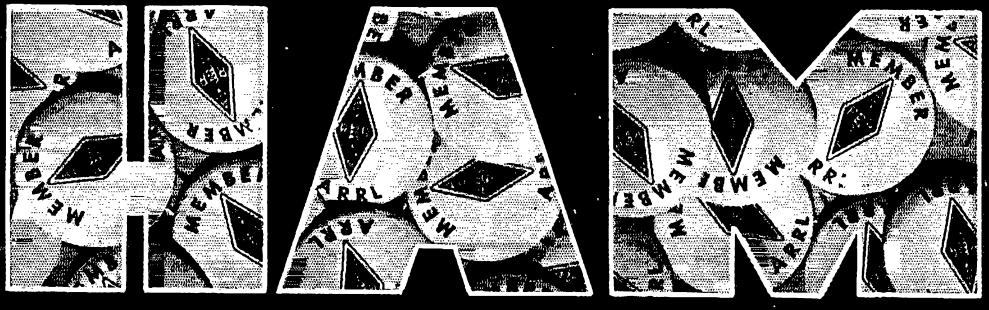
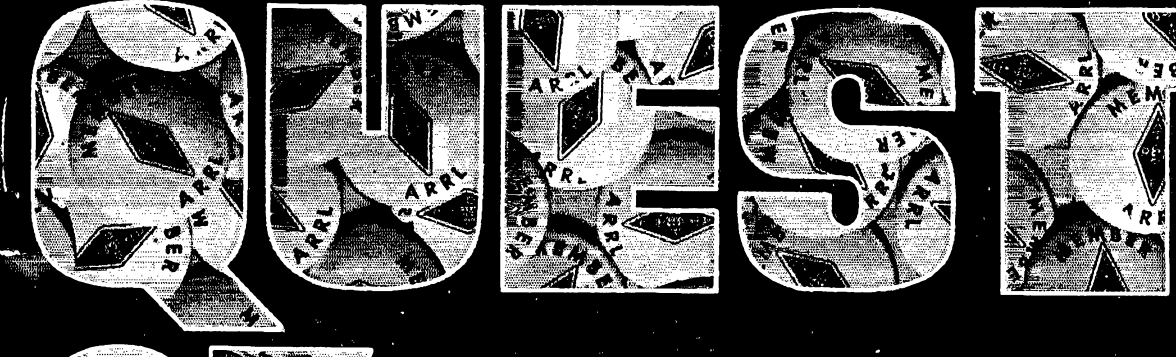
QST

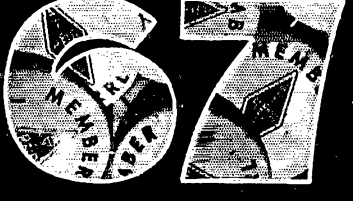
October 1966
60 Cents

devoted entirely to

amateur radio







OFFICIAL JOURNAL OF THE ARRL

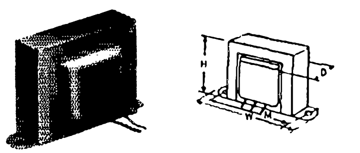
REPLACEMENT TYPE TRANSFORMERS & REACTORS

UTC

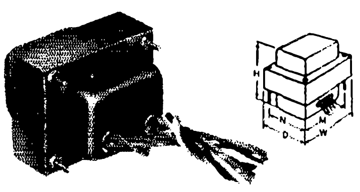
PIONEERS IN MINIATURIZATION ®

Thirty years of pioneering by UTC in research, design and engineering skills assures you quality and reliability unexcelled in the industry. UTC's line of 2000 stock and special custom built items covers virtually every transformer and filter requirement for both military and commercial use.

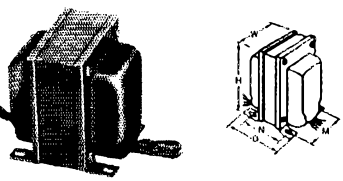
UTC replacement type transformers, here described (Pri. 117 V, 50/60 cycles) provide the highest reliability in this field. All units are low temperature rise, vacuum sealed against humidity with special impregnating materials to prevent corrosion and electrolysis. Shells are finished in attractive high lustre black enamel.



CHANNEL TYPE



DOUBLE SHELL TYPE



VERTICAL SHELL TYPE

CHANNEL FRAME FILAMENT/TRANSISTOR TRANSFS.

Pri. 115 V 50/60 Cycles—Test Volts RMS: 1500

Type No.	Secondary	W	D	H	M	Lbs.
FT-1	2.5 VCT-3A	2 7/8	1 1/2	1 11/16	2 3/8	3/4
FT-2	6.3 VCT-1.2A	2 7/8	1 1/2	1 11/16	2 3/8	3/4
FT-3	2.5 VCT-6A	3 5/16	1 7/8	2	2 13/16	1
FT-4	6.3 VCT-3A	3 5/16	1 7/8	2	2 13/16	1
FT-5	2.5 VCT-10A	3 3/4	2 1/8	2 5/16	3 1/8	1 1/2
FT-6	5 VCT-3A	3 3/4	2 1/8	2 5/16	3 1/8	1 1/2
FT-7	7.5 VCT-3A	3 3/4	2 1/8	2 5/16	3 1/8	1 1/2
FT-8	6.3 VCT-8A	4	2 1/2	2 5/8	3 5/16	2 1/2
FT-10	24 VCT-2A or 12V-4A	4	2 5/8	2 5/8	3 5/16	2 1/2
FT-11	24 VCT-1A or 12V-2A	3 3/4	2 1/8	2 5/16	3 1/8	1 1/2
FT-12	36 VCT-1.3A or 18V-2.6A	4	2 5/8	2 5/8	3 5/16	2 1/2

Taps on pri. of FT-13 & FT-14 to modify sec. nominal V, −6% +6%, +12%

Type No.	Secondary	W	D	H	M	Lbs.
FT-13	26 VCT-.04A	2 1/8	1 3/8	1 1/4	1 3/4	1/4
FT-14	26 VCT-.25A	2 7/8	1 5/8	1 11/16	2 3/8	3/4

DOUBLE SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-101	275-0-275	50	2A	2.7A	3	2 1/2	3	2 1/2	2	2 1/2
R-102	350-0-350	70	3A	3A	3	2 1/2	3 5/8	2 1/2	2	3 1/2
R-103	350-0-350	90	3A	3.5A	3 3/8	2 7/8	3 15/16	2 13/16	2 1/4	4 1/2
R-104	350-0-350	120	3A	5A	3 3/4	3 1/8	3 7/8	3 1/8	2 1/2	5 1/2
R-105	385-0-385	160	3A	5A	3 3/4	3 1/8	4 5/16	3 1/8	2 1/2	7

VERTICAL SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-110	300-0-300	50	2A	2.7A	2 5/8	2 13/16	3 1/4	2	1 3/4	2 1/2
R-111	350-0-350	70	3A	3A	2 5/8	3 7/16	3 1/4	2	2 3/8	3 1/2
R-112	350-0-350	120	3A	5A	3 5/16	3 11/16	4	2 1/2	2 5/16	5 1/2
R-113	400-0-400	200	3A	6A	3 7/8	4 5/16	4 5/8	3	3 1/8	8

CHANNEL FRAME FILTER REACTORS

Inductance Shown is at Rated DC ma—Test Volts RMS: 1500

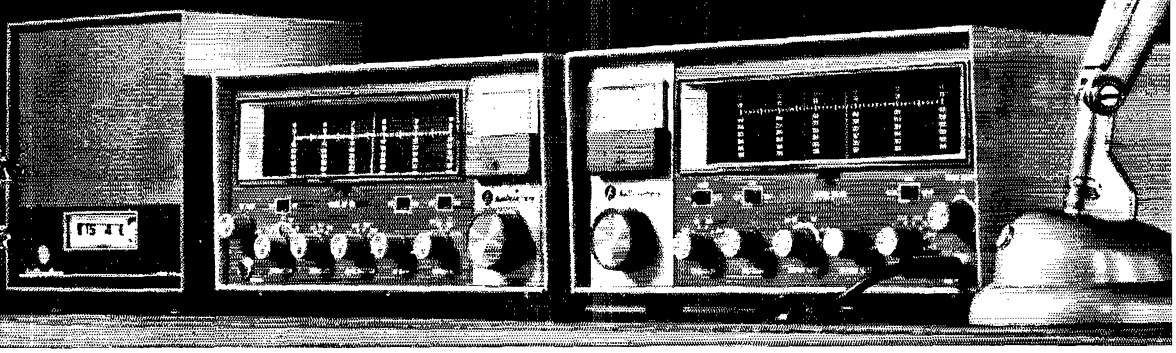
Type No.	Induct. Hys.	Current	Resistance Ohms	Dimensions, in. W	D	H	M	Wt. Lbs.
R-55	6	40ma	300	2 1/8	1 3/8	1 3/4	2	1/2
R-14	8	40ma	250	2 7/8	1 1/2	1 11/16	2 3/8	3/4
R-15	12	30ma	450	2 7/8	1 1/2	1 11/16	2 3/8	3/4
R-16	15	30ma	630	2 7/8	1 1/2	1 11/16	2 3/8	3/4
R-17	20	40ma	850	3 5/16	1 5/8	2	2 13/16	1
R-18	8	80ma	250	3 5/16	1 5/8	2	2 13/16	1
R-19	14	100ma	450	3 3/4	1 7/8	2 5/16	3 1/8	1 1/2
R-20	5	200ma	90	4 1/8	2 1/4	2 5/8	3 5/16	2 1/2
R-21	15/3	200ma	90	4 1/8	2 1/4	2 5/8	3 5/16	2 1/2
R-220	100/8 Mhy 25/2 Mhy	2.5A 5A	.6 .16	3 3/4	2	2 5/16	3 1/8	1 1/2

Write for latest catalog of over 1,300 STOCK ITEMS with UTC top quality

UNITED TRANSFORMER CO.

DIVISION OF TRW INC. • 150 VARICK STREET, NEW YORK, N.Y. 10013

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; 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; S-meter.

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

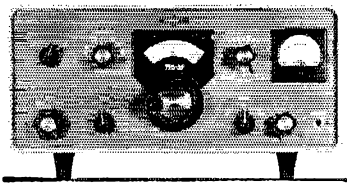
"Quality through Craftsmanship"

hallicrafters

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

Available in Canada from Gould Sales Co.

73, Old Man! No matter what language it comes booming in on, you've made a good QSO. And you can work the best with Collins' S/Line. One star of this *complete* fixed station is the 75S-3B, featuring *sharpest selectivity* on SSB, CW and RTTY — optional filters that give you up to three degrees of selectivity in CW/SSB, and with a filter socket for AM— rejection tuning, AGC, and spinner tuning knob. Contact your authorized Collins distributor today. You'll be surprised to find how little it costs to own the finest.



COLLINS

QST

OCTOBER 1966

VOLUME L NUMBER 10

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

OFFICES

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

Subscription rate $6.00 per year postpaid: $6.50 in Canada; $7.00 elsewhere. ARRL Membership, including *QST*, available only to individuals with a bona fide interest in amateur radio: $5.00 per year; $5.25 in Canada; $6.00 elsewhere. Single copies, 60 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

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

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

OUR COVER

What's "Hamquest 67"? Read all about it on page 9. Then pitch in to help your local club and ARRL in this joint membership drive.

—CONTENTS—

TECHNICAL —

Why Key Clicks?.....*George Grammer, W1DF* 11
Field-Effect Transistors.....*Jim George, W7AWH* 16
Yagi *vs.* Quad.....*Robert E. Fitz, W4RBZ* 20
Gimmicks and Gadgets
A 300-Ohm Standard For The Transmatch..... 22
A V.L.F. Receiver Without Tuning Capacitors or Coils
John M. Tiffany 23
V.F.O. Stability — Recap and Postscript
George Grammer, W1DF 26
Building Your Own Arrays for 50 and 144 Mc.
Edward P. Tilton, W1HDQ 33
Recent Equipment
Knight-Kit TR-106 Transceiver..... 42
Knight-Kit V-107 V.F.O..... 43
Parks 432-3 Converter..... 44
Technical Correspondence..... 46
New Apparatus
Omega Multirange Panel-Meter Kit..... 108
Millen No-String Illuminated Slide-Rule Dial.....108

BEGINNER AND NOVICE —

A Transmatch For Balanced and Unbalanced Lines
Lewis G. McCoy, W1ICP 38

OPERATING —

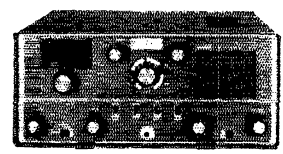
ARRL International DX Competition
Ellen White, W1YYM 58
Armed Forces Day — 1966..... 80
21st ARRL Simulated Emergency Test Announcement... 82
Thoughts on RACES and ARPSC..... 84
Sixth World-Wide RTTY Sweepstakes Rules..... 98

GENERAL —

Station Design For DX.....*Paul D. Rockwell, W3AFM* 48
"QSL . . . Solid Copy".....*John G. Troster, W6ISQ* 51
97.73 — or Bust!.....*David A. Lien, WA6YMY* 52
GBA.....*Louise Ramsey Moreau, WB6BBO* 55
A Noise-Silencing I.F. Circuit for Superhet Receivers
(reprinted from *QST*, February 1936)
James J. Lamb 96

ARPSC..... 84
Coming Conventions..... 95
Correspondence From Members 93
Hamfest Calendar..... 95
Happenings of the Month..... 88
Hints & Kinks..... 56
How's DX?..... 99
Index to Advertisers..... 182
"It Seems to Us . . ."..... 9
IARU News..... 90
League Lines..... 10
Operating News..... 112
Silent Keys..... 188
Station Activities..... 117
World Above 50 Mc..... 104
YL News and Views..... 109
25 Years Ago in *QST*..... 25

SPACE PACKAGE

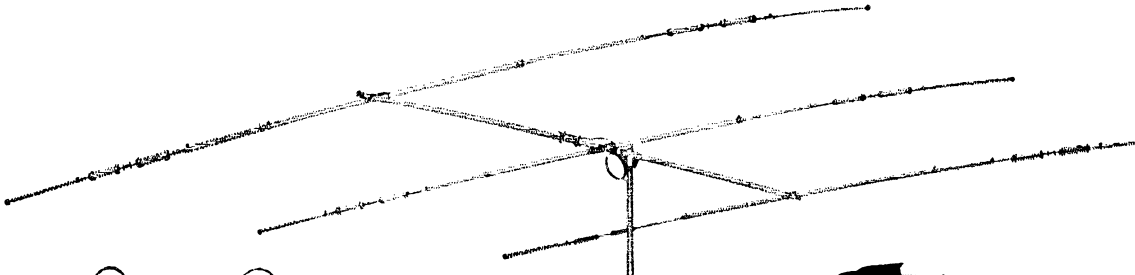


SBE SB-34 . . . advanced space age circuits. Small size solves space problems at home or mobile . . . only **$395 (12V DC & 117V AC built-in power supply).** Write for complete brochure.

RAYTHEON

213 E. Grand Ave.
***So. San Francisco, Calif. 94080**

So good it defies comparison...



hy-gain's 3-element

10-15-20

THUNDERBIRD

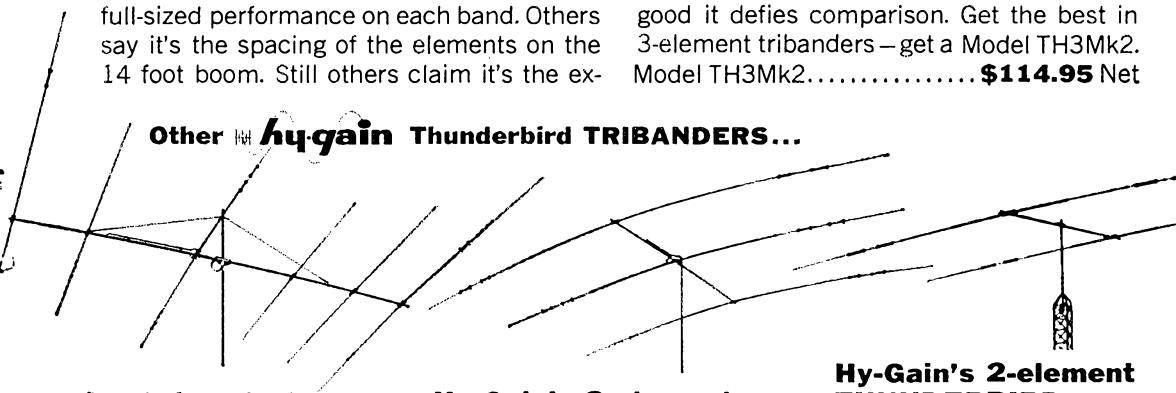
TRIBANDER MODEL TH3Mk2

- **Delivers uncompromised full-sized performance on 10, 15 & 20 meters**
- **Takes maximum legal power**
- **Exclusive time-proven Beta Match**

Try as you may, you just won't find another three-element tribander for 10, 15 and 20 meters that will even begin to compare with Hy-Gain's Model TH3Mk2. Some say it's the individually tuned, large diameter Hy-Q traps that make the difference by providing full-sized performance on each band. Others say it's the spacing of the elements on the 14 foot boom. Still others claim it's the exclusive, time-proven Beta Matching System that provides the optimum gain and maximum F/B ratio you get with the Model TH3Mk2. Actually, it's a combination of all of these factors plus rugged heavy gauge, taper-swaged seamless aluminum construction...solid aluminum trap housings using air dielectric capacitor...weather impervious molded high impact cycolac insulators... and Hy-Gain's over-all engineering excellence, that makes the Model TH3Mk2 so good it defies comparison. Get the best in 3-element tribanders – get a Model TH3Mk2.

Model TH3Mk2..... **$114.95** Net

Other hy-gain Thunderbird TRIBANDERS...



Hy-Gain's 6-element DX THUNDERBIRD

Provides the very ultimate in tribander performance. Takes maximum power. 24′ boom. Exclusive Hy-Q traps and time-proven Beta Match.

Model TH6DX **$149.50** Net

Hy-Gain's 3-element THUNDERBIRD JUNIOR

Fantastic performance in limited space. Takes 600 watts P.E.P. 12′ boom. Exclusive Hy-Q traps and Beta Match. Rotates with heavy duty TV rotator.

Model TH3Jr. . . . . **$74.50** Net

Hy-Gain's 2-element THUNDERBIRD

Installs most anywhere. Delivers outstanding performance. Takes maximum power. 6′ boom. Exclusive Hy-Q traps and time-proven Beta Match.

Model TH2Mk2 **$74.50** Net

Available now from your Hy-Gain distributor or write...

hy-gain ELECTRONICS CORPORATION

8402 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.

