ 4. (Aug.) W1DYE 22.

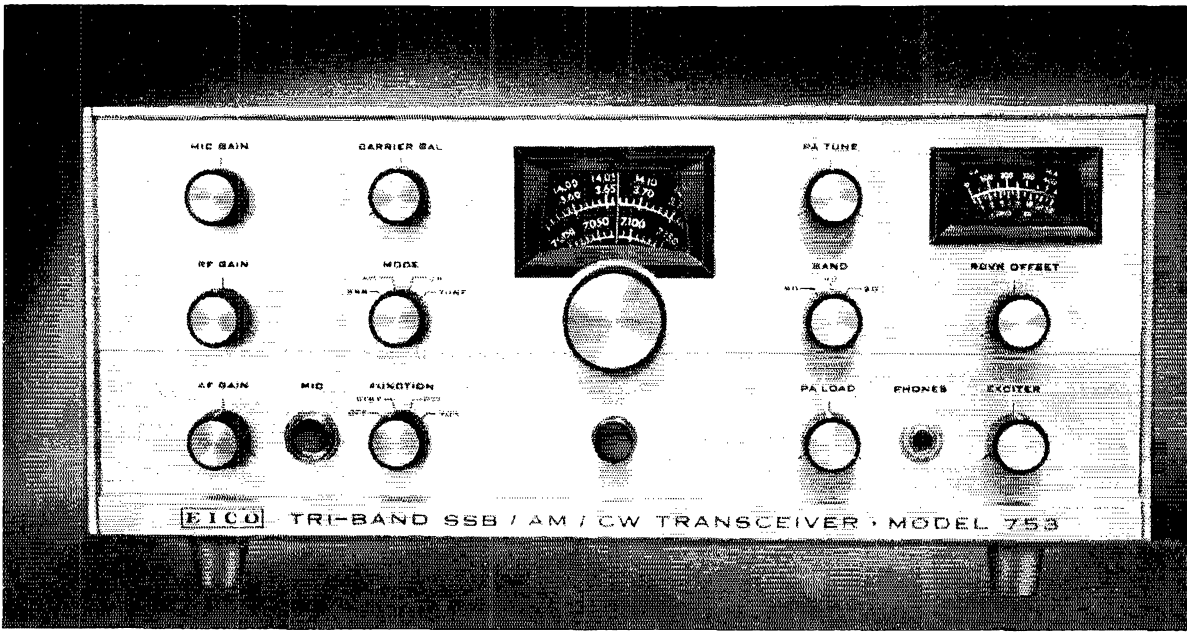
RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. Endorsements: K1NJT as OES. RIN reports 29 sessions, 120 QNI, 111 traffic. RISPN reports 31 sessions, 502 QNI, 85 traffic. The Newport County Radio Club held a successful auction under the direction of W1TXL with W1JFF assisting. The W1AQ Club of Rumford has a new acting pres.: K1AMG, as K1AGA is now working nights. Another member, WA1EQF, is in the hospital. WA1CVF was admitted to membership. K1PAM has built an Eico 753 transceiver and has bought a B.W. LPA-1000 and hopes to have a gallon of c.w.-s.s.b. on 80 through 20 meters. He also has 150 watts on 6-meter s.s.b. Don't forget to check in any of the traffic nets. You will be more than welcome. The RISPN meets daily at 1830 local time on 50.6 Mc. and the RIN meets daily at 1900 local time on 3.540 Mc. Traffic: W1YKQ 225, W1BTV 214, W1YNE 186, WA1FAV 107, K1TPK 102, K1VYC 59, K1BRJ 53, K1YEV 31, K1SXY 14, WA1CSO 12, K1QZW 11, W1SMU 10, K1YVN 7, K1YOA 3, WA6URR/1.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: WVSA. RM: W1WFZ.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
GR. Mt.	3855	2230Z	Dy x S	610	34	W1VMC
Vt. Fone	3855	1100Z	Sun.	125	—	W1UCL
VTNH	3685	2330Z	M-F	No report		K1UZG
VTCD	3990.5	1500Z	Sun.	167	3	W1AD
VTSB	3909	2300Z 1330Z	Dy x S Sun.	607	31	W1CBW

VTSB has moved net time up to 6 P.M. during the winter months. W1YFL and his XYL, WA1BFE, are now located in Grand Isle County and their QSL postage bill is mounting—send s.a.s.e. More 2-meter activity around Barre-Montpelier is expected this winter. The CVARC will sponsor a Vt. QSO Party next Feb. 19-20. K1UZG has been appointed OBS. The VTSB Net broke

NOW! A TRI-BAND SSB TRANSCEIVER KIT FOR 179.95



NEW EICO 753 SSB/AM/CW TRI-BAND TRANSCEIVER

Build the finest of SSB/AM/CW tri-band transceivers with 200 watts of SSB punch and every wanted operating facility, plus the extra reliability and maintenance ease inherent in kit design. Assembly is made faster and easier by VFO and IF circuit boards, plus preassembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The new EICO 753 is at your dealer now, in kit form and factory-wired. Compare, and you will find that **only the 753 has all these important features:**

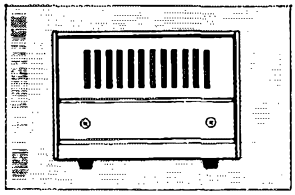
■ Full band coverage on 80, 40 and 20 meters. ■ Receiver offset tuning (up to ±10kc) without altering transmitter frequency. ■ Built-in VOX. ■ Panel selected VOX, PTT & STANDBY. ■ High level dynamic ALC to prevent flat-topping or splatter and permit the use of a linear amplifier. ■ Automatic carrier level adjustment on CW and AM. ■ Dual ratio ball drive permits single knob 6:1 rapid tuning and 30:1 vernier bandspread (over 10 degrees of scale). ■ Position of hairline adjustable on panel. ■ Illuminated S-meter/PA Cathode Current Meter and tuning dial. ■ Fast attack, slow decay AGC. ■ Grid-block break-in CW keying. ■ Product detector for SSB and CW, triode detector for AM. ■ TR relay with auxiliary contacts for use with high power linear amplifier. ■ Includes mobile mounting bracket.

ADDITIONAL SPECIFICATIONS

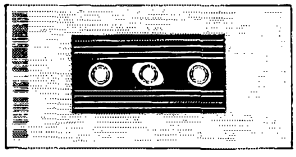
FREQUENCY COVERAGE: 3490-4010kc, 6990-7310kc, 13890-14410kc. SSB EMISSIONS: LSB 80 and 40 meters, USB 20 meters. RF POWER INPUT: 200 watts SSB PEP and CW, 100 watts AM. RF POWER OUTPUT: 120 watts SSB PEP and CW, 30 watts AM. OUTPUT PI NETWORK MATCHING RANGE: 40-80 ohms. SSB GENERATION: 5.2 Mc crystal lattice filter; bandwidth 2.7kc at 6db. STABILITY: 400 cps after warm-up. SUPPRESSION: Carrier-50db; unwanted sideband-40db. RECEIVER: Sensitivity 1uv for 10db S/N ratio: selectivity 2.7kc at 6db; audio output over 2 watts (3.2 ohms). PANEL CONTROLS & CONNECTORS: Tuning, Band Selector, AF Gain, RF Gain, MIC Gain with calibrator switch at extreme CCW rotation, Hairline Set (capped), Mode (SSB, AM, CW, Tune), Function (Off, Standby, PTT, VOX), Carrier Balance, Exciter Tune, PA Tune, PA Load, Receiver Offset Tune, MIC input, phone jack. REAR CONTROLS & CONNECTORS: VOX Threshold, VOX delay, VOX sensitivity, Anti-VOX sensitivity, PA Bias adjust, S-Meter zero adjust, power socket, external relay, antenna connector, key jack, accessory calibrator socket. METERING: PA cathode on transmit, S-Meter on receive. SIZE (HWD): 5 3/16" x 14 1/4" x 11 1/4". POWER REQUIREMENTS: 750 VDC at 300 ma, 250 VDC at 170 ma, -100 VDC at 5 ma, 12.6 VAC at 3.8 amps.

The Model 753 is an outstanding value factory-wired at $299.95.

Power Supplies Tailored for Optimum Performance of the 753.



Model 751 Solid State AC Supply/Speaker Console.
Matching table-top companion unit. Built-in PM speaker.
Kit $79.95 Wired $109.95



Model 752 Solid State Mobile Supply.
For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload.
Kit $79.95 Wired $109.95

EICO For FREE Catalog and 753 Spec. Sheet write to EICO Dept. QST-1, 131-01 39th Ave., Flushing, N. Y. 11352

600 barrier in the 3rd month of its existence. Traffic: K1BQB 161, W1CBW 22, K1YMY 18, K1LLJ 13, K1MPN 9, W1IDM 8, K1EQI 3, (Sept.) K1UZG 55. (Aug.) K1UZG 58.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: K1LJV. Despite bad weather the Valley Amateur Radio Club in Springfield had 35 in attendance at its Oct. meeting. At this time we welcome VE3DWW/W1 to our section. His name and address are Ted Westall, 68 Langlois Ave., Williamstown. The West, Mass. C.W. Traffic Net handled 92 messages during Oct. with the following in attendance (in order of activity): K1LJV, K1WZY, W1DWA, W1BVR, W1DVW, K1LBB, K1SSH, WA1DNB, W1ZPB, K1ZZI, W1WEF and WA1ABW. The Extra Class course that was going to be given by the Hampden County Radio Association has now been postponed until spring (not enough signed up for it). W1VSR has been working Europe and South America on 10 and 15. W1UUK and W1OBA now have Extra Class. Congrats. DX corner: W1GTO worked 148, 110 confirmed; K1MRP worked 122, 92 confirmed; W1UUK worked 259, 235 confirmed; K1WZY worked 99, 85 confirmed; W1UUK and W1GTO worked the Don Miller Expedition while it was at Burma, Thailand and Spratly Island. It is reported that the 4As are coming through on 15. New voices on 6 in the Berkshires; K1TNB, W1DUQ, WA1DAF. On 2: K1FQS and W1UDT. W1ZPB is very busy with his school job, but sincere thanks from us for his excellent work during the summer keeping WM1N controlled. WA1BZQ is chasing DX on 40. Ditto WN1ELX. K1YOI is on s.s.b. Traffic: W1BVR 115, K1LJV 85, K1WZY 57, K1LBB 37, K1SSH 37, W1DWA 14, W1ZPB 3, WN1ELX 1.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Daniel R. Wright, KL7-ENT—The Juneau ARC resumed monthly meetings Sept. 28. The club topped the Sitka ARC 100 points in FD, combining the exercise with a fine club picnic. KL7FDX has a new kw. linear and KL7EFS started the Tue.-Thurs. 7-to-9 P.M. classes for code and theory Sept. 30. Contact him for details. The SCM welcomes copies of *Ground Wave, QRM* and all news to swell this column. Let's have your applications for station appointment and individual reports from all on the air. W3ATH, now KL7FMU, has joined our ranks here in Anchorage. There's fine attendance at Anchorage Radio Club meetings. The club is running a series of educational programs. Many new Generals are expected from a MARS-AF class the SCM is conducting. Dan also is organizing a weekly ARRL net, 3950 kc., 0500 GMT, to start Jan. 1, 1966. We will welcome all callers, both members and non-members.

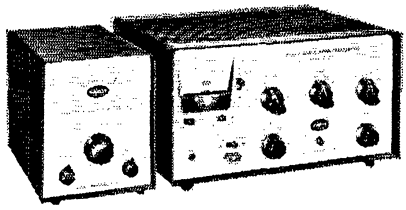
IDAHO—Acting SCM, Raymond V. Evans K7HLR PAM: W7GGV. The office of SCM for the Idaho section has been open since last April, so let's get on the stick and get the office filled. As usual, there is very little news except from the Idaho Falls gang. W7DHD had a very interesting article in the *ERRC News* on antennas. The Idaho Falls group had its usual goblin patrol this year and had a missing person hunt Nov. 13. The FARM Net reports 20 sessions, 415 QNI, 42 QTC. Traffic: K7HLR 114, W7GMC 64, K7NEY 34, W7GGV 3.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY, V.H.F. PAM: K7IOA, OOs: K7SVR, W7FIS. Appointments: K7PQM as OPS.ORS, K7EGJ as EC. Endorsements: W7COH and W7LBK. The SET was held in the state by the following ECs: W7LBK, W7NPV, W7TYN, W7COH. New officers of the Montana State University Club are K9MWO, pres.; W7EKB, vice-pres.; K3LWD, sec.; K7MYH, treas.; K7KOK, trustee club station W7YB. WA7BQS is putting an Eico 753 together and will be on s.s.b. soon. Results of the recent Frequency Measuring Test included W7FIS 18.0 p.p.m., W7NPV 1.2 p.p.m. Congratulations on a fine job, gentlemen. Several of the larger towns still need ECs. If you are interested in an EC appointment check with your SEC or SCM and they will be glad to line you up. Traffic: W7RZY 60, W7TYN 40, W7NPV 29, K7NIP 26, W7COH 9, W7ED 9, K7EGJ 9, W7CJN 6, K7YNZ 5.

OREGON—SCM, Everett H. France, W7AJN—Acting SEC: W7AJN. RM: W7ZFH. EC reports on the SET: K7PHP EC Multnomah County, WA7APD call of AREC permanent station located in Red Cross building operated a total of 8 hours on 3875 kc. contacting W6CXO with traffic, also other stations standing by, the transmitter is a BC-610 and was operated by W7CFS. W7DEM, EC Josephine County, reports 14 hams participated, using 7 mobiles and 7 fixed stations

AMECO *Leader in Compact, Quality Ham Gear*

NEW VFO FOR TX-62 or any other VHF TRANSMITTER



NEW AMECO VFO FOR 6, 2 & 1¼ METERS

The new Ameco VFO-621 is a companion unit designed to operate with the Ameco TX-62. It can also be used with any other commercial 6, 2, or 1¼ meter transmitter.

Because it uses the heterodyne principle and transistorized oscillator circuits, it is extremely stable. An amplifier stage provides high output at 24-26 MC. The VFO includes a built-in solid state Zener diode regulated AC power supply.

This new VFO is truly an exceptional performer at a very low price **Model VFO-621 $59.95 net.**

The NEW AMECO TX-62

In response to the demand for an inexpensive compact VHF transmitter, Ameco has brought out its new 2 and 6 meter transmitter. It is easy to tune because all circuits up to the final are broadbanded. There is no other transmitter like it on the market!

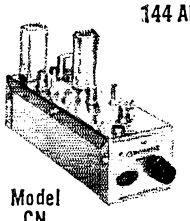
SPECIFICATIONS AND FEATURES

Power input to final: 75W. CW, 75W. peak on phone.
Tube lineup: 6GK6—osc., tripler, 6GK6 doubler, 7868 tripler (on 2 meters) 7984-Final. 12AX7 and 6GK6 modulator.
Crystal-controlled or external VFO. Crystals used are inexpensive 8 Mc type.
Meter reads final cathode current, final grid current and RF output.
Solid state power supply.
Mike/key jack and crystal socket on front panel. Push-to-talk mike jack.
Potentiometer type drive control. Audio gain control.
Additional connections in rear for key and relay.

Model TX-62 Wired and Tested only $149.95

AMECO EQUIPMENT CORP. 178 HERRICKS RD., MINEOLA, L. I., N. Y.

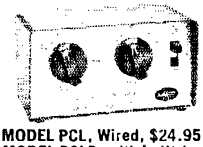
NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



Model CN

Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) $49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) $34.95

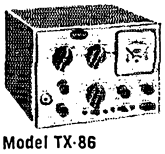
ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL, Wired, $24.95
MODEL PCLP, with built-in power-supply, wired, $32.95

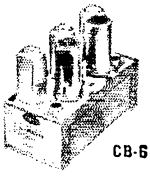
2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's *overall gain in excess of 20 db.* Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required—120 V. at 7 ma. and 6.3 V. at .27 A. —can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3".

COMPACT 6 THRU 80 METER TRANSMITTER



Model TX-86

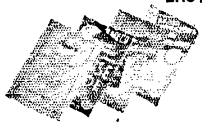
Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. *Size — only 5" x 7" 7 7" — ideal mobile or fixed.* Can take crystal or VFO. **Model TX-86 Kit $89.95 — Wired Model TX-86W $119.95. Model PS-3 Wired $44.95. Model W612A Mobile Supply wired $54.95.**



CB-6

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. $19.95
CB 6W — wired & tested $27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix. 6J6 osc. $23.95
CB-2W — wired and tested. ... $33.95
Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units. PS-1K — Kit ... $10 50
PS-1W — Wired $11.50

EASY TO UNDERSTAND AMECO BOOKS



Amateur Radio Theory Course $3.95
Amateur License Guide ..... .50
Radio Operators' Lic. Guide, EL 1-2 ..... .75
EL 3 ..... 1.75 EL 4 ..... 1.25
Amateur Log Book ..... .50
Radio Electronics Made Simple 1.95

CODE PRACTICE MATERIAL

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear. Dept. QST-1

Ameco equipment at all leading ham distributors.

AMECO EQUIPMENT CORP.

178 HERRICKS RD., MINEOLA, L. I., N. Y.
Affiliated with American Electronics Co. and Ameco Publishing Corp.

using 2 and 75 meters. Participants were W7EMF, W7TCT, W7OPH, W7DEM, K7RDP, K7BZP, K7UAQ, K7PMB, K7YNO, K7YQM, WA7ADT, WA7ADW, WA7ADK, WN7EEJ. W7AZD, mgr. of Oregon AREC Net, reports Oct. activity as 30 sessions, 17 counties, total attendance 446, traffic 1, QSTs 5, 2 bulletins, 71 contacts. New hams in the Grants Pass area are W7-ACH, W7VAD, WA7DCA and WN7EEJ. K7YQM is teaching a code class for the Southern Oregon Radio Club of Grants Pass, with 14 students attending the first class. WN7CKS is experimenting with 2-meter antennas. A few weeks ago we received an AREC application from WN7DWK, age 10 years who sends in his first station activity report. His transmitter is a Globe Scout 680-A, receiver HQ-170-AC, and with 65 watts on 15 meters he has worked JA1LPZ and many states in the U.S. Traffic: (Oct.) W7JHA 273. W7ZFH 69, W7DEM 19, W7AJN 15, WA7DEI 6, W7KTG 4, K7DVK 3. (Sept.) W7GWT 8.

WASHINGTON—SCM, Everett E. Young, W7HMQ —SEC: W7HMQ. RM: W7OEB. PAM: W7LEC. V.H.F. PAM: W7PGY. NTS nets:

WSN	3535	Daily	0200Z	QNI 442	QTC 456	Sess. 31
WARTS	3970	Ex. Sun.	0100Z	QNI 951	QTC 175	Sess. 27
NTN	3970	Daily	1730Z	QNI 1001	QTC 903	Sess. 31
N.W.Slo Speed	3700	Daily	0300Z	QNI 226	QTC 45	Sess. 31
N.W. S.S.B.	3945	Daily	0130Z	QNI 1376	QTC 120	Sess. 31
WSN (Sept.)	3535	Daily	0200Z	QNI 435	QTC 331	Sess. 30

W7HMA earns a special medallion after 20 years of traffic. WN7BWG is now in Texas and working hard for his General. EC K7MGA is planning an AREC Net for Yakima County. WA7CFY, W7NMT and K7VVA handled communications for the Naval Shipyard Derby. W7OEB, along with W7BGH, hooked 1S9WNV on 20-meter c.w. K7QOM sets up gear for the repeater via Rattlesnake Ellensburg to the Tri-Cities area. K7PWM enrolled at C.B. J.C. K7CDI modifies wide-band t.m. for 144 Mc. The Yakima County ARC now meets in Boy Scout Hq. W7GYF had two hours activities for SET control. W7AMC has new keying for his Viking Two. W7AIB now is owner of WAZ #2194. W7AJV has gone s.s.b. and reports that K7MGA and W7WCW and XYLs visited his shack. K7CHH made 169K in the C.D. Party. W7JC says activity is at a low ebb with only KC6, KS4, HM4, KM6 and JAs. W7EYW is out of the hospital following surgery. W7ZEV has worked 9700 stations since 1960. WA7HAY uses a new Swan 350. WA7BZO was heard working ZE and XE on the low 40. K7HSF is hanging a new 20-meter beam. K7VNI, K7-ZJP and W7NSI enjoyed the salmon feed on W7HDG. K7JAJ has a new jr. operator. WSN members can be proud of the FB reports reaching the SCM from their recorder. W7PI is doing a real pro job. The following acted as NCS for the SET: W7PWA, W7PI, K7PXA, K7CTP, W7JC and W7OEB. W7SAB is compiling a list of old radio clubs for our section. Any information would be appreciated. W7UVR gets 6 db. gain from two beams 100 feet apart. W7AXT is sporting a new 75A-4. The Bremerton ARAB gang is amending its constitution. Spokane radio amateurs have a RACES Hospital Net on 146.16 Mc. along with 29.6 Mc. Tue. at 7 local time. K7KRD is home from the hospital and doing fine. W7AZI and XYL W7WLX received an accolade from the radio club of Tacoma's *Loggers Bark* for many years service to amateur radio and W7DK. Roy was licensed in 1931. Congrats to K7AMJ on FB reporting. K7CYZ is hanging a new beam from a 60-ft. tower. Director W7PGY requests all amateur radio clubs to forward full name, date, time and place of meetings to his Seattle home immediately. Your SCM W7HMQ, RM W7OEB and PAMs W7PGY and W7LEC join in wishing each of you the Happiest of Holidays. Traffic: (Oct.) W7BA 2308, K7TCY 1244, W7DZX 1125, W7HMA 673, W7APS 292, K7CTP 281, K7JHA 219, WA7CFY 152, W7PI 140, W7OEB 134, W7PWA 131, W7HMQ 130, W7JEY 84, W7BTB 76, K7MGA 57, W7GYF 49, W7AMC 43, W7AIB 32, W7AJV 6, W7ZEV 6, K7CHH 4, W7JC 3, W7EYW 1. (Sept.) W7PI 60.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Congratulations to W6TYM on making the BPL. WB6-ETY, WB6FHH, W6IDY, WB6ILH, K6JZR, K6LRN, W6TYM and WA6WNG participated with the NCN during the SET. W6ZF came from the Greater Bay Area Hamfest with a Swan 350. WA6WNG won a 3-400Z with socket and chimney at the NCN get-together. K6LRN, WA6FBS, K6JZR, WA6DOO, WB6FHH, W6-IDY, W6TYM and W6UZN also attended, representing the East Bay section. WB6FHH is now WB6RKQ. K6VXZ has been voted a life-time membership in the Grizzly Peak VHFARC for his work in establishing the

YOU COULD SPEND LOTS OF $$$;

Cajole a dozen hams to put up a giant tower; guy it with a forest of wires; install a powerful rotator (and wire that!); top off the whole works with a monster antenna (your neighbors will love it); tune up with a dozen electronic instruments; and spend half your life dangling in space;

or

GET A GOTHAM V80 VERTICAL ANTENNA FOR $16.95

"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, T12FGS, W2STK, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2OGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

GOTHAM VERTICALS DELIVER THE CONTACTS

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

ALSO AVAILABLE AT
AIREX RADIO CORP, NEW YORK CITY
GRAHAM RADIO, READING, MASS.
EDWARDS RADIO, PROVIDENCE, R.I.
BROSCH ELECTRONICS, WEST GERMANY
VAREDUC-COMIMEX, PARIS, FRANCE
VICTORY ELECTRONICS, ODENSE, DENMARK
CANADA—ON REQUEST

NOW is the time to order

WHY

THE GOTHAM VERTICAL ANTENNA IS THE BEST ALL-BAND ANTENNA FOR YOU

- Absolutely no guying needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

73,
GOTHAM

DO YOU KNOW

1. YOU WILL HAVE NO DIFFICULTY INSTALLING YOUR GOTHAM VERTICAL ANTENNA IN JUST A FEW MOMENTS, REGARDLESS OF YOUR PARTICULAR PROBLEM, SO ORDER WITH CONFIDENCE EVEN IF YOU HAVE RESTRICTED SPACE OR A DIFFICULT SITUATION.
2. 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.
3. EVERY GOTHAM ANTENNA IS SOLD ON A TEN DAY TRIAL BASIS. IF YOU ARE NOT FULLY SATISFIED, YOU MAY RETURN THE ANTENNA PREPAID FOR FULL REFUND OF THE PURCHASE PRICE. THIS IS YOUR GUARANTEE OF FULL SATISFACTION.

FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. QST
1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money order for:

☐ V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS..... $14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS. DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

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

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

HOW TO ORDER. Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

Name.....

Address.....

City.....Zone.....State.....

repeater and club. A big hand goes to OOs W6TYM and W6OJW for their conscientious monitoring and mailing of many notices. Effective Nov. 1 the Santa Clara Valley Section Net became The Bay Area Net. This is only a name change as the net has many QNIs from East Bay and S.F. as well as S.C.V. WA6RRH will continue as manager. Chuck, incidentally, has just moved to Warm Springs and will be V.H.F. PAM for the East Bay section. He also holds OBS and OES appointments. His XYL is WB6ADM. The Bay Area Net meets at 0245Z daily on 146.7 Mc. Any help, NCS or liaison or just QNIs, will be welcome. WA6NFF is out of the hospital after a heart attack. Activity was down in October. The LARK reports attendance off, as does the Oakland and Hayward Clubs. Support your local radio clubs and the various nets operating in your section.

NCN	0300Z	Daily	3.635
BAN	0245Z	Daily	146.700
NCTN	0230Z	Daily	3.905

WA6PUF is gathering parts for a 4-400 linear. WN6NUI has a Ranger and a 75-A2. WN6PAU is new in Concord. Traffic: (Oct.) W6TYM 501, W6IDY 307, WA6WNG 301, K6LRN 220, WB6FHH 182, WB6ILH 58, W6ZF 8. (Sept.) W6UB 4.

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernie J. Kurlansky, KH6CCL. PAM: KH6ATS. RM: KH6EWD.

Net	*Freq.*	*Time*	*Days*
Friendly	7.290	2030Z	M-F
50th State	3.895	0500Z	Tue.-Sat.
No. Kaoi	7.290	2230Z	Sat.
RACES	7.225	1930Z	2&4 Sun.
RACES	28.700	1930Z	2&4 Sun.
RACES	50.252	1930Z	2&4 Sun.
RACES	147.000	1930Z	2&4 Sun.

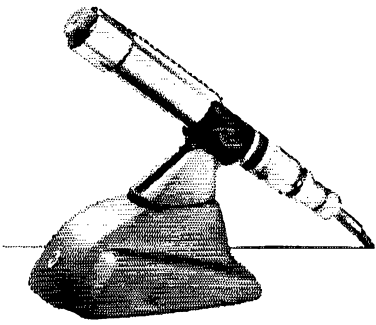
We regret to report the death of a well-known amateur friend of all, and holder of many certificates, Gladys Stickle, KH6BTX. New appointees: KH6IJ as ORS; KH6ENI as OO Class II. KH6CMM as OO Class I. W4EXM/KH6 returned from BV1-Land. KH6FRU ex-KA2HA, has added a new 75S3-B to his 32S3 companion. K4CKP/KH6 has returned to his 8/Line after a trip to S.W. Asia. K3DIO/KH6 tied the knot recently. K4LRC/KH6 and KH6FRE dropped by at KH6BZF's for an eyeball. KH6EIT, his XYL, and their five children had a very pleasant vacation in Europe this past summer. KH6ENI is active on Maui with a kw. on 2 meters two-phased Telrex beams and is continuing the 144.009 sked with WB6KAP. W5WBA/KH6, on the slopes of Mauna Loa, puts an S5 signal into Honolulu with his 25 watts. KH6BJ and KH6CCL have been chasing DX of late. KH6BB is back from a trip to Korea and Japan. KH6FRE is on 6 meters with his S-46. KH6BZF likes his new 75S-3C very much. K4-CKP/KH6 is on with his S/Line. Traffic: (Oct.) KG6-AIG 83, KH6ENI 7, KH6ATS 1, KH6DEM 1. (Sept.) KH6BZF 14, KH6EWD 6.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU/K7JU, W7CXH was presented a gift from Heathkit for a very nice article. W7THH also is a musician with the Shriner's band. WB6IKN/7 now is active in Las Vegas. W7PBV and family were guests at the Edison Amateur Radio Picnic in San Dimas Park, courtesy WA7BEU/W6EBS. W7AAF and W7ANW have almost completed teaching a course for 30 prospective Novices and are getting ready to start a course for General Class licenses. W7AKE, ex-W9AMP, and W7-CDH, ex-W9JHO, OM-XYL team, have a repeater on f.m. RCV-146.94 Mc. XMT-147.5 Mc. Several stations are heard on the repeater. It is reported that more will be active soon with K7LBQ, WA7BEU, W7PRM, K7-NYU, WA7ARZ and W7PBV working on their f.m. gear. W7FBL is setting up a RACES plan with his AREC group. K7ICW reports good signals with K7ILB on Sun. mornings on 50.110 Mc. Traffic: K7RBM/7 238, W7AAF 224, W7PBV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: W6SMU, WA6TQJ. RM: W6CMA. PAM: K6RHW. ORSs: W6CMA, W6LNZ, W6OFK. OPSs: WB6EAG, WB6MAE, WA6TQJ. OBSs: W6AF, K6HHD, WA6SLU, WA6TQJ, WA6YYK. OOs: WA6-DBL, W6ECE, W6GDO, W6WLI, WA6YQS, W6ZJW. OESs: WA6FWU, W6GDO.