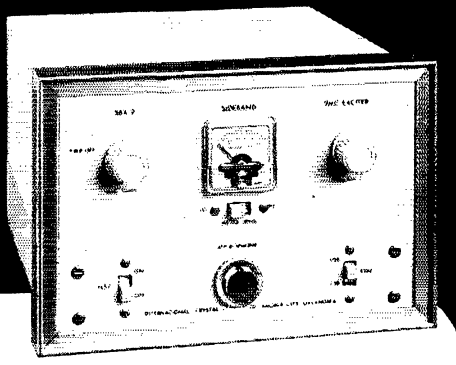
ATLANTIC DIVISION				
Delaware	W3IYE	Roy A. Belair	415 Brighton Road	Wilmington 19809
Eastern Pennsylvania	W3ZRQ	Allen R. Breiner	212 Race St.	Tamaqua 18252
Maryland D. C.	W3QA	Bruce Boyd	290 Bloomsburg Ave., Apt. 6-3	Baltimore, Md. 21228
Southern New Jersey	W2ZI	Edward G. Raser	19 Blackwood Drive	Wilburta Gardens, Trenton 08628
Western New York	K2HUK	Charles T. Hansen	Warner Gulf Rd.	Holland 14080
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	K9IYG	Mrs. M. Roberta Kroulik	401 El Portal Drive	Michigan City 46361
Wisconsin	K9GSC	Kenneth A. Ebneter	822 Wanona Trail	Portage 53901
DAKOTA DIVISION				
Minnesota	WØTCK	Herman R. Kopischke, Jr.	RFD 2	Janesville 56048
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	KØTXW	Seward P. Holt	Box 58	Clear Lake 57226
DELTA DIVISION				
Arkansas	K5GKN	Don W. Whitney	1117 North Drive	(P.O. Box 311), Osceola 72370
Louisiana	W5PM	J. Allen Swanson, Jr.	RFD 1, Box 354-E	Covington 70433
Mississippi	W5EAM	S. H. Hairston	2321-27th Ave.	Meridian 39303
Tennessee	W4UVP	William A. Scott	115 East Holston Ave.	Johnson City 37601
GREAT LAKES DIVISION				
Kentucky	WA4KFO	Lawrence F. Jeffrey	1605 Antler Ave.	Owensboro 42301
Michigan	W8FX	Ralph P. Thetreau	27209 W. Six Mile Road	Detroit 48240
Ohio	W8AL	Wilson E. Weckel	1317 Logan Ave., N.W.	Canton 44703
HUDSON DIVISION				
Eastern New York	W2EFU	George W. Tracy	1138 North Country Club Drive	Schenectady 12309
N. Y. C. & Long Island	K2IDB	Blaine S. Johnson	266 Cypress St.	Massapequa Park, L. I. 11762
Northern New Jersey	W2CVW	Edward F. Erickson	13 Robert Circle	South Amboy 08879
MIDWEST DIVISION				
Iowa	WØBDZ	Owen G. Hill	RFD	Gilman
Kansas	KØBXF	Robert M. Summers	3045 North 72nd,	Bethel 66009
Missouri	WØTPK	Alfred E. Schwaneke	Edgar Star Rte	Rolla 65401
Nebraska	WØGGP	Frank Allen	Box 272	Gering 69341
NEW ENGLAND DIVISION				
Connecticut	W1GVT	John J. McNassor	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Maine	K1DYG	Herbert A. Davis	RFD 1	Franklin 04634
New Hampshire	W1SWX/K1DSA	Robert Mitchell	Box 137-A, RFD	Chester 03036
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	E. Reginald Murray	3 Hillcrest Drive	Montpelier 05601
Western Massachusetts	W1BVR	Percy C. Noble	8 St. Dennis St.	Westfield 01085
NORTHWESTERN DIVISION				
Alaska *	KL7DG	John P. Trent	2329 Maple Ave.	Anchorage 99504
Idaho	W7ZNN	Donald A. Crisp	3727-14th St.	Lewiston 83501
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave.	Anaconda 59711
Oregon	W7AJN	Everett H. France	3335 S.E. 116th Ave.	Portland 97266
Washington	W7HMQ	Everett E. Young	2217 Fifth St., S.E.	Puyallup 98371
PACIFIC DIVISION				
East Bay	K6LRN	Richard Wilson	107 Cordova Way	Concord 94521
Hawaii	KH6BZF	Lee R. Wical	45-601 Liuku Rd.	Kaneohe 96744
Nevada	W7PBV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	WA6JDT	John F. Minke, III	6230 Rio Bonito Drive	Carmichael 95608
San Francisco	WA6AUD	Hugh Cassidy	77 Coleman Drive	San Rafael 94901
San Joaquin Valley	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	W6ZRJ	Jean A. Gmelin	10835 Willowbrook Way	Cupertino 95014
ROANOKE DIVISION				
North Carolina	W4BNU	Barnett S. Dodd	420 West Franklin St.	Salisbury 28144
South Carolina	K4LNJ	Clark M. Hubbard	124 Fant Lane	Union 29379
Virginia	W4SHJ	H. J. Hopkins	8600 Hammett Ave.	Norfolk 23503
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554
ROCKY MOUNTAIN DIVISION				
Colorado	KØTTB	Donald Ray Crumpton	P.O. Box 223	Alamosa 81101
New Mexico	WA5FLG	Bill Farley	1306 Spruce	Alamogordo 88310
Utah	W7VSS	Gerald F. Warner	4765 South 275 West	Ogden, 84401
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	K4KJD	William S. Crafts	Route 3, Box 233	Athens 35611
Canal Zone	KZ5TT	Mrs. Lillian C. Smith	P.O. Box 191	Balboa
Eastern Florida	K4SJH	A. L. Hamel	220 N.E. 25th St.	Pompano Beach 33064
Georgia	W4RZL	Howard L. Schonner	P.O. Box 1902	Columbus 31902
West Indies (P.R.-V.I.)	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073	Caparra Heights San Juan, P.R. 00922
Western Florida	W4RKH	Frank M. Butler, Jr.	494 Elliott Rd.	Fort Walton Beach 32548
SOUTHWESTERN DIVISION				
Arizona	W7FKK	Floyd C. Colyar	3411 West Pierson St.	Phoenix 85017
Los Angeles	W6BIG	H. G. Garman	3732 Chatwin Ave.	Long Beach 90808
Orange	W6DEY	Roy R. Maxson	1434 South Olive St.	Santa Ana 92707
San Diego	W6LRU	Don Stansifer	4427 Pescadero	San Diego 92107
Santa Barbara	WA6OKN	Cecil D. Hinson	1933 Coventry Court	Thousand Oaks 91360
WEST GULF DIVISION				
Northern Texas	W5BNG	L. L. Harbin	4515 Calmount	Fort Worth 76107
Oklahoma	K5CAY	Daniel B. Prater	1401 E. Oklahoma Ave.	Enid 73701
Southern Texas	W5AIR	C. D. Jerry Sears	5634 Eskridge St.	Houston 77023
CANADIAN DIVISION				
Alberta	VE8TG	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	VE2OJ	Jim Ibey	209 Brookdale Ave.	Dorval, P. Q.
Saskatchewan	VE5QC	Mel Mills	P.O. Box 801	Saskatoon

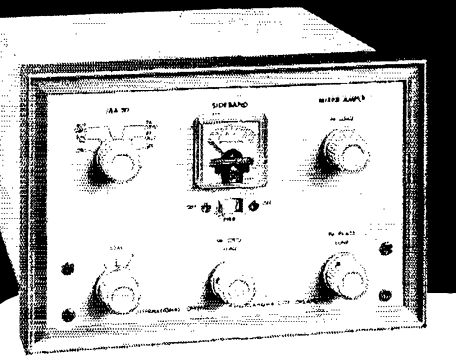
* Official appointed to act temporarily in the absence of a regular official

NEW from International

SINGLE SIDEBAND
9mc EXCITER-DRIVER
50-54mc MIXER-AMPLIFIER

The SBX-9 Exciter-Driver and the SBA-50 Mixer-Amplifier provide the perfect combination for 50-54mc SSB operation. Performance, versatility and reliability are incorporated into this new SSB pair. A tremendous value at a low price!





Model SBX-9

SPECIFICATIONS:

Exciter-Driver 9mc

Tubes:	6BH6 Oscillator 12AX7 Audio 7360 Bal Modulator 6BA6 RF Amplifier
Filter:	Four crystal half lattice Carrier Suppression 45db min. Unwanted SB Atten. 40db min.
Output:	Provides voltage drive for mixer such as SBA-50
Controls:	Carrier Balance Microphone Gain Test Switch USB-LSB Switch
Metering:	RF output for balance adjust. Two sensitivity ranges available with front panel switch.
Misc:	Relay included for push-to-talk operation. Crystals for upper and lower sideband included. Requires high impedance microphone. For operation on 117 vac 60 cycle power.

$125.00

Order direct from International Crystal Mfg. Co.

Model SBA-50

SPECIFICATIONS:

Mixer-Amplifier 50-54mc

Tubes:	6U8A Oscillator-Mixer 12BY7A Amplifier 6360 Linear power amplifier
Drive:	Requires 9mc sideband signal from SBX-9
Output:	SSB single tone 10 watts
Controls:	On-Off Power PA Grid Tune PA Plate Tune PA Load Tune Metering Switch
Metering:	Oscillator 9mc Drive Buffer Grid PA Grid RF Out
Crystals:	Three positions, uses 3rd overtone 41-45mc range. Crystal frequency = final frequency —9mc
Misc:	Accessory socket provided for connecting keying circuit to SBX-9. Comes with three crystals. Specify frequency when ordering. For operation on 117 vac 60 cycle power.

$145.00

INTERNATIONAL

CRYSTAL MFG. CO., INC.

18 NO. LEE • OKLA. CITY, OKLA. 73102

THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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

Past Presidents

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

Officers

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

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

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

Secretary . . . . . JOHN HUNTOON, W1LVQ

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

• • • • •

Honorary Vice-Presidents . . . . . ALEX REID, VE2BE
FRANCIS E. HANDY, W1BDI

• • • • •

General Manager . . . . . JOHN HUNTOON, W1LVQ
Communications Manager . . . . FRANCIS E. HANDY, W1BDI
Technical Director . . . . . GEORGE GRAMMER, W1DF
Assistant General Manager . RICHARD L. BALDWIN, W1IKE
Assistant Secretary . . . . . PERRY F. WILLIAMS, W1UED
225 Main St., Newington, Connecticut 06111

• • • • •

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

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

DIRECTORS

Canada

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

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

Atlantic Division

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

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

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:

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

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

Vice-Director:

New England Division

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

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

Northwestern Division

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

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

Pacific Division

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

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

Roanoke Division

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
2210 S.W. 27th Lane, Miami, Fla. 33133

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

Southwestern Division

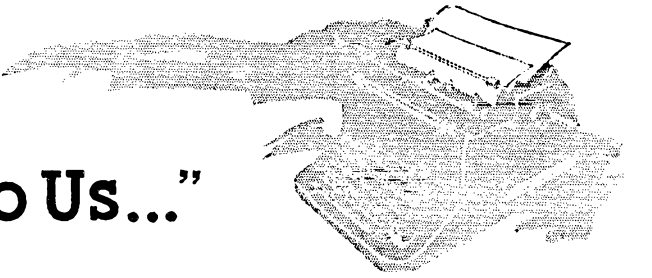
HOWARD F. SHEPHERD, JR. W6QJW
127 South Citrus Avenue, Los Angeles, Calif. 90036

Vice-Director: John F. Martin W6ECP
1135 Crest Drive, Encinitas, Calif. 92024

West Gulf Division

ROEMER O. BEST 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..."

HamQUEST '67

Unity.

Not acquiesence, but unity.

Strength through unity — that's what is needed.

THERE are some 275,000 radio amateurs in the United States and Canada, yet only about 81,000 of these are members of the ARRL and only about 40,000 are members of local radio clubs. We radio amateurs are individualists, there's no doubt of that. (And if there is doubt, come and read the Hq. mail sometime!) But despite our many and varied interests and likes and dislikes, we have a common goal, a common hope — we want amateur radio to be a continuing and dynamic occupant of the radio spectrum.

The world grows ever more complicated. The garret inventor is replaced by a team of scientists. The airplane pilot requires a crew of mechanics, meteorologists, and flight controllers to guide him on his way. Even the lonely mountaineer requires at least one other man on the rope.

So it is with radio amateurs. We all need the association and support of our fellow radio amateurs. 80,000 of us are banded together in the American Radio Relay League. 40,000 of us are banded together additionally in local amateur radio clubs. That's only a fair showing, and it could be better. That's the reason for HamQuest 67 — a cooperative program for clubs and the League to enlist substantially expanded membership, in order more effectively to represent and serve the growing needs of the amateur fraternity. It's a program for greater unity in amateur radio.

Why do we need a stronger League? Why do we need stronger clubs? Because each of us alone cannot solve the many problems facing amateur radio, but as a united team we have a strong voice.

What can membership in the club do for you? First of all, you have the sociability and fraternalism of others who have the same interests that you do. Some of them may have already solved a problem that is bugging you. They get together for field days and other types of contests. The club probably runs a code and theory course from time to time. It has an interference committee which tackles local problems. It participates in local civil defense and emergency communications activities. It provides communications for parades and the like. It gets special training films and slide shows from ARRL Hq. It receives regular bulletins from League Hq. relative to the latest news in amateur radio, much more expeditiously than even *QST* can provide. As a member of a club you participate in as many of these activities as interest you, and you have a chance to be one of those who guide the future of the club.

What can membership in ARRL do for you? It brings you twelve issues of *QST*, which during the course of a year has something for everybody several times over. It permits you to nominate and vote for those fellow amateurs who would like to serve as directors of ARRL and thus guide the future of amateur radio. It provides you with a Technical Information Service, with your technical problems answered by members of the Hq. staff. It provides you with representation before the Federal Communications Commission, the Department of Transport, and the International Telecommunications Union, so that the needs and wants of amateur radio operators are made known to those who establish the national and international regulations. It provides you with WAC certificates and DXCC certificates and RCC certificates and WAS certificates, to acknowledge your operating ability.

A campaign kit has been sent to each of more than 1800 clubs all over the U. S. and Canada. It has ammunition to be used in convincing non-members that they ought to join the League and a club. It tells all about the prizes that you as an individual and your club can earn by enlisting more members. If you are a member of a club and this campaign kit hasn't reached you yet (it was mailed in late August), drop us a line and we'll duplicate shipment.

The future strength of amateur radio, both nationally and internationally, lies in a greater unity — that is, in a greater membership both in the League and in the local clubs. That's what HamQuest 67 is all about. QST

League Lines . . .

Shortly after you receive this issue, ballots will be going to members in divisions where there has been more than one nominee for director or vice-director. Be sure to exercise your right to vote, and return the ballot promptly. Don't think your vote doesn't count; a recent director election ended in a tie and a run-off--one vote would have tipped the scale. (And it was still close, 12 votes, at the run-off.)

Cop McDonald, WAØNLQ, visited Hq. in August with a highly-interesting demonstration of his slow-scan TV setup. We doubt that SSTV will ever replace c.w. or sideband, but it is an intriguing new mode of communication, with 6 kc. or less bandwidth, and we predict many hams will be using it in the future.

The ARRL DX Contest dates will be the first and third weekends of February and March next year. Heard about the new rules try? KH6 and KL7 back to DX status, at their request . . . the 48 contiguous states plus VE1-VE8 and VO for DX multipliers per band . . . a handsome trophy to DX single-operator continental leaders . . . PLUS elimination of the W/VE quota on c.w.

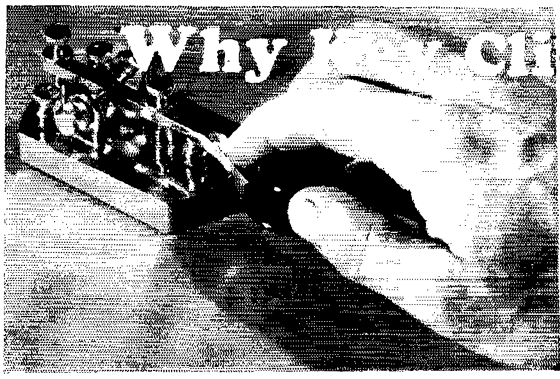
Quite a number of you indicated interest in a life membership in ARRL at $100. Such a new policy would require Board action, of course, and the subject will certainly be on the 1967 meeting agenda. Gives you plenty of time to fill the piggy-bank, eh?

A European amateur magazine recently reported that ARRL had "lost 14,000 members" the past year. One guess as to which world traveler provided them with that misinformation!

Some associations offer participation in a group life insurance program at rates considerably reduced from those applying in individual cases. Premiums depend on age--e.g., for $10,000 face value, $27 annually at age 25, $88 at age 47. If there is enough interest, the League might sponsor such a program. What say, gang?

How fast can you copy, "Some sages say Mississippi sissies are sissier than Tennessee sissies"? Explorers (High-school age Boy Scouts) attempted it at 10 w.p.m. in the communications and electronics events of their national conference in August. The code tapes, as well as some visual pegboard displays of problems involving resistor combinations and equipment trouble-shooting, were conceived and supplied by the League as part of continuing efforts to interest more youngsters in amateur radio and electronics.

One management study firm says today the cost of writing a business letter is $2.44, up 30% from 1960. Hq. does it for a lot less, but the percentage increase is probably about the same. How much longer the League can keep operating on a 1960-established dues rate is a question our Board will have to tackle next year.



Why Key Clicks?

The Necessary Bandwidth for C.W. Signals

BY GEORGE GRAMMER,* W1DF

ARE key clicks necessary? There are those who contend that they are, the argument being that at high code speeds "soft" dots and dashes become unreadable. The issue is clouded by personal preferences as to how a keyed signal should sound, just as there are personal preferences about voice "quality". Putting aside such subjective factors, the question "Are key clicks necessary?" can be rephrased: "How much *bandwidth* is necessary for good code transmission?"

There is a long-standing answer to this last question. It is to be found in the international regulations, where the necessary bandwidth is specified as the keying speed in bauds multiplied by a factor which is 3 for circuits where the signals are steady, and 5 for circuits where fading is bad. To see how this specification affects amateur practice it is necessary first to review a few fundamental keying definitions.

Keying Speed

The building block of telegraph transmission is the *code element*, the time duration of the shortest keying pulse. In International Morse code the shortest pulse is one dot. Since, by definition, the space length is equal to one dot length, a space is also a code element. This is shown in Fig. 1, where the top drawing could represent a d.c. circuit being keyed in a string of on-off dots and spaces. Such a circuit is shown in Fig. 2. If the string of dots is continuous and fast enough to let the meter's pointer settle down at an average value of current, the meter will read just half what it would with the key closed. This is because the current is off just the same length of time as it is on. We can look at this continuously keyed circuit, therefore, as one in which the keyed signal is alternating about an average direct current equal to the meter reading.

Thus we have an a.c. square wave superimposed on the average d.c. One cycle of this square keying wave runs from the beginning of a dot through the following space to the beginning of the next dot. This is shown in the lower drawing in Fig. 1. Obviously, one cycle of the keying wave is equal to *two* code elements.

Any repetitive waveform, of whatever shape, can be reproduced by a collection of sine waves in harmonic relationship to a lowest frequency which is the same as the basic repetition rate of the waveform under consideration. This "fundamental" sine wave is also sketched in Fig. 1. If we are sending 25 dots per second, for example, the fundamental keying frequency is 25 cycles per second. By adding the proper harmonics to the fundamental, the actual square-wave shape can be approached as closely as we like. Getting those square corners, though, takes very high-order harmonics -- harmonics whose frequencies may be many times the fundamental frequency. This means that the circuit bandwidth has to be large compared with the fundamental keying frequency if square-wave keying is to be closely approximated.

Fortunately, it isn't necessary to use anything like a real square wave for good keying. It has long been recognized that a keying waveshape which contains only the *third* harmonic of the fundamental is quite sufficient for good copy. This is the reason for the factor 3 in the regulations. On this basis, a 25-cycle fundamental would take only a 75-cycle bandwidth. It is also recognized that when the signal-to-noise ratio is poor a somewhat sharper keying wave is needed; this explains the factor 5, meaning that the fifth harmonic of the fundamental keying frequency is transmitted.

C.w. keying can be clickless — without signal deterioration at any *sending speed an amateur will use.*

*Technical Editor, *QST*.

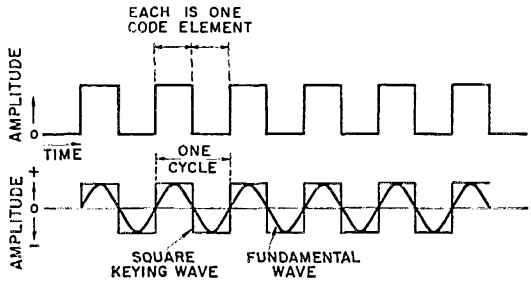


Fig. 1—Upper: A code element is the length of the shortest pulse—a dot or space in International Morse Code. Below: A succession of alternating dots and spaces considered as an a.c. square wave superimposed on the average value of current or voltage. The fundamental sine-wave frequency for such a square wave also is shown.

Keying Speed

Transmission speed is ordinarily expressed in *bauds* rather than in cycles per second. A baud is one keying element per second; therefore one cycle per second is equal to *two* bauds. In International Morse a dash is three code elements long, but since a dot or dash has to be followed by at least one space, a dot is considered to consist of two code elements and a dash to have a total of four. Thus

One dot = 2 code elements
One dash = 4 " "
Additional space between letters = 1 code element
Additional space between words = 2 code elements

The letter C, for example, consists of

Dash — 4 code elements
Dot — 2 " "
Dash — 4 " "
Dot — 2 " "
Space — 1 " "

making a total of 13 code elements. If it is sent in exactly one second, the speed is 13 bauds, and the fundamental keying frequency is therefore 6.5 cycles per second.

This method of measuring keying speed is exact, while "words per minute" is rather nebulous. The w.p.m. figure is dependent on the selection of words of average length; several such selections have been made, and the resultant w.p.m.-per-baud factor varies from a shade over 1 to about 1.2. Thus a keying speed of 25 bauds can be interpreted as something between 25 and 30 w.p.m. More to the point, a speed of 50 bauds is about as fast as any amateur will go with hand keying, so our opening question boils down to this: What bandwidth is *necessary* for a speed of 50 bauds — that is, 50 to 60 w.p.m.?

It seems reasonable to assume that no one would attempt such a speed, unless signals were good. Under such conditions the international regulations say that the necessary bandwidth is 3×50, or 150 cycles. This is small enough to be contained easily within the passband of the narrowest c.w. filters used in today's receivers.

In passing, it should be noted that the fundamental frequency is 25 cycles when the speed is 50 bands, so transmitting the third harmonic along with the fundamental calls for a keying bandwidth of only 75 cycles. The extra factor of 2, above, comes in because when the keying wave, which is modulation just as much as voice, is applied to a radio-frequency carrier *two* sets of sidebands are generated. Thus the *radio-frequency* bandwidth is twice the keying bandwidth.

Shaping

What we have been discussing so far is the necessary bandwidth for a very special case — an interminable string of dots and spaces of equal length. Actual code transmission consists of dots, dashes, and spaces — the latter of various lengths — and since whatever shaping is used will be applied to the beginnings and ends of dots and dashes alike, it is more appropriate to talk about the rise time at the beginning of each pulse and the decay time at the end. Ideally these two times would be equal. Practically, they are seldom so, although they can be made approximately the same by careful adjustment of the shaping circuits. Also, the *shapes* of the rise and fall of amplitude differ when practical shaping methods are used.

There is a useful approximate formula which states that the bandwidth of a pulse is equal to 1 divided by twice its rise or decay time, whichever is smaller.[1] The rise (or decay) time is defined as the time required for the pulse to go from 10 percent to 90 percent of its maximum amplitude. For a 75-cycle bandwidth this formula gives 6.7 milliseconds as the rise or decay time. Alternatively, we may consider that we have a 200-cycle i.f. passband available in the sharpest receiver, and for such a bandwidth find that the formula gives a rise or decay time of 5 milliseconds.

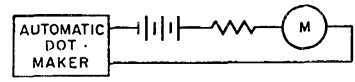


Fig. 2 — A d.c. circuit which would generate the square waves shown in Fig. 1.

In other words, a rise or decay time of 5 to 7 milliseconds is short enough for the fastest hand keying speeds and a signal so shaped occupies no more bandwidth than can be handled by the sharpest receiving filter. Furthermore, careful listening tests show that a keyed signal using these rise and decay times *has no clicks*. The transition from key open to key closed, while difficult to describe accurately in words, is a moderately firm thud which does not have any resemblance to the sharp sound that distinguishes an unmistakable click.

[1] *Reference Data for Radio Engineers*, International Telephone & Telegraph Co., New York; fourth edition, p. 542.

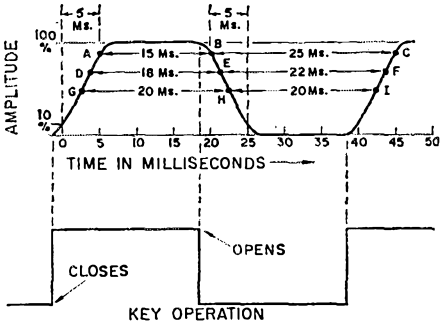


Fig. 3 — A shaped dot and its relationship to closing and opening the key.

Weight

At a speed of 50 bauds one code element occupies 20 milliseconds (1 sec. divided by 50). Fig. 3 shows, in a somewhat idealized way, the effect of shaping with 5-ms. rise and decay times. In this drawing it is assumed that the output rises to 10 percent of its maximum amplitude 1 ms. after closing the key, and decays to 90 percent 1 ms. after opening the key. The effect of shaping is to lengthen the dot duration, overall, but to shorten the time during which the amplitude is maximum. This immediately poses another question: What is the effective length of such a dot?

An ultraconservative viewpoint would be that the dot length is the time during which the amplitude is within 1 decibel of maximum. This is approximately the time between the 90-percent amplitude points. The keying shape shown in the drawing would have a dot length of 15 ms. (*A* to *B*) and a space length of 25 ms. (*B* to *C*) on this basis. A more realistic assumption would be that a 3-db. drop would establish the dot and space times, in which case the dot length is 18 ms. and the space length 22 ms. In this drawing the dot and space lengths reach equality when the amplitude is down 6 db.

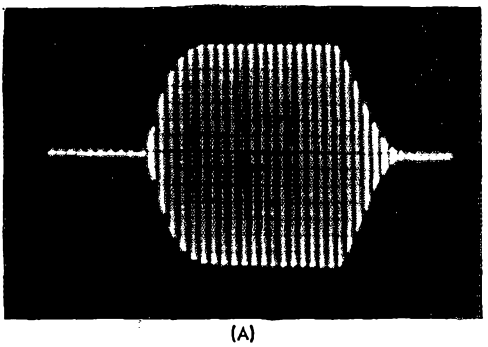
Since reception is by ear and not by machine, the question of the effective dot length cannot be resolved with complete objectivity. There appears to be no actual problem in recognizing the dots as separate entities with shaping of this general order. If they seem light to some and heavy to others, it is easy to change the keying weight slightly so the dwell time differs somewhat from the space time. Or the receiving operator can readily apply audio clipping to a dot that seems short; 6 db. of clipping would make the dot and space times equal in this example. Clipping also shortens the rise and decay times and makes the keyed signal sound "harder" — which some like.

Neither of these measures increases the keying bandwidth. The operators at both ends of the circuit have a great deal of control — control that does *not* increase the interference to stations trying to operate on nearby frequencies.

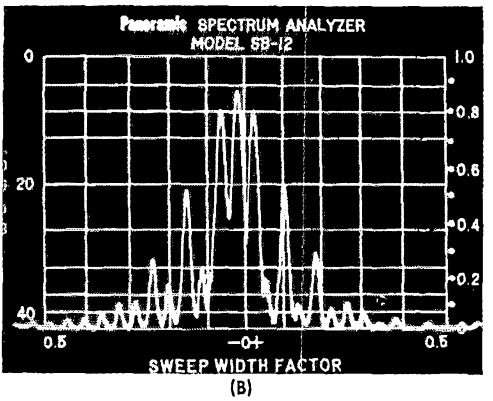
Keying Waveshapes

Most, if not all, shaping systems in amateur c.w. transmitters use the discharge of a capacitor to slow down the break end of a code character. The waveshape of the decay is superficially exponential, resembling the discharge of a capacitor through a simple resistance, but is considerably modified by the circuit conditions. However, the general effect is that the transmitter output decays rapidly at first and then tails off more and more slowly.

This curve is inverted on the make end of the character, rising rapidly at first and then slowly approaching the maximum amplitude. The critical points in both shapes are the starting points, where the change from off to on, or from on to off, begins. With truly exponential curves this



(A)



(B)

Fig. 4—A—Shaped dot generated at a 46-baud rate with approximately 5-millisecond rise and decay times. Vertical lines are from a 1000-cycle signal applied to the Z axis for timing. B—The corresponding frequency spectrum as shown by a Panoramic analyzer. Distance between vertical lines is 50 cycles, for a total bandwidth of 500 cycles for the entire picture. Decibel scale at the left is with reference to the key-down signal amplitude which was set at 0 db. in this and the spectrum plots of Fig. 6. The fundamental-frequency components are 23 cycles on either side of the carrier frequency, which appears slightly to the left of the vertical zero axis. Note that the odd harmonics of 23 cycles are predominant, the even harmonics being relatively small. The 3rd harmonics are 20 db. down and the 5th harmonics are about 28 db. down. Higher-order harmonics are practically negligible. With 7-ms. rise and decay times the 5th harmonics are down 30 db.

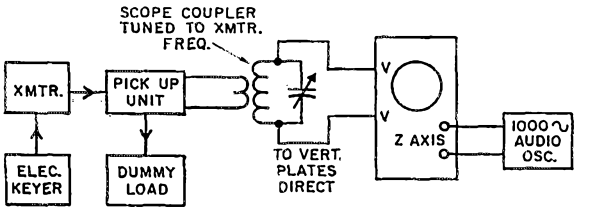


Fig. 5—Setup for obtaining the scope patterns shown in Figs. 4A and 6A. The pickup unit and tuned scope coupler can be made as described in *QST* for October 1964 (also in *Single Sideband for the Radio Amateur*, Fourth Edition, p. 196).

sudden transition from "nothing" to "something" on make would result in a long string of harmonics — *i.e.*, a wide band would be generated. Fortunately, tube characteristics tend to eliminate the sharp corners on both make and break.

A typical dot waveshape with blocked-grid keying is shown in Fig. 4A, where the rise and decay times have been adjusted for approximately 5 ms. at a keying rate of 46 bauds, the highest speed of the electronic keyer used. The corresponding frequency spectrum is shown in Fig. 4B. (If anyone doubts that a keyed signal consists of a carrier and sidebands this picture should settle the question.)

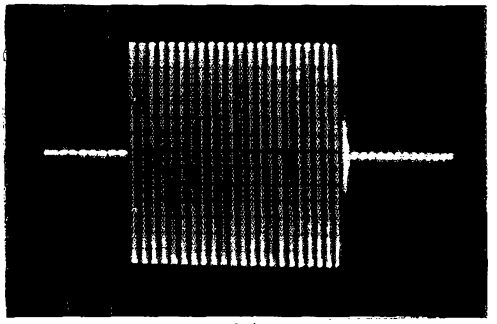
The vertical lines in the scope pattern, A, are the peaks of a 1000-cycle timing wave applied to the intensity or Z axis of the scope. The setup for making patterns of this type is shown in Fig. 5, and can easily be duplicated by anyone having an electronic keyer, a general-purpose oscilloscope, and a 1000-cycle oscillator having a reasonably pure waveform. The vertical lines mark 1-millisecond intervals. Timing is essential with oscilloscopes of the type ordinarily found in amateur stations, since the "linear" sweep is usually not very linear at the 20- to 25-cycle sweep rate required for showing just one dot and its accompanying space at a 40- to 50-baud rate.

Fig. 6A shows a dot at the same speed as Fig. 4, but with no shaping, and Fig. 6B is the corresponding frequency spectrum. This is a "hard" signal on both make and break, although it should be noted that because it is a good square wave, particularly on the make side, it is less clicky than many signals that can be heard at almost any time on any band where c.w. operation is going on. Fig. 7 is a typical example of a clicky signal recorded off the air. Power-supply regulation accounts for the large spike on make. The immediately-following undulation in amplitude is caused by the power-supply choke; an appreciable length of time is required for the output current to build up through it after the initial "bump" has been supplied by stored-up energy in the filter capacitor.

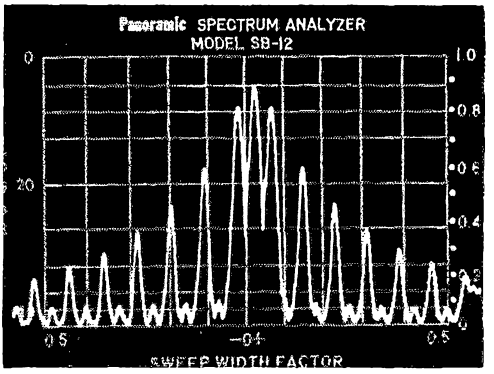
Checking With a Receiver

Although a setup such as Fig. 5 is useful and instructive, it takes no elaborate monitoring equipment to arrive at a satisfactory adjustment of keying waveshape. Your receiver will tell you everything you need to know, provided you use it properly.

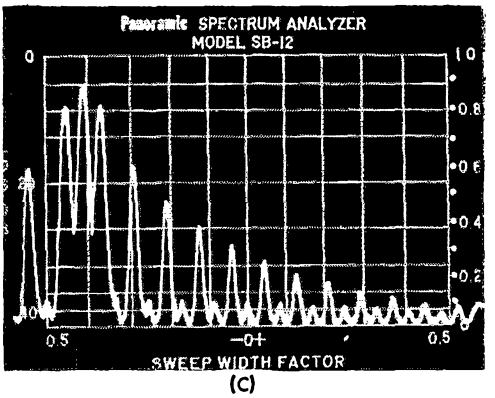
The transmitter's output should be fed into a dummy antenna — a reasonably good one, not just an incandescent lamp or two. Lamp resistance varies too much with current, and the



(A)



(B)



(C)

Fig. 6—A — Dot with no intentional shaping; conditions otherwise the same as in Fig. 4. There is a finite decay time inherent in the keying system, but the rise time is quite short. B—Corresponding frequency spectrum over a 500-cycle bandwidth; carrier frequency slightly to the right of the vertical zero axis. C—Same as B, but with the carrier set at —0.4 to show outlying components not visible in B. Bandwidth to the right of the carrier is 450 cycles. Note that the odd-harmonic components have not dropped to — 40 db. in this range.

thermal lag may cause the results to be misleading. Good dummy antennas are not expensive, and every amateur station needs one for all types of transmitter testing.

The antenna should be taken off the receiver so there will be no overloading. Set the audio gain control to maximum, tune in your key-down signal, turn on the b.f.o., and decrease the r.f. gain until the signal is about S9. Make sure that this setting of the r.f. gain is within the linear control range — that is, the signal should not sound the least bit mushy or thin, and an increase or decrease in gain should change the audio output in proportion. Setting the audio and r.f. gains in this way will effectively eliminate any automatic gain control action in most receivers, but if there is a separate a.g.c. switch turn it to "off"; you can learn nothing about your keying if the receiver gain varies while the amplitude of the shaped character is building up and decaying.

After getting these receiver settings right, turn off the b.f.o. and switch to a.m. reception with the widest bandwidth available in the receiver. Now key your transmitter. There will be an increase in background noise when the key is down, but this is normal. (If you have hum on your signal it will also show up, but a properly filtered power supply will show none.) Listen carefully when the key is closed, and equally carefully when it is opened. If there is the slightest trace of a hard click, the shaping is poor and the signal will be taking up a wider band than it should. The most you should get is the previously mentioned fairly soft thudding sound when the key is closed. This may not even be present on break, because of the nature of the rise and decay curves.

After adjusting the shaping to eliminate clicks completely, switch on the b.f.o. again. This will tell you how your signal will sound to others. If it seems unnecessarily soft you may have gone too far in slowing down the rise and decay times. A few back and forth trials should result in clean keying *with no trace of click*. If you are using a bug or electronic keyer, adjust the keying weight so the dots and spaces sound about equal.

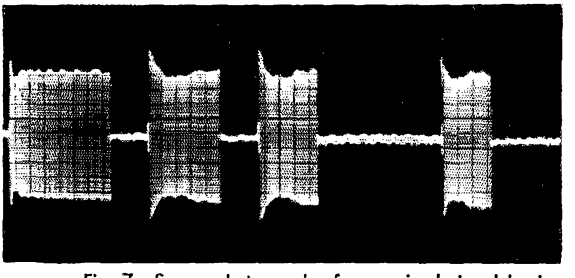


Fig. 7—Scope photograph of a received signal having essentially no shaping. The spike at the leading edge is typical of poor power-supply regulation, as is also the immediately-following dip and rise in amplitude. The clicks were quite pronounced. This pattern is typical of many observed signals, although not by any means a worst case. The signal was taken from the receiver's i.f. amplifier (before detection) using a hand-operated sweep circuit to reduce the sweep time to the order of one second.

That's all there is to it, except for one thing: If shaping adjustments don't get rid of clicks you've got other troubles. Sparking at the key and contact bounce in a bug or keying relay are the most likely prospects.[2] They have to be cured before you can begin to control your keying characteristics.

If the shaping job has been done properly, the final test is to switch in the receiver's narrowest filter and detune until the beat note just drops into the noise. Then switch off the b.f.o. At this point you should hear *nothing* when you key the transmitter, even if the filter is as narrow as 200 cycles. If anything at all is heard, the keying is too hard — provided, that is, that the receiver isn't overloading. Overloading will show up as a change in background, possibly accompanied by clicks that actually aren't on the signal. Once again, let us emphasize that the receiver *has* to be operating linearly and with constant gain. If the gain rises 40 or 50 db. when you tune your signal out of the passband (as it can do very easily if the a.g.c. is operating) you haven't proved anything. The same statement goes for any checks you may attempt to make on another fellow's signal.

Slower Speeds

Most c.w. work is at speeds ranging from 15 to 35 w.p.m. — that is, at a rate of about 12 to 30 bauds. Since the required bandwidth is directly proportional to the baud rate, most amateurs can use rise and decay times considerably longer than 5 to 7 milliseconds. On the other hand, shaping of this order does not produce key clicks, as we have said, and confines the transmitted bandwidth to a figure that is compatible with the highest c.w. selectivity ordinarily available in current receivers. There seems to be no need, therefore, to change the shaping every time the sending speed is changed. Once set for no clicks at the highest speed at which the operator will send it may be left alone — provided it can be maintained under the variable conditions thrust on the keying system by changing frequency within a band, on going from one band to another, or by different transmitter loading adjustments. Maintaining the keying waveshape under such conditions is no mean feat. Some of the problems that come up in this connection will be discussed in a subsequent article. Shaping circuits themselves are well covered in the keying chapter in the *Handbook*. QST

[2] Sparking at the key contacts usually gives rise to clicks only within the station; although these clicks do not actually go out on the air with the signal they can obscure the real state of the shaping when the station receiver is used as a monitor. See *Handbook* chapter on keying.

Field-Effect Transistors

What They Are — How They Work

BY JIM GEORGE,* W7AWH

A RECENTLY INTRODUCED semiconductor device called the field-effect transistor, or FET for short, combines some of the best features of both the vacuum tube and the transistor. The FET is appearing in new electronic circuits of all types and will soon be used in amateur radio equipment. A great deal of excitement centers about this solid-state device which acts much like a vacuum tube, and it is the purpose of this article to describe its construction and operation.

Before getting into device characteristics, let us quickly review some basic concepts in semiconductors. Useful semiconductor material is either p-type, where holes (a hole is actually a place where there is no electron) are concentrated relatively heavily, or n-type which features an excess of free electrons. Both the holes and free electrons are the current carriers in a piece of semiconductor, just as free electrons only are the current carriers in a piece of copper. As a memory aid, remember that the "p" in p-type material stands for the positive charge of the current carriers (holes) and the "n" stands for the negative charge of the current carriers (free electrons) in n-type semiconductor material. When p-type material and n-type material are brought together, a p-n junction is formed as shown in Fig. 1A.

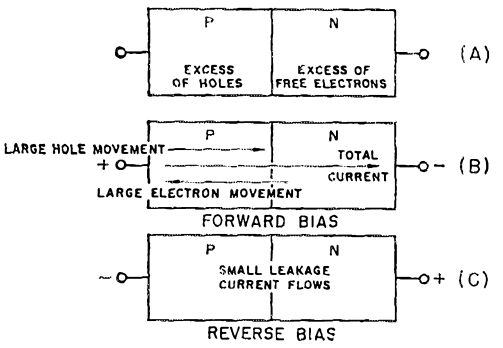


Fig. 1—Action of p-n junction when bias is applied.

The Junction Diode

The resulting action of a p-n junction is well known. When a forward bias is applied as shown in Fig. 1B, a large current will flow. The total current is made up of the electron current plus the hole current. When reverse bias (Fig. 1C) is applied, only a small reverse current flows — the p-n junction acts as a diode. It is important to note the reverse-bias case. We know that when a voltage is applied to a resistive network, this voltage is dissipated by IR drops until the applied voltage is "used up" by the sum total of all the voltage drops. The same principle applies to the case of the reverse-biased p-n junction diode. We have applied V volts of reverse bias and this voltage must be used up somehow in our circuit, the p-n junction. The resulting action is shown in Fig. 2, where charges are separated in a region close to the junction. Enough charges are moved

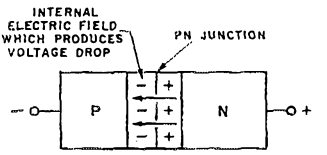


Fig. 2—Reverse bias causes electrons and holes to move away from the p-n junction, leaving a depletion region (shaded area) and no current flows.

until the electric field across the junction produces a voltage drop which is approximately equal to our applied voltage. The important point here is that the region around the p-n junction is now depleted of all its holes and free electrons, thus there are no current carriers available. This region is commonly called the "depletion region" and it sounds reasonable that its thickness depends on the magnitude of reverse voltage which is applied. It will be an important point in the operation of field-effect transistors that no current can flow in the depletion region since there are no current carriers in that region.

The field-effect transistor, for the last few years a tantalizing promise of better things in semiconductor devices, is now rapidly coming into the market at prices attractive to amateurs. We've already shown you one application in Walt Lange's audio oscillator (July *QST*). Here's the background story of the FET — how it's made and how it functions, and why it will be superior to older transistor types in many applications.

* %Motorola Semiconductor Products, Inc., 5005 East McDowell Road, Phoenix, Ariz. 85008

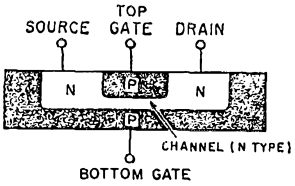


Fig. 3—The junction field-effect transistor.

The Junction FET

Field-effect transistors are divided into two main groups: junction FETs, and insulated-gate FETs. We will discuss the Junction FET, or JFET, first. The basic JFET device is shown in Fig. 3.

First of all, note the location of the terminals where voltages can be applied. The reason for the terminal names will become clear later. A d.c. operating condition is set up by starting a current flow between source and drain. This current flow is made up of free electrons since the semiconductor is n-type in the channel, so a positive voltage is applied at the drain. This positive voltage attracts the negatively-charged free electrons and the current flows (Fig. 4A). The next step is to apply a gate voltage of the polarity shown in Fig. 4B. Note that this reverse-biases the gates with respect to the source, channel, and drain. This reverse-bias gate voltage causes a depletion layer to be formed which takes up

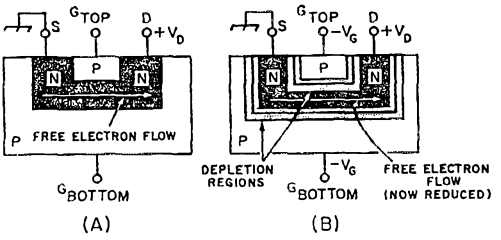


Fig. 4—Operation of the JFET under applied bias. A depletion region (light shading) is formed, compressing the channel and increasing its resistance to current flow.

part of the channel, and since the electrons now have less volume in which to move the resistance is greater and the current between source and drain is reduced. If we apply a large gate voltage, we cause the depletion regions to meet, and in this case the source-drain current is reduced nearly to zero. Since we changed the large source-drain current with a relatively small gate-voltage, we have a device which acts as an amplifier.

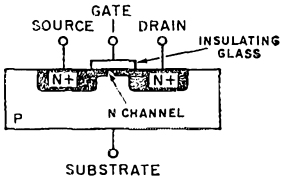


Fig. 5—The insulated-gate field-effect transistor.

Further, note that in the operation of the JFET, the gate terminal is never forward biased, because if it were the source-drain current would all be diverted through the forward-biased gate junction diode.

The resistance between the gate terminal and the rest of the device is very high, since the gate terminal is always reverse biased, so the JFET has a very high input resistance. The source terminal is the *source* of current carriers, and they are *drained* out of the circuit at the drain. The gate *opens* and *closes* the amount of channel current which flows. It is seen how the operation of a FET closely resembles the operation of the vacuum tube with its high grid input impedance. Comparing the JFET to a vacuum tube, the source corresponds to the cathode, the gate to the grid, and the drain to the plate.