SVN	3600 kc.	0230Z	Daily	W6CMA
SCEN	146.28 Mc.	0100Z	Wed.	WB6BWB
NCTN	3905 kc.	0100Z	Daily	K6YBV
NCN	3635	0300Z	Daily	W6QMO

When QRM Gets Tough Choose The Only Microphone With Backbone!



ELECTRO-VOICE
MODEL 676
DYNAMIC CARDIOID

The backbone of the Electro-Voice Model 676 is no mere decoration. It's visible proof of the most exciting idea in directional microphones—Continuously Variable-D (CV-D)™.

Here's how it works. We attach a very special tapered tube to the back of the microphone element. This tube automatically varies in effective length with frequency. It's a long tube for lows—a short tube for highs. All this with no moving parts! The tube is always optimum length to most effectively cancel sound arriving from the back of the microphone, regardless of frequency.

This ingenious solution* is years ahead of the common fixed-path design found in most cardioid microphones. It means you pick up less noise and room reverberation, ensuring a crisp signal and optimum vox performance. It also is less sensitive to wind and shock—ideal for field days! There is almost no "proximity effect"... no boosted bass when you must operate extra close.

Long life and peak-free response are guaranteed by the exclusive E-V Acoustalloy® diaphragm. And the 676 has unusually high output for a microphone so small. Of course you get both 150-ohm and Hi-Z outputs, plus high efficiency dust, pop, and magnetic filters—indeed, all of the hallmarks of Electro-Voice design that have made E-V a leader for years.

But that's not all. The 676 has an exclusive bass control switch built in. Choose flat response (from 40 to 15,000 cps) or tilt off bass 5 or 10 db at 100 cps to eliminate power-robbing lows that reduce efficiency and lower intelligibility. You'll be amazed at the reports of improved audio you'll get when you switch to the E-V676.

Visit your E-V distributor to see this remarkable new microphone today. And when difficult QRM must be faced squarely, stand up and fight back with the microphone with a backbone (and CV-D)—the new Electro-Voice Model 676 dynamic cardioid!

Satin chrome or TV grey, $60.00 amateur net, Model 420 Desk Stand, $12.00 amateur net.

ELECTRO-VOICE, INC.
Dept. 162Q, 631 Cecil Street
Buchanan, Michigan 49107

*Pat. No. 3,115,207

Electro-Voice®
SETTING NEW STANDARDS IN SOUND

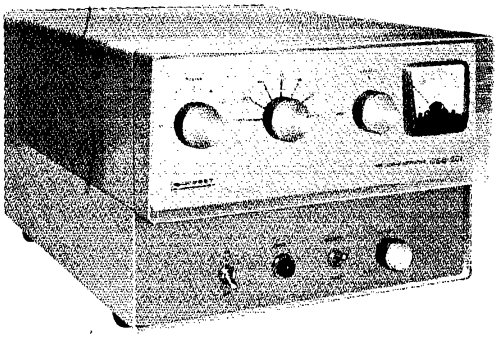
The Sacramento Valley Net (SVN) still is looking for members to QNI. The net is usually over by 0300Z Section Net certificates were issued to WB6IXX, WB6HAW and W6CMA for participation in SVN. On Oct. 24, NCN held a luncheon at the Rock House in Livermore; W6LNZ and WA6JDT represented S.V. October BRAT certificates went to NCTN members WB6HAW (29) and K6EIW (46). K6ALH, W6ECE, W6GDO, W6WLI and W6ZJW participated in the September FMT; all had an error of less than 71.43 parts per million. W6ZJW, of Willows, has been upgraded to Class I OO. SET exercises were held by the RAMS, SCEN and the Yolo Co. C.D. ARC on Oct. 9. WN6-RIM is a new amateur in Carmichael and is the son of K6VOO. W6SYX is going RTTY in Chico. WA6HYU reports daily traffic readiness of the WCARS Net, working on 7225 kc., stating the experience in the ARRL SET of value to its over 100 members. Want to improve your c.w.? See page 53 Nov. 65 *QST* and copy W6OWP C.P. runs Traffic: WB6HAW 221, WA6HYU 163, W6-CMA 62, K6YBV 37, WA6JDT 23, W6LNZ 20, W6QHP 17, WB6AQR 16, WB6MAE 9, WB6EAG 3.

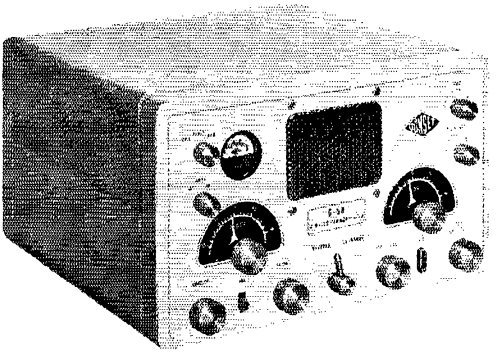
SAN FRANCISCO—SCM, Hugh Cassidy, WA6-AUD—SEC: W6KZF is looking for more participation in his plan for relaying traffic conditions on the freeways during commute hours. In the Sept. FMT W6-SPB had a low average of .2 parts per million, hitting the 7-Mc. frequency right square on the nose. W6CYO was awarded a plaque as the Ham of the Year in Marin County when the Marin Club held its annual Christmas Dinner in Fairfax. WB6AUB, a 14-year-old YL, received a 25-w.p.m. certificate at the Bay Area Hamfest Code Proficiency Test. W6YKS and W6OPL attended the Northern California Net get-together at Livermore. WA6IVM has returned from Florida, where there was a family get-together with W2RUF and ex-W2AOI. The San Francisco Section Net continues to meet Mon. and Fri. at 1830 local time on 3900 kc. WB6-GVI has been finding 25 meters open to the Far East. There was a full capacity crowd at the Marin Club dinner, with W6OPL taking over as incoming pres., along with W6IFO, vice-pres.; WB6IMO, secy.; and WA6EJY, treas. The Humboldt County Radio Club is temporarily meeting at the QTH of WB6DGJ. K7RUD has been back on frequency after overhauling his communicator and WB6KHS has a 10-watt 6-meter rig operating from a mountain-top near Kneeland. W6KHH has signed up two Assts. ECs in the Novato area. The group meets Wed. on 146.65 f.m. Another on 6 meters is W6PPB with 6 watts and six-element beam. W6CWR, long active in the Eureka area, now operates from Santa Rosa with a Heath SB-400 and WB-300. The HAMS provided communications for the hydroplane races at Lake Merced in San Francisco the last Sun. in Oct. Those participating were W6GGC, W6GHI, W6JWF, WA6DPJ, WB6LRQ and W6LVG. W6GGC and W6GHI have been looking over electronic organs. W6-RLV has his 420-Mc. gear about ready to put on the air. The film on amateur activities in the Alaska earthquake was shown at the San Francisco and Marin Clubs. WA6DJI passed the 100-mark in his DX quests. Traffic: W6YKS 541, W6CXO 331, W6UDL 167, WB6-GLD 76, W6BIP 69, W6KVQ 32, WB6GVI 17, WB6-ABP 13, WA6AUD 9, W6CYO 4, WA6IVM 2, K6LHN 2.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The 14th Annual MARSFEST, with W6BJI as chairman, was held in Fresno, Oct. 16. Among those in attendance were K6IXA, W6SNA, W6GYN, W6-SKH, W6BJI, W6ARC, W6NTK, W6QOS, W6PCS, W6-JPU and W6ZZB. The reported SET for the NCN Net: 180 messages handled, 13 hours, 5 net controls and 8 liaisons. Thirty-two stations participated in 2 days. In this section W6ADB, WB6HVA, WB6MZU, WA6SCE, WA6TZN, WB6HVY and WA6BUH participated. W6-NKZ has an SB-33 mobile and another SB-33 for a home station. K6LJG is now located in Visalia, having moved from Bakersfield. WB6KVO has a Galaxy V. WB6HVA has a new Ham-Scan. WA6TZN reports 12 stations participated in the SET. WB6FRM is on 2-meter mobile. K6LPG is on 2-meter f.m. WB6HVA, WB6KUG, W6ADB, WB6MZU, WA6DAU, K6CPQ and WA6TZN attended the NCN Luncheon in Livermore. W6KOK is playing with RTTY. K6ACY is working lots of DX on 10 and 15 meters, with a Swan 350. K6SEV has an HW-12. W6NTB is having problems with his DX-60. W6FXV is mobiling with an SB-34. I'd like to wish everyone a very Happy New Year. Traffic: W6ADB 184, WB6HVA 181, WA6TZN 100, WB6-MWY 34, W6ARE 8.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM, Ed Turner, W6NVO. SEC: WA6-HVN. RM: W6QMO. V.H.F. PAM: WA6RRH. Clubs and groups reporting as active in the annual Simulated Emergency Test were the SCARS, SCCARA,

THE HOT LINES FROM GONSET®





For HFers

GSB-201 RF LINEAR AMPLIFIER

- **Covers 80, 40, 20, 15, and 10 Meter Bands**
- **Input 2000 Watts PEP, 1000 Watts CW, 400 Watts AM**
- **Controlled Avalanche Silicon Rectifiers**
- **Built-in Antenna Changeover Relay**

The GSB-201 Linear Amplifier makes an ideal fit into any high frequency system. It provides high performance in a compact handsome package at a comfortable price.

Gain — 10 db worth on the 80, 40, 20, 15 and 10 meter bands.

Input — Maximum power ratings are 2000 watts PEP, SSB, 1000 watts on CW, 400 on AM.

Exciter — Any SSB unit capable of delivering 65 to 100 watts output.

Circuits — Grounded-grid for max stability — low cost 811A tubes — silicon rectifiers for dependability.

Plus — A built-in antenna changeover relay, switchable panel meter to indicate plate current or power output, and a switch facility for preliminary tuning at low power.

For VHFers

G-50 COMMUNICATOR

- **6-Meter Fixed Station Transceiver**
- **48 Watt Transmitter**
- **Built-in Power Supply**
- **VFO or Optional Crystal**
- **Dual Conversion Receiver**

Here's a complete 6-meter amateur station in a compact, smoothly operating package. Look at these features:

Full Band Frequency Coverage — 50 to 54 Mc with a built-in low pass filter to attenuate harmonics and spurious signals over 65 Mc. 48 watts at your fingertips, with VFO or crystal, pi network, and ganged multiplier stages.

Reception, Plus — RF receiver stage provides high S/N ratio and top sensitivity. Dual conversion means excellent image rejection, 7 Kc selectivity.

With Full Control — Adjustable squelch; "S" meter; calibrated, planetary vernier dial tuning; VFO spotting switch; meter conversion switch for amplifier grid or plate currents, or modulator plate current.

The Gonset G-50 has all the dependability and performance that goes with the name Gonset, for over 25 years the leader in VHF amateur radio gear.

Complete specifications on the G-50 Communicator and GSB-201 Linear Amplifier are included in Gonset's Amateur Equipment Catalog AG-1303 — yours on request from your local Gonset distributor, or write — 95-1.

GONSET®, INC.

A Subsidiary of Ling Altec, Inc.

1515 SOUTH MANCHESTER AVENUE, ANAHEIM, CALIF.

Santa Cruz, San Mateo, Half Moon Bay, Santa Clara County RACES, King City and NCN. The Salinas gang was active with a road race at Laguna Seca which kept them away from actual SET participation, according to EC K6TEH. NCN handled 180 total messages in 13 hours of operation with a total score of 292. The NCN also enjoyed a fine Sun. luncheon under the able directorship of Manager W6QMO. Three SCMs and the Division Director were present. The net is more active than ever. A Division SCM meeting was held at the Greater Bay Area Hamfest in Marin, with the SCMs of S.C.V., S.V., S.F. and East Bay present and SECs from S.F. and East Bay. The Division Director and Vice-Director also were present at the meeting relating to mutual problems. The group will organize a Bay Area Two-Meter Net in place of the S.C.V. Net which will help coordinate traffic between the sections. W6RSY is active on RN6 and with independent skeds. W6YBV works NCN. W6QMO reports that NCN met one hour early to overcome poor operating conditions. W6AGR and W6ZRJ play chess over the air. W6IDEF is active in the Redwood City C.D. Net. W6AIT works NCN. W6PLS reports a poor SET turnout for Half-Moon Bay. W6JNK is active again on NCN. K6YKG is NCS on NCN. W6VZE has reactivated the Burlingame Radio Club and is active as EC. The club call is WA6-YBE. W6AUC is active on the SKETO Net, QCWA and Grandpappys. W6YHM is working on RTTY gear and showed a fine piece of RTTY gear to the SARO. W6OII is active on Mission Trail. WA6HVN is busy with Red Cross work. W6SAW works as OBS and OO. Herb now has his RTTY gear working in fine shape. W6AOF and W6BYB are new NCNers from Palo Alto. BYB is a transfer ORS from 9-Land. WB6IZF is the new EC for King City. Ed is active on the C.D. and Weather Net. The SCCARA made plans for its Annual Christmas Party. The SCARS was active in the GBA Hamfest and made plans for future club programs. The October meeting of the PARA featured a home-brew contest. The Santa Cruz Club's Nov. meeting featured W6JCZ who reported on the ham activity in Santa Cruz prior to WW II. Traffic: W6RSY 723, W6QMO 168, W6YBV 146, W6AGR 120, W6DEF 112, W6AIT 104, W6PLS 72, W6JNK 67, W6ZRJ 38, K6YKG 29, W6VZE 25, W6AUC 19, W6YHM 17, W6OII 6, W6SAW 4.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4-AJT and WA4LWE. V.H.F. PAM: W4HJZ. We sadly note the passing of another beloved "oldtimer," Walter C. (Parson) Benson, W4GOB, Wallace, N.C. He was one of the original members of THEN and remained faithful to the net until ill health curtailed his activities. K4OXM is the proud owner of a brand-new CP-35 certificate, and K4IEX recently received that most coveted piece of wall-paper issued by the FCC, Amateur Extra Class radio operator license. W4VON has completed a 100-kc. marker with 10-kc. multivibrator points. WA4VVT finally got the courage to QNI the NCN (L) and finds "it's great fun!" K4CVJ has been handling traffic on 20 for overseas service men and Peace Corps workers. K4SNF has been appointed Postmaster at Rockwell, N.C.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN(E)	3573 kc.	2330Z	Daily	310	K4CWZ
SSBN	3938 kc.	2330Z	Daily	171	WA4LWE
NCN(L)	3573 kc.	0300Z	Daily	157	WA4ANH
THEN	3865 kc.	0000Z	Daily	57	K4WLV

Traffic: (Oct.) W4LWZ 231, WA4PDS 221, W4EVN 211, W4IRE 184, K4OXM 183, K4EOF 119, K4HZP 100, WA4ICU 95, K4IEX 85, WA4ANH 76, K4TTN 45, K4-GNX 41, W4AJT 37, W4BNU 29, K4EO 28, K4ZKQ 24, W4VON 20, WA4VVT 14, WA4CFN 13, K4CVJ 12, WA4-FJM 10, WA4EYA 4. (Sept.) W4IRE 168, WA4EYA 3.

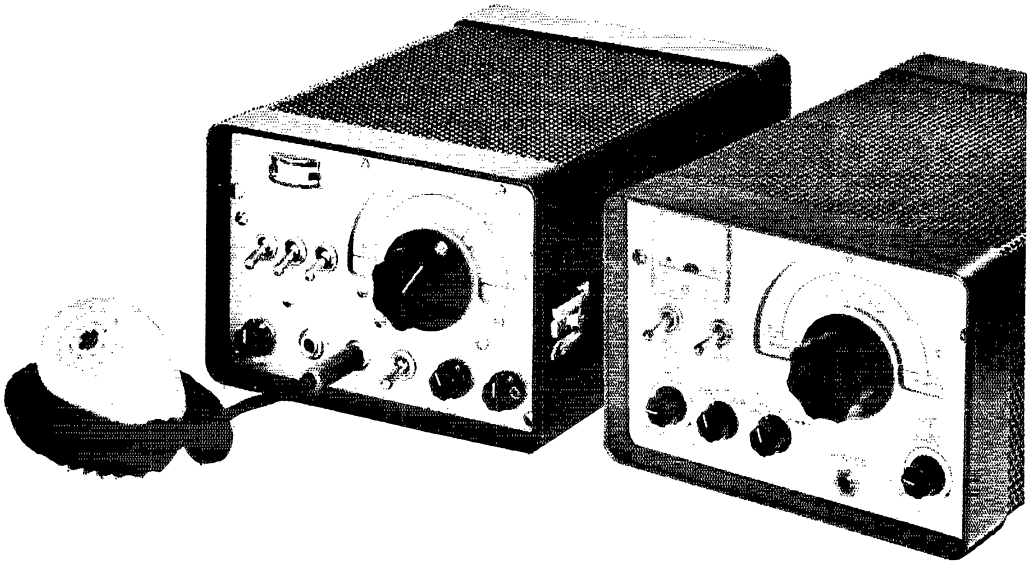
SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: K4WQA.

Net	*Freq.*	*Times*	*QNI*	*QTC*
SCSSB	3915 kc.	Daily 0000Z	1050	159
SCN	3795 kc.	Dy., 0000Z/0300Z	—	159
SCSN	3795 kc.	Daily 2330Z	—	—

The S.C. section conducted a belated but successful SET Oct. 23, led by Asst. SEC, W4WQM. Forty-eight persons took commercial or amateur exams in Rock Hill. Of this group W4GCB, W4NDH and K4YFK reported success with the Extra Class exam. W4AWY, RTTY OBS, also reports he is now Extra Class. The section OOs made a very good showing in the Sept.

DESIGNED FOR THE AMATEUR WHO IS

ACTIVE ON SIX



COMPLETE, SELF-CONTAINED STATION FOR FIXED, PORTABLE, OR MOBILE OPERATION.

LI'L LULU TRANSMITTER FOR 6

Special gang-tuned circuits in Li'l Lulu let you QSY instantly — there's no buffer tuning and final dipping needed when the frequency is changed. And the rig is really TVI proof! By keeping the VFO grid circuit in the 25mc range, TVI is eliminated.

• 117 vac, 12 vdc integral power supply. Class A high level modulation. Carbon dynamic or crystal mic input. Push-to-talk, or use panel switch • Built-in cw keying filter • VFO spotting switch • VFO control • 12 DQ7 final.

LI'L LULU RECEIVER FOR 6

Specially developed to complement the famous Li'l Lulu one-knob-controlled transmitter for 6 meters, the new Li'l Lulu receiver is unmatched for performance.

• AM, CW, SSB • Product detector for SSB • BFO crystal controlled • Delayed AGC operates on AM, CW, SSB • Integral front-end filter • Tunes 50-54 mc, and 10 mc for WWV and converter input • Critical components are temperature compensated • 10 mc crystal filter ahead of 3 IF amplifiers • Built-in CW monitor • ANL operates in all modes • S meter controlled by non-delayed AVC • Front panel control for companion transmitter — 80 to 1 drive reduction for precise tuning • Matches the Li'l Lulu transmitter.

WHIPPANY LABORATORIES, INC.

A subsidiary of Industron, Inc.

77 Jefferson Avenue, Westwood, New Jersey

FMT, led by W4NTO with an average error of 1.5 parts per million. Because of a radio council push led by K4JVY and W4FFH, the number of call letter plates rose to 614 this year, almost triple the 1964 total. The Greenwood club put on good show at the fair with a TR3, Communicator IV. WA4QKQ reports good DX with a new beam. Traffic: WA4SOL 212, K4LND 168, W4WQM 111, K4LNJ 53, W4AKC 49, K4OCU 49, W4NTO 46, W4PED 43, WA4LPV 26, WA4QKQ 24, WA4HFA 10.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: W5VZO/4. RMs: WA4EUL, W4QDY, W4SHJ, W4ZM. PAM: K4SCL. The recently-appointed EC for Prince William County is WA4FCS. SET activity in the section was moderately heavy, equal or greater than that of last year. K4LMB, Area 4 EC, has initiated a traffic training program for both phone and c.w. WA4URN and WA4YSE succeeded in making BPL for the first time. WA4EUL announces he was not called to military service and the first renewed issue of the *Virginia Ham* will be out before you read this. We expect more activity from K4ITV, whose new QTH and shack are now finished. K9KBI/4, on a U.S. Navy oiler, works Virginia nets when not maritime mobile. The antenna of W4JXD is down, the victim of Halloween pranksters. The following section NTS nets meet daily:

VSBN	3935	2300 GMT	WA4EDG Mgr.
	3935	0300	W4OKN
VSN	3680	2330	WA4EUL
VN	3680	2400	W4ZM

All stations report an increase in traffic totals, most likely as a result of the SET activity. Traffic: (Oct.) W4DVT 337, K4LJK 258, WA4YSE 236, K4LMB 231, W4TE 222, WA4EDG 209, W4VCJ 179, K4SCL 176, W4RHA 168, WA4URN 163, K4WCO 162, K4YCH 143, WA4EUL 141, W4NLC 132, W5VZO/4 132, WA4DAI 118, K4MXF 108, WA4KVR 104, W4BZE 102, W4OWE 96, W4SHJ 78, K4ITV 74, W4OKN 72, W4ZAU 69, W4ZMT

VIRGINIA QSO PARTY

January 22-24, 1966

All amateurs are invited to participate in the Virginia QSO Party, sponsored by the Roanoke Valley Amateur Radio Club, Inc. Virginia stations are urged to work as many out-of-state stations as possible to permit others to earn credit for the Old Dominion County Award, the Virginia Civil War Centennial Award, and USA-CA.

Rules: (1) Contacts will be made during the 32-hour period from 1800 GMT Saturday, January 22, to 0200 GMT Monday, January 24. (2) No power or minimum time limits. (3) The same station may be worked and counted on different bands and modes. (4) The general call is "CQ Virginia". Virginia stations are requested to identify themselves by signing "DE VA" on CW and "This is Virginia" on phone. (5) Vifginia amateurs residing in cities will use their discretion in determing the county they will use in contest exchanges and may use only that county throughout the entire contest period. (6) CW and phone will be considered separate contests and separate logs must be submitted. No distinction will be made between SSB and AM.

Exchanges: Virginia stations will send QSO number, RS/RST report, and county (such as "NR 23 579 ROANOKE"). Out-of-state stations will transmit QSO number, RS/RST report, and state, province, or country.

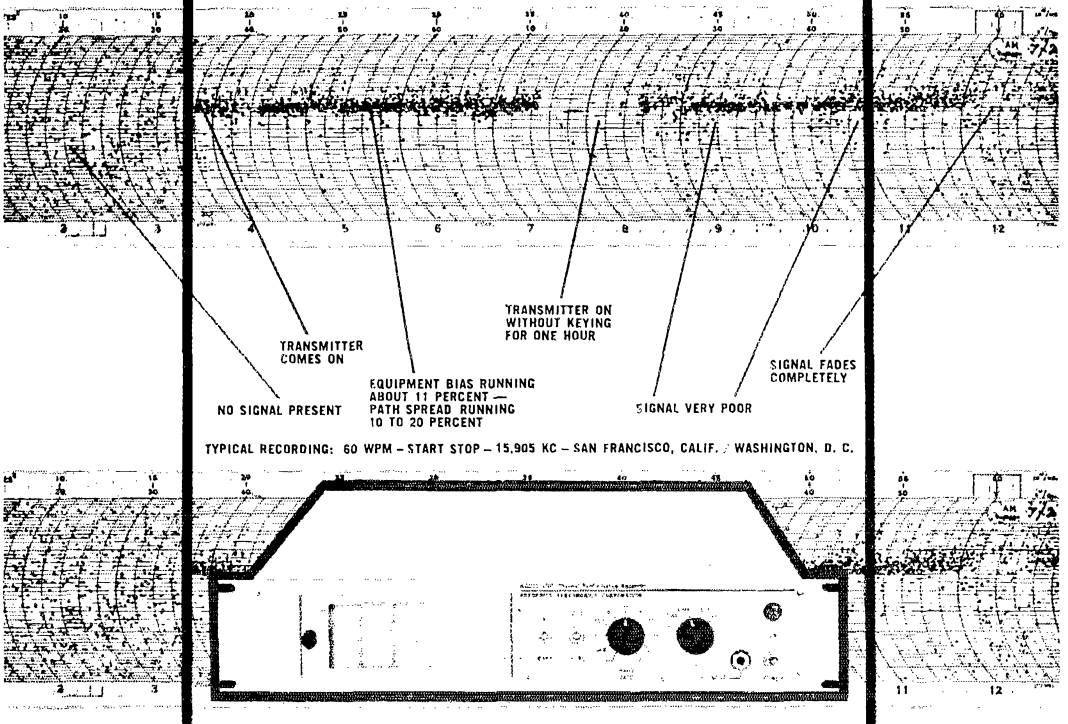
Scoring: Virginia stations will count one point for each completed contact, including those with other Virginia stations. Multiply this total by the number of states, provinces, countries, and Virginia countries worked to obtain the final score. Out-of-state stations multiply the number of QSO-points by the number of different Virginia counties worked.

Prizes: Highest scoring station in each state, province, and country will receive a certificate. Virginia stations will compete for First, Second-, Third-, Fourth-, and Fifth-place certificates.

Suggested frequencies are 3575, 3830, 3930, 7030, 7205, 7235, 14,070, 14,250, and 14,340 kcs. Logs, showing dates, times, stations contacted, bands, modes, locations, and final scores, must be received not later than March 1, 1966. Send logs to: Roanoke Valley Amateur Radio Club, Box 2002, Roanoke, Virginia.

A NEW APPROACH
TO CHANNEL PERFORMANCE ANALYSIS

Frederick Electronics' NEW Channel Performance Recorder, Model 1310, provides an accurately timed and printed analysis of telegraph signal distortion.



Accepts start-stop or synchronous signals at standard rates, 37.5 to 300 baud from conventional neutral or polar telegraph systems.
Provides long-term permanent record of overall system performance.
A trouble-shooting aid – indicates amount and type of distortion present.
Provides information on channel traffic loads.
Provides information on propagation conditions.
All solid state circuitry.
Designed for use in standard rack mounting.

FOR FURTHER INFORMATION WRITE--

FEC

FREDERICK ELECTRONICS CORPORATION
HAYWARD ROAD, P.O. BOX 502, FREDERICK, MD. • PHONE: 301-662-5901
INTERNATIONAL DIVISION
750 THIRD AVENUE, N.Y. 17, N.Y. CABLE ADDRESS: ARTROCKE

05, K4FSS 57, W4WRG 57, K4VCY 45, W4PTR 37, W4KX 36, K4NOV 35, K4SDS 27, WA4ECS 21, WA4-UMX 15, K9KBI/4 12, W4MK 11, K4PIK 7, W4JUJ 4, K4YEE 4, W4WBC 1. (Sept.) K4NOV 3.

WEST VIRGINIA—SCM, Donald B. Morris, W8-JM—SEC: W8SSA. RM: W8LMF. PAMs: K8CHW, W8IYD. West Va. nets: 3570, 3890, 3903, 3905 kc. W8IYD is the new V.H.F. PAM for the 10-meter band and special emphasis will be on the 29.6-Mc. f.m. net operation. MARA officers are W8QR, pres.: W8GQE, vice-pres.; W8JM, secy.; WA8EQI, treas.; WA8HHA, act. mgr. WA8OVT and W8LSC want 1215-Mc. skeds. WA8-HSW received his General Class ticket. K8MYU has a new HT-44. I regret to report the passing of WA8-KRD, of Wierton. W8PXF enjoys c.w. net operation. The Wheeling AREC Net now operates on 29.6 Mc. f.m.

Net	*Freq.*	*Time*		*Sess.*	*QNI*	*QTC*	*Mgr.*
WVN phone	3890	2300	Mon.-Fri.	21	449	118	K8CHW
WVN CW	3570	0001	Mon.-Fri.	28	107	83	K8TPF
WVN PON	3903	2230	Mon.-Fri.	4	61	18	K8TPF
WVN SSB	3905	2330	Mon.-Fri.	16	230	6	K8SHP

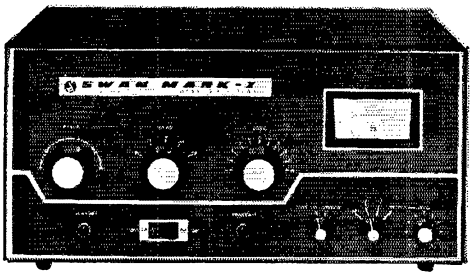
K8SDI was active in the SET on c.w. from the Eastern Panhandle. W8PZT, W8QR, K8ELH and W8JM have 29.6-Mc. f.m. gear in operation. W8DUW reports the following on RTTY in Huntington on 6 meters: WA8-EVI, WA8KZU, W8HIC, W8NJV, W81EQ and W8DUW. Remember the Roanoke Division Convention, Natural Bridge, Va., May 28-29. Traffic: K8TPF 196, W8CKN 107, W8HZA 65, WA8KUW 63, K8WWW 54, K8BIT 50, WA8PXF 25, K8CHW 19, K8SDI 11, WA8KGU 9, WA8-ALI 6, K8MQB 5, WA8NDY 5, K8WMQ 5, WA81MY 4, WA8OVT 4, WA8CRW 3, WA8GGI 3, WA8KMZ 3, W8-CUL 2, W8CVE 2, WA8KCO 2, WA8MRK 2, W8VOI 2, WA8AJN 1, WA8HPQ 1, K8QYG 1, K8SVH 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—SEC: WØSIN. WØSIN has been very ill in the hospital in Denver. At the last report some improvement has been made. Also in the hospital for an operation was WØCUZ. KØKUP has gone to Roswell, New Mex., for a while. His XYL, Helen, has gone for a check-up. Net activities are on the gain. WAØAGY is getting a new T-4X to join the S-4 presently gracing his shack. Boulder has a good crop of new Novices, with WNOs MMF, MMH, MMI, LMP, LZR, MNZ and NNQ joining the ranks. WNØDR recently moved to Boulder from Ft. Morgan and is setting up shop on 7.174 Mc. WAØKKA got his General in Sept. WNØ-LEB is working for his when school work permits and WNØKBP is going for Technician and v.h.f. experimental work. The Boulder High School Amateur Radio Club is in full swing with added interest as a result of the completion of the club station, WAØLLH. WNØ-LEB is pres.; WNØKBP, vice-pres. and secy.; WAØ-KKA, code instructor. The station can be heard on 40-meter phone and c.w. from 1530 to 1630 GMT during WAØKKA's study hall, and during meetings at 2200 GMT Tue. Thanks are given to Mr. W. Einert, sponsor of the club. Net traffic: High Noon Net 130, Colorado Code Net 58, Sleepy Head Net 20. Traffic: KØZSQ 82, KØDCW 63, WAØJEV 51, WAØJTB 12, KØTTB 5, KØKUP 2, KØBCX 1.

NEW MEXICO—SCM, Bill Farley, WA5FLG—After doing exceptionally well with three watts mobile (c.w.), WA5BMN has now gone super power with a home-brew 100 watts. The rig is a hand-held job on the front seat of his VW. All members of both New Mexico nets held a moment of silence for K5ZHN, a former SCM who passed away recently. K5ONE gave a box of cracker jax to the daughter of K5ECQ and enclosed was an engagement ring. Her brother, K5HPJ, could only shake his head when asked for a comment. WA5KUI has had good results from the 2- and 6-meter repeater he installed in the mountains above Alamogordo. WA5JAM, in Grants, is pushing ahead with the emergency corps for his area. K5VXJ has been appointed EC and is eager to provide his services to The Gate Way to New Mexico. All reporting stations in the major cities now have portable capabilities. Some are mobile while others have generators. K5ONE has been operating with his generator almost every week end. Participation in the Breakfast Club net and the Roadrunner Net still improves. More and more of the net members are going to other nets to pick up traffic that used to be mailed into this section. W5IGU spent 16 hours underground in a bomb shelter at White Sands Missile Range for the good of science. Traffic: WA5DUH 203, K5ONE 75, K5HTT 70, W5UBW 32, WA5FLG 24, WA5FFL 18, WA5LFX 18, K5HPJ 16, W5WZK 16, WA5-AMG 13, K5VXJ 7.

A WINNING PAIR . . .



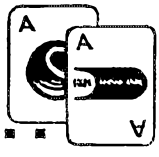
the **Swan Mark I**
LINEAR AMPLIFIER

the **Swan 350**
TRANSCEIVER

Answering the need for a good quality linear in the medium price field, Swan has developed the Mark I. 2000 watts PEP input, two 3-400Z Triodes and the usual Swan reliability make the Mark I a perfect partner for the Swan 350.

the Mark I	**$425**	Less tubes
	68	Pair 3-400Z Triodes
	$493	Including tubes

the Swan 350 **$395**
Model 117-XC Power Supply **$85**



ANOTHER WINNING PAIR . .

HENRY RADIO and **SWAN,** two leaders in the field, are dedicated to designing, producing and distributing the finest equipment available. For 38 years the Henry family has been involved in using and selling shortwave apparatus. For personal attention to your communications needs or problems, please call, write, or come in.

TED HENRY	BOB HENRY	WALT HENRY
W6UOU	W0ARA	W6NRV

6% FINANCE CHARGE • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS. Nearly all makes and models. Big savings! 15 day trial — 90 day warranty. 90 day full trade back on new apparatus. Write for bulletin.

Henry Radio Stores

CALL DIRECT . . . USE AREA CODE

Butler 1, Missouri	816 679-3127
11240 W. Olympic, Los Angeles, Calif.	213 477-6701
931 N. Euclid, Anaheim, Calif.	714 772-9200
431 E. Green St., Pasadena, Calif.	213 684-0861
6116 N. 27th Ave., Phoenix, Ariz.	602 AM 4-3895

"Worlds Largest Distributors of Short Wave Receivers"

UTAH—SCM, Marvin C. Zitting, W7MWR/W7-OAD—Asst. SCM: Richard E. Carman, W7APY. SEC: W7WKF. Section nets: BUN meets daily on 7272 kc. at 1930Z. UARN meets each Sat. and Sun. on 3525.5 kc. at 1400Z and on 3987.5 kc. at 1500Z. The October SET was a big success with all section nets operating and amateurs throughout the state participating. K7CLS has a new boy jr. operator. W7BAJ has his beam back up and ready for the winter DX. W7POU and K7SAI continue to work DX on 15 meters. K7SAB is on 2 meters in Provo with a new receiver and transmitter. Operation at K7SDF has tapered down to 2 meters with much time spent on school work. K7HFV has been getting everything in shape engineering-wise at KWHO AM-FM. Please send your reports in early. Traffic: W7OCX 155, K7SAI 41, K7CLS 35, K7SDF 11, W7MWR 2, W7BAJ 1.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: W7BHH. PAMs and OBS: W7-TZK and K7SLM. Nets: Pony Express, Sun. at 0830 on 3920; YO, Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1230 on 3920. WA7DNP is now on 2 meters. K7HHW is on the air at the new QTH in Gillette. K7HBB had K7SAR helping to wrangle dudes during the hunting season last fall. Wyoming is listed in 11th place in the nation for the ECs turning in reports to Headquarters. We may have about the least number of hams but, our League Officials are doing a fine job. Congratulations to all of you. I hope every one of you had a very joyous Christmas and that you all got all of the new ham gear you wanted. I am looking forward to another year of association with the Wyoming hams. Traffic: K7SLM 19, K7AHO 10, WA7-CLF 9, K7ITH 8, W7ONZ 4, K7POX 4, K7LOH 2, W7YJG.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: WA4EXA. PAMs: K4NSU and K4WHW. Had an FB visit with the Russellville Club Oct. 21. A quick check looks like Huntsville won the SEC Cup again to gain permanent possession. Congrats to W4NML and W4-SQV on making Operator of the Month in Nov. *QST*. Oct. section net reports (times GMT):

Net	*Freq.*	*Time*	*Days*	*Sess.*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575	0100	Daily	40	12	6.7
AENM	3970	2400	Daily	32	12	45.5
AENP	3955	1230	Mon.-Sat.	27	3.8	13.4
AENR	50.55	0115	Wed./Fri.	9	4.66	20
AENT	3970	2230	Daily	35	2.71	6.82

K4OYV and W4YRM are out of the hospital. WN4BNN is a new Novice in Athens. K3SUH is attending Athens College. W4AP/4 operated at the S. Ala Fair. WA4-FIJ and XYL, WA4FJF are returning to Panama City, Fla. W4RLS has 300 DXCC worked. We urge that more Alabama hams operate 160, a fine band for low power. Traffic: (Oct.) W4NML 549, WØHXB/4 333, W4ZJY 327, K4KJD 195, WA4RES 165, K5RSI/4 159, K4RSB 146, K4NUW 131, W4YNG 113, WA4EXA 75, WA4UXC 63, K4WHW 63, K4NSU 59, K4WOP 53, WA4-MTG 45, WA4DZF 38, W4AP 31, K4AJF 29, K4GXS 28, K4BSK 27, W4HON 26, WA4EBS 25. WA4FIJ 19, WA4-DYD 18, K4TUT 16, K4RQQ 15, K4FZM 13, WA4OCL 11, WA4GNK 9, W4YRM 7, WA4HUO 5, W4ZVI 5 W4TSY 4, K4FZQ 3, W4CHJ 2. (Sept.) K4BSK 44, K4-TUT 11.

CANAL ZONE—SCM, Thomas R. DeMeis, KZ5TD—KZ5HH now is operating from Lakewood, Tex., as K5JGT. WB4BDH is the call of former KZ5BL, from Hickory, N.C. KZ5KG left for duty with the U.S. Navy. KZ5MQ is now in Japan with the U.S. Navy. W4MXU, assigned the call KZ5FX, has been appointed as ORS. KZ5KR is awaiting the new Heath transceiver. KZ5GE put up a couple of inverted "Vs" for 40 and 80 meters. KZ5MV has been keeping schedules on 80 meters also to the U.S. KZ5JT completed a 6-meter rig inside of a tuning unit from a BC-610. The CZARA has been having code practice sessions at the meetings for the Technicians who are building up their code speed. KZ5PW, KZ5MM and KZ5TD were assigned to the nominations committee. The Army MARS Net reports good activity. KZ5JW, active on s.s.b., had to send its equipment back to the manufacturer for modernization. KZ5AY reports working 94 countries with an indoor 7-ft. piece of copper tubing and loading device similar to the English Joystick antenna. KZ5MV is working on a 4-1000 linear.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJH—SEC: W4IYT. RM C.W.: W4LUV. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAMs: W4SDR, W4-

In the market for quality used ham equipment? Harvey Radio says look for the **pink tag.** It's your assurance at Harvey's that you are getting the best used amateur radio equipment at prices you won't want to miss.

For over 38 years Harvey Radio has served amateur radio with the widest variety of ham and electronic equipment at the lowest prices. Now Harvey goes a step farther by offering **pink tag** quality used ham equipment with the Harvey performance guarantee. You get a 90-day warranty plus complete equipment check-out. And if you're in the market for new ham equipment, our liberal trade-in allowance lets you step up to what you've always wanted.

Remember, the sign of the **pink tag** at Harvey's is your clue to the best values in quality used ham equipment.

– Elliot Berelson, WA2HDP

HARVEY
RADIO CO. INC.

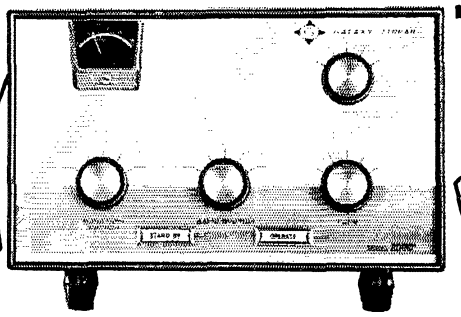
103 W. 43rd St. / N.Y., N.Y. 10036 / (212) JU 2-1500
60 Crossways Park West / Syosset, L.I., N.Y. 11797 / (516) WA 1-8700
Federal Electronics Inc. (Subsidiary): Vestal Parkway, Binghamton, N.Y. / (607) Pioneer 8-8211

TUB, PAM V.H.F.: WA4BMC. Sorry to lose W4KOB as EC of Lee County but tickled that W4SMK will take over the job. While speaking of ECs I invite all and sundry to observe two more outstanding ones who can be mentioned this month: (1) W4FP of Polk County. Never did see anyone get so much done with so little fuss and noise. (2) W4GUJ, of Duval County. If someone didn't point him out with pride you would never know he was around unless you checked into *that AREC* organization but then, with a club like there is up there who could help *wanting* to do a good job and getting it done. We have quite a few real good ECs and, from time to time, we would like to mention them as they "pass in review." Thanks mucho for the hard work all of you fellows are doing. For W4KRC: You don't *need* break-in to QNI the net. Try using another antenna for receiving. Just a short wire. For W4LMT: Aw, come on, Ken. You've been saying that for years. Get with W4SDR, a good teacher. If all appointees would take a few minutes to review what they agreed to do over their signatures when they accepted an appointment reports would be more frequent and much better than they are now, in general. Traffic: (Oct.) WA4SCK 1101, W4BOW 795, WA4BMC 597, WA4IJH 414, K4YSN 364, W4FP 358, W4FPC 339, WA4NEV 256, K4KDN 230, WA4LHK 156, W4DFU 144, W4LUV 121, W4IYT 88, K4QAY 82, WA4CIQ 79, W4SDR 78, W4GUJ 77, K4SJH 75, WA4HDH 64, WA4DEL 61, W4EHW 61, WA4WZD 61, WA4YRU 61, K4ILB 60, WA4PDM 52, WA4RXG 52, WA4OHO 47, K4YOQ 46, K4BNE 42, W4AYD 36, K4DAX 36, K4OSQ 36, W4MVB 35, WA4WZC 32, WA4NBT 31, WA4YGP 29, W4MOL 28, K4EBE 25, W4FGH 25, W4RQR 25, WA4IWO 24, K4MTP 21, W4BKC 16, W4IE 15, W4KRC 15, W4IAD 14, WA4MKE 14, W4TJM 12, W4TQL 12, WA4FVP 11, W4SMK 11, WA4WZZ 8, WA4QLZ 7, WA4IYG 4, W4LMT 2. (Sept.) K4YSN 426, W4DFU 252, W4FPC 117, W4GUJ 12.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4SAZ. RM: W4DDY. PAMs: K4PKK, K4YZE, WA4HSN, WA4JSU. K4TXK is busy with school. W4HYW participated in the Mass. and Del. QSO Parties. WN4AIU is looking for his General Class ticket. WA4WKZ has a new Eico 753. K4YZE has a T-4X ordered to match the Drake R-4 receiver. WN4ARB is NCS of the Cobb County AREC Net. WB4BDG is active with traffic but misses the old call. WA4UYT is taping OBs for retransmission on c.w. W4FOE received the Ham of the Year Award from the Ga. SSB Assn. WA4UPE is NCS on the Ga. Teenage Net and GSN. He also posts a CP-20 certificate. WA4BVD made CP-25. W4TFL/4 acted as net manager for GSN during Oct. after the RM's illness forced his absence. Bob is being transferred to the Atlanta area and will be active from there. WA4KWW has a new antenna. He has completed a Braille log. The Griffin picnic was an outstanding success. It yielded funds for a new reclining wheel chair as well as a Swan 350 for K4QLX. WA4PSA is doing a bit of hamming and eyeballing at the U. of Ga. W4YE returned from a long trip and had a wonderful time mobile. Cobb County AREC net for '66 includes K4YZE, WA4TYW, WB4AIU, K4ICX, W4IUD, WB4ARB, WA4VMV, K4ODW, W4SAZ, WA4VMF, WN4YED, WA4AJU. Traffic: W4TFL/4 156, WA4BVD 142, WA4UPE 129, W4FOE 100, W4SAZ 84, WA4UYT 81, WB4BDG 68, WN4ARB 61, W4RZL 59, W4PIM 54, WA4GAY 47, WA4LLI 45, K4FLR 40, K4YZE 34, WA4WKZ 18, WN4AIU 10, K4BAI/4 8, W4HYW 8, WA4JES 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: K4NMZ. RM: W4BVE. Pensacola: Navy MARS has given local 10-meter activity a big boost. Many local hams operated WA4ECY at the Interstate Fair. W4UL is working with R/C model airplanes. The V.H.F. Club has resumed meetings at the USO Club. W4AXP and W4FSM keep 4 A.M. skeds with W1EAN, formerly of Chipley. Milton: K4NMZ gave the traffic nets a good workout during the SET with 166 originations! He is working on a 6- and 2-meter v.f.o. and a 4-400 linear. It's good to hear K4ZEB active again. Fort Walton: The monthly 2-meter bunny hunt was won by W4KWX and WA4WAX. WA3APO got the bugs out of his TR-3. W4BVE is taking over as QFN mgr. W4ZGS keeps things lively on 145.2 Mc. Panama City: WA4JIM renewed OPS and acquired a Codax keyer. New PCARC officers are K4MAC, pres.; K4MZA, vice-pres.; K4PMO, secy.; K4MPK, treas. WA4IMC acquired K4PMO's HT-37. Bristol: WA4VXD got his DX-100 going to become the only active station in Liberty County, Tallahassee: The TARC set up a station at the North Florida Fair and operated on 15 and 2-meters. The only club bulletin in the section is produced by WA4YPO for the TARC, with help from WA4EAO, W4MLE and W4GAA. Traf-

BREAK THROUGH



$450.00 Includes Separate POWER SUPPLY

"TALK POWER" MORE PER DOLLAR Than Ever Before!!

NOW FOR THE FIRST TIME 2KW+ TABLE TOP LINEAR FOR UNDER $500.00 GUARANTEED! 2KW+ PEP SSB INPUT and *1200 WATTS PEP OUTPUT*, ALL BANDS 80 THROUGH 10 METERS.

EXCLUSIVE GALAXY LINEAR FEATURES

* ***Revolutionary new circuit.*** Sustains Hi-Efficiency 10-80 Meters.
* ***Most compact 2KW Linear ever made.*** R.F. unit just 6" x 10¼" x 11¼". Same as Galaxy III and V.
* NEW *ALS!* (*A*utomatic *L*inearity *S*ystem) An improvement over conventional ALC.
* ***MOST TALK-POWER EVER*** in this small size.
* ***Operates AB$_1$*** at all times.
* Built-in ***antenna switching relays.***

MORE OUTSTANDING FEATURES

* ***INPUT: 2,000 Watts PEP-SSB,*** 1,000 Watts-CW, 1,000 Watts-RTTY
* Complete tube replacement cost under $30.00.
* Uses ten 6HF5's in new, efficient design.
* Full Power from any 100-200 watt output exciter.
* Tubes fan cooled for longer life.
* SIMPLIFIED, reduced power tune-up.
* One knob bandswitching, 80 through 10 meters.
* High efficiency PI-NET, matches 40/90 Ohms impedance.
* Built-in, adjustable low-pass filter.
* 3rd order distortion - 30DB.
* 115/230 VAC power supply.
* Shipping weight (Linear and Supply) Approx. 55 lbs.

POWER SUPPLY

Heavy duty power supply has 115/230 VAC primary, conservative 2KW CCS rating with grain-oriented silicon steel core, solid state rectifiers. All cables supplied. Power supply can be placed under desk for operating convenience. Protected by attractive cover.

Leo I. Meyerson WØGFQ

GET YOUR FREE '66 CATALOG

WRL

WORLD RADIO LABORATORIES

3415 West Broadway
Council Bluffs, Iowa 51504

☐ Send information on Linear Amplifier.
☐ Send quote on separate sheet.
☐ Send new catalog.

QST

Name_____ Call_____

Address_____

City_____ State_____ Zip_____

fie: (Oct.) K4VFY 363, W4MLE 268, K4NMZ 236, WA4-EOQ 120, W4BVE 116, WA4NRP 16, WA4JTM 15, K4SOI 6. (Sept.) K4BSS/4 123.

SOUTHWESTERN DIVISION

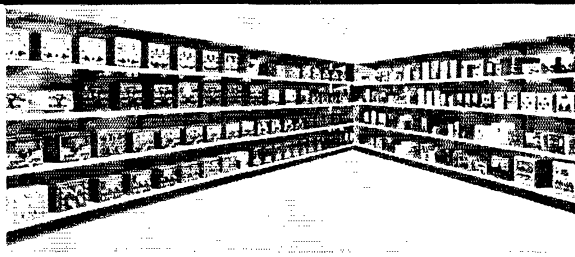
ARIZONA—SCM, Floyd C. Colvar, W7FKK—SEC: K7NIY. PAM: W7CAF. RMs: K7NHL, K7TNW. New officers of the Phoenix V.H.F. Club are W7GNP, pres.; K7UJV, vice-pres.; K7YFD, secy.; W7PXE, treas. K7AAB soon will be on ATV on 432 Mc. The Copper State Net has changed frequency ot 3878 kc. 0200Z Mon. through Fri. The ARC of Arizona had a very impressive station at the Arizona State Fair using the call WA7AOW. We were pleased to have W6QJW, Southwestern Division Director with us to participate in the amateur radio activities at the State Fair. K7-DHD is busy making lists of the names of students at the National Foundation for Asthmatic Children in Tucson. These lists contain pertinent information about the students and the help the local hams have gotten in the past from hams all over the continent who have made contacts between the children and their parents possible over Christmas week end. K7VOR puts out Bulletins on 50.340 Mc. and 145.350 Mc. Mon. and Thurs. at 0200Z. Appointments: K7OIX as OO; WA7-EBR as ORS and OBS. Fine reports were received from K7VQI, W7AYY, K7VOR, K7UTF, W7CAF, WA7-EBR, K7RUR, K7OFL, K7NII and K7NHL. Traffic: WA7EBR 505, K7NHL 236, W7CAF 30, W7FKK 19, K7-UTF 11, K7RUR 7.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: John A. Vaidean, W6BNX. RMs: W6-BHG, WB6BBO, W6QAE. PAMs: K6MDD, W6MLZ, W6ORS. BPLers: K6EPT, W6WPF, WB6BBO. New appointments: WB6KGK and WA6NLG as OBSs; WB6-GHB and WN6QWE as OESs. K6EPT is back in the top bracket again. WB6BBO is coming closer on her totals + or —1. W6QAE went to Arizona and New Mexico for a month. K6IWV QNIs four nets. K6MDD is active with the Salvation Army Net. K6IOV and WB6QXY (OM and XYL) are working as a team on traffic. New officers of the So. Calif Chapter of QCWA are WA6AYF, chairman; W6PIF, vice-chairman; K6-GIL, secy.-treas.; W6GH historian. W6OI received a brief message from W6BHG, only 4½ feet long! WB6-AEL is receiving nice reports on the new antenna up 50 feet. WA6NUA has RTTY on 6. WA6WTX is at San Fernando Valley State College. W6NKR has been QNIing SCN. WB6GXI says the Eight-Ball Net has 23 active and 3 honorary members. K6UMV borrowed gear to complete DXCC and visited the Oscar gang in San Francisco. WB6BOW wants to hear from stations interested in 423-Mc. operations. The W6YRA Radio Club is experimenting with lasers and building 432-Mc. gear. WB6IBZ and OM WB6ITG started a new net on 50.40 Mc. Mon. through Fri. at 1535Z called the Blue Kangeroo Breakfast Klubbers. W6AM has three 2000 Johnson transmitters for quick QSYing. WA6DTG is working steady as an OBS. W6IBD is finishing a new four-element 15-meter beam. W6MEP/K6MYK, off for three weeks in Florida, left the repeater station with W6HTQ. W6NAA did good public relations work during the local drill and SET. WB6NMO's tower finally is up. WA6OKZ is using the rotation method for NCS for additional drill. W6PUZ is building equipment for Oscar IV and has antennas and converters for 432 and 144 Mc. W6SD has started new Novice classes at Robert Fulton Jr. High Tue. nights. WA6WOY is busy with OBS skeds. W6YRA was top station in the June CD Party and second in the Collegiate FD. W6MLZ's articles appear in the Sunday paper, and he also has a radio program, "Calling CQ," on KPFK (90.7 Mc.) t.m. Sun. at 10:30 AM. PST. W6QAE sent in a short bulletin but to the point. *QRM* is the bulletin of the Tri County Amateur Radio Assn. WA6WKF worked VE6AFQ in Calgary on 6 meters; also K7UGH in Washington. WB6BBH says there are good openings for Oregon, Wash., Mont. and S. Dakota. The Palisades Amateur Radio Club meets the 2nd Tue. of each month at Rustic Canyon Club House. The Los Angeles Fair at Pomona had over 200 guest hams, including ZL1QQ ZS6SN and several from Canada. *The Loudspeaker* was received from the San Gabriel Valley Radio Club. California State FM Assn. has a good bulletin and anyone looking for f.m. information should contact WB6-RGL. The Eight Ball Net (EBN) meets Mon. through Fri. at 1515Z and Tue. through Sat. at 0130Z on 50.5 Mc. Southern California Net (SCN) meets daily at 0300Z on 3600 kc. Traffic: (Oct.) K6EPT 1820, W6WPF 1046, WB6BBO 618, W6QAE 487, K6YVN 461, K6IWV 276, K6MDD 200, WB6QXY 195, W6BNX 187, K6IOV 131, WB6GIL 98, K6GIL 97, WB6KGK 66, W6MLF 64, W6TXJ 60, W6OI 27, K2PHF/6 23, WB6AEL 21, W6-USY 20, WA6NUA 19, WA6WTX 19, W6LVQ 18, WA6-

NOW—

CONVENIENT TIME PAYMENTS
PLUS SPECTACULAR SAVINGS
ON LIKE-NEW, EXTRA-CLEAN EQUIPMENT

- TWO-WEEK TRIAL
- 90-DAY GUARANTEE
- TRADES ACCEPTED
- FREE PARKING



Tops in value, tops in performance, and tops in appearance—that's what you get with every piece of TRIGGER thoroughly reconditioned, clean-as-a pin, like-new equipment.

Alignment, calibration, and performance are as good as new, and frequently better.

SEND FOR FREE PRICE LIST

Contact TRIGGER for a cash quote on your present gear or for a tremendous allowance on brand new equipment. For a real eye-opener visit TRIGGER — conveniently located in west suburban Chicago on Route 64, three blocks west of Route 42A, and only 20 minutes from the Chicago Loop via the Eisenhower Expressway.

Domestic and foreign inquiries or orders processed promptly.

another important TRIGGER service: WE BUY USED HAM GEAR FOR CASH

PROMPT SERVICE / PROMPT CASH!