Insulated-Gate FET

The other large family which makes up field-effect transistors is the insulated-gate field-effect transistor, or IGFET, which is pictured schematically in Fig. 5. In order to set up a d.c. operating condition, a positive polarity is applied to the drain terminal. The substrate is connected to the source, and both are at ground potential, so the channel electrons are attracted to the positive drain and we now have a d.c. source-drain current. In order to regulate this current, we apply voltage to the gate contact. Note that the gate is insulated from the rest of the device by a piece of insulating glass so this is not a p-n junction between the gate and the device—thus the name insulated gate. When a negative gate polarity is applied, positively-charged holes from the p-type substrate are attracted towards the gate and the conducting channel is made more narrow; thus the source-drain current is reduced. When we connect a positive gate voltage, the holes in the substrate are repelled away, the conducting channel is made larger, and the source-drain current is increased. As can be seen, the IGFET is more flexible since we can apply either a positive or negative voltage to the gate. The resistance between the gate and the rest of the device is extremely high because they are separated by a layer of glass—not as clear as your window glass, but it conducts just as poorly. Thus the IGFET has an extremely high input impedance. In fact, since the leakage through the insulating glass is generally much smaller than through the reverse-biased p-n gate junction in the JFET, the IGFET has a much higher input impedance. Typical values of R_{in} for the IGFET are over a million megohms, while R_{in} for the JFET ranges from megohms to over a thousand megohms.

Characteristic Curves

The characteristic curves for the FETs described above are shown in Figs. 6 and 7, where drain-source current is plotted against drain-source voltage for given values of the gate voltage. Note the similarity to the family of a vacuum-tube pentode as shown in Fig. 8, where

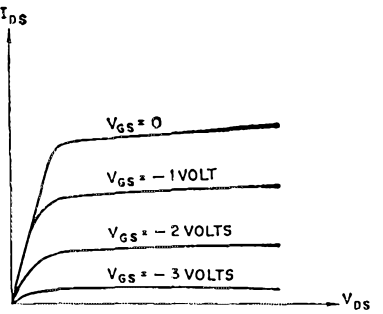


Fig. 6—Typical JFET characteristic curves.

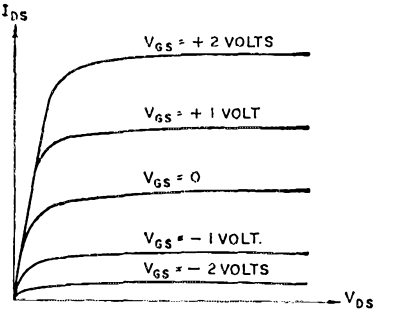


Fig. 7—Typical IGFET characteristic curves.

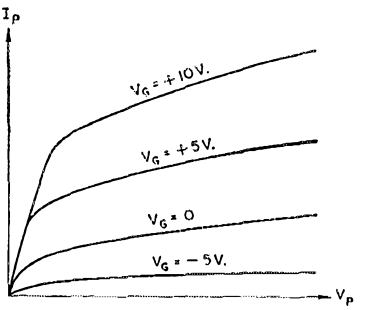


Fig. 8—Typical vacuum-tube characteristic curves.

plate current is plotted against plate voltage for varying amounts of grid voltage.

In discussing the JFET so far we have left both gates separate so the device can be used as a tetrode in mixer applications. However, the gates can be internally connected for triode applications. When using the IGFET the substrate is always a.c.-shorted to the source, and only the insulated gate is used to control the current flow. This is done so that both positive and negative polarities can be applied to the device, as opposed to JFET operation where only one polarity can be used, because if the gate itself becomes forward biased the unit is no longer useful.

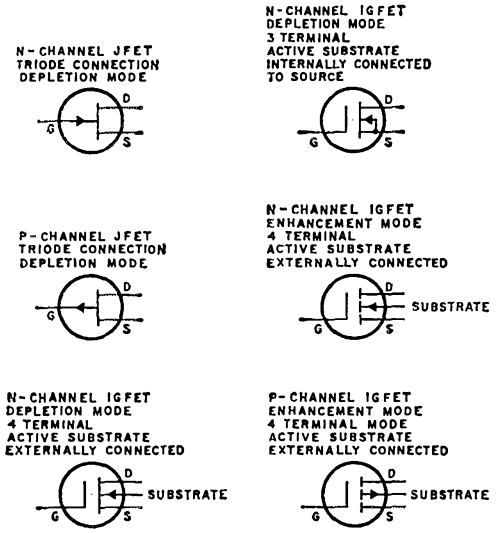


Fig. 9—Symbols for most-commonly available field-effect transistors.

Classifications

Field-effect transistors are classed into two main groupings for application in circuits, enhancement mode and depletion mode. The enhancement-mode devices are those specifically constructed so that they have *no* channel. They become useful only when we apply a gate voltage which causes a channel to be formed. IGFETs can be used as enhancement-mode devices since both polarities can be applied to the gate without the gate becoming forward biased and conducting current.

A depletion-mode unit corresponds to Figs. 3 and 5 shown earlier, where a channel exists with no gate voltage applied. For the JFET we can apply a gate voltage and deplete the channel, causing the current to decrease. With the IGFET we can apply a gate voltage of either polarity so the device can be depleted (current decreased) or enhanced (current increased).

To sum up, a depletion-mode FET is one which has a channel constructed; thus it has a current flow for zero gate voltage. Enhancement-mode FETs are those which have no channel, so no current flows with zero gate voltage. The latter type devices are especially useful in logic applications.

Circuit symbols approved for FETs are shown in Fig. 9. Both depletion-mode and enhancement-mode devices are illustrated.

Applications

Some applications for FETs are shown in Figs. 10 and 11. In Fig. 10 a JFET oscillator is pictured, and a versatile FET d.c. voltmeter (FETVM) is shown in Fig. 11.

The voltmeter features two Motorola 2N4221 JFETs and offers the high input impedance (22 megohms on all ranges in Fig. 11) of a v.t.v.m. but with more stability. The circuit is essentially a differential amplifier which works on the prin-

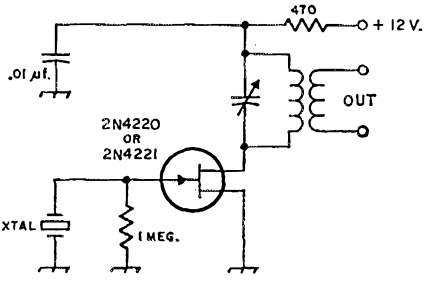


Fig. 10—Typical JFET crystal-oscillator circuit.

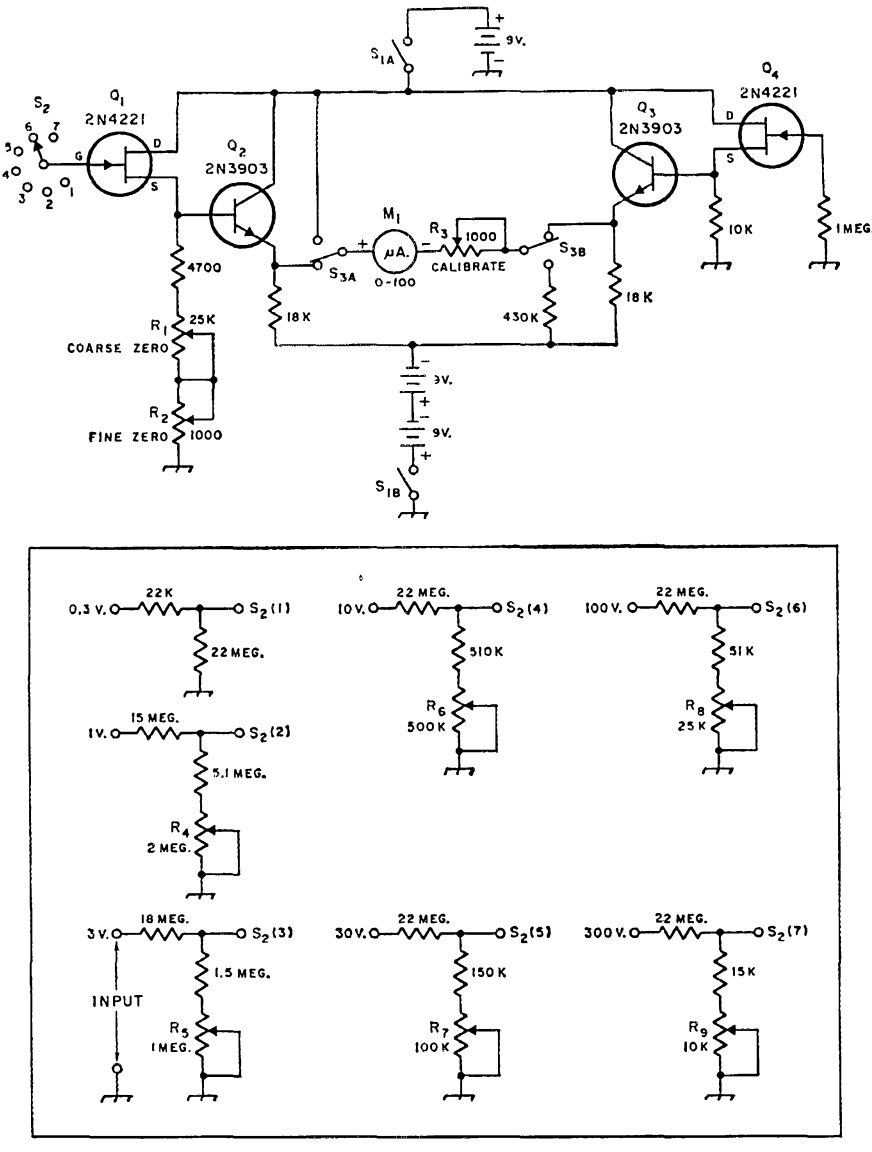


Fig. 11—D.C. voltmeter circuit using field-effect transistor. Resistances are in ohms (K = 1000); fixed resistors are ½ watt. The second position of S_3 is used for checking battery voltage.

M_1—0–100 microammeter.
S_1—D.p.s.t. toggle.
S_2—D.p.d.t. toggle.
S_3—Rotary, 1 section, 1 pole, 7 positions.
R_1 R_2 R_3—Linear controls (R_2 and R_3 are panel adjustments; R_1 can be internal).
R_4–R_9 inc.—Trimming potentiometers, for internal mounting (Mallory MTC or equivalent).

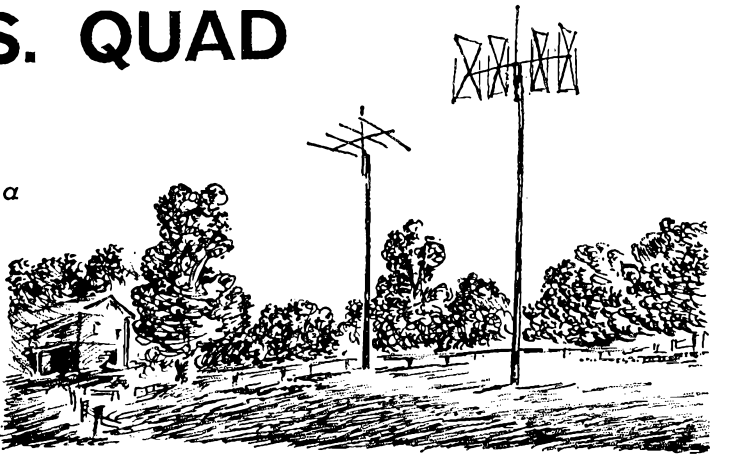
ciple that the current through a resistance is directly proportional to the difference between the voltages at its ends. When R_1 and R_2 are adjusted so that the voltage at the emitter of Q_2 is equal to the voltage at the emitter of Q_3, with no input signal, the voltage difference is zero and no current will flow through the meter.

When the voltage at the gate, G, of Q_1 is raised to 0.3 volt the voltage across the meter circuit also is approximately 0.3 volt since the source followers and emitter followers have a voltage gain of approximately one. R_3 is then adjusted to give full-scale meter deflection. The calibration resistors, R_4–R_9 inclusive, are individually adjusted for exactly full-scale deflection on each range when the maximum voltage for that range is applied to the input terminals through the range switch, S_2. An accurate voltmeter should be used to check the applied voltage when setting

(Continued on page 164)

YAGI VS. QUAD

Establishing Antenna Superiority Through Reception Reports



An artist's sketch of the spacious antenna site of W4RBZ. The beams are mounted 80 feet above the ground on telephone poles spaced 150 feet apart.

BY ROBERT E. FITZ,* W4RBZ

AFTER more than 30 years of hamming from a series of temporary and semipermanent locations, my first act upon retirement from the Air Force was to settle at a permanent location on a small farm in Tennessee and install a pair of the biggest telephone poles I could acquire.

The many discussions I had on the ham bands regarding the Yagi beam *vs.* the cubical quad led me to conclude that the ideal sport would be the on-the-air comparison of the two: I wanted to know exactly which antenna I should keep as the ultimate. These QSOs concerning the Yagi and the quad did not convince me that either one of them was vastly superior to the other. A big percentage of the quad men seemed only to be comparing their quads against tribanders or small beams that had been used in the past.

It seems to be pretty well established that at the lower heights a quad has a definite edge over the Yagi. However, I was curious to know how the two antennas would compare when both were placed at a relatively high elevation.

A 20-meter 4-element commercial monoband beam was installed on one of the previously-mentioned poles. This antenna worked better than any antenna I had ever used before at any location. About two months later I installed a 4-element quad, using the fiberglas arms and aluminum spiders available on the market. A coax switch was mounted on the station control panel to permit instantaneous switching from one antenna to the other for a rapid cross check.

* Route 1, Springfield, Tennessee 37172.

The merits of Yagis and quads have been expounded through the years, with it being a matter of opinion which antenna is the superior of the two. W4RBZ was fortunate to have enough time and real estate to erect both antennas and make on-the-air comparisons. Here's what he found out.

At the time this article is being written, I have used the two antennas for about three months and have checked both antennas with over a hundred stations. Most of the stations that I asked to give a comparative report were foreign; a definite effort was made to concentrate on the long-haul boys.

Any good engineer or analyst could point out a number of weaknesses in my system of comparison. This I will concede. I have only the standard test equipment available to the average ham; I don't have the capabilities for installing model antennas or conducting elaborate laboratory tests. My only motive was to determine whether a good commercial beam performed as well as, the same as, or better than a typical cubical quad installed at the same height at the same location by a ham of average ability with ordinary facilities and equipment.

First of all, a short description of the antennas is in order. The Yagi has a 36-foot boom and was adjusted strictly in accordance with the directions given by the manufacturer. The quad is mounted on a 30-foot boom in a diamond configuration and was originally installed using the dimensions given in a previous *QST* article[1] and in use by a number of hams. Both antennas were peaked to a fundamental frequency of 14,220 kc.

Each antenna is on a separate telephone pole and the boom of each is mounted exactly 80 feet above ground. The Yagi is about 30 feet closer to the shack, and is nearer to the highway and power lines; however, the quad is closer to some tall trees about 50 feet high. Both antennas are raised and lowered by similar elevator-cage hoisting arrangements.

As mentioned earlier, the quad was originally installed using those element dimensions that

[1] Bergren, "The Multielement Quad," *QST*, May, 1963.

seem to be most commonly employed. During the first two weeks of testing there was practically no difference between the antennas. Then the quad was lowered and completely retuned for maxium forward gain. This seemed to give the quad an edge on some contacts.

After the quad had been in use in this condition for about three weeks, one of the old antenna experts from the West Coast suggested that my quad still might not be peaked for maximum performance and suggested that I try his dimensions. This I did. The quad performance fell off noticeably. For the next 25 or 30 checks almost every station giving a comparison reported either that there was no noticeable difference between the antennas or that the Yagi had the edge. This was most noticeable on the long-haul contacts. Previously, VU2CK had reported on several occasions that the quad had about a one S unit advantage; after this change, Karnik reported that there was no noticeable difference between antennas. The same was true with several 9M2, 9M6 and VK9 stations.

The quad was again retuned for maximum forward gain, and tests were resumed.

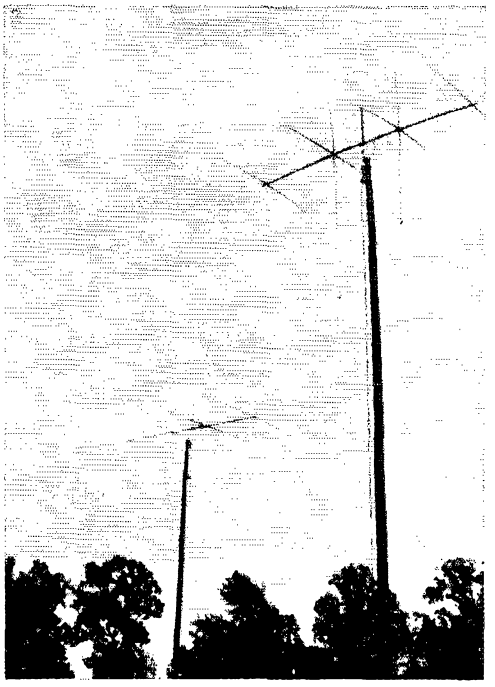
I will only cite my experience with the Yagi and quad installation. In general, there was practically no difference in signal strengths on the short-haul contacts, and there was seldom any difference on medium-haul contacts to stations in Europe, Africa and the mid-Pacific. However, on the very-long-haul contacts to the Far East, Asia and the South Pacific, the quad had a fairly consistent 2-3-db. edge. On only a few occasions was there a big difference in reported signal strengths; this seemed to work both ways, with the quad being given a 2-3-S-unit advantage in a few instances and the Yagi given the same advantage in a few others.

On a number of checks, inconsistencies in the reports indicated that the different angles of radiation of the two antennas had pronounced effects. For example, on one occasion a JA, DU and VK6 were worked in quick succession. The JA contact gave the quad the edge, the DU reported the stronger signal from the Yagi and the VK6 reported no difference in signal strengths. Instances of this nature occurred frequently.

I learned early in the game that, under ordinary conditions of QSB and QRM, one switch-over between antennas did not give a valid comparison; the signals from the two antennas were generally so close in strength that several checks in quick succession were necessary for the other station to be able to give a fair evaluation.

While my quad seemed to have an edge on long-haul contacts, there were still times, under the varying conditions of propagation, that the Yagi put out a stronger signal. The type of antenna in use at the "receive" end was definitely a factor. Shown below is a summary of my last 100 reports, the results of which are typical of my experience over the past thre emonths. The quad was tuned for maximum forward gain for these checks.

Number of stations asked to compare antennas	100
Number *reporting no* difference between antennas	38
Number reporting stronger signals from the Yagi	17
Number reporting stronger signals from the quad	45



This photograph shows some of the details of the quad and Yagi antennas.

Worthy of note is that there was never any reported difference on long-path contacts. This could be checked on only about a half dozen occasions, but no one reported any difference between antennas on the few long-path checks.

There are several factors, other than signal strengths at the "receive" end of the circuit, that must be given consideration in any final selection of the better of the two antennas. Even when tuned for maximum forward gain, my quad has a better front-to-back ratio; received signals were generally weaker off the back of the quad. The Yagi has stronger side lobes; a number of times, after checks with long-haul stations, a W station quartering off the side would break in to tell me that the Yagi appeared to be stronger during the test. This was also noticeable in reception. I also noted that during periods of heavy rain the quad had considerably less precipitation static.

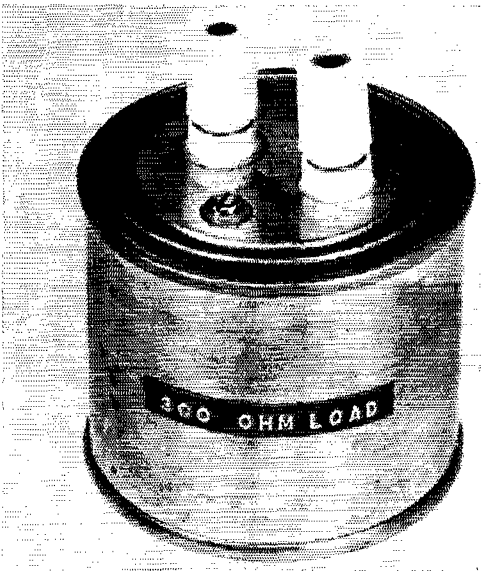
(Continued on page 166)

A 300-Ohm Standard For The Transmatch

MANY radio amateurs use balanced feeders, and 300-ohm twin lead is a common choice among these operators. Effecting an impedance match between the balanced transmission line and the antenna is difficult to do when one does not have a balanced-line type s.w.r. bridge. Admittedly, a coaxial balun can be inserted between the 300-ohm antenna and the feed line so that a 75-ohm unbalanced s.w.r. bridge can be used, but at the lower frequencies a coaxial balun becomes unwieldy. A coil-type balun transformer can be used, but what if one isn't readily available when needed?

A simple solution lies in the use of a transmatch and a 300-ohm noninductive load. The 300-ohm standard is attached to the transmatch in place of the antenna feed line, an s.w.r. bridge is connected between the transmitter and the transmatch, and the transmatch is adjusted for a 1:1 s.w.r. The dial readings on the transmatch are noted and when the feed line is again connected to the transmatch, the matching network at the antenna is adjusted for a 1:1 s.w.r. with the transmatch dials set at the same position as for the 1:1 condition when the 300-ohm load was attached.