SPECIALS OF THE MONTH FOR JANUARY

51J4	$795	DRAKE R4	$319	GONSET GR211	$ 69	HEATH DX35	$ 39	SX96	$129
75A2	229	CENTRAL 100V	399	GONSET GSO	239	DX40	49	SX100	147
75S1	299	CLEGG 99ER	89	GTI 6METER	139	DX60	77	SX43	89
75S3	459	THOR 6&AC	259	IV 6METER	189	HR10	69	SX101A	249
32S1	459	CLEGG VENUS	369	SUPER 12CONV	47	HR20	127	SX110	89
KWM2	739	VENUS AC	69	NCXS	449	DX100B	179	SX111	167
PM2 SUPPLY	119	POLYCOMM PC6	189	NCX AC SUPPLY	79	RX1	149	SX115	389
SM2 MIKE	34	GLOBE 75SA VFO	37	NCX DC SUPPLY	69	TX1	149	SX122	229
SWAN 350	329	AMECO CMA CONV	47	NC10S	97	HW32	127	SX140	77
AC SUPPLY	69	EICO 720FW	77	NC12S	77	6ER	47	CRX1 30-50MC	69
DC SUPPLY	109	EICO 722VFO	37	NC15S	119	2ER	49	CRX2A 152-174MC	69
SWAN 120	119	EICO 723	37	NC183D	169	SB10	97	SR46	159
SWAN 240	239	VIKING VFO	29	NC188	77	VF1 VFO	19	SR150	369
SBE34	339	CHALLENGER	69	NC300	179	HG10 VFO	34	SR160	229
SB2LA	209	THUNDERBOLT	259	HR060	229	HO10 SCOPE	57	HT33	179
DRAKE 2A	159	HQ110	127	HR060 AD COIL	37	HO13 SCOPE	77	HT37	259
DRAKE 2B	189	HQ110AC	167	HR060 XTAL CALL	27	HP20 SUPPLY	34	HT41	239
DRAKE 2BQ	52	HQ140X	107	HROSOO	975	340B	49	HT44	249
DRAKE TR4	495	HQ150	137	LAFAYETTE HE45B	77	S85	69	PS150AC	69
AC SUPPLY	67	HQ170C	209	LAFAYETTE HA350	139	S86	59	HT45	249
DC SUPPLY	109	HX50	249	HEATH DX20	37	S118	67	P150AC	139

A SMALL DEPOSIT WILL HOLD ANY UNIT ON LAY-A-WAY

NEW EQUIPMENT
ON LOW MONTHLY TERMS

SWAN	DRAKE	SBE
HALLICRAFTERS	HY-GAIN	VIBROPLEX
AMECO	WATERS	SHURE
ASTATIC	NUMECHRON	DOW-KEY

and other major brands

STORE HOURS

Weekdays 11:00 A.M.-8:00 P.M.
Saturdays 9:00 A.M.-3:00 P.M.
Or by Appointment
After Hours

TELEPHONES (area code 312)

From Outside Chicago . . 771-8616
Chicago Area 889-6429
Business phones with QTH Extensions

TRIGGER Attn: W9IVJ (ABC1234)
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.

TRIGGER Electronics

7361 NORTH AVE. • RIVER FOREST, ILLINOIS 60305
(WEST SUBURBAN CHICAGO)

WKF 18, WA6ZID 16, WB6BBH 15, W6NKR 14, WB6GXI 12, W6PCP 12, WA6USU 12, K6UMV 11, WB6BOW 10, W6BHG 8, W6HUJ 6, W6YRA 6, WB6IBZ 2, W6SRE 2, K9ELT/6 1. (Sept.) K6IWV 340, W6TXJ 39, WB6AKZ 12, W6YRA 7. (Aug.) W6TXJ 34, WB6AKZ 17. (June) WB6AKZ 21.

ORANGE—SCM, Roy R. Maxson, W6DEY—WB6ERG, OCTN mgr. reports 257 check-ins, 38 messages (Sept.) 210 check-ins, 28 messages (Oct.) 145.62 Mc. at 0230 GMT. WA6CXB, of the 246 Net, lists 40 members, 8 equipped for a.f.s.k., 6 for 50-Mc. operations. Communications for the Riverside JC Commerce at the L.A. Times Grand Prix Race Oct. 31 was handled by WB6JZJ, WA6CXB, K6HYG, WB6IGF, WB6CJS, WB6QBU, W6FKH, WB6CZT, K6YCI, WA6VAB, WA6GBH, WB6FFF, WB6FYM, WN6OFJ, and WA6VCN. CHOP WA6QYU, of W6ZJB, has a new SR-42 and eight-element "V" beam for signals to Orange and the L.A. area. Marty, CHOP of W6FCS, paid a visit returning from N.Y.C. K6MCA operators WB6OPA and WB6PRP are working spare time on a small problem with rigs and 20/15 meter beams and rotors. SEC W6WRJ has furnished SET reports to the National EC from WA6TAG, EC desert area, and K6LJA, EC for Central OC. K6RCK is a new EC for OC v.h.f. WA6ROF handled message count of 55 during the SET. WB6OTL enjoyed CD c.w. operations. New AREC members are WN6QMC and WB6FSK. W6FB advises the new pres. of the Desert RATS is WB6AJW. Traffic: K6MICA 1980, W6ZJB 601, WA6ROF 139, WB6JFO 97, W6DNA 54, WA6TAG 28, W6WRJ 24, WB6ERG 6.

SAN DIEGO—SCM, Don Stansifer, W6LRU—My sincere thanks to all who voted in the recent SCM election. Thanks for your support, and I'll continue to do my best as your SCM. The San Diego V.H.F. Club had a homebrew contest and did the judging at its November meeting. WIYNP/6 worked 100 countries in 97 days after moving to Lemon Grove, all with 100 watts. WA6AJB still is in Europe. K6RPD gave his new s.s.b. rig and beam a real workout during the Sweepstakes. W6CHV was a Florida visitor in the fall. W6BGF has been appointed RM as he is manager of the San Diego Section Net on c.w., which meets at 8:30 A.M. on 3795 each Sun. morning. He also is active on SCN and RN6. K6EC became the fourth San Diego DX Club member to make the DXCC Honor Roll, joining K6ENX, W6BZE and W6EPZ. Next month will show a complete list of all ARRL appointees in the section. A Happy New Year to all and good hamming in 1966. Traffic: W6YDK 7931, K6BPI 6987, W6IAB 3783, WB6JUH 547, WB6GMM 527, W6VNQ 504, W6EOT 419, W6BGF 220, WB6HPJ/6 79, WB6JLC 37, W6BKZ 31, WA6UUO 28, WA6TAD 27, WIYNP/6 18, W6LRU 4.

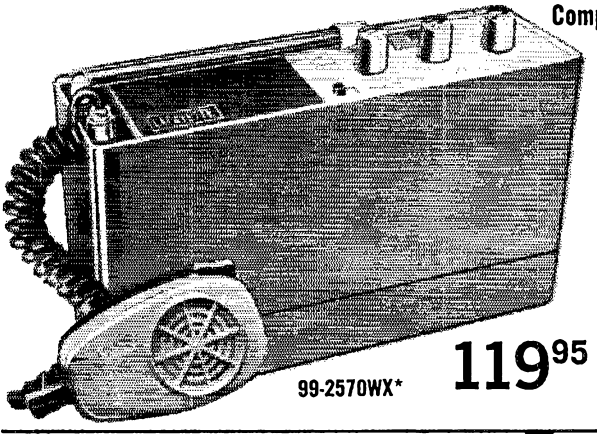
SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: WB6NDP. RM: W7WST/6. RTTY on 2 meters is catching on in and around Vandenberg where the club, W6AB, has changed its name to the Satellite ARC. W6DYQ is the new publicity chairman for that club and sends a nice report. WA6CPK has a new baby girl in the family. K6GRU and K6KCI are on a trip to Hawaii. WB6PBV is attending college in Santa Barbara. W6KZO has purchased yet another 2-meter f.m. rig. Ray also supervised the installation of t.m. gear in the WA6OKN auto. WB6ITZ, of the Ventura ARC, is experimenting with amateur TV. K6KCI had as a house guest G2YL from London. Unless the eyes are failing, there is a ham in Santa Barbara running RTTY mobile. K6LBV is busy with a kw. amplifier and college. New officers of the Ventura ARC are W6CBD, pres.; K6UJV, vice-pres.; WA6NVC, treas.; WA6VKW, sec. The 2-meter t.m. frequency in this section is 146.995.

WEST GULF DIVISION

OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil Andrews, W5MFX. SEC: K5DLP. The Enid Amateur Radio Club elected W5MFX pres.; WA5NYC, vice-pres.; WA5CHD, secy.-treas. W5TMY has a new antenna pole up. WA5NRY has a new Galaxy V. K5VYY has been transferred from Tulsa to Fort Worth. The Tulsa Electron Benders Mobile Group provided communications for the Tulsa Good Will Good Turn Drive by providing a base station and mobiles to coordinate the location of the trucks all over Tulsa. The same group also was called in to assist the Tulsa Auxiliary Police by helping coordinate traffic at the Southwest Raceways for the World Champion Finals. WA5LOB spent some time in Colorado deer-hunting recently and returned with some fine trophies. Anyone interested in donating or selling 40-meter s.s.b. transceivers reasonable for missionaries, contact K5KTW and advise what equipment is available. If you have

LAFAYETTE 6-Meter Solid-State Transceiver

Completely Portable And Mobile — Take It With You Everywhere!

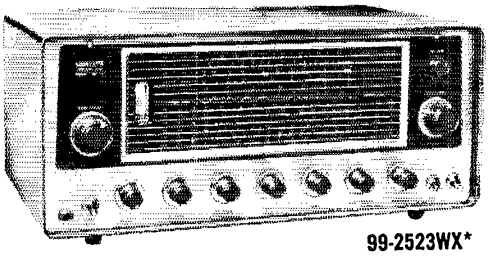


99-2570WX* **119.95**

Model HA-650

- 2.5-Watts Input
- Built-in Battery Supply
- 6 Crystal-Controlled Transmit Positions
- Tunable Superhet Receiver
- Portable, Mobile and Fixed Station Operation

A great new 6-meter transceiver designed for portable, mobile and fixed station use (with optional AC supply). All solid-state circuitry delivers more than 50% RF to the antenna. Has phenomenal 1.2 μV sensitivity; noise limiter. Includes push-to-talk dynamic microphone, leather carrying case with shoulder strap, telescoping whip antenna and batteries.



99-2523WX*

Model HA-225 **SALE! 119.95** Was 129.95

LAFAYETTE SSB/CW/AM 14-Tube Amateur Communications Receiver

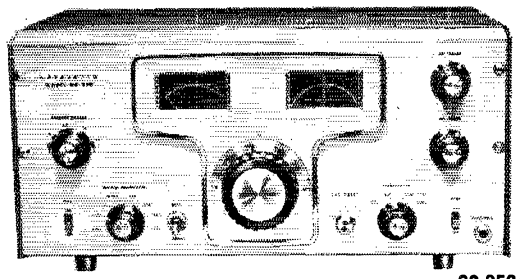
- 5 Bands—150 Kc to 54 Mc
- Extra RF Stage and Mixer/Osc. for Dual Conversion on 6 Meters
- New Product Detector Circuit for Improved SSB Reception
- Crystal Calibrator for Checking Receiver Calibration Markings

99-2522WX*

Model HA-230 **SALE! 69.95** was 79.95

LAFAYETTE 8-Tube AM/CW/SSB Amateur Communications Receiver

- 8 Tube Superhet Circuit: 4 Bands 550 Kc—30 Mc
- 1 RF + 2 IF Stages for High Gain Reception
- Built-in Q-Multiplier for Crowded Phone Operation
- Effective Automatic Noise Limiter
- Built-in Edgewise S-Meter
- Calibrated Electrical Bandspread on Amateur Bands 80 through 10 Meters



99-2524WX*

Model HA-350 **SALE! 139.95** Save 35.00 was 174.95

LAFAYETTE 10-80 Meter SSB/AM/CW Amateur Receiver

- Mechanical Filter for Exceptional Selectivity
- 7 Band-Switching Positions—3.5, 7, 14, 21, 28, 28.0 and 29.1 Mc Plus WWV on 15 Mc
- 12 Tubes Dual Conversion
- Automatic Noise Limiter
- Product Detector for Selectable Upper and Lower Sideband Reception
- 100 kc Crystal Calibrator and Crystal BFO
- Complete with Crystals for 80, 40, 20, 15 and 10 Meters

*Imported

FREE! *Lafayette 512—Pg. 1966 Catalog No. 660. Write: Lafayette Radio Electronics Corp., Dept. VA-6, P.O. Box 10, Syosset, L. I., N. Y. 11791*

some that need repairs and are just collecting dust, put them to good use by letting missionaries in remote places use them. Traffic: K5TEY 787, K5MBK/5 221, WA5BTQ 39, K5DLP 32, W5MFX 31, K5KTW 29, W5QMJ 24, W5UYQ 19, W5WDD 9, W5EHC 5, WA5FVJ 5.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5ZPD. RM: K5ANS. Was pleased to hear the activity on the SET week end. Former SEC K5RDP is taking it easy by doctor's orders. Sorry to see Gene have to stop most of his amateur radio activities. Your cooperation with our new SEC, K5QQG, will be appreciated. Pass him your reports of activity in So. Texas. Replacing K5QQG as Harris County EC is K5HXR who also is pres. of the Houston Amateur Radio Club. RM K5ANS received honors as Distinguished Graduate at the Texas A.&M. University given each year by the Association of Former Students. Congrats, Frank. W5ABQ advises that K5SRO the San Antonio Police Amateur Club, is adding a 2-meter relay station to its other v.h.f. services. WA5AUZ is on top with traffic this month. Come on, fellows, let's get with it on 3770 kc. at 1900 and 2200 CST, Tex. Tfc. Net. RM K5ANS reports Tex. Net stations 80 and traffic 96. K5HZR, Bexar County EC, reports the World Series gave its SET some competition. WA5GLM reports she and WA5JPA won a vacation trip to Puerto Rico, wrecked the car, began construction of a new ham shack and wound up briefly in a hospital between the 1st and 25th of the month. W5PTK and K5ZZJ have moved to the West Coast. K5LQJ has been too busy at W5AC to get his own rig going. The new Gonzales County EC is W5URW. Watch for new OBS WA5AUB Mon. at 1930S on 50.3 Mc., Wed. at 2000S on 50.42 Mc. and Thurs. at 2000S on 146.88 Mc. K5ABV is back at the University of Texas after spending some time on a Scientific Expedition for U. of T. in Peru and operating as OA4U. Marv is working on his PH.D. in E.E. October reports wree received from K5QQG, W5NGW, K5ANS, K5LQJ, WA5GLM, K5ZSC, K5HZR, WA5AUZ and W5ABQ. Traffic: WA5AUZ 353, K5HZR 119, W5AIR 61, K5ANS 39, W5ABQ 16, K5QQG 12.

CANADIAN DIVISION

ALBERTA—SCM, Harry, VE6TG—SEC: VE6FK. PAM APN: VE6ADS. PAM Inter-Provincial SSB Net: VE6FK. ECs: VE6s SA, SS, AFJ, HB, ALL, XO. ORS: VE6BR. OPSs: VE6s CA, PV, HM, SS, BA, ADS. OOs: VE6s HM, NX, TY. OBSs: VE6s HM, AKV. OESs: VE6s DB, AKV. I would like to thank VE6PV for the fine job he has done with APN over the past years; also VE6SS for the fine job he did filling in when VE6PV was not around. You fellows who receive cards from the OOs should acknowledge them as they are sent for your benefit. Our SEC reports that the provincial AREC test went over very well with good response from the Red Cross and EMO. APN is now on winter sked at 1900 MST on 3770 kc. Mon., Wed., and Fri. with the Inter-Provincial S.S.B. Net on Tue. Thurs., Sat. and Sun. same frequency and time. Let's have your traffic. Lethbridge, Vulcan and Calgary AREC report that police chiefs thank all the boys who helped out on Halloween. Vulcan, Calgary and Medicine Hat report new beginner classes and need you older fellows to help out if you can. Traffic: VE6FK 244, VE6XC 152, VE6HM 137, VE6SA 18, VE6ALQ 10, VE6SB 10, VE6SS 9, VE6FS 6, VE6HS 3.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —The mouth of October sadly ended with VE7JF and VE7OM as Silent Keys. Bill was EC and was planning a big build-up of our AREC members. VE7BOQ is the new Powell River EC. VE7BNM is a new EC and ORS for Kamloops. With the AREC plan well laid for the Vancouver area it lasted one month; VE7BQU was posted to Portland, Ore. VE7MI was in the hospital. Officers of the Chilliwack ARC are VE7XV, pres.; VE7BOK, vice-pres.; VE7BHG, secy. Officers of the Burnaby ARC are VE7FO, pres.; VE7BMC vice-pres.; VE7BGA, secy.-treas. VE7AKG is checking nightly on 3755 kc. The B.C. DX Club had a good visit in Victoria with the Victoria DX Club. VE7AZ is doing fine on 20

BARRY ELECTRONICS

Sommerkamp FR-100B Double Conversion SSB/AM/CW Receiver with two mechanical filters. New. **$250.00.**

Sommerkamp FL-100B Transmitter. Companion to FR-100B Receiver. 80 through 10 meters, 120 watts PEP. Mechanical filter. Built-in antenna relay. New. **$325.00.** (Write for brochure on Sommerkamp units FR-100B and FL-100B).

Simpson Model 303 VTVM. Like new. Only **$49.00.**

Johnson 813 Tube Socket: Johnson #122-237-1. For 813, 4E27A, etc., Giant 7-pin Steatite **85¢.**

Western Electric Teletype Relay Socket. Brand new. Only **$2.50.**

Western Electric Teletype Polar Relay Model 215A @ **$3.95;** Model 255A @ **$2.95;** Model 314A @ **$5.95.**

Mobile "Goose-Neck" Adjustable Mike: Salt Shaker 1" diameter mike, with 7 ft. cord and standard PL-55 Plug. **$9.50.**

Ceramic Ribbed Coil Forms: 2" Diameter × 5" Long @ **45¢;** 2" × 5½" @ **50¢;** 2½" × 5" @ **70¢;** 3" × 7" @ **85¢;** 3½" × 6" @ **80¢;** 3½" × 9¾" @ **$1.00;** 4" × 6" @ **$1.25** and 4" × 7¼" @ **$1.45.**

Mobile Deluxe Dual Headsets with Boom-Arm Mike. Brand new with separate PL-55 plugs. Sale **$14.95.**

2.5 MH Xmtg Choke: 400 Ma. **70¢.**

Collins SSB Transceiver KWM-2 With Heavy-Duty "Home built" AC Power Supply. **$750.00.**

National NC-400 Deluxe SSB/AM/CW General Coverage 540 KC to 31 Mcs. (Reg. Net **$995**). Sale Price: **$695.00** in sealed factory carton.

Lambda Regulated Power Supply: Input: 105 to 125 VAC @ 50 to 400 CPS. Adjustable from 125 to 325 VDC. 1% regulation. Model TD-749 (200 Ma.) **$49.00;** Model TD-750 (400 Ma.) **$69.00.** In stock: W2AU Balun 1:1 @ **$12.95;** ARRL Radio Amateur's VHF Manual @ **$2.00;** Electro-Voice Model 604 Variable Impedance Dynamic Cardiod microphone — Hi-Z @ **$51.00;** 604 Desk Stand w/switch @ **$9.00.**

EV 727SR Ceramic Mike Hi-Z with stand @ **$12.00.**

B & W "Vacationer" Portable/window antenna —2 throught 20 — 2 lbs. **$19.95.**

Cush-Craft Blitz Bug Coaxial Lightning Arrestor: For Ham, Commercial or CB use. Model LAC-1 @ **$3.95;** LAC-2 @ **$4.45.**

Dow-Key Coaxial Relays: DK60 @ **$12.45;** DK60-G2C @ **$15.65;** DK2-60B (new coax transfer switch) **$19.00;** DKC-71 (Single Pole-6 throw coax switch) 110 VAC 52 Ohms, 1 KW. **$49.50.**

Dow-Key In Line Coax Broadband Pre-Amp (1.5 thru 30 Mcs) Model DKC-RFB. **$10.75.**

New National HRO-500. In stock **$1295.00** net prepaid Continental U.S.A.

Galaxy 300 Deluxe SSB Transceiver with PSA-300 Matching console (PS AC/Speaker/GMT Clock). With VOX **$249.95.**

Johnson Viking Valiant II: 160 thru 10 meters. 275 Watts Exclnt condx, **$295.00.**

Gonset 6 Meter Communicator III: Xmtr/Receiver. **$149.95.**

Johnson Air System Socket for 4X150A, Johnson #124-114-1. Sale price **$3.95.**

Dumont Type 245 3" Scope, like new. **$79.95.**

Waterman Type OS-8/CU Pocket 3" Scope, excellent condition, with book and case. **$110.00.**

AN/ARC-48. 1¼ Meter Receiver /Xmtr. Modern module construction. Compact. New. **$75.00.**

Silicon Rectifiers: 800 to 900 PIV @ 1.5 Amps @ **50¢** each; 600 PIV @ 1 Amp @ **32¢** each. 400 PIV @ 400 Ma. @ **22¢** each.

Collins 51J-3 (R-388/URR Receiver) Excel. W/covers, rack mount. Gen. Coverage: 500 KC thru 30.5 Mcs. **$390.00.**

Hammarlund SP-600 Receiver (540 KCS to 54 MCS). 115/230 VAC @ 60 CPS. (good condition.

Dumont Model 224 3" Scope. Condition Fair to Good. **$49.00.**

RCA Model 155A. 3" Scope. Condition Fair to Good. **$29.00.**

LM Power Supply. This is the original P.S. for the LM Navy or BC-221 Freq. Meter. Operates from 115 VAC @ 60 CPS. **$25.00.** Condition: lab tested O.K., excel.

50 Ohm Microminiature Co-Ax Cable. 25 feet for **$3.00;** 100 feet @ **$10.00;** 500 ft. @ **$45.00.**

Remember, we have the biggest diversified unusel, first-quality **TUBE** stock in the United States. Best brands, highest quality at sensible prices. All mdse guaranteed (cost of mdse only). Ask for Barry, W2LNI.

COME IN AND BROWSE

Monday through Friday 9 AM to 5:30 PM. (Mon. through Friday Parking 501 Broadway, open lot).
Sat: 10 AM to 2 PM (Free Parking on Street Sat.)

BARRY ELECTRONICS DEPT. O-1
512 BROADWAY, NEW YORK, N. Y. 10012
WALKER 5-7000 (Area Code 212)

☐ Enclosed is money order or check and my order. Prices FOB, NYC. Shipments over 20 lbs. will be shipped collect for shipping charges. Less than 20 lbs. include sufficient postage. Any overage will be refunded. Fragile tubes shipped via Railway Express. **50¢ service charge for orders under $5.00.**

☐ Send 10¢ for Fall "Greensheet" catalog #17.

☐ Send information.....

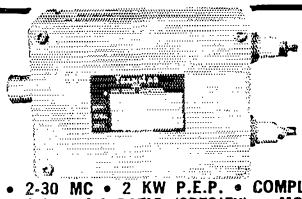
.....

Name .....Title

Company .....

Address.....

City .....State.....



BROADBAND FERRITE BALUN

$19.95

Plus Postage.
With mating UG21B/U add $1.00

- 2-30 MC • 2 KW P.E.P. • COMPLETELY WEATHERPROOF
- 1:1 or 4:1 RATIO (SPECIFY) • MOUNTING FOR BEAM OR DIPOLE

Nearly perfect characteristics are obtained by the use of low loss ferrite materials and special winding techniques. The transformer is completely encapsulated in plastic to assure freedom from moisture or shock damage. Model 601 is designed for a 1:1 ratio (50 ohms unbalanced to 50 ohms balanced) and the Model 601A is available for applications requiring a 4:1 ratio (50-200 ohms or 75-300 ohms). Each unit is supplied with a UG58A/U (type N) fitting to provide superior weather resistance.

Write for data sheet or see your local dealer

TRANSLAB INC. 4754 Federal Blvd. San Diego, Calif. 92102

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!

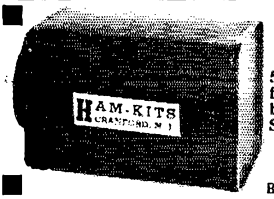
CSL NR 1 & NR 2 (1 tape) for the prospective Novice, Technician, General or Amateur Extra First. 3 to 25 wpm.

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



with some DX but mostly good ragchews. Vancouver ARC Pres. VE7AGX invites all amateurs to partake in the club's activities and Christmas Sat., Jan. 8, 1966, at the "Blue Boy." We are sorry to hear that "13 Club" will not hold meetings this year. The Chilliwack ARC's code and theory class produced VE7BHG VE7BOK and VE7BTF at its last session and is going strong on a new session. The Terrace ARC has a station now set up with a Viking 2 and dipoles. VE7QQ our RM is staying awhile long in Usk. The West Kootenay ARC repeater for 2 meters is progressing well. Traffic: VE7-ASY 159, VE7BNM 97, VE7BQB 97, VE7QQ 54, VE7-BJA 41, VE7BLO 34, VE7BBB 29, VE7BHH 19, VE7AC 5, VE7CT 3.

MANITOBA—SCM, John Thomas Stacy, VE4JT—SEC: VE4OL. ECs: VE4EO, VE4GM, VE4HB, VE4-HF, VE4IW, VE4LU, VE4NW, VE4JC, VE4JQ, VE4-JT. QSL: VE4OX. OBS: VE4QJ. RM: VE4QX. ORSs: VE4LG, VE4NE. PAM: VE4JQ. OO: VE4JW. OESs: VE4HI, VE4RE. As you can see every phase of amateur radio is represented in the section. VE4HI is putting the finishing touches on a 6-meter mobile. VE4QX takes over the editorship of *QUA*. He also made the BPL. The university gang, VE4UM, is getting ready for the Oscar IV launch. The AREC and the two traffic nets did an FB job during the SET. VE4XN is sporting a new tower and a TA-33. The c.w. net now has connections right through to the Lakehead and made 100% QNI on tenth region for the month. WARA reports a membership of 78. Some reports are arriving too late for this column. The deadline is the fifth of each month and station reports are sadly lacking. Traffic: VE4JT 336, VE4QX 226, VE4EI 152, VE4LG 120, VE4NE 63, VE4JQ 42, VE4OL 24, VE4QD 24, VE4-SC 21, VE4SW 19, VE4EF 15, VE4EP 7, VE4PE 7, VE4-EJ 4, VE4EX 3, VE4XN 3, VE4DQ 2, VE4EG 2, VE4-MT 2, VE4PW 2, VE4HH 1, VE4III 1.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and R. P. Thorne, VO1EI. SEC: VE1HJ. Deepest sympathy is extended to the relatives and friends of VO1BU (ex-VE1AHY), VE1VD and VE2IC (ex-VE1IC) who have joined the ranks of Silent Keys. VO2AW reports officers of the Goose Bay ARC are K9YCN/VO2, pres.; W8NTZ/VO2, vice-pres.; VO2AW, secy-treas.; VO2NA, awards mgr. NBARA officers include VE1UT, pres.; VE1FN, vice-pres.; VE1OW, secy.; VE1AGE, treas. Communications for the Marble Head Yacht Races were provided by members of the Halifax Club under the direction of VE1LZ. Activity on 2 meters is increasing in

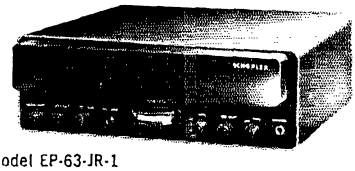
TWELFTH ANNUAL VE1 CONTEST

Jan. 22-23 and 29-30, 1966

All VE1 amateurs are invited to participate in a contest sponsored by the New Brunswick Amateur Radio Association. The contest is divided into two sections, phone and c.w. The highest scoring contestant in each section will be awarded permanent possession of an engraved cup, the NBARA Trophy. A special certificate of recognition will be issued to any participant submitting logs showing 25 or more valid contacts.

RULES: 1) The c.w. contest will begin at 2400 GMT Saturday, Jan. 22 and end at 2400 GMT Sunday, Jan. 23. 2) The phone contest will begin at 2400 GMT Saturday, Jan. 29 and end at 2400 GMT Sunday, Jan. 31. 3) Any and all amateur bands may be used but only c.w. to c.w., or phone to phone contacts will count. Any contestant may participate and be eligible for awards in both sections. 4) The same station may be counted but once for credit (in each section) regardless of band used. Mobile, portable, and home stations covered by the same station license constitute the same station. 5) The general call is "CQ VE1." 6) Exchange signal reports, county, province, and operator's name. Local QTH is not required. 7) Logs should show band, type emission, signal reports, county, province, time, and date. Logs not showing this information IN FULL will be disqualified. 8) Score one point for information received and one for information sent and confirmed. Multiply total points by the number of individual counties worked in the three provinces to determine final score. For contest purposes Sable Island will be classed as part of Halifax County. 9) Decisions of the contest committee will be final. Logs must be postmarked not later than Feb. 14 and should be in committee hands not later than Feb. 14. Forward all entries to: Contest Committee, P. O. Box 366, St. Stephen, N. B., Canada.

ECHOPLEX...



Model EP-63-JR-1

Kahn Research Laboratories' patented ECHOPLEX, EP-63-JR-1, provides commercial operators and advanced amateurs with one of the major communications system improvements of recent years.

- Signal-to-noise gain of 5-to-1 makes a 1 kw SSB transmitter produce the same signal/noise as a 5 kw SSB transmitter.
- Reduces the effects of fading by transmitting same information three times (time diversity).
- Allows you to identify your signal from non-echoplex signals thus easier to read through QRM.
- Can be used with existing amateur or commercial SSB or AM transmitters and receivers.

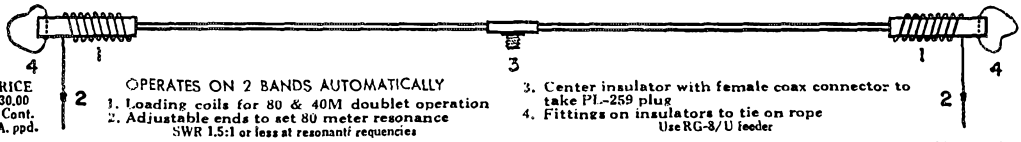
$399.60 TERMS THROUGH GENERAL ELECTRIC CREDIT CORP.

KAHN RESEARCH LABORATORIES INCORPORATED

For Further Information Write Dept. Q-16

81 SO. BERGEN PL., FREEPORT, L.I.
(516) FR 9-8800

LRL-70 ANTENNA **70' LONG, 80 & 40 M** • Power rating 2 Kw. P.E.P. or over



PRICE $30.00 in Cont. USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance SWR 1.5:1 or less at resonant frequencies
3. Center insulator with female coax connector to take PL-259 plug
4. Fittings on insulators to tie on rope Use RG-8/U feeder

LATTIN RADIO LABORATORIES • Box 44 • Owensboro, Kentucky

Hams- $500 per month?

Conservative extra income from citizens band and business radio maintenance!

Get into booming two-way radio maintenance!

Free booklet tells you how—see coupon below!

105-B MICROMETER FREQUENCY METER

Measures nearby transmitters, continuous coverage 100 KC to 175 MC and up. Internal calibrator. Only 8 lbs. $295.00

PPM METER — inexpensive accessory for the 105-B for 0.0001% accuracy on split-channels.

205-A FM MODULATION METER

Tunable 25 to 500 MC any channel. Direct reading. Light weight. Measures peak swing 0-12.5 and 25 KC. $290.00 Quad-Scale model $340.00

LAMPKIN

dependable low cost equipment used by thousands of engineers.

LAMPKIN LABORATORIES, INC. BRADENTON FLORIDA

LAMPKIN LABORATORIES, INC.
MFG Division, Bradenton, Fla. 33505

At no obligation to me, please send me free booklet "HOW to MAKE MONEY in MOBILE-RADIO MAINTENANCE"—and data on Lampkin meters.

Name_____

Address_____

City_____ State_____ Zip_____

the Goose Bay area. Successful moose hunters in Newfoundland include WA1EVL and VE1MZ. WA2SDF/VO1 is acitve aeronautical mobile on 14.305 Mc. VE1AHH reports activity by the Cape Breton Club in Boy Scouts' "Operation Starlite." Sincere thanks to all amateurs who participated in the recent Boy Scout Jamboree. VE1AX also holds the call VE0MJ. Congratulations to VO1s AL, CA, CE, CQ, HN and HS on acquiring their A3 privileges. Congratulations to VO1HC and his XYL on the arrival of a new harmonic. Traffic: VE1RT 74, VE1OM 37, VE1AX 18, VE1WB 15, VE1ABS 9, VE1DB 4.

ONTARIO—SCM, Richard W. Roberts, VE3NG—At this time I would like to wish all of you a Merry Christmas and a Happy and Prosperous New Year. This column is being typed after the Big Blackout of Hydro in our Province and that of the northern states of the U.S.A. The Ontario AREC went into action immediately after the Hydro went out. The Toronto group, under VE3DRF and VE3HW and supervised by SCM VE3NG, were on the air twenty minutes later on emergency power from Don Mills, on 2 and 75. The York V.H.F. Society is holding meetings. The Ottawa Mobile Club has a new club format. The club was active in the Ottawa area with the Flying Club Rally and the Sports Car Rally. VE3CLT is now Class AA, also VE3DMK. VE3FWA has designed an electronic kever in kit form. This is a Skywide Club project. If VE3GX would apply for appointment as an Official Bulletin Station to the SCM his club might receive the ARRL Official Bulletins as they are issued. We will all miss VE3DUU with his Christmas Santa for the kids on 75. From Lakehead we learn that VE3ANP is in charge of traffic to and from that area. We are sorry to hear that the XYL of VE3CFR, one of our 75-meter PAMs, is in the hospital. VE3GG is home now and cards will be welcome; VE3DN likewise. The Niagara ARC has made application to the ARRL to hold the Ontario Division ARRL Convention in Niagara Falls in October 1966. Ottawa ARC elected VE3-CDG, pres.; VE3BYT, vice-pres.; VE3EWE, treas.; VE3FZY, secy. Traffic: (Oct.) VE3CYR 243, VE3DRF 242, VE3BZB 228, VE3BII 215, VE3NG 182, VE3DPO 137, VE3DMU 114, VE3AWE 100, VE3TT 91, VE3OU 77, VE3FGV 70, VE3BLZ 69, VE3DU 69, VE3NO 65, VE3-EBC 62, VE3EHL 61, VE3AUU 48, VE3CFR 48, VE3-BUR 47, VE3BWM 30, VE3WW 24, VE3ETM 23, VE3-CFI 22, VE3ERH 16, VE3DWN 9, VE3OCU 5, VE3VD 2. (Sept.) VE3CYR 178.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. Claude Duberger, VE2ALH, VE2AUU (and many assistants) worked hard during the past year to build up the AREC with admirable results. VE2LI was successful during the KP4 moonbounce test. VE2NE made a fine showing during Field Day. VE2EC deserves special praise for his loyal support of the SCM. To all of you a Very Prosperous New Year. The repeater station on top of Mount Royal (700 feet above sea level) has been installed. The Quebec City AREC group is contemplating a similar installation. Greetings to G3JZZ, who now signs VE2BXZ, and to XE1XN, who is awaiting his VE2 call. New appointments: VE2OJ as RM and VE2CK as ORS. During the SET many VE2s took an active part, both on the 80-meter c.w. nets and on the Trans-Canada 20-Meter Net. VE2CI has a lot of fun mobiling with his Volkswagen. VE2ANK is an active OO. VE2EC reports that VE2ACI now has started the second course for budding hams. He also maintains liaison between CBers and amateur radio. Here is a delayed report from VE2ALH: VE2BUY est maintenant mobile. VE2OB est de retour a Quebec at sera sur l'air bientot. VE2AIR/2 est a l'university Laval et opere 80 m. avec une dipole de 125 pieds de haut. VE2HB se promene en roulotte et VE2ALH en bateau. VE2AGH, VE2UZ et VE2TJ traffiquent tous les jour avec le Diberville et sont tres occupes avec phone. VE2BJF, VE2BUB et VE2BUY sont a remonter le club VE2CAS. Traffic: VE2DR 231, VE2XT 200, VE2OJ 93, VE2BRD 85, VE2WM 49, VE2CP 46, VE2ANK 40, VE2EC 38, VE2AIR 29, VE2TA 27, VEØMS 24, VE2AUU 19, VE2BMS 16, VE2BPT 8, VE2BRT 8, VE2BG 5, VE2AE 3.

SASKATCHEWAN—SCM, Mel W. Mills, VE5QC—A Happy New Year to one and all in VE5-Land and welcome back DX in force to start the new year. Congrats to the technical committee of the Saskatoon Amateur Radio Club for its vast strides forward and its hookup with the University of Saskatchewan and its rocket research and communications program. U. of S. Club where was your Field Day score? Start planning now, gang, to go to Hamfest '66 in Regina. Traffic: VE5HP 95, VE5BO 21, VE5GX 12, VE5IL 11, VE5-TM 8, VE5PZ 6, VE5YR 3, VE5FX 2.

Happenings of the Month

(Continued from page 49)

Las Vegas, Nevada: Sometime in January.
Little Rock, Arkansas: February 2 and May 4 at 1:00 P.M.
Los Angeles, California 90014, Mezz. Floor, Rm. 50, 849 South Broadway: Wednesday at 9:00 A.M. and 1:00 P.M.
Louisville, Kentucky: Sometime in February and May.
Lubbock, Texas: May 12.
Marquette, Michigan: May 11 at 1:00 P.M.
Memphis, Tennessee: January 6 and April 7 at 8:30 A.M.
Miami, Florida 33101, 51 S. W. First Avenue, Room 919: Thursdays.
Milwaukee, Wisconsin: Sometime in January and April.
Mobile, Alabama 36602, 439 U. S. Court and Custom House: Wednesday by appointment only.
Nashville, Tennessee: February 2 and May 4 at 1:00 P.M.
New Orleans, Louisiana 70130, 829 Federal Office Building, 600 South Street: Monday at 8:30 A.M.
New York, New York 10014, 748 Federal Building, 641 Washington Street: Tuesday through Friday (exam must be started before noon).
Norfolk, Virginia 23510, 401 Federal Building: Fridays only, 9:00 to 11:00 A.M.
Oklahoma City, Oklahoma: January 14 and April 15.
Omaha, Nebraska: Sometime in January and April.
Philadelphia, Pennsylvania 19106, 1005 New U. S. Customhouse: Mondays, Tuesdays, and Wednesdays, 9:00 A.M. to 10:00 A.M.
Phoenix, Arizona: Sometime in January and April.
Pittsburgh, Pennsylvania: Sometime in February and May.
Portland, Maine: April 12.
Portland, Oregon 97205, 441 U. S. Court House, 620 S. W. Main Street: Fridays, 8:45 A.M.
Rapid City, South Dakota: May 14 at 11:00 A.M.
St. Louis, Missouri: Sometime in February and May.
St. Paul, Minnesota 55102, 208 Federal Courts Building, 6th and Market Streets: Fridays at 8:45 A.M.
Salem, Virginia: April 6, 8:30 A.M.
Salt Lake City, Utah: March 11 and June 10 at 8:00 A.M.
San Antonio, Texas: February 3 and 4; May 5 and 6.
San Diego, California 92101, 1245 Seventh Avenue, Fox Theatre Building: Wednesday by appointment.
San Francisco, California 94126, 323A Customhouse, 555 Battery Street: Friday at 8:30 A.M.
San Juan, Puerto Rico 00903, U. S. Post Office and Courthouse, Room 322-323: Friday at 9:00 A.M.
Savannah, Georgia 31402, 238 Post Office Building, Box 77: By appointment.
Schenectady, New York: March 16 and 17; June 15 and 16 at 9:00 A.M. and 1:00 P.M.
Seattle, Washington 98104, 806 Federal Office Building, 1st Avenue and Marion Street: Friday at 9:00 A.M.
Sioux Falls, South Dakota: March 11 at 8:00 A.M.
Spokane, Washington: Sometime in April.
Syracuse, New York: Sometime in January and April.
Tampa, Florida 33602, 738 Federal Office Building, 500 Zack Street: By appointment only.
Tucson, Arizona: Sometime in April.
Tulsa, Oklahoma: January 12 and April 13.
Washington, D. C. 20555, Room 204, 521 12th Street, N. W.: Friday at 9:30 A.M. and 1:00 P.M.
Wichita, Kansas: Sometime in March.
Williamsport, Pennsylvania: Sometime in March and June.
Wilmington, North Carolina: June 1 at 8:30 A.M.
Winston-Salem, North Carolina: February 2 and May 4, at 8:30 A.M.

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 307

November 19-20, 1965

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the headquarters office of the League at 1:20 P.M. November 19, 1965. Present: President Herbert Hoover, jr., in the chair; First Vice President W. M. Groves; Directors P. Lanier Anderson, Jr., Charles G. Compton, Robert W. Denniston and Noel B. Eaton; General Manager John Huntoon; Vice Presi-

dent F. E. Handy; and Treasurer David H. Houghton. General Counsel Robert M. Booth, Jr., was also present.

On motion of Mr. Denniston, affiliation was unanimously GRANTED to the following societies:

Atomics International-Rocketdyne Amateur Radio Club, Canoga Park, Calif.

Aviation High School Radio Club, Redondo Beach, Calif.

Delaware County Amateur Radio Association, Inc., Delaware, Ohio

Lumberton Amateur Radio Club, Lumberton, Miss.

Post 86 Amateur Radio Club, Carlsbad, New Mexico

Reynoldsburg Area Radio Amateur Club, Reynoldsburg, Ohio

As information, members of the staff outlined procedural changes being made or contemplated in the administration of the DX Century Club. It was the sense of the meeting that the Communications Manager should proceed with such changes to streamline and improve the League's sponsorship of DX activities.

The Committee noted, with deep appreciation, receipt of a commendation from Mayor Victor Schiro of New Orleans paying tribute to the emergency communications performance of amateurs during Hurricane Betsy.

The Committee was in recess from 2:15 to 2:45 P.M., at which point Director Robert Y. Chapman and Technical Director George Grammer joined the meeting. There ensued extended discussion on the general problem of man-made interference to amateur communications, particularly from appliances and power lines. The staff was requested to expedite its studies of this problem and report to the next meeting of the Committee.

The General Manager reported to the Committee that initial results of the League study of 1800–2000 kc. lend encouragement for the possible expansion of amateur privileges therein, but much more engineering work must be done.

Director Chapman reported briefly to the Committee on developing plans for the 1966 National Convention.

The Committee recessed at 4:15 P.M., and reconvened at 2:40 P.M. November 20, subsequent to the completion of the work of the Committee of Tellers in counting ballots in the current director elections.

On motion of Mr. Eaton, approval was unanimously GRANTED for the holding of an Ontario Province Convention in Niagara Falls, September 16–17, 1966.

The General Counsel briefly reported on his activity in connection with amateur difficulties in local tower cases.

The Communications Manager reported on the stepped-up autumn operating schedule at W1AW. At his recommendation, and on motion of Mr. Eaton, unanimously VOTED that present emergency-power units at the station be replaced to obtain expanded capacity for full station operation in the event of power failure.

On motion of Mr. Compton, after discussion, unanimously VOTED that the League request the Federal Communications Commission to amend the amateur rules so as to provide for F-1 radioteleprinter operation in 28.0–28.5 Mc., thus to bring rules in this band in line with those for 80-40-20-15 meters.

President Hoover announced, after consultation with members of the Committee, the appointment of a special Board Committee on Personnel and Organization, composed of Directors Anderson (Chairman), Smith and Compton. In view of the retire-

ment, on account of age, of a number of key personnel of the Headquarters staff within the next few years, he requested the special committee to work closely with the General Manager on the problems of their replacement and assignment of duties.

At this point the meeting was joined by Don Waters of Don Waters & Associates, and the Committee engaged in extended discussion of the subject of membership relations. It was agreed desirable that Mr. Waters should continue his spot samplings of amateur opinion at additional locations.

There being no further business, the Committee adjourned, at 5:30 P.M.

Sincerely yours,
JOHN HUNTOON
Secretary

Certification of Committee of Tellers

We, the undersigned, having been appointed by the Executive Committee of The American Radio Relay League, Inc., to serve as a Committee of Tellers, hereby certify that we have this day examined and counted the ballots in the current autumn ARRL director elections and do find as follows:

Atlantic Division

For Director:	
Crossley, Gilbert L., W3YA	2889
Van Dyke, George S., Jr., W3ELI	2038
Blank Ballots	11
Invalid Ballots	57
For Vice Director:	
Bieberman, Jesse, W3KT	1946
Breiner, Allen R., W3ZRQ	1531
Van Deusen, Edwin S., W3ECP	1439
Blank Ballots	18
Invalid Ballots	59

Delta Division

For Director:	
Cassen, Franklin, W4WBK	396
Spencer, Philip P., W5LDH	1205
Blank Ballots	3
Invalid Ballots	19
For Vice Director:	
Arnold, Max, W4WHN	831
Goggio, David C., W4OGG	157
Singer, Maurice, K5YMM	106
Swanson, John A., Jr., W5PM	494
Blank Ballots	12
Invalid Ballots	20

Great Lakes Division

For Director:	
Cartwright, Dana E., W8UPB	1486
Siringer, John E., W8AJW	1228
Voorhees, James W., W8EGR	1375
Blank Ballots	3
Invalid Ballots	39

Midwest Division

For Director:	
Denniston, Robert W., WØNWX	1908
Schmidt, William J., WØOZN	511
Blank Ballots	1
Invalid Ballots	17

Pacific Division

For Director:	
Engwicht, Harry M., W6HC	1676
Reed, Larry M., W6CTH	697
Blank Ballots	5
Invalid Ballots	38

Now, therefore, pursuant to the provisions in By-Law 15, and by virtue of authority delegated to

us by the Executive Committee, we hereby declare elected the following, for the office and in the division indicated, all for a two-year term of office commencing at noon on January 1, 1966:

ATLANTIC DIVISION
Director — Gilbert L. Crossley, W3YA
Vice Director — Jesse Bieberman, W3KT

DELTA DIVISION
Director — Philip P. Spencer, W5LDH
Vice Director — Max Arnold, W4WHN

GREAT LAKES DIVISION
Director — Dana E. Cartwright, W8UPB

MIDWEST DIVISION
Director — Robert W. Denniston, WØNWX

PACIFIC DIVISION
Director — Harry M. Engwicht, W6HC

Done at Newington, Connecticut, November 20, 1965.

(s) P. L. Anderson, Jr.
(s) Charles G. Compton
(s) Noel B. Eaton

Certification of Certified Public Accountants

A representative of this firm having witnessed the opening of the sealed ballots in the above-described elections, and having supervised the counting of the ballots and ascertained the results thereof, we hereby certify that the tally of votes recorded above is correct.

(s) Ernst & Ernst
Certified Public Accountants

Witness
(s) Robert York Chapman

Novice Roundup

(Continued from page 60)

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80-, 40-, 15-, or 2-meter bands. Crossband contacts are not permitted. C.w. to phone, c.w. to c.w., phone to phone, phone to c.w. contacts are permitted. Novices work any amateur stations eligible; non-Novices work only Novices. Valid points can be score by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section.

A Novice may operate in the Novice portion of the competition until he *receives* his General Class License, then *must* operate as a non-Novice entry.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this *QST*) worked during the contest is the "section multiplier." Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold ARRL Code Proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of qualifying run from W6OWP, January 6, or February 4, or from WIAW, January 18 or February 16. CP credit equals the w.p.m. speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting:* Contest work must be reported as shown in the sample form. Reporting forms and a map of the United States will be sent gratis upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be postmarked not later than March 4, 1966.

6) *Awards:* A certificate award will be given to the highest-scoring Novice in each ARRL section.

7) *Disqualifications:* Failure to comply with the contest rules or FCC regulations are grounds for disqualification. ARRL Contest Committee decisions are final.

Silent Keys

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

K1BCP, Pinckney W. Snelling, Osterville, Mass.
ex-W1DJL, William H. Weppler, Athol, Mass.
ex-W1IBC, John F. Cashell, Dorchester, Mass.
K1LSW, ex-W8GEB,William H. Friedel, Shrewsbury, Mass.
K1ZUN, J. Ross Sibley, Haddam, Conn.
WB2AWI, George D. Stearns, Cherry Hill, N. J.
K2HHW, Irving A. Bookstaber, Newark, N. J.
W2HNY, Madison P. Rehm, Watchung, N. J.
WA2ILY, Charles C. Greco, Brant Lake, N. Y.
K2IZD, William F. Boehle, East Paterson, N. J.
W2JL, Harry Civiletti, Searsdale, N. Y.
W2JTO, Louis N. Belok, Rego Park, Queens, N. Y.
WB2LHX, W. D. Wiggs, Jr., Cherry Hill, N. J.
WB2OOR, Louis Berger, Hillsdale, N. J.
W2PIA, John S. Edmonds, Islip, N. Y.
W2PZS, John J. Power, Trenton, N. J.
W2RS, Rudolph J. Herdin, Clifton, N. J.
WB2SJZ, Robert Wilson, Flushing, N. Y.
W2TO, Frederick L. Ulrich, Jamaica, N. Y.
W3ABZ, John D. Angeny, Broomall, Pa.
W3BJL, Alfred H. Miller, Jr., Philadelphia, Pa.
ex-W3CFS, Edward Albert, Phoenixville, Pa.
W3IBH, Charles Clements, Philadelphia, Pa.
W3KSM, Kenneth W. Gearhart, Sunbury, Pa.
W3LPO, Ned J. Clark, Bradford, Pa.
W3LVP, Hugh E. Dievendorf, Bethesda, Md.
K3MTW, Robert K. Palmer, Smethport, Pa.
K3NJU, John Belosky, Pittsburgh, Pa.
K4AJX, George H. Phillips, Lithia, Fla.
W4BCO, Clarence F. Jones, Bluff City, Tenn.
W4CAE, Andrew S. Lemmon, Winnsboro, S. C.
WA4EOP, D. D. McGuire, Gainesville, Fla.
W4GZI, Burnie D. Mattox, Mobile, Ala.
W4HR, Charles C. Raimer, Concord, N. C.
W4MSZ, Oscar O. Lee, Newport, Tenn.
WA4PTO, Daniel C. Seivert, Clearwater, Fla.
WA4RDD, Richard W. Billett, Rapidan, Va.
WA4SFB, Vernon E. Willet, Richmond, Va.
WN4WBP, Karl A. Perkins, Murfreesboro, N. C.
W4YLZ, James M. Allen, Louisburg, N. C.
W5ANE, Arthur G. Charles, Dallas, Tex.
W5BPL, Henry W. Thomas, New Orleans, La.
W5CEA, John D. Edwards, Dallas, Tex.
W5FPU, Jon L. Bloomfield, Irving, Tex.
W5GUU/K5KQB, Arthur D. Bradley, Sr., Greenville, Miss.
W5ZHN, Carl W. Franz, Albuquerque, N. M.
ex-W6BY, Arthur L. Munzig, Manhattan Beach, Calif.
W6EKI, Aaron J. Otto, Pasadena, Calif.
ex-W6GHJ, George Stoolfire, Baldwin Park, Calif.
WB6KWC, Harvey H. Jamison, Indio, Calif.
W6KY, Kenelm D. Yonge, Lafayette, Calif.
W6MSC, Joseph W. Conn, Sherman Oaks, Calif.
W7UHZ, Milo V. Kubalek, Medford, Oregon
W7VUF, Calmar W. Clark, East Portal, Montana
W8BCA, James C. Gill, Galion, Ohio
W8JUU, Harold J. Fausnaugh, Lawrence, Mich.
WA8KRD, Paul Coxen, Weirton, W. Va.
ex-W8MRZ, Elbert C. Baker, Dearborn, Mich.
W8NOM, Paul L. Gilmore, Wooster, Ohio
K8OUE/4, Norman A. O'Harra, Port Charlotte, Fla.
W8ZYE, Frank Rybka, Almont, Mich.
W9FEV, Corda G. DeLong, Mattoon, Ill.
W9FUO, Herbert J. Lieser, Westmont, Ill.
K9HIQ, Betty R. Stevenson, Flora, Ill.
W9IIE, Oliver M. Jones, Danville, Ill.
W9TZD, Jack Buck, Portland, Ind.
K9UGN, John L. Lattuada, Danville, Ill.
KØARF, Grace Ellis, Rapid City, So. Dak.
WAØBWV, Fred J. Stevens, Sioux City, Iowa.
WØOSO, Charles Poches, So. Sioux City, Nebr.
WØREH, Merle R. Fish, Peterson, Iowa
WØSAF, Roy F. Robertson, Buffalo, Kansas

(Continued on page 150)

(Continued from page 148)

ex-WØTPF, Robert C. French, El Dorado, Kansas
HB9UL, Ady Lumpert, Zollikerberg, Switzerland
KH6BTX, Gladys T. Stickle, Honolulu, Hawaii
VE3DMI, Walter J. Totman, Corbeil, Ont.
VE3DUU, Albert Jensen, Toronto, Ont.
VE3MK, Cecil H. Wilson, Downsview, Ont.
VE7OM, W. C. Orchard, North Surrey, B. C.

ARPSC

(Continued from page 67)

TCC Roster: Eastern Area (W3EML, Dir.) — *W1s* BGD DYE EFW EMG NJM, *W2s* SEI ZVW/ K2SIL/8, *WA2s* BLV LJM RUE, *WB2s* AEJ ALB HWB, *W3s* EML NEM PWZ, *K3s* FHR MVO, W4DVT, K4VDL, WA4PDS, W8CHT, *K8s* KMQ NJW QKY, *WA8s* BQK GYT, WØOHJ, WAØHZD. Central Area (W4ZJY, Dir.) — *W4s* OGG ZJY WA4AVM, W5PPE, *WA5s* AVO CBL, *W9s* CXY DYG JOZ VAY ZYK, WA9BWY, WØHXB/4, KØGSY. Pacific Area (W7DZX, Dir.) — *W6s* EOT IDY AGR HC TYM VNQ, *K6s* DYX LRN, *WA6s* ROF WNG, WB6JUH, *W7s* AAF DZX GMC.

Net reports:

Net	*Sessions*	*Check-ins*	*Traffic*
20 Meter SSB	21	311	1926
HBN	31	466	791
North American ssb	26	640	735
ISSB	31	1311	557
7290	42	1149	512

QST

Portable Beams

(Continued from page 33)

maximum signal strength in receiving, and it will be close enough. An alternative, perhaps more effective, is to check the adjustment with enough power to get a reading on an s.w.r. bridge, and then mark the position of the coupler knob so that it can be reset if knocked off. Depending on the nature of the receiver input circuit, tuning for best reception may not always be the best adjustment of the coupler for power transfer in transmitting, though it will never be far off if the receiver input and transmitter output circuits are similar, as they are (for this express purpose) in the little 50-Mc. transceiver.

Performance of these two antennas is just about as good as it is possible to get with three elements for 50 Mc. and five for 144. Especially when used with short feed lines in portable work, keeping line loss well below what it usually is in home-station installations, the little arrays really do a job. Compared with the best mobile antenna systems, the difference is simply tremendous, averaging around 20 db. in favor of the portable beams. Set up on your favorite high spot, they have another distinct plus: they hold down the QRM from stations within the line-of-sight range. This characteristic may be at least as helpful as their gain, particularly on a contest week end, or during open-band conditions. QST

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.
(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.
(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.
(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**
(8) **No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.**

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

ROANOKE Division Convention, Natural Bridge, Va. May 28 and 29, 1966. Varied program includes Home-brew Contest. Enjoy the Convention and see Natural Bridge, too! Special Advance Registration package, $6.50. Reservations handled. Inquiries to Box 2002, Roanoke, Va. J. M. Evans, K4RDT, Program Chairman.

DAYTON Hamvention April 16, 1966. Everyone welcome at the Dayton Amateur Radio Association's 15th Annual Hamvention. Wampler's Ballarena, Dayton, Ohio. Watch Ham-Ads for information.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communication equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA Wayne Nelson, Concord, N.C.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmandy 8-8262.