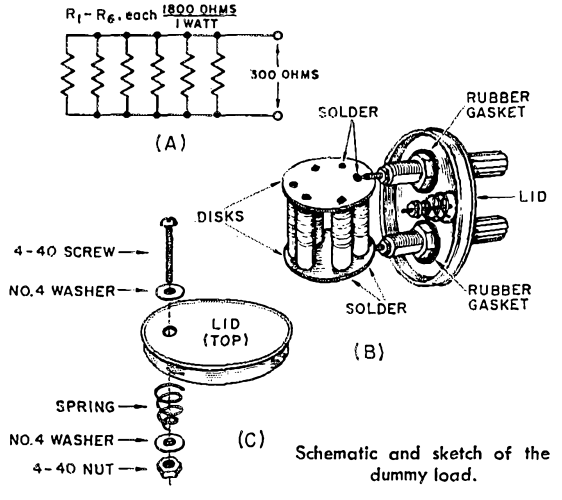
Simple? Yes, but let's talk about the standard and how it's built.



The balanced 300-ohm standard.

Construction

The dummy load shown in Fig. 1 will handle 20 watts of r.f. power (sustained) and up to 50 watts for periods of 10 seconds or less. Generally, the station exciter can be used for the antenna tests, keeping the power output within the limits specified for the 300-ohm standard. The standard will present a 300-ohm impedance (non-reactive) from 1.8 to 30 Mc. A deterioration in performance was noted at 50 Mc., resulting in an impedance reading of 220 ohms when the unit was tested on a Boonton 250-A RX meter. Hence, it is not recommended that the load be used as a standard above 30 Mc.



Schematic and sketch of the dummy load.

The unit is made up from six 1-watt, 1800-ohm resistors. When parallel connected, the resistance becomes 300 ohms. For best accuracy, 5-per cent resistors should be used, but by hand-selecting 10-per cent resistors, it should be possible to obtain the 300-ohm figure.

The resistors are mounted between a pair of 1-inch diameter copper or brass disks, and are spaced around the perimeters of the disks as shown in Fig. 1B. Make certain that the body of each resistor is flush against the disk before soldering the pigtail to the disk. When soldering, do not overheat the assembly because this can change the value of the resistors.

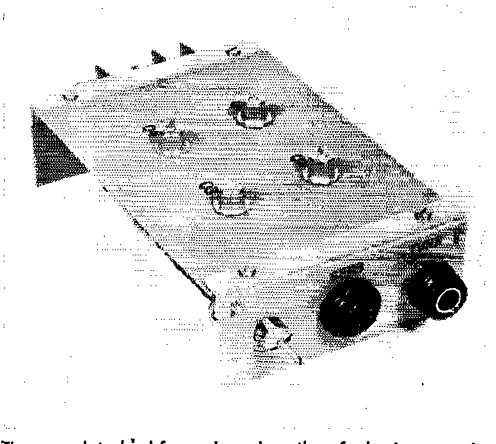
Two E.F.Johnson binding posts are mounted on the lid of a small paint can (mine measures

(Continued on page 170)

Simple Transistor Unit Covering 16 to 30 Kc.

A V.L.F. Receiver Without Tuning Capacitors or Coils

BY JOHN M. TIFFANY,* ex-2BQK, 2CGK, W3CQN



The completed v.l.f. receiver. Lengths of aluminum angle are used to fasten the circuit board to the end supports. The latter are of the same material as the board.

WHILE reminiscing one day with W4GCC, ex-5MO, about the old days of ham radio, the talk got around to the world of 25,000 meters. That was the playground of the arc transmitter of POZ, Nauen, the pure tone of the alternator of WII, New Brunswick, and several others. That was also the world and time of the Old Man's Young Squirt, when the threat of the Wouff Hong and the Rettysnitch was a thing to be reckoned with. Those were the days when the Young Squirt wound his 25,000-meter tuning coil with No. 24 wire on an oatmeal box and made his own tap switch, using brass machine screws for contacts. Today, the spark, arc, and alternator transmitters are gone, but NAA, now transplanted from Virginia to Maine,[1] is still on the air with its high-power tube transmitter, and the many transmitters of NSS can be heard day and night. The receiver described here was designed and built to listen in on these stations. This receiver does not match the performance of the modern superhet, but it does bring in the long-wave transmissions of time signals and press, and provides good code practice.

Circuit

The receiver consists essentially of three interrelated circuits — oscillator, detector, and amplifier. The oscillator beats with the incoming signal to produce an audio signal in the detector and at the amplifier output. To avoid the need for large coils and tuning capacitors, the oscillator is a free-running multivibrator with adjustable emitter bias for frequency control. Using the values shown for R_1, C_1, R_2, C_2, and tuning potentiometer R_3, the tuning range is about 16 kc. to 30 kc. Selecting different values for C_1 and C_2 will shift the range higher or lower if desired. Larger values reduce the frequency. The combination of CR_1, C_3, and R_4 assures that the multivibrator starts oscillating each time power is applied, even though potentiometer R_3 may be set to its maximum resistance. Without this circuit, Q_2 could be cut off by the large amount of emitter resistance, reducing the loop gain of the multivibrator and preventing oscillation. However, when power is first applied, capacitor C_3 has no charge and CR_1 conducts, effectively connecting the emitter of Q_2 to ground. Under this condition, the gain of Q_1 and Q_2 is enough to start oscillation. As oscillations build up, C_3 charges positively at the junction of CR_1, back-biasing CR_1 and effectively removing C_3 from the circuit. Detector Q_3 is untuned and the antenna is connected to its base through RFC_1. The latter serves in a limited way as an antenna loading coil, but is primarily an r.f. choke to keep out unwanted signals from local broadcasting stations. Capacitor C_4 shorts out any unwanted higher frequency signals that are not completely blocked by RFC_1.

The oscillator is d.c.-coupled to the base of detector Q_3 through the sensitivity control R_5 and resistor R_6. The setting of R_5 determines the average bias level for Q_3. The a.c. signal from the oscillator swings the base current of Q_3 through the optimum operating conditions twice each cycle, and causes pulses to be generated in the collector of Q_3 at the simultaneous occurrences of incoming signal and oscillator voltages. The result is an audible heterodyne signal which is amplified by the circuits of Q_4. Capacitor C_5 filters residual oscillator voltage.

The current drain of the receiver is 11 ma. at 12 volts. At this low drain, battery operation is practical, although a simple voltage-doubler rectifier and filter, supplied by a 6.3-volt filament transformer, is more convenient. The receiver

*2601 Lullington Drive, Winston-Salem, North Carolina.

[1] Baldwin, "NAA — 1961," *QST*, October, 1961.

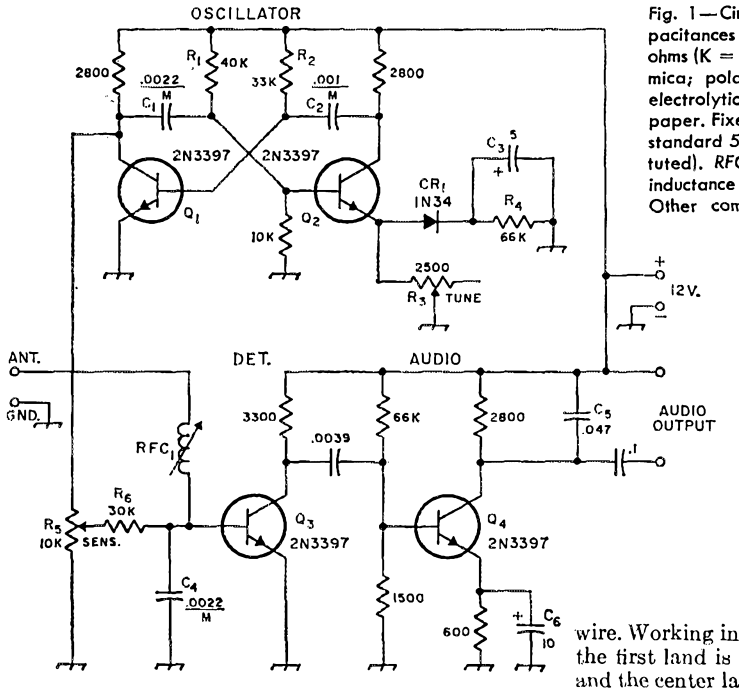


Fig. 1—Circuit of the v.l.f. receiver. Capacitances are in μf.; resistances are in ohms (K = 1000). Capacitors: M indicates mica; polarized capacitors are 15-volt electrolytic; others are disk ceramic or paper. Fixed resistors are ½ watt (closest standard 5 per-cent values may be substituted). RFC_1 is a slug tuned width coil, inductance approximately 2 to 10 mh. Other component labels are for text-reference purposes.

will operate over a range of about 6 to 15 volts, but good headphone level is obtained with 12 volts applied. An audio amplifier with medium or bridging input impedance can be used for loudspeaker reception. A single-wire antenna at least 75 feet long, and up to a couple of hundred feet long, if possible, should be used. A good ground is essential. CAUTION! Do *not* use power or telephone lines as an antenna.

The receiver shown in the photograph uses p-n-p transistors that are not available on the market. The transistors shown in the schematic are n-p-n of the G.E. economy line, and have characteristics suitable for this application. Various types of transistors have been used in this receiver circuit, all with good results. If p-n-p transistors are used, the polarities of the supply voltage, diode CR_1, and capacitors C_3 and C_6 must be reversed.

Construction

All components, except the terminal board and the two controls, are mounted on a 3½ × 5-inch laminated fiber-glass, or equivalent, board. All copper is stripped from one side of the board (if both sides are copper-clad) and the pattern of lands (exposed copper) is cut on the apparatus side as shown in Fig. 2. The lands, about 3/16 inch wide, are used as tie points for all component leads. The six lands at each end are used for input and output connections and miscellaneous tie points. Starting at each transistor location and working toward the edges of the board, the first land is a tie point for the transistor base, the next for the collector, and the outer land is for common positive supply. The two outer positive supply lands are strapped by a wire. Working inward from the transistors, the first land is for the emitter connection and the center land is for common negative supply and ground.

To cut the lands, mark the pattern on the copper and, using a metal straightedge, score the copper with a sharp-pointed knife blade. Using the point of the knife blade, loosen a corner of the copper to be stripped and pull off the unwanted copper with long-nose pliers or the points of diagonal cutters. When all the unwanted copper is removed, polish both surfaces with fine sandpaper to remove rough edges. Examine the areas between the lands to be sure that all copper has been removed and that there are no shorts between the lands. Drill the holes for the transistor leads and connect the leads to the appropriate lands, grasping the leads with flat-nose pliers while soldering to prevent overheating the transistor. In the case of Q_1 and Q_3, the emitter lands are not used and the emitters are connected directly to the negative-voltage land. Use in-

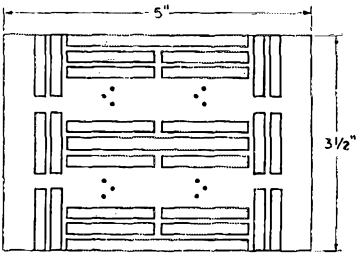
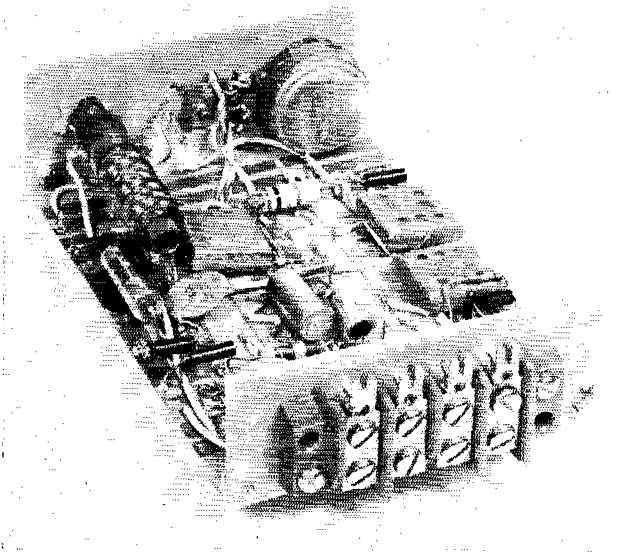


Fig. 2—Components are mounted on a copper-clad circuit board. Dark areas represent lands—the copper that is left after cutting the remainder away with a sharp knife, as described in the text. Note: The transistor terminal arrangement shown is for the transistors originally used. For the 2N3397, the holes should be in a straight vertical line, with approximately ⅛-inch spacing.



Bottom view showing the arrangement of components on the under side of the circuit board.

sulation over the transistor leads where they pass over a land used for a different circuit. Solder the component pigtails directly to the appropriate lands, using pieces of insulated wire for any required connections between lands and for leads to the terminal block and controls. The two controls and the antenna loading coil are mounted on an end strip attached to the board by a piece of aluminum angle, and the terminal strip is mounted similarly at the other end of the board. The layout of the components and the wiring is not critical and no doubt many variations would be equally good.

Operation

Apply power to the receiver and rotate the sensitivity control R_5. A point will be found where the background noise is loudest. Probably one or more of the long-wave stations will be heard, since it is usual to find several of them on the air. The selection of signals and their beat notes are controlled by the tuning potentiometer R_3. Each time the setting of the tuning potentiometer is changed, the sensitivity potentiometer may have to be adjusted for optimum strength, but it will usually be somewhere near mid-scale. Adjusting RFC_1 may have some effect on the signal strength, depending on the length of the antenna, but its primary function is that of an r.f. choke at broadcast frequencies, as mentioned earlier, and its effect on long-wave signals is small.

Performance

Using a single-wire antenna about 100 feet long at the writer's East-Coast location, good signals are received from NSS, Annapolis; NAA, Maine; NPG on the West Coast; and NBA, Canal Zone. Since there is no preselection in the receiver, signals at twice the oscillator frequency can also be heard. No interference has been noticed from any of the local broadcasting stations. QST

. . . K. B. Warner editorialises about the probable forthcoming shortage of standard parts for the ham who builds his own. In the "good old daze," of course, there being no such widespread variety of components, most amateurs did in fact make most of the components. He even hints that it might be a good idea to stock up on a few tubes in case there are jobs to be done that only amateurs can do.

. . . Oakes Spalding, W1FTR, recently returned from a two-year cruise on the *Yankee* takes us on a marvelous trip around the world, working Ws back home and certain designated foreign hams. He visits all the classic spots, including Pitcairn Island. Better read this one.

. . . Byron Goodman, W1JPE (now W1DX) has a piece on an all-band 80 watter. Built on the popular metallic "breadboard" of the day, there is a string of 6AC5Gs to drive an HY30Z final. It can, of course, be used to drive a final large amplifier.

. . . S. Gordon Taylor, W2JCR describes an automatic line-voltage regulator, using the familiar filament transformer to boost the line voltage, but also employing an Amperite voltage regulator tube.

. . . This month we have several pages devoted to the YLs. There are some familiar names, too. What the article is really about is the formation of the YLRL, Young Ladies Radio League, designed to cope with communication emergencies of about whatever nature.

. . . Ev Battey, W1UE, concludes his two-part article on the secrets of good sending. He goes into considerable detail in this matter of correct character formation, spacing, etc. The dope still applies.

— *W1ANA*

V.F.O. Stability — Recap and Postscript

In Two Parts—Part II *

An Examination of Some Design Principles, Old and New

BY GEORGE GRAMMER,** W1DF

Remote Tuning

Since the change in drift characteristics with the physical rearrangement of the tank had been so pronounced, two 15-inch pieces of RG-62/U cable were installed to connect the tank to the tube, the latter being mounted on an entirely separate chassis. The thought here, of course, was that this would entirely eliminate conducted heat as a factor.

There followed a series of drift runs which gave somewhat confusing results — sometimes the drift would be positive and sometimes negative. The drift was generally less (in one outstanding case, only about 50 cycles over a 12-hour period) but more variable. Further checking with the hair dryer showed that the coax cable had a *negative* temperature coefficient of capacitance, while all the other tank components were positive. RG-59/U was substituted and found to have the same characteristic, so it would appear to be a property of the polyethylene cable.

This offers a means for temperature-compensating a circuit using the remote-tuning principle, although it may be harder to apply satisfactorily than regular negative-coefficient capacitors unless the cable is made a part of the complete assembly so it heats in the same way each time the v.f.o. is used.

Heat Transfer — General

From the foregoing, it is clear that the direct solution to 99 per cent of the drift problem is to keep the temperature of the *tank circuit* as constant as possible, or at least to force any unavoidable changes in temperature to occur as *slowly* as possible. The obvious way to do this is to keep the tank far away from heat sources. The entirely separate "remote-tuned" tank box is well justified, provided some care is used in placing the connecting coax cables so they aren't inadvertently subjected to temperature changes. In some cases this may be cumbersome, so in this v.f.o. one-chassis assembly of the r.f. section was attempted. The power supply, usually a potent source of heat, was built separately.

The finished circuit retained the coax cables so the tank could have maximum separation from the tubes, which are at the opposite end of the chassis. As Fig. 7 shows, the tank is in a shield box

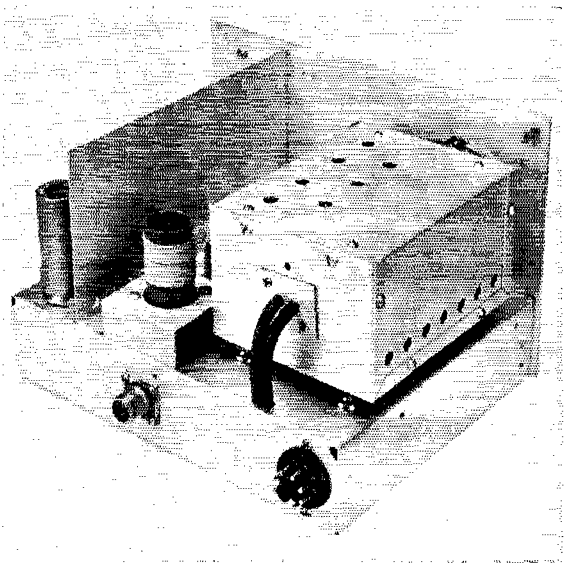


Fig. 7—Tank-enclosure mounting. The shield box is set on half-inch pillars to minimize heat conduction from the chassis to the box. Ventilating holes in the box cover are arranged so air enters at the bottom of the outer side and emerges at the top left. Note that additional sheet-metal screws are used to hold the cover firmly in place.

mounted on pillars. This allows air to circulate underneath, and reduces actual contact with the chassis to a minimum, thus cutting down conducted heat.[9] Ventilation of the inside of the tank box is provided by a series of ¼-inch holes along the bottom of the outside wall of the cover, plus an equal number in the top toward the opposite side. This allows air from outside the chassis to be drawn through.

To shield the tank box from radiated heat a baffle plate of bright aluminum is mounted right alongside the tubes so their heat is reflected outward from the chassis. Quarter-inch holes are drilled in the chassis alongside the tube sockets and along the bottom of the baffle plate, Fig. 8, to encourage air circulation upward past the tubes. The cover and bottom plate for the

** Technical Editor, *QST*.

* Part I appeared in September 1966 *QST*, p. 22.

[9] The pillars in the version shown are metal, but celotex insulation between the chassis and tank box also was tried, with no metal-to-metal contact. There was no observable difference between the two methods.

entire assembly are made from *open-work* do-it-yourself aluminum.

These measures are quite effective in keeping the tank box cool. After several hours of operation the box is still just about as cool, as judged by touch, as it was before power was turned on, although the end of the chassis on which it is mounted is noticeably warm and the tube end is even more so. Actually, the measured temperature rise inside the box after a four-hour run averages 6 to 8 degrees F.

In this layout the conversion crystals at first were covered by an aluminum shield, to prevent possible stray coupling between the crystals and the output coil at the rear. This shielded space confined some of the chassis heat. Removing the shield reduced frequency drift in the crystals, and fortunately the shielding was found to be unnecessary.

Parasitic Oscillations

Lengthening the leads between the oscillator tube and the tank invites v.h.f. parasitic oscillations when a good high-transconductance triode is used. In several different physical layouts used for this oscillator parasitics invariably were generated. The frequency ranged from about 50 to 200 Mc., depending on the lead lengths. The parasitic circuit is a simple Colpitts using the interelectrode capacitances to tune the grid and plate leads, as shown in Fig. 9. The regular tank capacitors are so large that they act as a short circuit at the end of the "line" formed by the leads from the tube to the tank.

Various chokes and choke-resistor combinations were tried in the grid and plate leads, and

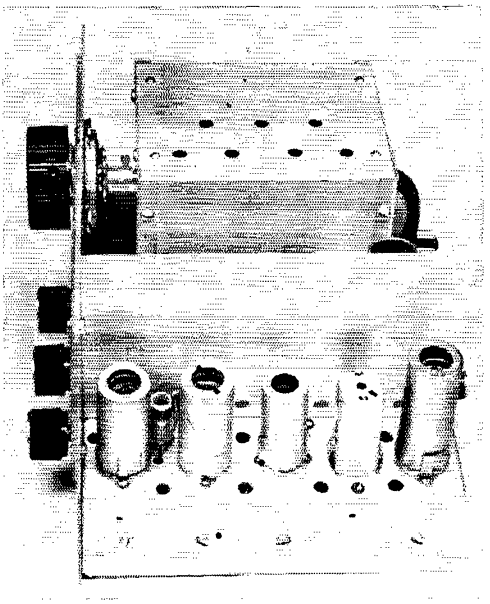


Fig. 8—Heat from the tubes causes convection currents that draw air across the chassis and through the holes in the baffle plate, as well as from below the chassis through the holes along the chassis edge.