WANTED: All types of aircraft on ground 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 or buy ancient radio set and parts magazines. Laverty, 118 N. Wycombe, 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 price u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Cointon, Chicago 6, Ill.

304TL tubes wanted. Also other xmtg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARG, GRC, URR, 5J and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

WANTED: Collins Parts. BC-610, GRC-27, Autodyne, Bethpage, L.I., N.Y.

INTERESTING Offers galore in the new combined "Equipment Exchange-Ham Trader". Next 12 issues $1.00. Sample free. Brand, Sycamore, Ill.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

ACT Now!! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-Walker-5-7000.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 120 West 18th St., N.Y. 11, N.Y.

WANTED: For personal collection: QST, May 1916, W1CUT, 18 Mohawk Dr., Unionville, Conn.

NOVICE Xtals: 80-40M, $1.05 each, others 75¢. Free list. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

COLLINS 75A owners tuning knob 6 to 1 reduction, $7.00 postpaid. J. W. Wenglare, W4VOF, 1517 Rose St., Key West, Fla. 33040

QSLS? SWLS? Made-to-order! State maps? Rainbow maps? flags? Cartoons? Space? Eagles? Religious? Samples 25¢, DeLuxe 35¢ (deductable). Sakkers, W8DED, Box 218, Holland, Mich. 49424.

QSLS, samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ back on the job! Bringing hams greater QSL returns, over a quarter century! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona (formerly Joliet, Illinois).

QSLS: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLS-SMS. Samples 10¢. Malgo Press, Box 375 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, 1994 N. M.-18, Gladwin, Mich.

QSLS. Twenty exclusive designs in 3 colors. Rush $3.00 for 100 or $5.00 for 200 and get surprise of your life. 48-hour service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

10¢ Brings free samples. Sims Advertising Service, 3227 Missouri Ave., Lt. Louis, Mo. 63118.

DON'T Buy QSL cards until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSL Specialists. Distinctive Samples. 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago, Illinois, 60639.

PICTURE QSL Cards of 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, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal, snazy, unparagoned cards (Wow!). Rogers KØAAB, 961 Arcade St., St. Paul 6, Minn.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

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 3-color glossy, 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLS Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Samples 15¢. Agent for Call-D-Cal decals K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

NEW Plastic holder, frames and displays 5 certificates, 3 for $1.00, or 10 for $3.00 ppd. Regular 20-card holders, same price. Assorted if you wish. Tepabco, Box 193, Gallatin, Tenn.

QSLs. Free samples, fast service, customized cards. W7UZ Press, Box 183, Springfield, Ore.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N.J.

3-D QSL Cards have that prestige look, with glittering colors and metallic in raised space-age designs fused to brilliant plastic finishes. Cost so little more than mere mediocrity! Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

AT Last! Something new in Qsl cards! All original designs. Send 25¢ for samples to Yaraco, Box 307, Yorktown Heights 1, N.Y.

QSLS Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSL. 3-color glossy. Samples, 10¢. Gates Print Shop, 317-11th Ave., Juniata, Altoona, Penna. 16601.

1966 QSL Designs. Samples 10¢. Brigham, Colson St., No. Billerica, Mass.

DX-QSL. The original plastic display for ur cards. Holds 20 cards, 3 for $1; ten for $3. Satisfaction guaranteed. Dealers' inquiries invited. DX-QSL, Box 19033, Houston, Texas 77024.

FINE Embossed QSL cards, Ace Printing Service, 3298 Fulton Road, Cleveland, Ohio 44109.

QSLS-SWLs, 2&3 colors. 100 $2.00. Samples dime. Bob Garra, Lehighton, Penna.

QSLS. 18 samples, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

HUNDRED QSLS: $1.00. Samples, dime. Holland, RJ, Box 649, Duluth, Minn. 55803 (formerly Melninger, Jesup, Iowa).

QSLS. Free offer with samples, 10¢. "Jack", W3PRU, Rice's Lane, Baltimore, Maryland 21207.

LOW Cost QSLS: 100 4-color glossy, $3.99. Free samples. Ed's Press, 3232 LeMoyne, Chicago, Ill. 60651.

QSLS. 18 samples 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

RUBBER STAMPS $1.00. Call and address. Clint's Radio W2UDO. 32 Cumberland Ave., Verona, N.J.

SRY, Fellas! Your orders are coming in so thick we have to hold up our ad for a while. Volpress, Box 133, Farmingdale, N.Y.

DENVER Metropolitan Area only: QSLS by KØRRS (John Cox). Phone 934-4739 or come to 3624 West Kentucky, Denver evenings or Saturdays.

QSLS: 18 samples, 10¢. Filmcrafters, P.O. Box 304, Martins Ferry, Ohio.

QSLS: Free samples. WA6QAY Press, P.O. Box 17112, San Diego, Calif. 92117.

QSLS, SWLS, 3 & 4 colors, 100, $2.00. Samples dime. Bob Garra, Lehighton, Penna.

QSLS. Cartoons, colors, something different, samples 10¢. Chris, W9PPA, Route 1, Box 31, Crystal Lake, Ill.

HUNDRED QSLS, $1.00. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

QSLS. Moyer's Printing, 846 Rising Sun, Telford, Penna.

SAMCO, QSLS presents! "Proto-Call" for '66. Samples 10¢. Stamp-ett 2" x 3" gloss white cards complete with Call and report in 2-color, just stamp with name and QTH ot complete: $1.00. Hundred ppd. Samco, Box 203, Wynantskill, N.Y. 12198.

DENVER Metropolitan Area only: QSLS by KØRRS, John Cox. Phone 934-4739, or come to 3624 West Kentucky, Denver, Colorado, evenings or Saturday.

QUALITY QSLs. New designs monthly. Samples 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

SUPERIOR QSLS, samples 10¢. Ham Specialties Co., 108 East Palace, Hobbs, New Mexico.

TOOOBES: 6CW4-$1.40; 6146B-$2.55; 6146B-$4.00; 6360-$3.45; 5894-$15.00, 417A-$3.95. New, boxed, guaranteed. No pulls, seconds or IAN. Free catalog and hundreds more. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

HAM Discount House. Latest amateur equipment. Factory-sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J., Tel. GArfield Area code 201-471-2020.

WANTED: FR-2409 bandpass filter. State price. Pete Chamalian, W1BGD, 111 Buena Vista Road, West Hartford, Conn. 06107.

TELETYPE Machines, converters. R-388, 51J3 and 51J4, R-390; R-390A receivers, mechanical filters for R-390A (455 IF). Want: TS-382 audio sig. CV89/URA8A converter. Alltronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: 617-742-0048.

RTTY Gear for sale. List issued monthly. 88 or 44 mhy toroids, five for $1.75 postpaid. Eliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

4000 Radiowords for hams. German-English. Send one dollar bill to Christian Zangerl, OE9SZ1, Dornbirn, Austria.

HIGHLY Effective home-study review for FCC commercial phone exam preparation. Free literature. Cook's School of Electronics, Box 747, Riveread, N.Y. 11902.

HOUSE, Custom-built estate home, ideal ham location. 400 ft. high point in Stamford ridges 35 miles from NYC, 3 bedrooms, den, 2 full baths, solarium, terrace, 2-car garage, sundeck, large kitchen, privacy. On landscaped acre: $46,000. Two adjoining acres available. Financing arranged. W1TZX Erich Ouast, Skymeadow Drive, Stamford, Conn. 06903.

PRINTED Circuit materials. Three sample pieces and details, one dollar. Betty Nolin, 35 Arbor Drive, New Hartford, N.Y.

TELEPRINTER Parts. Fast service. W4NYE, Schmidt.

WANTED: QSTs 1916 to 1920 inclusive. Government Callbooks, Fleming, de Forest, Moorehead, Audiotron tubes. Marconi and Wireless Specialty receivers. Private collection. Top prices. John Cain, 1101 Belle-Meade Blvd., Nashville, Tenn. 37205.

COLLINS 75S-3, in xclnt condx. Will pay shipping charges anywhere in states. First $450 takes it. E. M. Cholerton, Sea Isle City, N.J. Day phone: 609-263-8836.

COLLINS 75S-2 recvr, $275.00. J. F. Young, W5HXW, 1214 Northlake, Richardson, Tex. Tel: 214-235-6927.

COLLINS KWS-1, buy of a lifetime! Factory-sealed carton, completely modernized and fully guaranteed by the factory. Exceptionally fine condx: $650.00. Ray Clurman, W2LNP, 134 Wheatley, Glenhead, N.Y. 11545.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each. $10.00 pair prepaid in U.S.A. Send check or m.o. Everett Stidham, Jr., W5JLQ. 722 So. 30th, Muskogee, Okla.

MANUALS for surplus electronics. List, 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

FOR Sale: Plate transformers, 3600-0-3600 VAC @ 1000 ma. CCS, with 120/240 VAC primary. Commercial-quality units carry one year unconditional guarantee. Price $35.00. Peter W. Dahl Co., 401 4th St., S.E., Minneapolis, Minn. 55414. Tel: 338-9077.

POSI-CHECK Extra Class Amateur Extra and General Class FCC type exams, complete in detail and style even to the IBM type answer sheets! A must for checking before taking an exam. 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. *A very good aid to learning and a* Must in preparation for FCC exams. 138 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.

RTTY Channel Filters, octal mounted, specify frequency, $3.00 each. Zack, WA6JGI, 3232 Selby Avenue, Los Angeles, California 90034.

FOR Sale: Cash & Carry: Valiant, $150.00. NC-303, $250.00. Gary Schmidt, WA2AVY, 238 East 58th St., New York, N.Y. 10032. Tel: Plaza 9-3591.

KWM-2, PM-2, MM-2, new condx, in original factory cartons: $965.00. Write or phone. Orvis T. Asleson, P.O. Box 84, Hazelwood, Mo. Tel: 314-HA-9-0510.

TUNAVERTERS! Halt mobile station AM-SSB-CW. $19.95-$24.95! Transistor, 6-1 tuning, calibrated converters for Marine, Amateur, SW bands! Satisfaction Guaranteed! Salch & Co., Woodsboro, Texas 78393.

SELL: TR-3, AC, DC supplies, speaker. All new condx, factory guarantee, $560.00. Collins 75A 4, like new, over 5000 serial number, $525.00; New-Tronics 10M mobile, Kreco 10M coaxial antennas. American D-50K mike, B&W KW balun, all bands. Make offer. Bell & Howell 8mm movie camera (trade?), extra lenses, 6 volt mobile power supply. R. Lamb, 1219 Yardley Road, Morrisville, Penna. 19067.

HRO-60 with coils. *A thru D, home-made xtal calibr.*, $225; Globe King Mod. 300, extra meter hole in panel, $125. A Crist, 41 Walden, Newtonville, Mass. 02160.

KNIGHT T-60, $40.00: 40 meter ARC-5 VFO w/supply, $20.00. Both are in xclnt condx, TV1-suppressed. WB2JBL, Adrian Rose, 16 Marlborough Ave., Marlton, N.J. 08053.

HT-37, GSB-101, 75A-1, perf, condx, $650.00. WA4NZG, Gutmann, 2312 Yorkshire Dr., Tallahassee, Fla.

SX-117, HT-44, homebrew AC power supply. All perf, condx, and all for $500. W2JFO, 22 Sherwood Close, Somerville, New Jersey 08876. Tel: 201-722-1642.

COLLINS 351-D2 mobile mount including factory-cable supplied. Make offer. W2RRP, 48 Deer Trail, Ramsey, New Jersey.

WANTED: 2-meter linear Gonset 3062 or 903A or what have you. WA9ORV, 2766 W. 96th St., Evergreen Park, Ill. 60642.

DX-60, in xclnt condx, $50. K9TVC, 8804 Robin, Des Plaines, Ill.

FOR Sale: SR-150 with AC power supply; never mobile, one owner, original cartons, $450.00. R. T. Evans, KØDOJ, Box 95, Britt, Iowa.

SACRIFICE: Like-new Johnson latest desk Kilowatt Transmitter, new prop-pitch motor, AC converted, Ranger I transmitter, 75A-4 Collins, latest serial rcv. 13-year collection of QST magazines, other tubes, and parts. Write Ernest Molinari, W6FLR, 6218 Lexington Ave., Hollywood 90038, Calif.

SELL: Collins KW-1, xclnt condx. Collins 2 KW P.E.P. SSB linear amplifier operation incorporated. $925.00. Dr. H. Schurgin W1ZIP/Ø. 269-B Randolph, Grand Forks AFB, North Dakota.

TRADE R-77/ARC-3 2-meter rcvr, 2 field telephones TP-6A, 2 desk telephones, Eico grid dip meter. All or part for 35 mm camera. John Bagwell, W4DQK, Somerville, Box 15, Tenn. 38068.

NATIONAL NCX-5 and AC supply with solid state balanced modulator. In xclnt condx: $540.00. K1VUX, 49 Old Morton St., Mattapan, Mass. 02126, Phone 617-298-0196.

SELL: QST, CQ, Radio, Modern Electrics and Handbooks, any quantity. Buy: old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

WANTED: Johnson 275W Matchbox or equivalent, VTVM or VOM and SWR bridge. David Mays, RFD #1, Box 58-A, Philippi, W. Va.

SELL: Drake TR-4 complete, speaker, power supply. Original carton, never been opened. $550.00. Rev. A. Tamulis, Macon, Ill. Tel: RO-4-3795.

FM For 2, 6, and 432. G-E 12 volt, 40-50 Mc receiver-transmitter 4ER6-4ET5, 30 watts. Transmitters are fully narrow-banded. These rigs were removed from service this year and are very clean and in xlcnt condx. Complete with all tubes, xtals, cables, control heads, speaker, etc. (less antenna), $39.95 each. Same unit, with tubes, less cables, $29.95 ea. Receivers *only, with tubes*, $24.95. Transmitters only, with tubes, $13.95. 12 volt dynamotors, 660V, $9.95. Transmitters less dynamotors, $9.95. Link 432 Mc transceivers (5894's), less mike, spkr, $28.85 ea. Shipped F.o.b. L. R. Newsome, K8TJP, 2670 Pinetree, Trenton, Michigan 48183. Phone 313-676-7460.

GALAXY Five, Remote VFO, Deluxe acc. console, speaker console, AC and DC power supply, VOX, calibrator, MMB mobile mount, sealed cartons: $600. R. F. Kreiner, KØSOA, Hampton, Iowa.

HEATH Marauder, Hallicrafters SX-111, both for $450, or will sell separately. J. Michlin, WA2WPN, 2282 Bronx Park East, New York City 10467.

SELL: Best offer: Globe *King 300B RF section*, 300 watt AM modulator with power supply, Astatic VHF booster and UHF converter, Heathkit telephone amplifier, B&W 380B TR switch, coaxial relay, Knight VFO, Heath SB-10, homebrewed 20-watt speech amplifier, Heath GW 10 and GW 10D rigs with mobile whip and coax antenna. W2INY, 206 W. 9th St., Elmira, N.Y.

FOR Sale: KWM-2 PM2 power supply, carrying case. All perfect condx, $900. H. L. Griffin, Jr., Box 809, Redding, Calif. 96002.

WANTED: 1932 to 1940 Model HRO with power supply and coils, state condx. W1BB.

SELL: Complete station (special price) or units. RME 6900, Globe Champion 350, both in mint condx, accessories. Write Bert Whisenant, K4VOC, Box 1232, Davidson, North Carolina.

CLEGG 62T10, a 200-watt VHF transmitter for 2-meters, 6-meters and 10-meters with self-contained modulator and power supply, $225. Gonset G-76 with 12V-DC power supply. Like new, $225. Also B&W 5100 with 51 SBB attached as single unit. Factory overhauled, $295. John Doremus, W2ADE, Pocono Road, Mountain Lakes, New Jersey Tel: 201-334-3331.

NCX-5, Adcom 350-12 power supply, D-501K speech clipping microphone, all for sale to the best offer over $500, or state offer for individual items. K2IJU, Box 196, 801 DeMun Ave., St. Louis, Mo. 63105.

SELL: 2-meter Nuvistor Ameco converter, with power supply, $15.00; Eico 723, $35.00; Drake 2B with L. F. converter, $190.00. Cash and carry deal only. Write G. Hertsch, 400 W. 119th St., N.Y., N.Y. 10027.

NC-270 recvr, like new, in carton, with manual, $175. Will ship. APX-6's, 2 converted and working 1225 Mc, 18 mo. 2-50 ft. UHF coax, 1- 30" dish, 1 corner reflector, 1 mic. "Go UHF." $95. Will ship. W4IIS.

HAMMARLUND HQ-145C, just collecting dust, in gud condx, $100. Ken Goodwin, K1ONW, 25 Whitfield Road, Somerville, Mass. 02144.

MUST Sell entire shack: xmitter, receiver, linears, etc. SAE for list. Dick, 9600 S.W. Highway, Oak Lawn, Ill. 60453.

POWERFUL New 572B's, 2000 hour guarantee, never unboxed, $39.50. Matched set of four postpaid. Need: Drake DC-3. Len Malone, WA5DAJ, Box 1222, Garland, Texas.

MULLARD VT13 and other rare tubes for sale. W2EZM, 431 Oakland, Maple Shade, N.J.

SWAN 350, Swan D.C. power supply; Waters 20 meter antenna, *Master Mobile Mount, Shure 488A mike, all new in* July; $475.00. F.o.b. K6GPM, 14446 San Diequito, La Mirada, Calif.

COMPLETE Sideband station. Full legal power, new condition. 20-A exciter and Thunderbolt linear, 2000 P.E.P. 1000 c.w. 400 AM price $500 complete. Contact Bob. KIPQT, 12 Creswell Rd., Worcester, Mass. Tel: 754-0931.

SELLING: HT-37, $295.00; HT-41, $225.00. Like new. HA-20 linear never used, $95.00; FGC-1 terminal unit and power supply, $75.00. R. G. Armstrong, W1JTL, Reservoir Road, Lunenburg, Mass.

HW-12 Heath 75 SSB transceiver, in xclnt condx, with fixed and mobile p/ss, 100 kc. xtal calibrator, mike, cables, $200. K9KTL, 3514 N. Riley, Indianapolis, Ind. 46218.

HT-41 Linear amplifier. Must sell! In mint condx! Asking $200. Will ship F.o.b. K3MCO, Thomas J. Bradley, Rosemont Plaza, Apt. 116, Rosemont, Penna. 19010 Tel: 215-527-0628.

HOMEBREWERS wanted to meet other builders, display gear, and exchange ideas at the Roanoke Division Convention next May. Interested? For details write Joe, W4IMP, 4318 Hanover Ave., Richmond, Va. 23221.

IN College, must sell: DX-60 in mint condx. $55.00; also in vy gud condx: Hallicrafters S-85, $65.00; Johnson Adventurer, $55.00; VF-1 VFO, $11.00; B-1 balun coils, $5.00; Astatic JT-30, $5.00. Lowell Guengerich, Yoder Hall, Goshen College, Goshen, Ind.

JOHNSON Viking Ranger with PTT, Gonset mike, 50 ft. of RG/8-U and fittings, like new condx, $99.00, plus shipping charges. Dave Friedman, 41 Campo Ave., Selden, L.I., N.Y. tel: 516-732-3082.

GENERAL Coverage HX-145X, calibrator, speaker, exclnt condx, $160; Hallicrafters SP-44 Panadaptor, $40; HC-458, new, $6.00; Par-Metal 42 in. cabinet, $10. Parts of kilowatt linear and power supply, including new FC-15 and R175A chokes, cheap. KH6EWG/0, 4181 Chartley, Bridgeton, Mo.

HEATHKITS: HW-32 20-meter transceiver with calibrator, $100.00; DX-100B wired for SB-10, $100.00; SB-10, $50.00; plain DX-100, $50.00. All in xclnt condx and optg shape. Need cash. Will deliver 100 miles radius. W1MBX, 2389 Winsted Road, Torrington, Conn.

DXCC A problem? Improve QSL returns by making yours stand out with 10-year old (3 cent) commemorative stamps. 5 each, 20 different, $4.00. Wittenberg, 40 Deer Path, Princeton, N.J.

APACHE, $150.00; 32V3, $180.00; NC-270, $150.00; SX-71, $60.00; 75A-1, $170. All on the air. Will ship prepaid on receipt of first certified check. Clare Bailey, 519 Parkhurst, Dallas, Texas.

SELL Or trade QSTs 1932 to 1965, also some old CQs and Radio magazines. Also some old ARRL and Radio Handbooks. Al Foley, W8NGY, 4192 W. 143rd St., Cleveland, Ohio 44135.

STATION, T-60, $40.00; SX-110, $140.00, both and free xtals for $170.00. 4 months and in exclnt condx. WB2RDW, 273-21st Ave., Paterson, N.J.

WANTED: Small 40-meter xmtr with or without p/s; VF-1 VFO; 40-meter surplus receiver. WA2MHY, 16 Coolidge St., Larchmont, N.Y.

FOR Sale: VHF and low band NC-155 National receiver in guaranteed and xclnt condx, covers 6-80 meters. $115.00; Ameco Nuvistor converters for 2 meters, factory-built, 6 meter IF, in xclnt condx, $30.00. P/S, $8.00; Drake TV-1000 low-pass filter, 1000 watts maximum, $12.00; Vibroplex Champion bug, in xclnt condx, $16.00. Saturn 6 halo with matching xfrmr, $15.00. Call or write Tom Adler, WB2GSK, 2 Garden Road, Scarsdale, N.Y. Tel: 914-SC3-3041.

FOR Sale: HT-37 SSB, AM, CW transmitter, 80-10 meters, with VOX cable and instruction manual. In xclnt condx, $225.00, pick-up deal only, sri. Ed Abbott, 127-04 109th Ave., South Ozone Park, Queens, L.I., N.Y. Tel: MI 1-0502.

KWM-1, AC supply, $425.00; Eico 425 oscilloscope, $30.00. Sonar 2M transceiver, 25W, input, $125.00. K2DAC, Larry Finch, 1975 Walton Ave., Bronx N.Y. 10453, Phone 212-299-5655.

SALE: HW12, SB-200, SB-300, SB-400, DX-60, HR-10, SX-101, GR-64. Name the kit you want. Wired or repaired. Lan Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

STAINLESS Steel heavy-duty guy cable (7 strand 7/32" wire) for sale in 1500 ft. roll, or fractions. W3YI, Heller III, University of Pittsburg, 326 Shenley Hall, Pittsburgh, Penna.

ANOTHER Collegiate pauper: Must sell DX-60, HG-10, SX-71. Also 6 KVCT xfrmr, RCA mobile power supply. W3CGJ/-K3WFZ, A-714, 3955 Forbest, Pittsburg, Penna.

BRAND New Hy-Gain TH-2 beam, used E-Z Way 40 ft. crank-up galvanized tower, AR-22 rotator, $100.00. W2MES.

CHRISTIAN Ham Fellowship now being organized among Christian hams for fellowship, tract evangelism, missionary efforts among hams. Christian Ham Callbook, $1 donation. Free sample of gospel tract for hams. Write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Mich. 49424.

NCX-3, NCX-A in warranty, spotless, used little. Sacrifice, $248.00. W3KWO.

BARGAIN: Sell P&H Linear GG A-1 condx, $125.00; Telrex 80-meter balun, 1 KW, $10. Transpro c.w. monitor, $10.00. BC-312N rcvr 1.5-18 m/cs, $45.00. K4EOF, Thomasville, N.C.

FOR Sale or trade: 432 Mc. television transmitter with transmission line and discone antenna. No shipping, srv. S. Rand, 27 Forest Ave., Ossining, N.Y.

CENTRAL ELECTRONICS 20-A and matching VFO and in mint condx: Built by a professional EE $225.00. Also HQ-110-C, xclnt shape, $170.00. K0EES, 1833 South 17th St., Fargo, No. Dakota.

EXCELLENT SX-100 with matching speaker, $135.00; in gud condx, DX-60, $40.00; new HG-10 VFO, $25.00; Eico 1020 transistorized power supply, $13.00. WB2LGG, 5 Bohling Rd., New Hartford, N.Y.

SELL: HQ-145XC with speaker. Cost $319.00. Will sell for $220.00. HT-40 w/three xtals, $75.00. DK-60 relay, $10.00. All used 5 hours. Robert Giordano 1 Headley Way, Woodbury, L.I., N.Y. Tel: 516-692-2708.

NEW 4-400A and PL4-400A, $20 each, both for $35.00; Heath AM-1 ant. imped. meter, $10.00; Heath CT-1 capaci-tester, $10.00; Gonset Super Six w/noise limiter, $15.00; 10-104 mike w/G-Stand, $18.00; Drake TV1000 l/p filter, $8.00. F.O.B. Ed Miller, 436 Ocean Ave., Lakewood, N.J.

SELL: Collins 30/S1, $700.00; Swan SW-117AC supply, $45.00; QSTs 1932 to date, four for $1.00. Arthur A. Jablonsky, W0MCX, 1022 N. Rockhill Road, St. Louis, Mo. 63119.

MUST Sell entire shack: GSB-100, HQ-170A, Hunter Bandit, 2000B, many extras. SAE for list. Dick Haynes, K9RGH, 9600 S.W. Highway, Oak Lawn, Ill. 60453.

TOWER Wanted: fold-over or crank-up and/or 20-meter beam and rotor. K3TKF, Keiser, 110 Bolling Circle, Chadds Ford, Penna. Tel: 215-459-3675.

INSTRUCTOGRAPH and tapes, $20.00; Policalarm P.R. 9, $20.00; Knight Ocean Hopper, $5.00; Hallicrafters SX-62, $125.00. Shipping: C.o.d. H. L. Danner, 840 So. 29th St., Omaha, Nebr.

FOR Sale: Complete station H1-37, 75S-1, TA-33 Jr beam, one owner only equipment in perfect factory condx. Take all for $550.00 or will split up station. Chuck Berg, K9QIZ, 3825 N. Avers, Chicago, Ill.

WANTED: Pre-1934 QSTS and binders for old and new volumes. R. Kampf, 9 Black Birch Lane, Scarsdale, N.Y. Tel: 914-723-1467.

COLLINS 75A-3, 32V-3 both for $325.00. Clarence Blog, 25 Peru St., Metuchen, New Jersey 10013.

TELETYPE Model 15, $75.00, or best reasonable offer, first received WA6YNJ. 1321 18th St., Manhattan Beach, Calif. Tel: 372-5468.

FOR Sale: Clegg Zeus and 11 element 6 m. beam. Contact WB2CUD, 1424 Clinton Ave., So. Plainfield, N.J. 07080. Tel: 201-756-8340.

600 PIV @ 750 Ma., Tophats, 10 for $2.50; tubes, pullouts, 4CX1000, $37.50; 6146 or 6883, $1.25; 4CX250B, $6.50; 4-125, $5.00; 5894A, $5.00; 813, $5.00, 5763 or 6CL6, $1.00; 4X150, $4.50, 12AX7-12AU7, 6AK5, 6BH6, 6CL4, 6CB6, 6AK6, 6S4, 6AQ5, 6BJ6, 6AL5-4 for $1.00, FRR rec. 14-8 Mc. drawer), $75.00. All material guaranteed. East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

WANTED To buy: 1915 Call Book, QST February 1922, W8BU, Russell, 201 Chester 12th Bldg., Cleveland 14, Ohio.

MOBILE Package: SBE-33, DC supply, Hustler 80-40 M coils, $220.00. R. Klausner, 1339 Shanabrook, Akron 13, Ohio.

ESTATE Of K2EN, month old SX-117, and HA-10 tuners with matching speaker, BC-221AH frequency meter and power supply. Best offer, all or separately. Cash & carry deal. Mrs. Olson, 31 Jervis Road, Yonkers 5, N.Y.

COUPON Book. Special offers from various firms for members of Electronic Experimenters' Club. Dues: $2.00 or write for further information. Box 5332-W, Inglewood, Calif. 90310.

WANTED: Many types military or commercial surplus: airborne, ground, test sets. Try the big boys, then write or call collect Area code 703-560-5480 and give us your price. We pay cash and freight. Dun & Bradstreet rated. Ritco, P.O. Box 156, Annandale, Virginia.

DRAKE R-4 receiver, new condition. First $300.00 check takes it. W8HDB. Tel: 522-6310. 3785 Susanna Dr., Cincy, Ohio.

MUST Sell: Best offer takes Valiant F/W, Gonset Super Six, manuals included. WA5ESW, 646 McClendon, Corpus Christi, Texas

PARSIMONIOUS: Drake 2-B receiver, $150.00; Heathkit HO-10 monitor 'scope, $40.00, both in gud condx. John Stoltenberg, 770 South Evergreen, Kankakee, Ill.

WRL Blue Book prices save money on used gear. Take 10% without trades: 75A-1, $199.00; Communicator III (6 or 2), $169.00; HT-37, $275.00; SX-101A, $219.00; SR-50, $439.00; RX-1, $159.00; TX-1, $149.00; 200V, $429.00; Warrior, $199.00; HX-10, $289.00; Loudenboomer P/S, $299.50; Champ 350, $199.00; Valiant, $199.00; NC-303, $269.00; Galaxy 300, $249.00, hundreds more. free list. Leo, W0GFQ, Box 919, Council Bluffs, Iowa.

"USED Gear." First check gets it. 75A-4, ser. No. 267, clean, $350.00; 2A clean, $135.00; 2B, like new, $175.00; 2BQ, $20.00; KWM-1, $240.00; HQ-170 AC, $195.00; Ranger, $86.50; Drake TR-3, $475.00; RV-3, $60.00; AC-3, $60.00; DX-100, clean, $86.50; SB-10, $67.50; G-66, G-77 AC supply, $115.00; Globe LA-1, $63.25; CE-10AA, $65.00; NCX-3, $265.00; GSB-100, $195.00; clean, Apache TX-1, $140.00; Swan 170, $100.00; S-76, $66.25, SX-99, $76.50; Knight T-60, $43.50, NC-57, $48.25; Linear systems LSA-3, $135.00; DX-20, $27.50; Globe 680A, $20.00; NC-190, $149.00; S-85, $63.00; Heath HP-13, $25.00; HX-50, "like new" condx, $250.00; 75A-2, clean, $185.00; NC-300, $141.35; PMR-7, $100.00; Adventurer, "like new," $28.50; Gonset GR-212 $100.00; Hammarlund HQ-100, $99.95; Hammarlund HQ-100, $135.00. Crabtree Electronics, 2608 Ross Ave., Dallas, Texas. Tel: RI 8-5361.

SELL: Collins 75A-4, #4633 w/.5, 1.5, 2.1 kc filters. Full W2VCZ modifications for sensitivity. $450.00. Prefer local deal. Ron Lumachi, 73 Bay 26th St., Brooklyn 14, N.Y.

QST Library, Dec. 1941 thru Dec. 1964, less May 1942 and February 1955. $50.00 F.o.b. Mark M. Bowelle, W4CXY, 361 East Drive, Oak Ridge, Tenn.

JOHNSON Directional coupler 250-37, $8.00. W2SSC, 8550 Howard, Buffalo 21, N.Y.

DRAKE TR-3, RV-3 and AC p/s, $550.00. Hallicrafters HA-2, HA-6 and AC p/s, $250.00. Absolute finest mint condx. K4TCK, Adams, 689 Beth Lane, Lexington, Ky.

MUST Sell: Valiant I, $200.00; HQ-170, $200.00; Viking 6N2, $100.00; 6N2 VFO, $25.00; Matchbox (250-watt) with SWR indicator $65.00. D-104 with g-stand, $25.00. Make offer. K9IBT, Nesbit A. Boyles, P.O. Box 7, Hartford City, Indiana.

FULL Size beams: new, all 7/8" and 1" aluminum alloy; absolutely complete, SWR 1:1, adjustable entire band; three-element 20-meter, $22.00; two-element $16.00; three-element 15-meter, $16.00; two-element, $12.00; four-element 10-meter, $18.00; four-element 6-meter $15.00. Remit with order. Express collect shipment. All orders honored. Gotham, 1805 Purdy Ave., Miami Beach, Fla. 33139.

100 Microfared oil-filled capacitor, 4000 wvdc (conservative). Six by eight by thirteen inches. $40.00. W7DXH, Kaufer, Seattle University, Seattle, Washington 98122.

NATIONAL NC-303 with calibrator, $225.00; Central 20-A exciter with VFO $100.00; P & H LA-400B linear, $75.00. All in like-new condx. M. Maltz, 867 E. 8th St., Brooklyn, N.Y.

FOR Sale: KWS-1, 75A-4, speaker, relay, $1000.00; KWM-2, No. 13899, 312B-5, 516F-2, $1000.00; KWM-1, 312B-2 console, 516E-1, 516F-1, 351D-1, $350.00. Major James Craig, 172 White Birch Dr., Pease AFB, New Hampshire 03803.

PHILLY Area: HA-2 2-meter SSB transverter with matching power supply in xclnt condx: $175.00. K3YWH, Mathis, Tel: area code 215-825-0911.

NEED Book, First Edition 1919, "The Thermonic Vaive" by Fleming. Early carbon filament lamps, Fleming, de Forest, Moorehead, Audiotron tubes, Marconi, de Forest gear. W9EWK, 610 Monroe Ave., River Forest, Ill. 60305.

TELETYPE Model 15 in mint condx with table, power supply, manual, auto-unshift-on-space, copy light, worked 20 countries, $129.00; with converter built into table, ready to go on air, plugs into phone jack, and mic jack of ssb xmtr: $395; usable with any rig. K2DCY, Tom Perera, 410 Riverside Drive, New York City, N.Y. 10025.

SPECIAL! $50.00 credit on the purchase of station accessories with the purchase of a new Galaxy V or SB-34. Reconditioned specials: DX-40, $29.95; HQ-100C w/m speaker, $89.95, Galaxy 300, $188.00. Cash or time payment. Order today. Electronic Sales, Executive House #15, Lewisburg, Tenn.

HAMMARLUND HQ-110 receiver, in new condx, with clock, $140; Hallicrafters S-38E receiver, $39.00; National 6/2 VFO, $35.00; BC-221 original book p/s, $6.00; 4CX250, new, $8.00; 832 2/$7.00. W2FNT, 18 Hillcrest Terrace, Linden, N.J. Tel: 201-486-6917.

QST. All in binders and in xclnt condx. Complete March 1927—1960, except August 1929, December 1930. Make an offer. Norman Lyons, 27 Lee St., Cambridge, Mass.

FOR Sale: J. V. KW with RH desk, Ranger exciter for AM, operates SSB with SSB exciter, in xclnt condx, with extras. Write, Heath GC1-A, factory-wired, manuals, two supplies, exclnt, will ship GC1-A on receipt of first certified check, $120.00. Pete Unchur, W2URM, RFD 5, Amsterdam, N.Y. 12010.

WANTED: Bird Thru-Line, any condx. Measurements 65B, Dumont or International 24 channel freq. meter. Collins 51J3, 4, and others. L. R. Newsome, K8TJP, 2670 Pinetree, Trenton, Michigan 48183. Phone 313-676-7460.

MAKE Offer: Precise 308 6-in. oscilloscope, DX-20 w/xtals; Model 270 Simpson milliameter; Model R.E.1 tube rejuvenator kit; RME receiver and speaker; 2 mikes; capacitor substitution box; resistor substitution box; Seco grid circuit tester. Miscellaneous coils and metal boxes. Gus Frieberger, K0ZZB, 8130 Edinburgh, Clayton, Mo.

RME 6900 receiver, $195.00; SA & S env. for descriptive circular and other information. Gerst, 4236 W. 36th St., Cleveland, Ohio 44109.

WANTED: HRO-5, HRO-7, Viking I, old magazines, catalogs, S. A. Schatitz, Box 900, Sharon, Penna 16147.

HEATH Apache TX-1, $125.00; Hammarlund HQ-110C with clock, $110. Both in A-1 condx. Nearby delivery, sry. W. Grove, W2BZJ, Box 212, Pennington, N.J. Tel: 609-737-1458.

COLLINS F455J05 filter $37.50; F455J31 filter $25; Johnson Lo-pass filter $10; Ranger II factory wired, like new $200. K4AOZ, 572 Park Avenue, Birmingham, Ala. 35226

COLLINS Mech. filter for 75A-4: 455-J-05, 455-J-31, 455-J-60, $35.00 each. Want McCoy 32B1. W6PZ, 9155 Skyline Blvd., Oakland, Calif.

EICO 723 transmitter, factory wired, with two Novice xtals, $60.00; Lafayette receiver, HE-80, with spkr, xtal calibrator, like new condx: $105.00. Both for $155.00. S. Phillips, 7 Orchard Drive, Woodbury, N.Y. Tel: (516) MY2-3184.

COLLINS 51J4 with 3 mechanical filters, reduction tuning knob exclnt condx, $695; Central Electronics signal-slicer with Q-multiplier, $45.00. Al Hughes, W1FGL, 145 Pinckney St., Boston, Mass. Tel: 617-742-0029.

GONSET Communicator II, 2 M., 6VDC/110VAC. Like new condx, $115.00. Lanny Aldrich, K1LEC, 134 Buell St., North Springfield, Vermont 05150.

GALAXY 300. PSA300AC p/s with clock. H.B. DC mobile supply, cables, mobile mount, manual, mint condx, $240; Heath grid dip, $12.00; prop-pitch motor, $20.00; deluxe Vibroplex, $15.00. List of bargain equipment. W0LWZ, P.O. Box 6202, Denver, Colorado, 80206.

SELLING: Heath HR-20, HP-13, Ameco TX-62, UTC CVM-5 xfrmr, Sylvania TV camera, Centimag 432 xmtr, Cush Craft 64 el. colinear, 4CX250B, 5894, 6252. All in new or like-new condx. Chris, WA6HTJ, 2515 N. Vermont Ave., Los Angeles, Calif. 90027. Tel: 213-664-6984.

EICO 753 transceiver. Used less than ten hours. Perfect condx, with factory conversion for VFO stability, manual, and warranty. Desire $270. Sold to highest bid. Need the cash. Also Lincoln 6'er, xclnt condx, $32.00. Robert Clark, 217 High St. Maryville, Tenn.

500 watt amplifier and power supply. Extremely well constructed. Send for details and pictures. Bill Sesko, 109 Holton St., Winchester, Mass.

GONSET 101 Linear, $150.00; Hallicrafters SX-111 receiver, $125.00; Eico 730 modulator, $30.00; Harvey-Wells Z-match, $30.00. Philip Schwebler, Jr., W9GCG, 4536 N. 50th St., Milwaukee, Wis. 53218.

GUARANTEED A-1 Reconditioned equipment on approval. Terms: Collins 75S-1, $299.00; 30L-1, $349.00; 75A-4, $395.00; 30S-1, $675.00; Hallicrafters HT-41, $199.00; SX-101A, $219.00; HT-37, $269.00; National NCX-3, $225.00; NCL-2000, $395.00; NCX-5, $445.00. Other equipment. Write for lists. Henry Radio, Butler, Missouri.

FOR Sale: Complete SSB station: B&W 5100B, 51SB-B, plus 75A-3 with xtal calibrator, Match-Master plus all connecting cables and relays: $495.00. Jack Resnick, 63-07 71st Middle Village, N.Y. 11379.

SELL Heath HW-32, $100; HP-13 power supply, $30.00, xclnt condx. Will deliver within 150 miles of Chicago. Leo Hunter, K9GDI, 940 N. Chestnut, Arlington Heights, Illinois.

WANTED: Heathkit Warrior or B&W L-1000A or LPA-1 amplifier, any condx. Also plate-tuning and loading capacitors for KW amplifier. K3BHB, Thomas, 903 Western Avenue, Jeannette, Penna.

THOR 6, beautiful performer by Clegg. In original cartons including instruction book. Used less than 3 months. Going SSB. First $239.00 takes. Ed Shucy, W3BTA, 4913 Keppler Place, Washington, D.C. 20031.

COLLINS 75S-3, serial No. 14400, 4 kc mechanical filter on AM. Absolutely perfect, $445.00. All others returned. Leo Wilson, Rt. 4, Box 1851, Huntsville, Alabama.

SELL Ranger II, in perf. condx, new appearance, $220.00. J. J. Bittens, W8WTK, 6463 Buckingham Drive, Parma, Ohio 44129.

VHF: One set custom prototype converter for 6 and 2-meter scatter work. 417A front-end, regulated p/s, etc. Write for photo and details. Dr. Lampson, 27 Lee St., Apt. #1, Cambridge, Mass.

TOO Much gear! TX-62, mint condx, $120.00. HE-45B, gud condx, $65.00. L. R. Feld, Cedarbrook Hill 1221, Wyncote, Penna. 19095.

FOR Sale: QSTs 1936-1960. Make offer. Pick up deal only. W1RO.

COMPLETE Collins Station 75S-3B, 32S-3, 30L-1, 312B-4, 516F-2. Absolutely mint, $1500. W9HQG, Tel: 317-849-3433.

SELL: Ranger, $100; DB-23, $20.00. Will trade for 2-meter gear. W2GRY, 7 Lawndale Ave., Morristown, New Jersey. Tel: 201-539-5493.

NEW HW-32, HP-23, calibr., mic, factory-aligned for peak performance. $140.00. K8IKB, 1414 Tiffin Road, Findlay, Ohio.

EICO 753 Tri-band transceiver kit, new, unopened kit: $165.00. Will ship free in U.S.A. James Hemingway, K1PBW, Box 672, Lehigh University, Bethlehem, Penna.

WANTED: HT-20 Hallicrafters transmitter. Any condx. W3KWO, Box 900, Sharon, Penna. 16147.

SELL: Hallicrafters HT-37. Going transceiver. More details. Contact K2JSA, F. C. Bloomingdale, 113 Henderson Blvd., Syracuse, N.Y. 13209.

FOR Sale: Hallicrafters SX-101: Mark III rcvr, with R-46B speaker: $145.00. Lester Grove, K2JKB, Genoa Ave., Egg Harbor, N.J. RD Box 171. Tel: 609-965-2686.

TELETYPE, Model 26, Table, spare parts, $55.00; Linear, KW P.E.P. Band-switching, 160 through 10. Fully cased, TVI suppressed, with regulated power supply. 10-watts will drive it. $145.00. Central Electronics 20A SSB band-switching exciter. Separate VFO with FSK included. $85.00. W6WSM, 4054 Woodford Dr., San Jose, Calif. 264-9879.

SELL: National NCX-5 and NCX-A P/S, $530; Collins 75S-1, $240.00. W5NTL, Lagaly, Rt. 3, P.O. Box 79C, Oklahoma City, Oklahoma 73127.

FM Equipment Schematic Digest: A comprehensive collection of Motorola schematic diagrams covering low-band, high band and 450 Mc equipment, manufactured between 1949 and 1954. Crystal formulas, alignment instructions and a wealth of technical data included in 92 pages. Price $3.95 ppd. Two-Way Engineers, Inc., 1100 Tremont St., Roxbury 20, Mass.

SX-110, like new condx, $77.00: WB2EAT, Hoberman, Tel: 516-LO-1-0374, Valley Stream, L.I., N.Y.

WANTED: Collins 1.5 and 2.1 Kc. mechanical filters for 75A-4. K9IMR.

QSTS. Unbroken run: July 1924 to date. 499 issues together. Almost all in fine condx, covers, contents intact. Best offer takes. W4AYG/4, 1125 13th Ave., North, Jacksonville Beach, Fla.

WANTED: Collins 75A-4 500 cps filter: F455-J-05. WA6-HSU/6, 2326 Ralmar, Palo Alto, Calif. 94303.

RANGER I, $140.00; RME 6900, $290.00. Mike Bellinger, 2110 Lincoln Way, Ames, Iowa.

WANTED: Johnson 6 & 2 Thunderbolt. Sam Gallaher, Box 212, Mahaffey, Penna. 15757.

VIKING II, Viking 122 VFO. In mint condx: $95.00. David Dossin, 15 Flower Hill, Poughkeepsie, N.Y. Tel: 914-471-4452

OLD Old Timers Club now over 600 members with verified 2-way contacts before 1925. Life membership, $15. Bi-monthly "Spark-Gap Times", $2.50 annually; also available to non-members, $3.00. Write Secretary W1MPP, Lovell, Maine 04051.

BEST Offer: HT-37, HT-41; both in xclnt condx. WA2ZVJ, 2115 E. 27th St., Brooklyn, N.Y. Tel: SH3-2525.

CLEANING House! HT-32, perf. condx: $275.00; Pawnee, Nuvistor front end, used only 10 hours, $145.00; DXers dream linear 2 4-400s, 3400 volts, vacuum tuning, $275.00; KW Tri-band beam, $25.00. O. C. Lindsey, W5OBX, 1919 Ramada Drive, Houston 58, Texas.

VHF Amateurs: Sell Heath VHF-1 Seneca, one of last made and in exclnt condx: $135.00. Heath HX-30 6-meter SSB transmitter in kit form, last production model, $150.00. Call George, WB2GWU, Brooklyn, N.Y. Tel: 212-EV8-1893 between 5 and 8 PM.

RTTY Model 28 KSR, in immaculate condx; gears for 60, 75, 100 Wpm. Type blocks (2) and key tops for communications and stock market service. Parts manual and loop supply. $400 or $300 and gud used rcvr P. Truelsen, K6URG, 1429 Wagoner Dr., Livermore, Calif. 94550.

TR-4, $480; AC-3, $66.00; DC-3, $108.00; all factory sealed, never opened. Warranty, naturally. Will sell separately. K4LGR, Box 10021, Greensboro, N.C. 27404.

CIRCUITS From ARRL Handbook. QST, etc, constructed. All work guaranteed. Free information. WA6IKV/9, Whitmore, 520 South 16th St., Springfield, Illinois. Tel: 527-7209.

APACHE like-new, perfect, $150.00. K2EGI.

HAM photo and filmbugs attention! Cine Kodak Special 100 or 200 ft. magazines wanted for cash for high school program. Ted Dames, 64 Grand Place, Arlington, N.J.

COLLINS 75S-3B, #15896, new condx, $450.00; Collins 32S-1, #10410, xclnt condx, new, 6146s, K9MZX, Barnes, 3256 Waubenoor Dr., Green Bay, Wis. Tel: 414-336-1196.

QST! FB T-150A, $69.00; DX-60 and HG-10, $59. All in literally exclnt condx. Contact WA5IBV, 422 Retama, Harlingen, Texas.

MUST SELL: Eico 720, $65.00 and Eico 730, $45.00. Both for $100 or you make an offer. WB2JDE, 46 Bradish Lane, Bay Shore, N.Y.

SELL: NC-183-D, xtal calibrator, xclnt condx, $145.00; With 2 kc. mech. filter, $160.00. Original carton. Bill Parlin, WA2-PMU, 1356 Belmont Ave., Schenectady, N.Y.

CRYSTALS Airmailed: Nets, SSB, Novice, MARS, etc. Custom finished etch stabilized FT-243, .01% any kilocycle 3500 to 8600 $1.90. (Five or more same or mixed frequencies $1.70) (Ten or more same frequency $1.35) (1700 to 3499 and 8601 to 20,000 $2.50). Overtones supplied above 10,000 kilocycles. Add 50¢ each for .005%. HC-6/u metal miniatures above 2000 add 75¢ each. ARRL kits: FT-243; "DCS-500", "IMP" $9.95. Many other filter and oscillator crystals & kits including 370 to 540 Kilocycles. Write—state exact needs. Add 10¢/crystal airmail, 5¢ surface. Crystals since 1933. C-W Crystals, Rt. 2, Box 22-B, Marshfield, Missouri 65706.

STEREO Components: Dyna-Stereo 70, PAS-3, FM-3, AR turntable-cartridge, 2-AR-2A spkrs. One year old. Complete, $395.00. H. Martin, Box 1275, Bluefield, W. Va. Tel: 327-9254.

LAFAYETTE HE-30, HE-48 spkr, cartons, manual, new condx, $65.00. Gud S38D, $30.00. Will ship collect. Hall, WN2UHK, RFD #1, Hornell, N.Y.

SIX Meter Gonset Communicator II and VFO, xclnt condx, $125.00; Hy-Gain 6-2 beam, $10.00; National HRO-60, three extra coils, $275.00. Hal Blough, W9SP, 9959 Drury Lane, Westchester, Illinois.

POLYCOM 6 fixed-mobile station, complete with mike: $150.00. Evelyn Miller, 1109 Essex Dr., Lima, Ohio 45804.

FOR Sale: Heath DX-60 wid HG-10 VFO, $90; HW-12, $119.95. Will pay postage in California. WB6MTS, Jerry Crum, 1031 Neal Dow Ave., Chico, Calif. 95926.

SELLING Out! SX-101, $115.00; T-150A, $59.00. K7ZEN, 2217 N. E. Fremont, Portland, Oregon.

SALE: Hunter Bandit 1000A, like new condx, used only four months: $195.00. Shure 440 with stand, $12.00. Foy Guin, W4RLS, Russellville, Alabama.

COLLINS 75A-3, in exclnt condx, w/product detector, gud SSB rcvr, $240.00. 50 ft. Rohn tower, brand new, $65.00. Pick up or pay freight. W. Van Dyck, W4BZB, 482 Ridgewood Road, Key Biscayne, Fla. 33149.

HALLICRAFTERS HT-44 with maching spkr/pwr. supply, like new condx, original cartons, $240; BC-1031C, Panadaptor (455 Kc IF and up to ±100 Kc. sweep), $75.00; HO-13 ham scan, $70. W6KWU, Bob, 1332 Paloma, Belmont, Calif. Tel: 415-591-7550.

MUST Sell: SX-101A, $175.00; HT-32, $200; remainder will go at best offer. Commercial PS, 0-1000V at 500 Ma., metered, regulated; Dumont 303 'scope; 0-5B/FR teletype, facsimile xmtr; Ferris 18-C microvolt sig. generator; Weston 798 tube-tester; RCA-22-AE with book; IS-174/U with book; RCA WV-98A, no probes; Dymec (HP) 2501 electronic counter, 0-100 KC; ME-6C/U AC elec. voltmeter; ZM-4B/U, resistance bridge; Sprague TO-4 resistance capacitance analyzer; Heath IM-11 VTVM and IG-102 signal generator; 4CX250B and sockets. Shipped F.o.b. for certified check. Information for SASE. K3OKK/7, George Schade, M.D., 807 East Belmont Ave., Phoenix, Ariz.

FOR Sale: Drake 2-B receiver, with Q-multiplier and speaker combo Also Hallicrafters HT-37 transmitter/exciter, with solid-state rectification; can be supplied with built-in f.s.k. diode keyer, if desired. Both for $450.00. If purchased separately, 2-B with 2BQ combo, $210.00; HT-37, $260.00. K1AFC, R. J. Rinaldi, 228 Hickory Hill Lane, Newington, Conn. 06111. Pick-up deal preferred. Tel: (203)-666-3223 after 6 P.M.

WE Are overstocked on Trade-ins: special cash price on the following: HQ-170, $169.00; Ranger, $75.00; HT-37, $199.00; TR-3, $399.00. Each item is checked, reconditioned and guaranteed. Drake 2-A, $139.00; 2-B, $159.00; Collins 75S-1, $259.00; KWM-2, $650.00; Elmac AF-67, $39.00; Gonset GSB-201, $199.00; GSB-100, $159.00; GSB-101, $159.00; Heath HA-10 Warrior, $159.00; HQ-170 AC, $229.00; SX-101, $129.00; SX-101A, $159.00; Send for complete listing of guaranteed reconditioned equipment. SB-33, $199; SW-240, $179; NCX-3, $199; SW-140, $119; SW-120, $119; HW-12, $109; HW-32, $109; VHF HX-30, $159; HA-20, $99. We have time payments available. Send for special "Package Deals" on new equipment. Edwards Electronics, 1320-19th St., Lubbock, Texas. Phone 806-PO2-8759.

DRAKE 2B, 2AC, 2BQ, $220.00; Heathkit Marauder HX-10 with stand, SSB mike, $230.00 or all for $430.00. Like new. WA4UET, Jackson, 1106 E. College, Griffin, Ga.

SB-200, $180.00; SB-300, all accessories, $270.00; SB-400, $295.00; HDP-21 mike, $20.00; Super Pro rcvr, $40.00; GEFM, $35.00; Link, $25.00; Eico VTVM, $25.00. K9JCR, Box 94, Greencastle, Indiana 46135.

SELL One KW AM 400As, final 810 mod. SuperPro rcvr. Ranger exciter plus spare parts. First $200.00 takes all. W6SAN, Pauly, 9222 Trask Ave., Playa del Rey, Calif. Tel: EX8-7054.

NCX-3 w/AC supply; warranty to August 1966, $275.00; G-50 transceiver, $200; Viking Valiant II, $190.00; 275 W. Matchbox, $35.00. W2KOG, 2087 Westfield Ave., Scotch Plains, N.J.

EXCEPTIONAL Condition, SEE operating: Collins 75A-1 receiver, $160.00; Ranger, $110.00. Phone: 201-356-5158, 834 Hawthorne Ave., Bound Brook, N.J.

CLEVELAND Deal: BW 5100B, Collins 75A-1, $140.00 each. Handel, K8SSY, 95 Murwood Dr., Chagrin Falls, Ohio Tel: CH 7-6130.

SWAN 240 with Swan AC supply, built-in speaker, $250.00; Poly Comm 2, 117 VAC and 12 VDC, $175.00; Mosley A-320, $40.00; Heath GD-1, $10.00; Heath HM-11, $10.00. Harrington, 117 Highland Ave., Rowayton, Conn.

SELL: NC-270, DX-60, like new condx; VF1, vy clean, $185.00. Bell, 2001 Thomas Ave., Anniston, Alabama 36201.

SELLING Eldico SSB100A transmitter bandswitching SSB, AM/CW, 100 watts built-in 'scope monitor, has really stable PTO With manual and blower. Pick-up deal only, sry, $170.00. Also Webster Bandspanner, $7.50. Autronic Keyer, complete, $45.00. K2CUI, Phone (212)-689-8957.

75A-4, S/N 5437, spkr, vernier filters; recent Collins factory overhaul: $450.00: Teletype #15, $75.00; #26, $50.00. Also tape equipment. Electrocom converter, $225.00; HX-500, $275.00; HQ-180C spkr, $275.00. 22 other items. Fred Macklin, 506 Gerona, Coral Gables, Fla.

APACHE with mike/PTT, in xclnt condx: $110.00. WB2AUB, Phil. Call 516-P07-8078.P. Bernstein, 72 Morewood Oaks, Pt. Washington, N.Y.

G-50, latest Double Conversion Model, $250.00; D-104 mike with UG8 stand, $25.00. WA6HXM, Von Hagen, 26019 Oak St., Apt. 50, Lomita, Calif. 90717. Tel: 325-3760 or 271-4280 before 10 PM.

APACHE, Exclnt condx! $125.00. John Kane, K2QIL, 1518 Longfellow Drive, Cherry Hill, N.J. 08034.

6 FM Motorola coffin-box transmitter and receiver, 12 VDC. Tuned up 52.525, cables, crystals, speaker, etc. Beautiful condition. $80.00. Federal Electronic, Siren, Penna. 12VDC, 4 lbs., all transistorized—latest model. 100 watts w/1 spkr, 150 w/2 output. Cost over $200. Will sell for $120. Gonset Tuners, #3012 and #3011 (152-162 Mc) and (40-50 Mc), respectively. Receiver police, fire, mobile telephone, ambulance services, highway patrols. F.B.I., etc. Illuminated dial. Squelch $65.00 each. All F.o.b. Richard M. Jacobs, WA0AIY, 1015 Glenside Place, University City, Missouri 63130. Tel. (314) WYdown 1-1941.