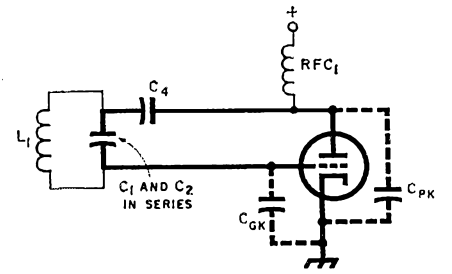


Fig. 9—Parasitic-oscillator circuit formed by leads from the grid and plate to the tank. The inductance of L_1 is large enough, at v.h.f., to act as an r.f. choke. Parasitic oscillations are likely to occur when the leads (drawn with heavy lines) are an inch or more long.

although they always could be made to suppress the parasitic after a little tinkering, the choke size had to be changed with each change in lead length. It is simpler to use resistance only, but since appreciable resistance is undesirable in either lead at the fundamental oscillator frequency the lowest possible value of resistance should be used. At the fundamental, a given value will be equally bad no matter where it is placed in the lead, but fortunately this is not true at the parasitic frequency. A low resistance at a high-current point in a parasitic circuit will be equally as effective as a high resistance at a low-current point. The high-current point in this parasitic circuit is right at the tank capacitors, so the resistor should be installed there. A 10-ohm carbon resistor, R_2 in Fig. 4, has been effective in several oscillator arrangements of this type.

It is more than likely that unsuspected v.h.f. parasitics exist in a great many low-frequency oscillators. The better the tube, the more likely they are to occur. Low power is no insurance against them. They cause erratic frequency changes, "hot" spots and body capacitance where there shouldn't be any, and similar effects. A rectifier-type wavemeter check should be made on any oscillator — just to be sure.

Vibration and Mechanical Shock

It is traditional to say that an oscillator should be "solidly constructed," and if this is interpreted to mean that the construction shouldn't be flimsy, the principle is good. "Solid," though, needs qualification. A bell is solid, but it can vibrate like mad. "Sound deadened" perhaps would be a better description of what is needed. The construction should be such that the oscillator cannot "ring" mechanically.

Since metal transmits vibration very efficiently, it is reasonable to assume that the vibration-sensitive parts should *not* be mounted on metal. Wood does not ring readily, but it is not a very satisfactory structural material for radio gear. The next best probably is a plastic of some sort.

Quarter-inch Plexiglas was used for mounting the tank components in the oscillator shown, and has proved quite satisfactory. Plexiglas is

also an insulator for heat. It slows down the conduction of heat from the box to the tank components, contributing further to making the temperature change, and hence the drift, very slow.

The tank and plastic plate form a single unit, mechanically. This type of assembly is less susceptible to mechanical shock than chassis mounting, since any movement tends to occur *as a whole*, rather than as a series of separate responses. The Plexiglas plate is mounted on pillars at its four corners; a three-point mounting theoretically might be better, but was avoided here because of the possible torsion effects when turning the variable capacitor (any twisting of the assembly with tuning probably would result in backlash).

The insulating base makes it possible to avoid multiple ground paths, which often give rise to intermittent effects.[10] A single ground bus can be used; in this oscillator, it is a half-inch wide strip of aluminum running from beneath the tuning capacitor to the rear of the mounting plate. This strip is the only capacitor ground point; the rotor shaft does not touch the front of the box where it goes through, and an insulated flexible coupling is used between the shaft and tuning dial.

An "air-wound" coil such as Miniductor deserves special attention. The principal problem is the method of mounting; the coil itself, if small, will have very little inertia and little tendency to vibrate. In this case the mounting is a strip of Plexiglas of the same thickness as the coil supporting strips, filed down to make a snug fit and then cemented to opposite strips. The assembly is supported on ¾-inch ceramic pillars. Experience has shown this method to be vibration-proof.

Ordinary chassis mounting suffices for the oscillator tube, since the tube has so little direct effect on the frequency. The triode-pentode is rather free from microphonic effects (none have been observed) because of the small and light elements and the short internal supporting leads, along with very good bracing.

If coax cables are used to connect the tank to the tube it seems better not to fasten them rigidly. They should be clamped together so they will move as a unit under shock. At one time the cables shown in Fig. 10 were anchored midway along their length, but there was less frequency change with both temperature and vibration when this support was removed.

Finally, the shield box containing the tank needs firm bonding all around the meeting surfaces of the base and cover. The box is coupled to the tank, especially to the coil, because of the electric and magnetic fields surrounding the tank components. Poor or intermittent contact between the metallic surfaces will affect the frequency in unpredictable (and usually sporadic) ways. Use enough screws so that the surfaces are everywhere firmly in contact.

[10] Such as those described by Long in the article mentioned in footnote 7.

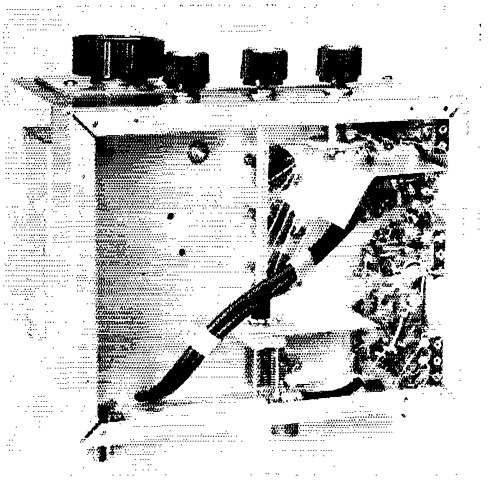


Fig. 10—The coax leads from the tank are clamped together to prevent relative movement, but are not otherwise connected mechanically with the chassis except at the ends where the electrical connections have to be made. This bottom view also shows the amplifier tuning capacitor, which is mounted on a bracket which shields it from the oscillators. The drive shaft is plastic rod.

With the construction shown, the oscillator frequency is completely free from any ordinary shock or vibration effects. Even dropping the entire v.f.o. on a hard table from a height of a couple of inches causes no vibration in frequency, although the shock sometimes is enough to jar the capacitor setting slightly.

The Buffer Amplifier

After taking the pains necessary to achieve stability in a tunable oscillator, it would be foolish to throw any of the stability away. It can happen, when the oscillator is coupled to another circuit, for the reasons stated earlier.

If the buffer is to prevent *any* variations that may occur either in its own plate circuit or in the following stages from affecting the oscillator frequency, its voltage amplification must be very low. This is because Miller effect[11] depends on voltage amplification. Low gain is no handicap, because in a conversion v.f.o. system the buffer should supply only a few volts of r.f. to the mixer. The buffer output circuit therefore can be simply a relatively low value of resistance — not more than 1000 ohms.

A second point is that the buffer should operate with close to its normal Class-A grid bias (obtained from a cathode resistor) and without being driven into grid current. With this type of operation the oscillator-buffer coupling can have its least value — an important factor in contributing to freedom from buffer reaction on the oscillator frequency. The buffer grid-resistor value is not

[11] Miller effect is the change in input resistance and reactance caused by feedback through the grid-plate capacitance. It depends on both the grid-plate capacitance and the actual voltage amplification, and becomes less when either is made smaller. It is the principal reason for using a pentode with the smallest available grid-plate capacitance.

too important; a 0.1-megohm resistor was used in the circuit of Fig. 11, but the resistance could be varied over a wide range without upsetting things. The coupling capacitor, C_5 in Fig. 4, should have the smallest value that will result in the desired buffer output voltage; a 3.3-pf. capacitor was used here.

The presence of grid current can be detected readily with the d.c. probe of a vacuum-tube voltmeter; there should be no d.c. voltage drop across the buffer grid resistor, R_4. If any such voltage can be detected in making the initial adjustments, the value of C_5 should be decreased.

In general, it is advisable to operate the buffer with a small value of cathode bias and low r.f. grid voltage rather than to avoid grid current by increasing the cathode resistance. This minimizes generation of harmonics of the oscillator frequency by the buffer tube and thus helps reduce spurious output in a conversion system.

Vibration and shock are minor problems in a buffer circuit of good electrical design. Ordinary construction methods suffice. The important thing in layout is to make sure that the buffer plate circuit cannot "see" the driving circuit electrically. This is readily done, in the layout shown in Fig. 12, by continuing the oscillator-tank coax shields as far as possible toward the grid and plate prongs of the tube socket, by mounting disk bypass capacitors over the socket to act as shields between the pentode plate and other elements, and by separating the "hot" components (the oscillator plate choke, RFC_1, and the buffer plate load resistor, R_7) as much as possible.

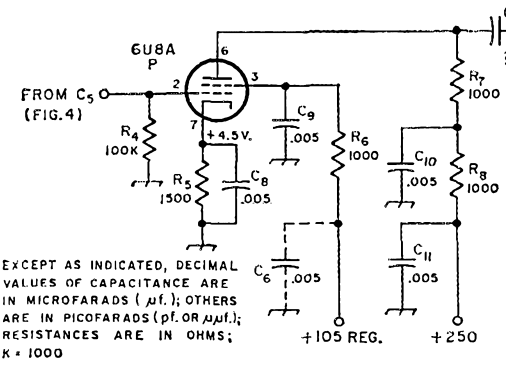


Fig. 11—Buffer circuit following tunable oscillator. Resistors are ½-watt composition; capacitors are disk ceramic, except C_{12}, which is silver mica. C_6 is the capacitor having the same designation shown in Fig. 4; it is unnecessary to use two separate capacitors across the same feed point. R_6 and R_8 are decoupling resistors backed up by C_6 and C_{11}; these circuits are essential for preventing r.f. coupling through the power-supply leads.

The Frequency Converter

Frequency conversion in a v.f.o. is much like frequency conversion in a receiver, and the same methods can be used. The dominant factor is that of maintaining isolation between the tunable oscillator, the output circuit, and the conversion oscillator. A converter tube such as the 6BE6 offers better isolation than some of the triode and pentode circuits used in receivers, especially in preventing coupling between the tunable oscillator and the fixed conversion oscillator.

Whatever the method of conversion, the fixed-frequency oscillator — usually crystal controlled — should be entirely separate from the mixer. And even though a crystal is a pretty stable device, it is advisable to follow the oscillator with a buffer amplifier. If the mixer is a 6BE6 it is preferable to let the crystal oscillator drive

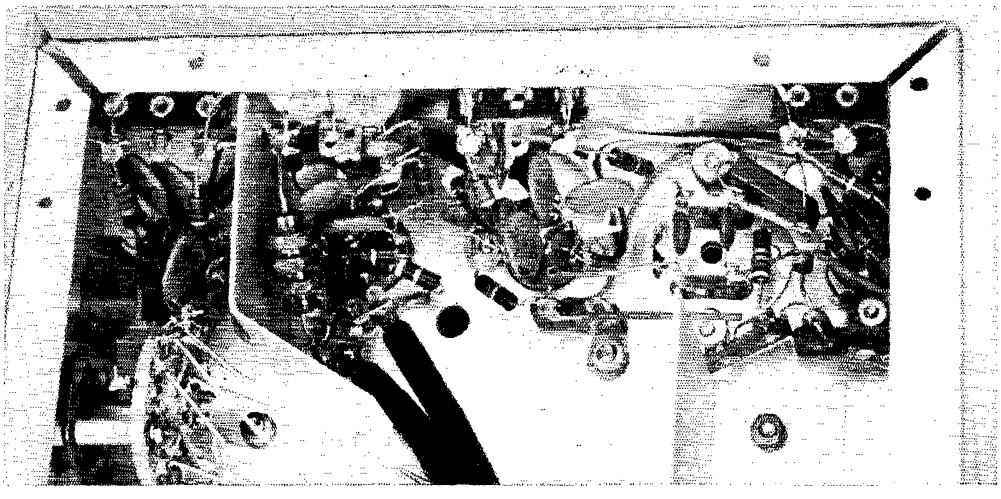


Fig. 12—A close-up of the wiring around the tunable-oscillator/buffer socket (to the right of bent shield plate) and the crystal-oscillator/buffer socket in the upper left corner. The metal center post of the socket is connected to the chassis through a soldering lug fastened under one of the socket mounting nuts; this is the single ground point for the stage. The same method of grounding is used in each stage. Disk capacitors are directly over the sockets to shield the oscillator and buffer sections from each other.

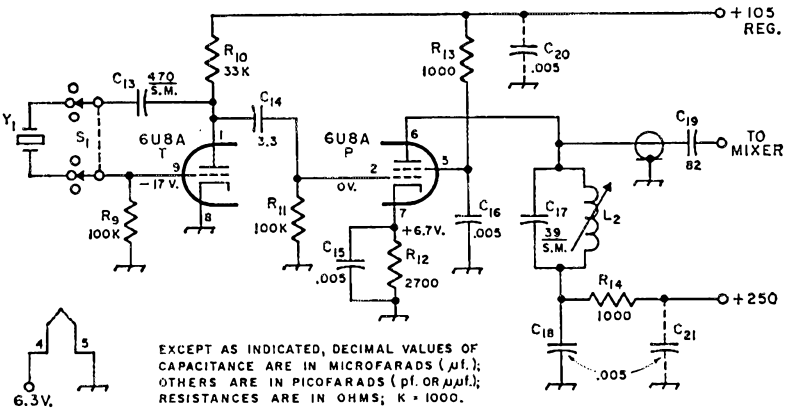


Fig. 13—Crystal-controlled conversion oscillator and buffer amplifier. Output tank capacitance includes the capacitance of the coax line between plate and C_{19}; if this lead is more than two or three inches long the capacitance of C_{17} may have to be modified to compensate. C_{19} should be at the mixer end of the coax line. If this and the circuits of Figs. 4 and 11 use the same power supply, C_{20} is identical with C_6 in Fig. 4 and C_{21} is the same capacitor as C_{11} in Fig. 11.

C_{13}, C_{17}—Silver mica.

C_{14}, C_{15}, C_{16}, C_{18}, C_{19}, C_{20}, C_{21}—Disk ceramic.

L_2—Slug tuned, to resonate at crystal frequency with C_{17} and associated stray capacitances. For crystals in the 6- to 8.5-Mc. region a coil adjustable from 6.7 to 15 μh. (Miller 4406 is suitable).

R_9-R_{14}, inc.—½-watt composition.

S_1—Ceramic wafer switch; sections and positions as required. A 2-section switch with 6 positions is used in the v.f.o. pictured.

Y_1—Conversion crystals, as required.

the injection grid, which requires some power, and to apply the tunable-oscillator/buffer output to the signal grid. Furthermore, to stay within the "linear" range of conversion the mixer tube should be operated with the same injection voltage that would be used in receiving — about 15 volts of rectified injection-grid voltage across a 22,000-ohm grid leak. The signal grid should be operated with Class-A bias and should not be driven into grid current.

The Conversion Oscillator

Fig. 13 is a practical circuit for the conversion oscillator and its buffer amplifier. The triode section of the 6U8A is used as a Pierce oscillator operating at low plate voltage, with light coupling to the pentode section used as a buffer amplifier. Since it is necessary to develop appreciable r.f. voltage for the 6BE6 injection grid, a tuned tank is used in the plate circuit of the pentode. If a wide range of crystal frequencies must be used for getting output in various bands, the crystals and buffer plate tanks can be simultaneously switched. The L/C ratio of the buffer tank is not too critical, but it should be low enough so that the Q will be reasonably high; the tank should contribute enough selectivity to minimize crystal-frequency harmonics.

The amplitude of the r.f. voltage supplied to the injection grid can be regulated by adjustment of the slug in L_2. One setting will suffice for a group of crystals in a narrow frequency range such as is used in the experimental v.f.o. In the more usual arrangement where each amateur band has a single conversion crystal, individual coils will be needed for each band and may readily be adjusted for optimum output. Overall control of output lies in the choice of R_{12}, lower values giving higher gain. With the circuit constants shown, the pentode is biased to about 7 volts and operates without grid current.

Stray Coupling

Oscillator-to-oscillator coupling may give rise to unanticipated effects. Note that in Fig. 12 there is a shield between the sockets for the tunable-oscillator and conversion-oscillator tubes. This shield was not used at first, and there was a small amount of coupling between the two circuits. The two oscillator frequencies combined in the crystal circuit, causing a difference-frequency signal to be applied to the 6BE6 injection grid. As this signal was at the converter output frequency it was amplified and fed to the following stage. Even when negative grid bias beyond the cutoff value was applied to the 6BE6 control grid there was a weak residual output that could not be eliminated. This made it impossible to use break-in keying with complete effectiveness. Installing the shield eliminated the coupling and made the mixer behave normally.

While coupling of this type might not occur in other layouts, the possibility of its existence should be kept in mind, especially if rated cutoff bias on the signal grid of the mixer does not completely cut off the output.

The Mixer Plate Circuit

One of the disadvantages of the conversion system is that it has innumerable by-product output frequencies, in addition to the desired frequency. If these are not suppressed they may go on through to the antenna to result in spurious radiations. The first real barrier to such frequencies is the mixer output circuit.

The mixer should not be asked to deliver power

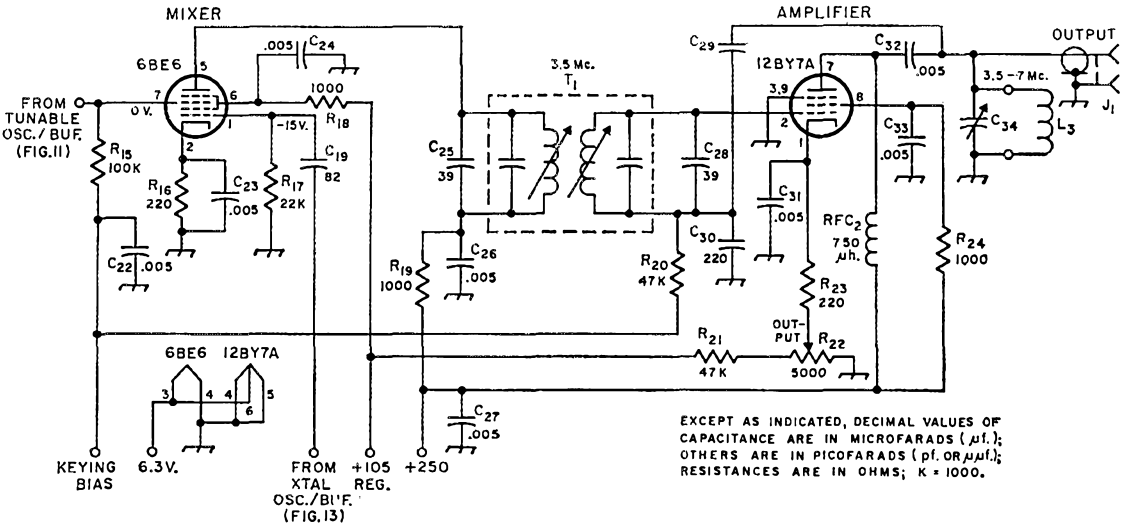


Fig. 14—Mixer and output amplifier circuit. Except for C_{29}, all fixed capacitors are disk ceramic. Fixed resistors are ½-watt composition. C_{19} is the capacitor having the same designation in Fig. 13.

C_{29}—"Gimmick" capacitor; twisted hookup wire adjusted to neutralize amplifier.
J_1—Coaxial connector, chassis mounting.
C_{34}—140-pf. variable (Millen 22140).
L_3—For 3-foot length of RG-62/U (app. 40 pf.) cable in parallel with C_{34}:
3.5 Mc.—33 turns No. 22 enam. close-wound on 1-inch diameter plug-in form (Millen 45005).
7 Mc.—14 turns No. 22, ¾ inch long, on same type form.
R_{22}—5000-ohm control, linear taper.
RFC_2—750-μh. r.f. choke (Millen 34300-750).
T_1—4.5-Mc. TV sound-i.f. transformer (Miller 6270) loaded to 3.5-3.6 Mc. by C_{25} and C_{28}.

to the following stage, but only to develop enough r.f. voltage for exciting a high-gain pentode as a Class A_1 or AB_1 amplifier. This takes only a few volts of r.f., so the mixer plate circuit should be designed primarily for attenuation of unwanted frequencies. A double-tuned transformer is highly desirable.

If the band of desired frequencies is narrow, in terms of percentage of the center frequency of the band, a slightly overcoupled tuned transformer will give sufficient band-pass effect to make more than initial adjustment unnecessary. A separate transformer for each band can readily be switched in as required. This method is usable for bandwidths up to 4 or 5 per cent of the center frequency. Wider bands may require a ganged variable capacitor to tune the transformer—which has the incidental advantage that, since looser coupling can be used between the transformer windings than in the bandpass case, the selectivity is increased.

Single-tuned circuits with capacitive coupling to the following stage, although less desirable, are simple to design and apply. They will usually give sufficient selectivity in transmitters where at least two tuned stages follow the mixer. It does not really matter how the selectivity necessary to prevent spurious radiation is obtained so long as it *is* obtained.

A single fixed-tune bandpass circuit, T_1 in Fig. 14, sufficed for this v.f.o. since mixer output was wanted only in the 3500-3650-kc. region. In the more usual conversion arrangement giving direct output on each band, a separate mixer output circuit would have to be provided for each.

The Output Amplifier

Up to the mixer output the overriding objective should be to get a signal that will be clean and stable under any conditions of operation, including keying in the mixer signal-grid circuit. If the v.f.o. circuits are incorporated in a complete transmitter, the rest of the design can go on from there. For a separate v.f.o. unit it is better to include an amplifier, partly for additional selectivity to discriminate against spurious output frequencies, and partly to obtain enough power output so that coupling losses and driving requirements of the transmitter can be supplied.

For highest power sensitivity a video-amplifier pentode is the most suitable tube type, and of these the 12BY7A has the lowest grid-plate capacitance, a desirable characteristic in an r.f. amplifier. However, the capacitance is not low enough to prevent self-oscillation under all conditions, especially with Class AB_1 operation. The amplifier should therefore be neutralized.[12] This is easy to do when it is driven through a

[12] This rule should be applied to any high-gain pentode r.f. amplifier stage. We have yet to see one that would *not* go into oscillation when actually tested for it—including those that supposedly "required no neutralization." The unneutralized ones either are tested only when heavily loaded, or operate as locked oscillators (or are at least highly regenerative), the instability being concealed by various means, such as keying the stage. No amplifier will oscillate with its plate current cut off; it *may* stay in lock with the driving source, key closed, as long as the source is operating.

double-tuned transformer, as shown in Fig. 14.

Since the complete v.f.o. shown here was intended as a crystal replacement, the amplifier output circuit is a parallel-tuned tank having part of its tank capacitance in a 3-foot length of RG-62/U cable. The stage can be used either as a straight amplifier on 3.5 Mc. or as a doubler on 7 Mc. In either case there is ample output for driving the crystal-oscillator tube in practically any transmitter, since none of these operate at a power level of more than a few watts. Other types of output circuits for these frequencies could be substituted, if necessary.

For regulating the drive to the transmitter's ex-crystal-oscillator tube the amplifier has a cathode-resistor gain control, R_{22}. The 12BY7A is grid-block keyed along with the 6BE6 mixer, to make doubly certain that there will be no "leak-through" in break-in work.

Observance of the principles discussed here has resulted in a v.f.o. in which keying has NO effect on the frequency. In fact, there is not even a phase shift in the output of either the tunable oscillator or crystal oscillator when the mixer grid is keyed, either with or without shaping.

Final Note

After measurements had been made on the tunable oscillator at approximately 5 Mc., curiosity prompted replacing the tank coil with one that would let the circuit be tuned to about 2500 kc. The capacitance of C_3, originally 35 pf., was increased to 50 pf. and a new series of crystals in the 6-Mc. region was substituted in the conversion oscillator. Aside from the new coil and variable capacitor, no changes were made in the tunable-oscillator tank constants.

The solid curves in Fig. 15 show the maximum and minimum limits of drift measured in seven 5-hour runs. The dashed curve is a single run which approximates the median of the two limiting curves. For the 5-hour period the median drift was about 70 cycles.

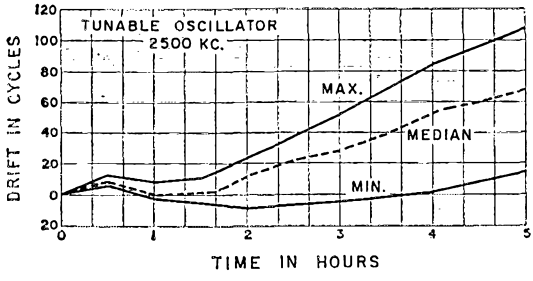


Fig. 15—Typical drift curves of tunable oscillator operating at approximately 2500 kc. These represent the extremes of performance in seven actual drift runs.

The crystals used in the conversion oscillator happened to have a positive frequency/temperature coefficient — i.e., the frequency increased with temperature. The opposite was true of the tunable oscillator. When the difference frequency is taken as output, as in this case, the two drifts add. Fig. 16 shows the results of 12-hour drift runs made on three occasions. The section to the left of the vertical dashed line covers the same length of time as Fig. 15. The effect of crystal drift is quite apparent when the two sets of curves are compared. The particular crystal used in making these runs had a total drift of 40 to 50 cycles. Most of it occurred in the first 30 minutes, after which the crystal settled down; the drift from then on was practically that of the tunable oscillator alone. The effect of crystal drift after the first half hour is to shift the tunable-oscillator drift curves upward by a fixed amount. If the crystal and tunable oscillators had both drifted in the same direction the total drift would have been their difference.

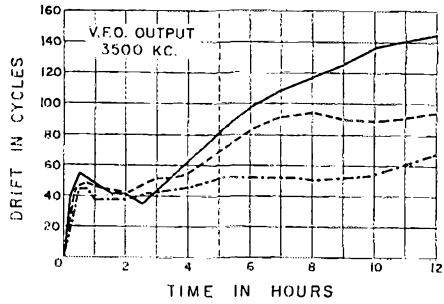


Fig. 16—Drift in output frequency over a 12-hour period. Comparison with Fig. 15 shows the effect of crystal-oscillator drift, which was predominant during the first half hour.

Using the 2.5 Mc. tunable oscillator and 6-Mc. crystals, the output, relative to fundamental output, on frequencies other than the desired one was measured with the amplifier tuned to both 3.5 and 7 Mc. (doubling in the latter case). The approximate limit of the measuring equipment was 80 db. The measurable outputs were as follows:

With output on 3.5 Mc.:

Freq., kc.	*Db. down*	*Remarks*
2550	65	Tunable oscillator
4450	75	Beat product
7000	19	2nd harmonic of output
10500	59	3rd harmonic of output
12100	72	2nd harmonic of crystal oscillator

With output on 7 Mc.:

Freq., kc.	*Db. down*	*Remarks*
3500	29	Fundamental
6050	59	Crystal oscillator
10500	42	3rd harmonic of 3500 kc.
12100	65	2nd harmonic of crystal oscillator
14000	65	2nd harmonic of output

The only ones of importance are those that would be expected from a "conventional" v.f.o. — i.e., harmonics of the desired signal. These are generated in the output amplifier/doubler. Other spurious responses are kept to negligible amplitude by careful adjustment of the buffer and mixer operating conditions and signal levels. The spurious output rises immediately when any of these stages shows grid current. QST

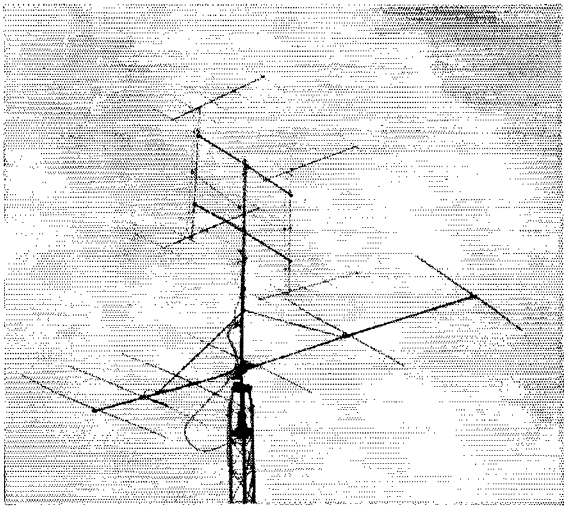


Fig. 1—All-metal arrays for 50 and 144 Mc. All parts of both beams can be assembled readily with ordinary hand tools. In this installation the two beams are fed from a single feed line, with a waterproofed coaxial switch at the top of the tower permitting selection of the desired array from the operating station.

Building Your Own Arrays for 50 and 144 Mc.

V.h.f. Beam Ideas for the Home Constructor

BY EDWARD P. TILTON, W1HDQ*

There are many good antennas for v.h.f. service on the market today, but there are advantages in building your own. The arrays described here follow standard practice as far as element lengths and spacings are concerned; the emphasis is on construction ideas, using materials that should be readily available almost anywhere. Only simple hand tools are needed.

THOUGH it is often said that "nobody builds ham gear anymore," there are still many of us, especially in the v.h.f. field, who like to make things. Trends in home construction change with the years, and we build our own gear today for quite different reasons from those that inspired amateurs of a generation ago.

Communications receivers were the first items in the ham station to "go commercial," and at one time it was common to buy a receiver and build one's transmitter. Commercially produced antennas were all but unknown. As transmitters became more complex, with the advent of multiband designs and extensive TVI precautions, many companies went into the transmitter field, but antennas were still mainly homebuilt, even when everything else in the ham station was "store-bought." In recent years the antenna business has come on fast, removing the last absolute need for anyone to build a major component of his station by hand.

These developments did not remove the urge to build, nor the benefits to be derived from it. Constructional articles are still the mainstay of *QST*, and antenna information is very much in demand. This is as it should be, for no ham home-work is more rewarding than experimentation with antennas, particularly those for 50 Mc. and higher bands.

There are many good v.h.f. arrays on the market, but we still have to erect them — and this may be the hardest part of the job. Since we're going to be doing quite a bit of work on any antenna project, why not go the whole way and build the antenna, as well as erect it?

There are many different characteristics to be sought in v.h.f. antenna installations, and the chances are good that you can come up with something better suited to your particular needs if you design and build with your operating preferences and installation problems in mind. A full discussion of this philosophy is beyond the scope of a single article. Most of what we might say along these lines is already available in *The Radio Amateur's V.H.F. Manual*, which has two thick chapters on antenna principles and practice. We will be concerned here with practical means of doing the construction jobs. These can be adapted to arrays of your own design, or to antennas we have already described elsewhere.

Materials and Methods

Finding the right components bothers some would-be antenna builders, perhaps because they look no farther than their favorite radio store or mail-order catalog. Actually, antenna materials are everywhere, if we do a little improvising. Booms can be wood or metal, in v.h.f.

* V.h.f. Editor, *QST*.

arrays. Your local lumberyard is a good place to go for round or square boom stock. There are several examples of wood construction in the *V.H.F. Manual*, and a wood-frame 432-Mc. array is described in April *QST*.[1]

Many hardware stores now carry stocks of "do-it-yourself" aluminum, in shapes and sizes commonly useful around the home. Most of the material for the 20-element 2-meter array shown herewith came from a small hardware store near ARRL Headquarters. This is not the cheapest way to do the job, but the materials are clean and easy to work with. Even using such high-cost sources, you'll probably come out saving money over what a comparable array would cost ready-made. More important, you may end up with a better antenna.

If you build mainly to save money, don't overlook junkyards, welding shops and the like. For many years the writer found almost everything needed for v.h.f. arrays at an aluminum smelting works. This outfit bought surplus aluminum that anyone wanted to unload, and they often had appreciable stocks of tubing, angle stock, sheet metal, rod and wire — all available to the bargain hunter who didn't mind getting his hands dirty digging it out. Prices ran less than half the new-stock figures, on the average. Aluminum wire and rod may be found in welding supply places. It is straight and much more rigid than the soft stuff many hams buy as "picket wire" in garden stores.

Wholesale distributors of aluminum usually have everything you'll ever need, but some insist on fairly large minimum purchases. Quantity prices may make it desirable to pool your needs with antenna-building friends. The classified section of your telephone directory will provide leads, if you live in or near any major city. One thing is sure: if you really want to build your own v.h.f. antennas, there are ways to get the materials.

Assembly methods vary with materials available. There are many ways to make antennas in addition to the common one of drilling the boom to mount the elements. Aluminum castings designed for element mounting are neat and easy to use, but they are getting harder to find all the time. Simple clamps cut from sheet metal are easy to make, and they permit adjustment of element spacing in experimental lashups. They're also fine for the fellow with limited machine shop facilities, eliminating the problem of lining up holes drilled in a boom.

Specific dimensions for use with popular tubing sizes are given under Fig. 4, but making clamps to fit available sizes is no problem. Our dimensions were arrived at by making paper mockups and then duplicating them in sheet aluminum. The basic idea is to make two U-shaped clamps that will hold two pieces of tubing together at right angles, as seen in Figs. 2 and 3. Dimensions are not at all fussy, since the clamps tend to be self-aligning. Just be sure

[1] "Yagi Arrays for 432 Mc.," April, 1966, *QST*, page 19.

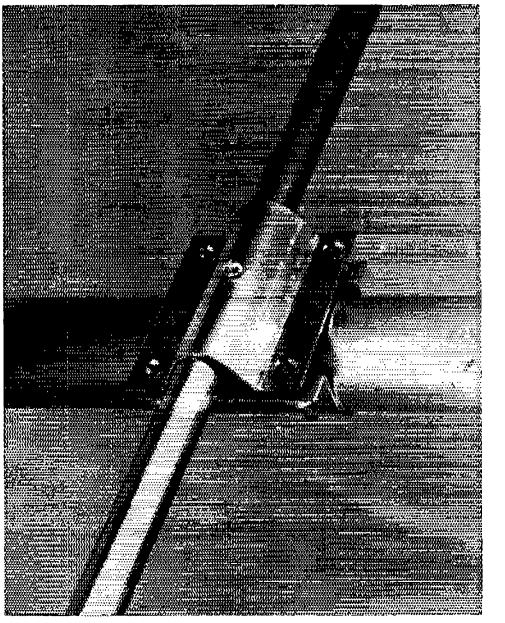


Fig. 2—Model showing the method of mounting elements on the boom without drilling holes through the latter. For strongest permanent assembly, self-tapping screws should fasten the sheet-metal clamps in position.

that the sides of the "U" are short of the actual diameter of the tubing to be used, so that when the clamps are bolted together at the corners they will hold the tubing members tightly. If both tubes are the same diameter, make two similar clamps. See A in Fig. 4. With differing diameters adjust the size of the clamps accordingly.

Once you have your frame or boom made up the way you want it, the assembly can be made permanent by "tacking" it together with self-tapping screws, as shown in the model, Fig. 2. This makes a very strong and rigid assembly, but we've had beam frames and boom-element combinations stand up for years without this final precaution. Clamp assembly is fine for arrays that must be dismantled and carried to the operating site. (Field Day committees take note.)

Large arrays used to be very heavy and cumbersome, but experience has shown that strength and durability are not necessarily synonymous with weight. One way to keep down weight and wind resistance is to use telescoping elements. Strength is needed only near the mounting point of a Yagi element, so the outer portions can be made of smaller and lighter materials. Steps taken in this direction are limited mainly by one's willingness to search out suitable materials and do the extra work involved in fitting them together. If making elements of graduated tubing sizes is too much bother for you, the sizes given for the center sections of our arrays for 50 and 144 Mc. will do a good job.

The 50-Mc. Yagi

The 6-element 50-Mc. Yagi in Fig. 1 can be built easily, with little scouting for hard-to-find components. In element lengths and spacings it duplicates an array of proven performance that has been a standard feature of several ARRL publications since its erection at W1HDQ in 1957.[2] Our new version differs from its predecessor only in assembly method and in the design of its gamma-matching system.

The boom is just over 20 feet long, made of light-weight aluminum TV masting. This is available in several standard lengths, and has one end of each piece compressed to fit into the other end of the next. If the builder wishes to use two 10-foot lengths, the spacing of the two forward elements can be reduced slightly from that given in Fig. 5. Three shorter lengths may be cut to give the full spacing shown, with little waste. Steel TV masting is *not* recommended.

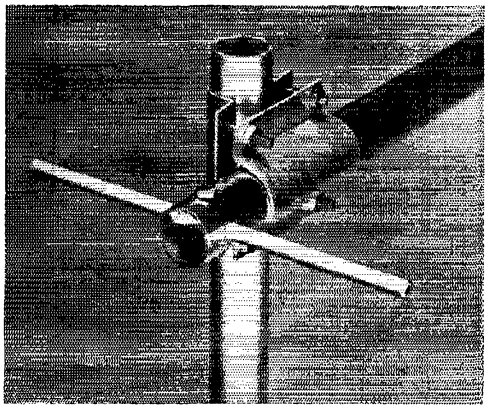


Fig. 3—Mockup showing clamps for assembling the framework of the 2-meter array. Mounting method for the elements is also illustrated.

The same general construction may be used with shorter arrays, merely by leaving off one or more elements starting at the forward director. Any number of elements up to five may be used without bracing of the boom, but with the length shown the suspension bracing is necessary with a light boom of this type. The exact dimensions of the braces are unimportant, and they may be fastened to the boom in several ways. About 2 inches at one end of the ¾-inch-diameter braces was hammered flat, and then fastened to the boom with U bolts. Holes were drilled in the upper ends of the braces, and these slip over the ends of another U clamp on the vertical support. Fasten this clamp in place with its regular nuts and then use an extra pair of nuts to hold the ends of the braces.

Elements can be half-inch tubing throughout, though in this model only the center sections, about 3 feet long, are this size. The end sections are very light thin-wall tubing of a kind commonly used for fuel lines. Ours is 7/16-inch o.d., though ⅜-inch would be preferable. The ends of the half-inch center sections are slotted with a hacksaw to a depth of about 3 inches. The smaller tubing is then forced inside to a depth of 2 inches, and clamped in place with a wrap-around strip of aluminum about ⅜ inch wide.

In the past we've used cast-aluminum clamps for mounting elements on the boom. If you can find these, there is nothing better, but we've had reports that they're getting scarce. If you have a procurement problem, the sheet metal clamps shown in the mockups, Figs. 2 and 3, will do the job nicely. Dimensions are given in Fig. 4 for all the clamps used in the arrays illustrated. These were made of 3/64-inch sheet aluminum, which can be bent easily by hand. Any heavier stock is good, if you have suitable bending facilities. Use of self-tapping screws to hold components in alignment, as shown in Fig. 2, is recommended with thin clamp stock.

The lips of the clamps should be bent upward at right angles first. Forming the "U" is started by placing the tubing in a vise in a vertical position, and bending the clamp around it. The actual U shape is achieved by opening the vise to slightly more than the width of tubing-plus-clamp, placing the clamp U-down loosely in the vise with the tubing lying in it, and then tapping the tubing lightly with a hammer. Alignment of the holes in the clamps is not fussy, and if they are drilled slightly larger than needed to pass the screws there will be no assembly problem. We used a No. 32 drill and 6-32 screws. The nuts should be pulled up only tightly enough to hold the assembly firmly together.

Feed Method

The first model of our 6-element array was fed with a coaxial gamma match, as described

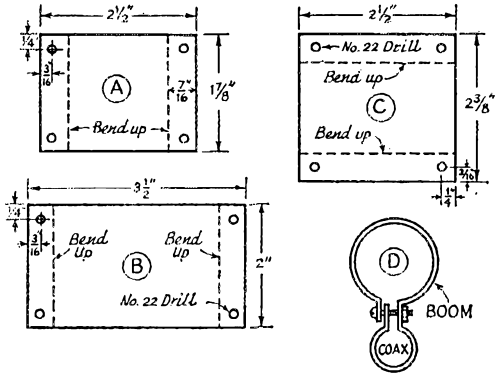


Fig 4—Dimensions of aluminum plates used to make the assembly clamps in the v.h.f. arrays. Sheet metal should be 3/64 inch or thicker. Two A-type clamps are needed for joining ¾-inch tubes at right angles. One B and one C are needed to mount a ½-inch element on a 1¼-inch boom. The "figure 8" clamp, D, made from a ½-inch wide strip approximately 6 inches long, is used to ground the coax to the boom, and keep it in a fixed position with respect to the driven element.

[2] "Six Elements on 6," October, 1957, *QST*, page 18.

in all ARRL publications dealing with antennas. We can recommend it highly in retrospect, since it was still working well when the array was dismantled after more than 8 years' service. It took some mechanical work to produce, however, so we looked for something simpler. The new gamma method is about as simple as you can get: the coax is merely brought along the boom to the driven element, bent at right angles, and run out far enough to match the antenna impedance when fed through a 100-pf. fixed capacitor. The point of connection was found experimentally, as was the value of series capacitance required. You may want to do the same with your array, though 20 inches and 100 pf. should come close, if the rest of the design is followed.

If you decide to do some adjusting, put an s.w.r. bridge in the line near the antenna. An electrical half-wavelength away from the feed point is good. Move the point of connection along the driven element until minimum reflected power is found. The coaxial line should be grounded to the boom near the point where the bend out to the driven element is made. This can be done by stripping a narrow band of the outer covering from the coax, and then fastening it to the boom with a "figure 8" bracket of aluminum strip. The area of the coax thus exposed should be waterproofed by wrapping with plastic tape after the connection is made, and then coating the whole with Krylon spray. The series capacitor should be treated in the same manner. This is a low-impedance point, so don't worry about insulation losses here.

The capacitor must be a type that will stand high r.f. currents. The centralab 8505-100N was designed specifically for transmitting applications and has more than adequate power-handling capabilities. A variable capacitor may be used if some provision is made for mounting it in a weatherproof container. Inexpensive plastic boxes intended for refrigerator use are good for this purpose. The voltage rating of the capacitor need not be high, so types with receiver spacing are suitable, if protected from moisture.

The array is supported on the vertical member by means of a square gusset plate of aluminum, backed up by a plate of similar size cut from tempered Masonite or outdoor plywood. These plates are about 6 inches square. Four U bolts hold the assembly together, in the manner of several v.h.f. arrays shown in all recent editions of the *ARRL Handbook*, *Antenna Book* or *V.H.F. Manual*. This plate and all hardware in the array should be given a coating of Krylon spray when assembly work is completed. This will greatly prolong the life of metal parts, particularly steel items such as the U bolts and other handy TV antenna hardware.

The Stacked-Yagi Array for 144-Mc.

The all-metal array for the 2-meter band has four Yagi bays of 5 elements each, but the same general layout could be used with shorter bays, or longer ones up to about 7 elements. The spacing is one wavelength in the horizontal and vertical planes, which is optimum for bays of this approximate size.

The booms and frame are all ¾-inch aluminum tubing, hardware-store stock, available in 6- and 8-foot lengths. Four 6-foot pieces ($1.79 each) took care of the booms, and four 8-foot ones ($2.39 each) were used for the horizontal and vertical frame members. You can beat these prices by methods already outlined, but the availability of the do-it-yourself hardware stocks is universal.

The clamps made as already described are shown in model and drawing form. Eight are needed. Elements can be anything from ⅛ to ¼ inch in diameter. Ours have ¼-inch center sections of tubing, with inserts of 5/32-inch aluminum wire or welding rod. Any stiff wire, tubing or rod stock could be used for the entire element. We used this combination for several reasons: it makes for exceptional strength, we had some of both but not enough of either for the entire array, and the inserts provided a convenient means of adjusting the element lengths. We will not bother with the various dimensions involved, other than the overall element lengths finally arrived at by experiment. See Fig. 6. The elements are run through the boom, and held in place by self-tapping screws, as seen in the mockup, Fig. 3. Aluminum screws for this purpose can be bought at the hardware store, and we recommend them over steel. They stay in place, and they won't rust.