RAUSMITEM:: $15 each: Allied Star Roamer, Eico 425, LM18, AN/FGO TTY desk: Sprague condenser tester, 110-W amplifier, OS-7U scope; $25 each: Kodak photocopier, Zenith Transoceanic, Royal typewriter, Gray dictator, TV-4 tube tester, AN/FRC-6 30-50MC base, $50 each; Hickok 209, Hickok 288X, National NC-200, $35 submarine periscope, Raytheon 30-50MC, $4 each; 115/400 inverter, WE-matching unit, tube tester, $1 each; 6V dry-charge batteries, Hickok 539 $65, Scott 23-tube receiver $75. Have 4-page list (SASE appreciated). Want: 8-gauge shotgun, Hamms Rippling Water sign, Astatic 950 mike, .22 or .38 handgun, microscope, telescope, binoculars, transit or level. Dual-Diversity receiver. WA9DYE, 114 W. Lakeview, Milwaukee 17, Wis.

VIKING II and VF-1, $90.00; AR-22 rotor (new) and cable, $25.00; DX-20, $20.0. You pay the shipping cost Allen Wilson, WB2KER, 15 Wight Place, Tenafly, N.J. 7670.

SACRIFICE: Clegg Zeus and Interceptor, best offer over $700 for the pair. Both in mint condx. Will sell separately. Pick-up deal at QTH or will ship collect. K5YPJ, Don Williams, 2206 Link St., Orange, Texas.

COMPLETE Station: 80 thru 6; T-150, NC-270, mike, antenna relay. In truly mint, condx: $250.00. Gilbert Harper, 7802 Carnational Dr., Pleasure Ridge Park, Ky.

SELL: Harvey-Wells Bandmaster TBS 50-D DeLuxe xmtr with manual, VFO and power supply 2 meters through 80, $49.00: Heath antenna tuner, $9.00; RME DB-23 Preselector, $24.00; Gonset 20-meter bow-tie antenna, $14.00. Sry, no shipping. Pick up deal. Phone 254-2344, South Pasadena, Calif. William F. Hanberry, 1340 Mountain View Ave., So. Pasadena, Calif. 91030.

SELL: Sixer, HW-29A, used less than five hours! $35.00. W5-LFN, Box 286, Umpire, Arkansas.

APACHE SB-10, in perf, shape. Will demonstrate. $200. Dick Sloan, 4604 N.W. 59th St., Oklahoma City, Oklahoma 73122.

COLLINS KWM-1, AC, DC, power supplies, mobile mount; $400.00; Globe High-Bander VHF-62, $60.00. Johnson 6 & 2 converter, $40.00. Cliff Alsop, W9EKD, 5927 Primrose, Indianapolis, Ind 46220.

KWM-2, 312B5, 516F2, SM1, all in perf. condx. Less than two years old. $775.00: write or phone R. Davis, WA5HGC, 3405 Pitt, N.E., Albuquerque, New Mexico. Tel: 505-299-8922 Evenings.

ESTATE Sale: SX-100 Hallicrafters w/spkr, Eldico SB-1000 transmitter SSB 100, exciter, Cornell-Dubilier rotor TR-2, Heath HH-1 voltometer, Heath T-4 signal tracer, Eico VTVM 221P, RCA 'scope WO88A; Eico 369 sweep generator, Eico 666 tube tester, 4 FM IF strips, 1 BSR tape head, $695.00 for everything. W. L. James, Tel: 201-228-2771, 1600 Oak Hill Ave., Apt. #15, Hagerstown, Maryland.

COMPLETE AM/CW station: Elmac AF-68, PMR-8, 1070 p/s; gud condx, $225; shipped collect. Consider trade for SSB gear. Bob Yates, W4GCB, Rt. 4, Box 374, Rockhill, S.C. 29732.

COLLINS 75A-4, xclnt, w/vernier and speaker, $350.00; HA-1 T.O. keyer, perfect, $35.00; new Elmac 4-1000A, $60. First cashier's check. D. B. Mitchell, R #1 B-59, Winnebago, Ill

WANTED: Must be in mint condx: Collins 32S-3, 516F-2, 30L-1 and 312B-4. C. W. Galbreath, W6BWA, 3235 Jaylee Dr., Santa Rosa, Calif.

FOR Sale: Gonset G-76 with latest factory mod., mobile p/s, Shure 10-4 mic, $250.00: Heathkit SB-10, new, in xclnt working condx, less than 20 hours use, $65.00. WA2IEO, G. Muller, 87-67-253 St., Bellerose, L.I., N.Y. Fieldstone 7-2046.

NRI Electronics Course, $5.00; CIRE Electronics Course, $5; Ameco Code Course, $5; Smith Code Course and key, $5; Pickett Slide Rule, $5; Supreme Multimeter $5; Sencore Tube-tester and 36 tunes, $5; B&K Tubetester, $25; Jackson Tube-tester, $25. Witmer, 217 S. East, Oak Park, Ill.

SELL: Collins 75A-1 w/spkr, $160.00: BC-348/M, $55.00: Globe Scout, 680A, $50.00; Heath VF-1, $10: Gonset GPP-1, $35.00. Prefer local sale. K1DCS, Knickerbocker, 28 Hudson St., East Hartford, Conn.

PRESENT Rig at W5WZO for sale. Valiant and SB-10 with power supply and inter-connection cables, $240.00; Warrior KW amplifier, $180. All, $400. This is well maintained equipment. Blaschke, 4513 De Lange, Houston, Texas 77018.

PICTURE Of yourself, home, equipment, etc. on QSL cards made from your photograph. 250, $7.50 or 1000, $14.00 postpaid. Samples free. Picture Cards, 129 Copeland, La Crosse, Wis.

WANTED: Heathkit Mohican receiver. W8BNO, 424 Lewis, Seifert Rd., Hubbard, Ohio.

SELL: HQ-110, brand new condition: $125.00. WA2WNX, Alan D. Gray, 5 Windsor Place, Mt. Holly, N.J.

WANTED: Collins station control 312B-4 Give price and age in your first letter. W1HN.

RECEIVER: Bargain: NC-300, gud condx, crystal calibrator, speaker and instruction book. Will ship, but local sale preferred; asking $125.00. Bob Anderson, K1TVF, 103 Hillcrest Avenue, New Britain, Conn.

"HOSS-TRADER" Ed Moory can sell cheaper for cash because he operates in a small town with low overhead. Factory warranty, demonstrator equipment: SR-500, $309.00; Swan 350, $339.00; TR-4, $449.00; SBE-34, $329.00; TA-33 beam with demon, Ham-M rotor, $169.00; R-4 receiver, $289.00; T4-X, $309.00; NCX-5, $529.00; NCL-2000, $509.00; new TR-3, $409.00; Galaxy V, $319.00; Galaxy 2000 watt linear, $349.00; 30L-1, $389.00. Reconditioned gear: SB-33, $195.00; Swan 240, $209.00; TR-3, $379.00; HT-37, $189.00; Johnson Ranger II, $129.00; SX-111, $139.00; GSB-100, $149.00; Ham-M rotor, $69.00; AF-67, $25.00; Swan Mark I, linear, $349.00; TR-44 rotor (new), $47.95. Will accept reasonable offers on new equipment for cash. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone WHitney 6-2820

DRAKE 2B, in mint condx, $199.00; xtal cal., $13.00; Q-mult., $20. All for $215.00. All f.o.b. this QTH. W9HZM, Griffiths, 1033 S. Seminary Park Ridge, Ill.

FOR Sale: New Hammarlund HK-1B keyer, $30.00; new Vibroplex Vibro-Keyer, $14.00; new factory wired Heath HO-10 monitor scope, $55.00; used Heath sweep generator, $25.00 or will swap all for gud Ranger xmtr. George Frazier, Sebago Lake, Maine.

SELL: All brand new wired and tested: Eico Triband SSB transceiver, $200; Acor DC supply, $90; Heathkit SB-200, $230.00. Gerald Williamson, K4LXT, Box 203, W. Williamston, N.C.

SELL: Hallicrafters S-20R receiver, in good working condition. $100.00. Nat Wadsworth, 1 Edgerton Court, Darien, Conn. K1MOT.

GLOBE King 500B, 540 watts, gud condx, $220.00. David Steffens, K8YWS, 656 Cascade Road, Cincinnati, Ohio 45240.

LINEAR Amplifier wanted. Vicinity New York City. A. Lukach, 295 Fifth Avenue, New York City 16.

CINCINNATI Hams, fixed or mobile, Monitor 28.7 for awards and FB QSO's. Cincinnati Area Ten-Tuners.

EICO 722 VFO, excellent condition, brand new, $40. WB2HYK, 216-69 Avenue, Bayside, L.I. N.Y. 11364.

POLY-Comm PL-6 transceiver with mobile mount, microphone and Squalo antenna, $225.00. Tom Benewicz, WA2OBT, 11 Montrose, Allendale, N.J.

BEST Offer takes mint condx Valiant (with low pass filter, mike), HQ-140XA (xtal calibrator). Be reasonable. K4KXN, 2209 Pike St., Durham, North Carolina.

HQ-180C, ser. #4485, like new condx, with speaker. First $260.00 certified check takes it. Will ship collect. Want SSB. Al McKelvie, KØZOA, 2409 West Charles, Grand Island, Nebraska 68801.

500 KC xtal oscillator module with oven and std. 7 pin tube plug. Excellent for receiver freq. marker, $4.50. WA8KNZ/9, 1807 Bueter Rd., Fort Wayne, Ind.

WANTED: 500 cycle and 2.1 kc. filters for 75A-4, types F-455J-05 (part No. 526 9154 00) and F-455-J-21 (part No. 526-9156 00). Kasper, R.D. 1, Box 134, Mays Landing, N.J.

ROBERTS 1057 4-track tape recorder with two mikes and new 52 amp. alternator. Best offer. L. E. Mitchell, 801 Terwood Rd., Drexel Hil, Penna. Tel: SU 9-0383.

WANTED: VHF Thunderbolt linear. Please state price and condition. WØLFI, 4600 Colfax South, Minneapolis, Minn. 55409.

SELL: Hallicrafters HT-37, $225.00; Hallicrafters HA-5 heterodyne VFO, $45.00; both unmodified, high serial numbers, perfect physically and electrically with original cartons, sales receipts, and manuals. Donald Cook, WB2DUI, P O. Box 872, Lehigh University, Bethlehem, Penna.

BENDIX Marine transceiver and antique Elkay receiver for sale. State your price: WN1DYA, 32 Robindale Dr., Kensington, Conn. 06037.

500 WATT plate modulated AM rig. Complete with power supply, drivers, modulators, etc. in 5½ ft. relay rack. Big, but well built, $75.00. C. V. Kimball, 616 Church St., Ann Arbor, Mich.

COLLINS KWM-1. In perfect condx, 300 hours service. 516E1 and 516F1 power supplies, 312B2 speaker/directional wattmeter, 351D1 mobile bracket w/new cabeling; 399B1 DX adaptor. Package only, $800. J. Madey, K2KGJ/6, 1055 E. Del Mar, Pasadena, Calif. 91106.

SELL: 20M Birdcage antenna, with E-Z way 20 ft. tower, hinged base, TR44 rotator, very stable mechanically, excellent DX results. Chicago area only. Complete $120.00 plus shipping. Adolph Jelen, W9WHY, 5054 N. Monitor Ave., Chicago, Ill. 60630.

PLATE Transformer 690v @ 450 Ma. No. C.T. 117 v. pri. Sealed, unused, $3.95 plus postage. Wt 19 lb. Companion choke 1.2 h @ 450 Ma., 1500 w.v. test. Unused. Sealed. $1.00 plus postage. Wt. 6 lb A.R.C. Sales, P.O. Box 12, Worthington, Ohio.

COLLINS 32V1, de-TVI'd and converted to use 829B, $125.00; Hallicrafters SX-88 all-band rcvr, $125.00; BC-221 sig. gen. with 110 AC power supply, $70. Will deliver within 200 miles radius of Los Angeles. Turley, 44064 No. Beech, Apt. 4, Lancaster, Calif.

Index of Advertisers

Adirondack Radio Supply 134
Allronics-Howard Co. 143
Ameco Equipment Corp. 113
American Radio Relay League, Inc.
QST 157
Binders 140
Decals 149
License Manual 145
Single Sideband 128
Supplies 147
VHF Manual 132
Apollo Engraving 150
Arrow Electronics, Inc. 139

Barry Electronics 135
British Radio Electronics, Ltd. (Eddystone) 143
Budwig Manufacturing Co. 147
Burstein-Applebee Co. 146

Clemens Manufacturing Co. 141
Cleveland Institute of Electronics 147
Collins Radio Co. 2
Communication Products Co. 139
Cubex Co. 142
Cush Craft 144

Dames Co., Theodore E. 149
Dow-Key Co., Inc., The 114
DuBord, G. 150
Dynalab Co. 122

EICO Electronic Instrument Co. 111
Eitel-McCullough, Inc. 159
Electro-Voice, Inc. 117
Electronic House 150
Electronicraft, Inc. 151
Evans Radio 136
E-Z Mobile Antenna Mount, Inc. 141

Fair Radio Sales 138
Fichter Electronics 140
Fort Orange Radio Distributing Co., Inc. 149
Frederick Electronics Corp. 123
Fugle Labs. 138

Gates Radio Co. 150
Gentec, Inc. 145
Gift Shop 149
Gonset, Inc. 119
Gotham 115
Grand Central Radio, Inc. 138

Hallicrafters Co., The ..... Cover II, 1
Ham Kits 136
Ham Wholesale Card Club 143
Hammarlund Manufacturing Co., Inc. 108
Harrison Radio 160
Harvey Radio Co., Inc. 127
Heath Co., The 101-103
Henry Radio Stores 125
Hy-Gain Electronics Corp. 5

Institute of Electrical & Electronics Engineers 149
Instructograph Co., Inc. 146
International Crystal Manufacturing Co., Inc. 7
ITT Mackay Marine 145

Kahn Research Labs., Inc. 137

Lafayette Radio Electronics Corp. 133
Lampkin Labs., Inc. 137
Lattin Radio Labs 137

Marin Amateur Radio Supply 145
Millen Manufacturing Co., Inc., James 158
Mini-Products, Inc. 112
Mor-Gain 151
Morse Telegraph Club, Inc. 139

National Radio Co., Inc. ..... 99, Cover III
National Radio Institute 134

P & H Electronics, Inc. 140
Pennwood Numechron Co. 147
Productive Tool & Manufacturing Co., Inc., The 142

Radio, Inc. 151
RCA Electronic Components & Devices ..... Cover IV
RF Communications Associates, Inc. 109
Rohn Manufacturing Co. 116

Shure Bros., Inc. 136
Sideband Engineers, Inc. 4
Skylane Products 124
Sound History Recording 135
Space Electronics 140
Spitz 151
Squires-Sanders, Inc. 107
Swan Electronics Corp. 104, 105

Teleplex Co. 149
Telrex, Inc. 141
Translab, Inc. 135
Tribander 139
Tri-Ex Tower Corp. 126
Trigger Electronics 131
Turner Co., The 130

Unadilla Radiation Products 148
United States Fiberglass Co. 118
U. S. Department of Commerce (Environmental Science) 151

Van Sickle Radio Supply Co. 142
Vanguard Electronic Labs. 141, 148
Vesto Co., Inc. 112
Vibroplex Co., Inc., The 143

Webster Manufacturing 110
Whippany Labs., Inc. 121
Wilson, Inc., Willard S. 145
World Radio Labs. 120, 129, 144

EIMAC

new power amplifier pentode provides excellent linearity

Now you can have reliable power in a new 1500 watt pentode. Eimac's 5CX1500A power amplifier tube is designed for use at the popular 1000-2000 watt peak envelope power range. And it's compact: height, 4⅞", diameter, 3½". Physical configuration is similar to Eimac's well-known 4CX1000A tetrode. The tube carries control and screen grid dissipation ratings of 25 and 75 watts, respectively. The 5CX1500A is ideally suited for Class C operation. In linear service the tube can provide a two-tone signal with third-order products of −39 db at 1000 watts PEP or −35 db at 1700 watts PEP. Write Product Manager, Power Grid Division, for details.

5CX1500A

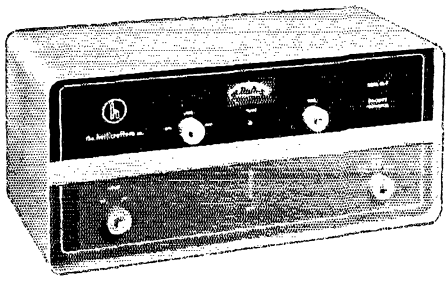
CLASS C MAXIMUM RATINGS	
DC PLATE VOLTAGE	5000 V
DC PLATE CURRENT	1.0 Amp.
DC SCREEN VOLTAGE	750 V
PLATE DISSIPATION	1500 W
SCREEN DISSIPATION	75 W
GRID DISSIPATION	25 W
SUPPRESSOR DISSIPATION	25 W

TYPICAL CLASS AB_1 LINEAR AMPLIFIER MEASURED VALUES IN TWO TONE TEST	
DC PLATE VOLTAGE	4000 V
DC PLATE CURRENT (No Signal)	250 mA
DC PLATE CURRENT (Two Tone)	485 mA
DC SCREEN VOLTAGE	500 V
PEAK ENVELOPE POWER OUT	1785 W
THIRD ORDER IN MAXIMUM	−35 db

EIMAC
San Carlos, California 94070
A Division of Varian Associates

NOW! YOU CAN ENJOY SIX METER SSB/AM/CW WITHOUT TVI!

OR YOUR MONEY BACK!



If your present transmitter and receiver, or transceiver, will work on ten meters — just connect this sensational Hallicrafters HA-6 "Transverter" to their antenna coax receptacles. Presto! You're on SIX METERS with a most sensitive receiver and a powerful transmitter!

Get away from the QRM! Have fun on six. It's FB for VHF DX, local QSO's, rag-chews!

Whatever mode you are using — SSB, AM, CW, RTTY, etc. — this superbly engineered piece of equipment will do a perfect job of converting both received and transmitted signals for operation in any part of the 50 to 54 MC band. Broadband design, you QSY with your regular receiver/transmitter tuning controls. Nuvistor front end gives excellent sensitivity with low noise figure. RF output indicator facilitates easy tune-up for maximum power — up to 120 watts input!

TVI? No sign of troublesome harmonics or spurious radiation, when you feed your output through one of the new WATERS coaxial cavity filters! (It improves your reception, too, by shutting out the "birdies" from TV, FM, and other transmitters.) Fundamental frequency front-end loading of TV receiver on channel 2 can usually be suppressed by simple stub trap at receiver.

GET YOUR HARRISON "HAPPY HAM/HAPPY TV NEIGHBOR" *BARGAIN PACKAGE!*

Hallicrafters HA-6 Transverter, Brand new, fully guaranteed. Original Amateur Net	$349.50
Matching P-26 Power Pack	99.50
Waters new 373-6 band pass filter	32.50
Drake TV-300-HP filter. (To convince that neighbor with early vintage TV receiver!)	3.97
TOTAL	$485.47

$300.00 OFF!

YOURS, FOR ONLY $185.00

HERE'S MY MONEY BACK OFFER!

Buy the package, at the bargain price of only $185.00. Try it out thoroughly in your shack.

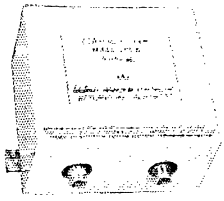
If, for any reason, you are not completely satisfied, just return it prepaid within 15 days after you received it.

I will promptly send back your full $185.00.

Fair enough? Send your order today, OM. TNX.

73 *Bil Harrison* W2AVA

Waters VHF COAXIAL FILTERS



New, resonant cavity bandpass filters. Double-tuned and preset at factory.

Absorbs practically all out-of-band spurious frequencies in output of transmitter. Improves reception by rejecting QRM from high-level out-of-band signals.

Insertion loss in 52 ohm line less than 1.5 db. Will handle up to 100 watts peak power output.

Model 373-6 (50-52 MC) $32.50
Model 373-2 (144-148 MC) $29.50

Ask for free catalog.

HARRISON

"HAM HEADQUARTERS, USA"®
229 GREENWICH ST., NEW YORK, N.Y. 10007
(212) BA 7-7922
Visit Our Long Island Store
139-20 Hillside Avenue, Jamaica

OK, BIL:

Here's my $.....

Rush your "Happy Ham/Happy TV Neighbor" Six meter bargain package to me.

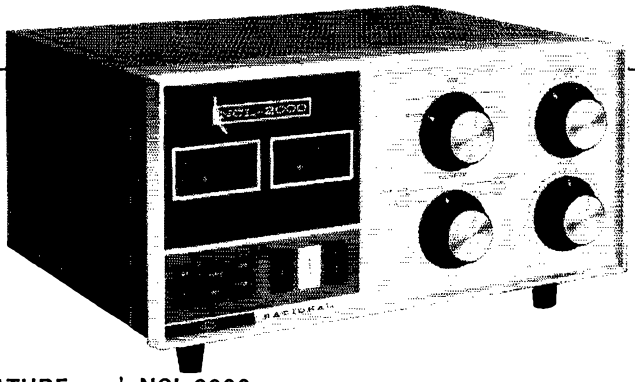
I understand that for any reason I may return it prepaid within 15 days in original condition for full refund.

NAME ..... CALL.....

ADDRESS .....

got a match?

Definitely not. It's a cold fact that no competitive linear amplifier compares with National's NCL-2000—regardless of price. Take the time to look at the chart below and plug in the specs of *any* amplifier next to those of the '2000—not a single competitive unit in the maximum power classification offers even half the features of the NCL-2000:



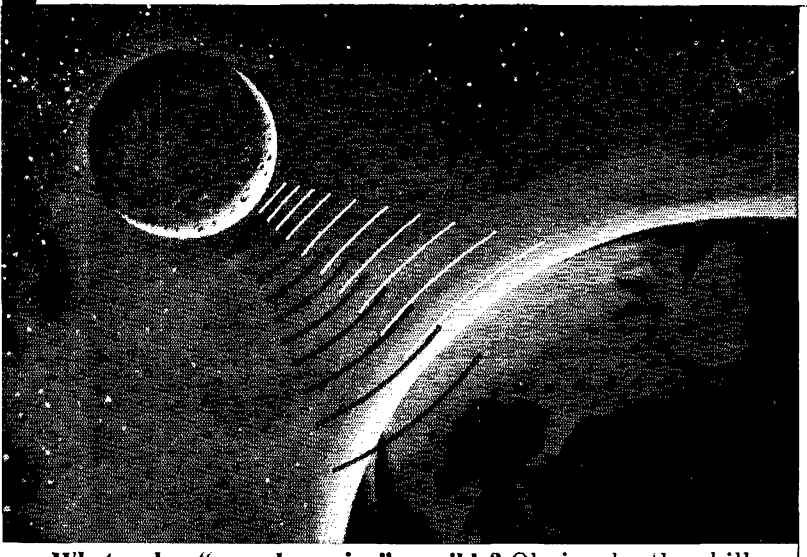
FEATURE	NCL-2000	COMPETITION
POWER	Entire equipment I.C.A.S. rated for full 1000 watt average, 2000 watt peak input; output tubes and all RF components rated for C.C.S. operation. Power input and efficiency identical on all bands—80 through 10 meters.	
SIZE	Completely self-contained, including power supply, in desk-top cabinet (dimensions only 7⅝" H, 16¼" W, 12¾" D).	
DRIVE REQUIREMENTS	Adjustable passive grid input and use of high power ceramic tetrodes in final permits drive to full output with exciters delivering as little as 20 watts or as much as 200 watts.	
METERING	Separate rear-illuminated precision D'Arsonval plate and multi-meters for simultaneous measurements.	
ALC	ALC output to exciter for maximum talk-power with greatest linearity.	
SAFETY AND PROTECTIVE DEVICES	Fuses, time delay and plate current overload relays, plate power lid interlock and automatic HV mechanical shorting bar.	
CLASS OF OPERATION	Grid-regulated AB_2 permits easiest tune-up, low drive power for maximum exciter linearity, and protection from destructive peak currents.	
EASE OF TUNE-UP	Internal dummy load in grid circuit makes adjustment of exciter into amplifier possible without turning on NCL-2000 and without radiating a signal.	
STYLING	Award-winning design matches NCX-5 transceiver and complements any equipment.	
GUARANTEE	National's exclusive One-Year Warranty.	
PRICE	Only $685.00.	

The NCL-2000 is a rock-crusher of a rig built to *commercial* standards. That's why you get I.C.A.S.-rated maximum legal power in a one-piece desk-top package, and why you get ALC and drive power compatibility with high quality exciters. It's why you get two precision meters, and sensible protection afforded by proper safety devices. Match the NCL-2000 with all the others before you buy — then see your National dealer for easy terms and trade-in deals.

NATIONAL RADIO COMPANY, INC.

37 Washington Street, Melrose, Mass. 02176 • World Wide Export Sales: Auriema International Group, 85 Broad St., N.Y.C.

"QUA"...RCA BEAM POWER TUBES



What makes "moonbouncing" possible? Obviously, the skill and ingenuity of stations involved, for one thing. For another, the RCA Beam Power Tubes they use in their "finals" to squeeze the maximum power output into their antennas.

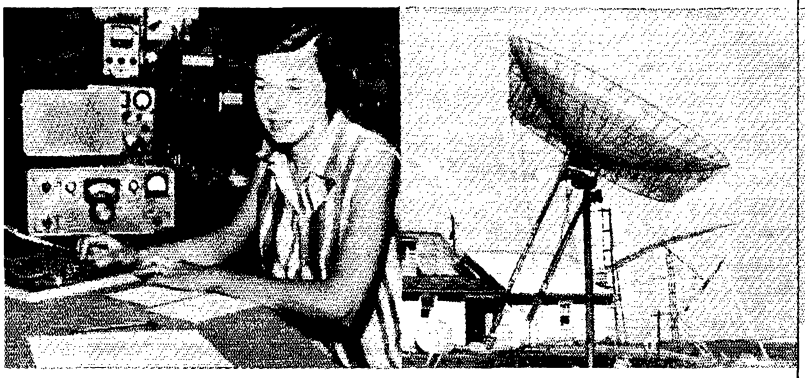
But, you don't have to be a "moonbouncer" to enjoy the benefits of rugged, dependable RCA transmitting tubes. For technical details on all types, pick up a copy of the TT-5 RCA Transmitting Tube Manual at your nearest RCA Distributor.

TALK ABOUT DX!

Here's how RCA Power Tubes help pioneering amateurs break records...

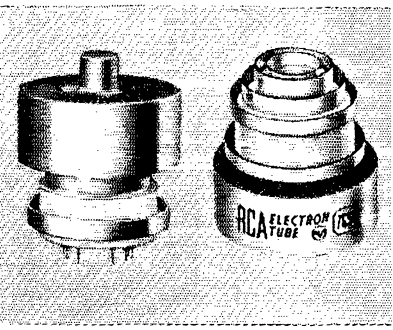
Using RCA-8122 and -7650 Beam Power Tubes, amateurs have found a new way to communicate...These pioneers are now bouncing UHF signals off the moon—for a total transmitter-to-receiver distance of *half a million miles!*

Consider the power this takes. The transmitting antenna on earth sends a relatively straight beam to the moon...but the convex lunar surface, as a passive reflector, dissipates the beam so that the received signal on earth is less than one trillionth the strength of the transmitted signal. Because of this power dissipation, you need utmost efficiency in power output such as offered by these RCA tubes.



First lady "moonbouncer"—Mrs. Oliver J. Smith III of Millersville, Pa., operates transmitter used to bounce CW signals off moon and back to receiving station in Puerto Rico.

Moonbounce antenna — the 27-foot diameter parabolic dish built by Mr. Vic Michael, W3SDZ, of Williamsport, Pa.; a measure of the initiative and dedication of moonbouncers.



RCA 8122 Beam Power Tube—used in several "moonbounce" transmitters, can provide useful power output of 300 watts up to 500 Mc/s in CW operation with a plate voltage of 2000 volts.

RCA 7650 Ruggedized Cermolox Beam Power Tube — operated by a European "moonbouncing" team, can provide up to 600 watts useful CW power output at frequencies of 400 Mc/s.

RCA ELECTRONIC COMPONENTS AND DEVICES, HARRISON, N.J.

The Most Trusted Name in Electronics

AVAILABLE THROUGH YOUR AUTHORIZED RCA INDUSTRIAL TUBE DISTRIBUTOR.