The phasing system is shown at the right of Fig. 6. A universal stub at the central feedpoint

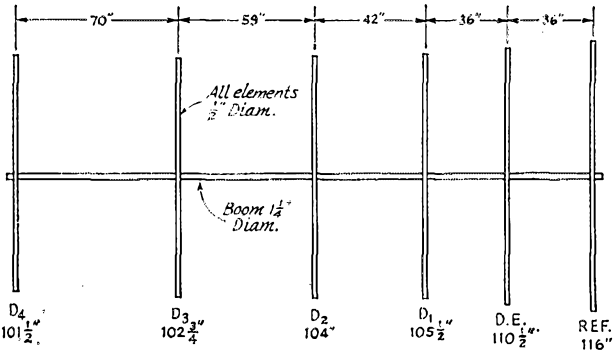


Fig. 5—Element lengths and spacings in the 50-Mc. Yagi array. For a 20-foot boom, shorten spacings between D_2 and D_3 and D_3 and D_4 by 3 and 4 inches, respectively. Lengths given are for optimum performance between 50 and 51 Mc.

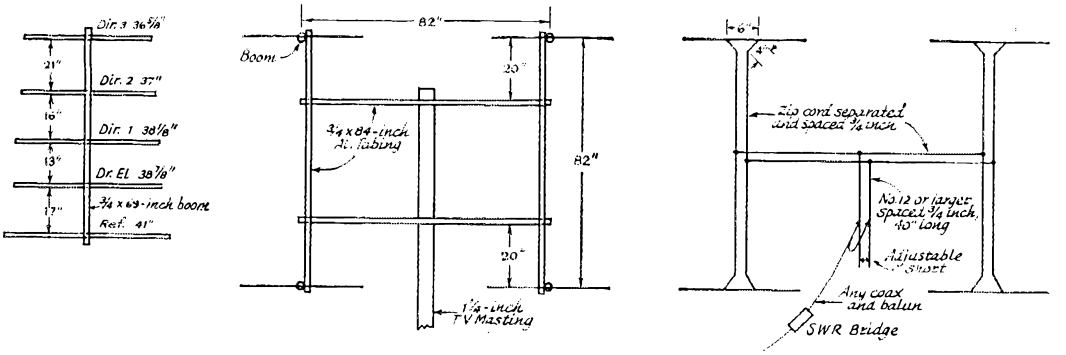


Fig. 6—Principal dimensions of the 144-Mc. array. Element lengths and spacings are given at the left. The supporting structure is sketched in the center. Details of the phasing harness and matching section are shown at the right. Impedances need not be known, since it is necessary only to adjust the position of the short and the point of connection of the balun for the frequency range most commonly worked. Dimensions of the fanned-out sections at the ends of the phasing harness are not critical, so long as all are the same size.

provides a simple means of matching without having to know the impedances involved. The phasing sections are fanned out near the point where they connect to each driven element. Here again, there is no precise dimension; just make the spacings and the triangular matching sections all the same. Be certain that a clean and permanently-tight connection is made to the driven element.

Phasing lines can be any balanced line, and most builders may prefer common TV open-wire line, either half-inch or one-inch spaced. We tried a different idea, and used ordinary zip-cord from the electrical counter of the hardware store. We strung this on homemade spreaders cut from ⅜-inch wooden dowel, drilled to give about ¾ inch spacing. The insulation on the zip-cord lasts well out of doors, and the wire is strong, yet flexible. Time will tell how it stands up, but it can be replaced easily if it doesn't. We have an idea that it will do all right.

Star lugs were soldered to the ends of the phasing lines to bolt to clips that wrap around the driven elements. The junction of the zip-cord and the lug was wrapped with plastic tape, and sprayed with Krylon. The wood-dowel spreaders were also sprayed. The line is supported at several points, using TV-type insulated standoffs which wrap around the appropriate dowel spreaders in the line. At this writing the antenna has been up in the wind at W1HDQ for about four months, and nothing has shown any sign of coming loose yet. The antenna has been used in heavy rain, with little apparent change in operating characteristics. Insensitivity to bad weather was a quality we hoped for with this unusual phasing system.

The element lengths given are for maximum performance in the bottom megacycle of the band. If you want the beam to be most effective above 145 Mc. it would be desirable to shorten all elements by ¼ inch for each megacycle higher. Element lengths are not as critical as most people think, provided that the short and points of balun connection on the matching stub are adjusted for zero reflected power at the center frequency you select. We made a single 5-element Yagi as a preliminary to the 4-bay system, and adjusted it carefully for optimum performance between 144.5 and 145 Mc. We found only a discernible difference in forward gain from 144.0 to nearly 147 Mc., when we readjusted the matching stub for each frequency change. Both gain and front-to-back ratio dropped off markedly above 147.

It was interesting to note that the frequencies of optimum gain and front-to-back (they're not the same) moved down about 500 kc. with the stacked system, compared with the single Yagi. Presumably this was the result of coupling between bays, and the introduction of more metal in the field of the array. The element lengths given are corrected for the 4-bay system. The single 5-element would have ⅛ inch more per element for peak performance over the same frequency range.

We put up this 4-bay array at W1HDQ after several years of working with a single 24-foot Yagi cut for the first megacycle of the band. Results with the new beam are at least as good on the peak frequency, and very much better at any spot above 145, than with the sharply-tuned single bay. This is not surprising; a long Yagi is fine where you don't worry about sharp frequency response, and particularly if you have limited ability to support an array that runs much above the top of your tower, but something with more driven elements and an appreciable frontal area is a better all-around antenna.

How much gain? We'd prefer not to say, for we know our limitations in gain measurement. We can make reasonable comparisons, however, and the 4-bay system was very close to 6 db. better than the single 5-element. A gain of 9 db. is a reasonable assumption for a 5-element Yagi, so 14 to 15 db. is a good honest figure for the 20-element. More important than tossing decibels around is the observation that this array is giving us consistent results in scatter work out to 450 miles or so. W8KAY, Akron, Ohio, is heard regularly on his skeds with New

(Continued on page 170)

A Transmatch For Balanced and Unbalanced Lines

Getting Rid of Your Harmonic Problem

BY LEWIS G. McCOY,* W1ICP

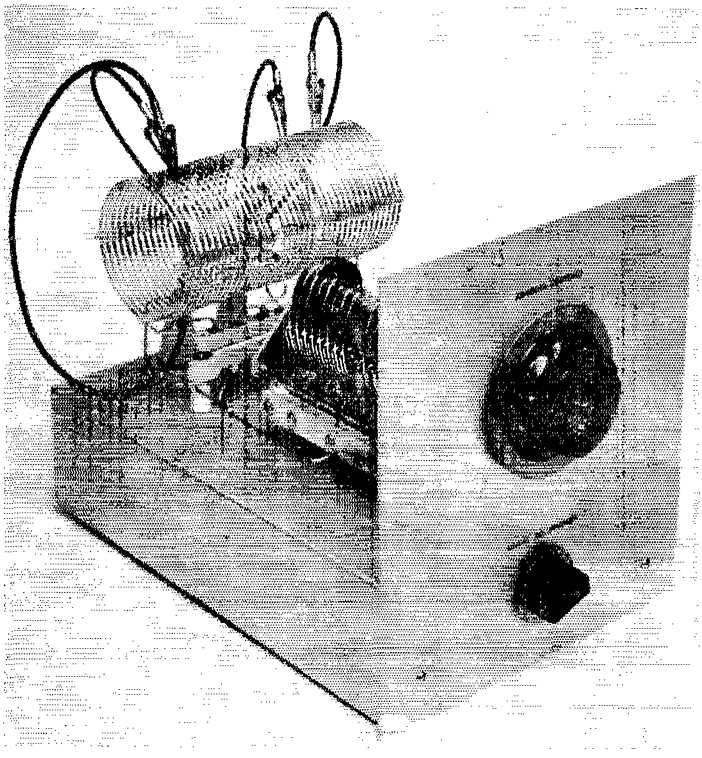
DURING 1965, over 7000 Novices received notices from ARRL Official Observers who had noted defects in the Novices' signals. Most of these notices cautioned the Novices that they were radiating a second harmonic of their 80-meter signal. A large number of these Novices were also cited by the FCC for harmonic radiation.

Certainly every Novice wants to have a clean signal, one with no spurious radiations. A newcomer, starting out in amateur radio, has to acquire considerable "know how" to put a clean signal on the air and this includes getting rid of harmonics. In this article, we'll tell you the "why" and "how".

Many amateurs are inclined to blame the manufacturer if his transmitter radiates a harmonic. This is unfair because a manufacturer has no way of knowing how the amateur is going to use the equipment after he purchases the rig. It is quite possible that the same transmitter could be used on two different types of antenna systems and radiate a harmonic on one system and not on the other. The best approach to the problem is to assume that a harmonic or harmonics will be radiated by *your* transmitter and that something must be done to prevent this from happening.

Usually the reason we have harmonic radiation from a transmitter is because of insufficient selectivity between the final amplifier stage and the antenna. Installing additional circuits will attenuate any harmonics to the point where they would be no problem. In our opinion, the best approach for cleaning up this problem is to in-

* Beginner and Novice Editor



This view shows the 80/40-meter coil with the shorting clips in place for 40-meter operation. The exact amount of coil to be shorted for 40 will have to be found by experiment but it will be approximately 8 turns on each side. Try for a condition that produces a match with C_2 near maximum capacitance and the antenna clips A and B, as far out on the coil from the link as possible.

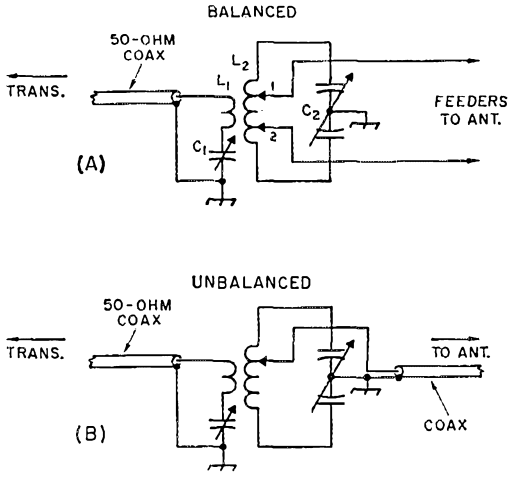


Fig. 1—At A is the transmatch circuit for balanced feed lines and at B, for coaxial lines.

stall a transmatch between the transmitter and antenna. A transmatch, in addition to providing the required selectivity for harmonic attenuation, has other important features.

Nearly all transmitters are designed to work into 50- to 70-ohm loads. On the other hand, very few antenna systems will present such a load across an amateur band and, what complicates the problem, many transmitters have no adjustments in the amplifier to cope with loads other than 50 ohms. For such a transmitter to work at full efficiency the load must be 50-ohms. A transmatch takes care of this problem because it can be considered a "matching" circuit in that it takes the unknown load on its output side and makes it a 50-ohm load on the input side.

Another important advantage in using a transmatch is to provide additional selectivity for your receiver. In many instances, a nearby broadcast station will cause severe cross-modulation in a communications receiver, particularly to 80-meter reception. If you don't know what cross-modulation is it can best be described as a mess of confusing "garbage" across the band. The signal you want to copy, instead of being clean, is hashed up by the strong nearby broadcast signal (or any strong local signal for that matter). The transmatch usually will provide enough selectivity to keep the strong signal from cross-modulating. Don't misunderstand, this won't get rid of another local ham signal in the same band but it will help on strong local signals that are outside the band you are listening to.

Still another feature of a transmatch is that it provides harmonic attenuation in the TV range in addition to taking care of the lower-frequency harmonics. Also, if you must use a low-pass filter for *maximum* TVI harmonic attenuation, such a filter should be installed in coax line that has a very low standing-wave ratio so that the low-pass filter components won't be damaged by excessive voltages. The transmatch will provide a section of coax line with a low s.w.r., that portion between the transmitter and transmatch. All in all, one should see the desirability of using a transmatch. The transmatch described in this article can be used for unbalanced lines (coaxial) or for balanced lines (open-wire or Twin-Lead).

Transmatch and Unbalanced Lines

Fig. 1A is the basic circuit for a transmatch used with balanced lines, and Fig. 1B is for unbalanced or coaxial lines. Fig. 2 is the circuit diagram of the working unit.

Until recently, and by recently we mean the last few years, transmatches were not used with coaxial antenna-feed lines. The main reason for *not* using a transmatch was simply that coax is a line that should be matched in its characteristic impedance — or at least if it is not matched, the standing wave ratio should be kept as low as possible. Operating coax line with a high s.w.r. causes excessive losses in the line. However, transmitters and transceivers in recent years have come on the market without any provisions in their tank circuits to handle loads other than 50 ohms. When the s.w.r. is greater than 1 to 1, the load on the transmitter is something other than 50 ohms, and in many instances it becomes impossible to load the final amplifier. A transmatch makes it possible and, in addition,

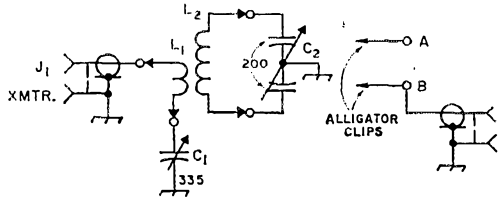


Fig. 2—Circuit diagram of the transmatch. Balanced feeders should be attached to A and B.

C1—335 pf. variable (Millen 19335 or equivalent).
C2—200 pf. dual variable, 0.077-inch air gap for 1 k.w. (Millen 16200), 0.022-inch air gap for 150 watts and less (Millen 28200).
J1, J2—Coax chassis fitting, SO-239.
L1, L2—See Fig. 3 and text.

even though a multiband coaxial-fed antenna is used, the transmatch will take care of the ever-present harmonic problem. These are the reasons for using a transmatch in a coaxial-fed antenna system.

On the other hand, balanced lines such as open-wire or a good grade of 300-ohm twin lead are not lossy lines and they can be operated with a relatively high s.w.r. without any appreciable loss in efficiency. In the case of a high s.w.r. we are faced with the problem of matching a load that is quite far removed from 50 ohms. The transmatch will do just that because it is an adjustable matching device.

Getting the Parts

It is becoming more and more difficult to find dealers who handle a wide range of useful ama-

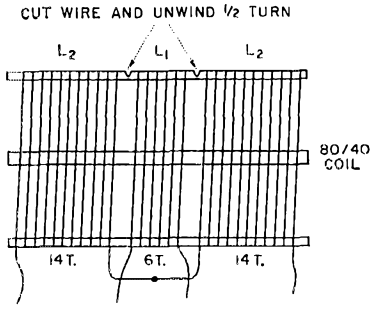


Fig. 3—Details for making the 80/40-meter coil. The 20-meter coil consists of 2 turns for L_1 and 6 turns for L_2 (3 turns on either side of L_1). Details for the 15/10-meter coil are given in the text. The coils are mounted on Millen type 40305 plugs and the socket is Millen type 41305. Coil stock is Polyphase PIC type 1778, 3-inch diameter, 6 turns per inch, No. 12 solid wire.

teur components, even among the larger mail-order houses. With the exception of the coil stock, all the components used in this transmatch are made by the Millen Co.[1] The coil stock is manufactured by Polyphase Instrument Co. and if your local distributor doesn't stock the coil material you can write the company[2] and they'll tell you where you can buy it.

[1] If you cannot obtain the parts from your distributor they can be purchased direct from Millen Co. Write to James Millen Manufacturing Co., Attn. Wade Caywood, W1KRD, Malden 48, Mass.

[2] Polyphase Instrument Co., Att. Tom Consalvi, East Fourth St., Bridgeport, Pa. 19405.

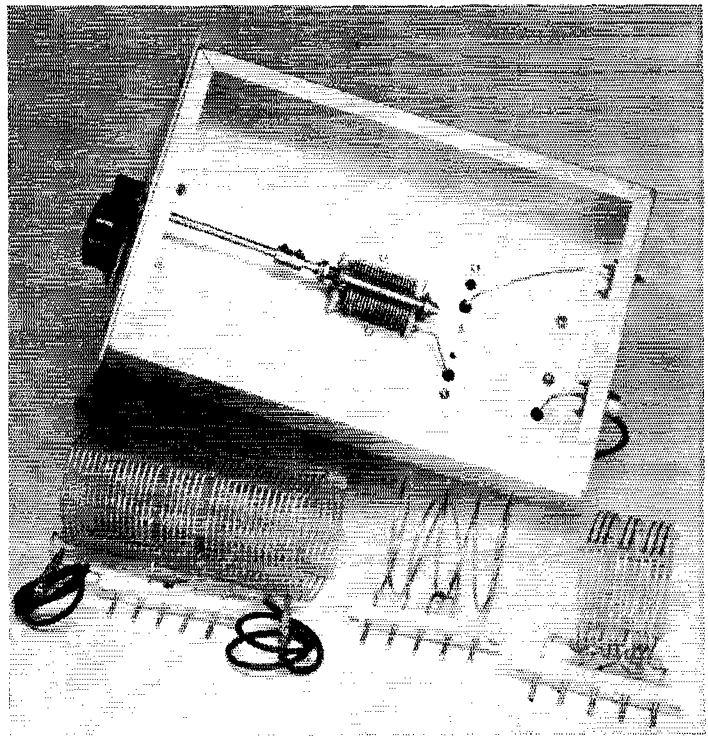
We've specified two types of capacitors for C_2. The larger spacing will handle one kilowatt with most loads that will be encountered, while the smaller-spaced unit will handle up to 150 watts. There isn't enough difference in price between large and small coil stock, except size, so the builder is just as well off using the larger-size coil material for all power levels.

Construction

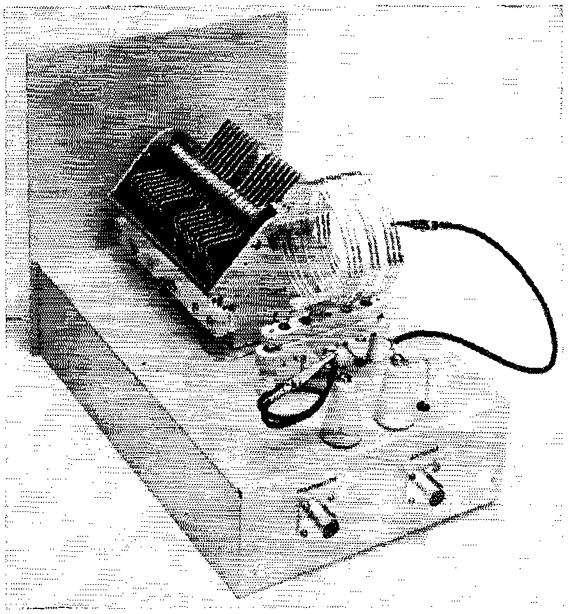
The transmatch is built on an aluminum chassis 3 × 8 × 12 inches, although any size chassis that will hold the components can be used. The dual variable, C_2, is mounted on top the chassis and C_1, the link capacitor, below deck. Mount the coil socket at least 2½ inches behind C_2 so that the coil stock doesn't short to the metal frame at the rear of the capacitor. The coil socket is mounted on ¾-inch-high isolantite stand-offs, and 1½-inch-high standoffs are used for the feeder tap leads. A permanent connection is made from one of these standoffs to J_2, the coax connector mounted on the rear of the chassis.

Three plug-in coils are required to cover the 3.5- through 28-Mc. bands, one serves for 80 and 40, another for 20, and a third takes care of 15 and 10 meters. A single length of the coil stock listed in Fig. 3 is all that is needed for the 80/40 and 20-meter coils. Coil stock is not used for the 15/10 coil.

Refer to Fig. 3 for details of the coil construction. This drawing shows how to make the two coils, L_1 and L_2, from a section of the coil stock.



This shows the placement of C_1 and also the three coils. Although the center pin of the coil sockets is not used for a connection, the "joined" portion on each side of the link (the two L_2 sections) are soldered together and then connected to the center pin. This provides additional support to the coil assembly.



This shows the set up for use with a coax-fed antenna. The clip on the standoff on the right is tapped onto L_2. The other clip is clipped back on itself.

The coil shown is the 80/40 combination and construction of the 20-meter unit is similar.

No. 12 solid wire is used to make the 15/10-meter coil. L_2 consists of 4 turns, 3 inches in diameter, with the 4 turns spaced over 3½ inches. L_1 is a single turn of No. 12, 2 inches in diameter, mounted in the center of L_2.

The 5-prong coil plugs have a nickel coating which should be filed off the ends of the prongs in order to get a good solder connection.

Tune-Up and Adjustments

In order to properly adjust a transmatch an s.w.r. indicator is a big help. Just recently in *QST*[3] a combination wavemeter and s.w.r. indicator was described. This is a very simple unit to make, and in addition to helping you adjust your transmatch, it will show you if you are on the correct band or not. Many newcomers make the mistake of tuning up their rigs on what they think is the correct band but actually end up outside the band. The unit mentioned, the Wavebridge, will help prevent this.

Fig. 4 shows a typical station arrangement for connecting the different units together. If a low-pass filter is required it can be installed immediately after the transmitter if an antenna change-over relay is used. If a diode or tube-type t.r. switch is used, the low-pass filter should be installed *after* the t.r. switch as these devices are known to cause harmonic TVI and you would want to prevent harmonics from such a device from reaching the antenna. Also, if at all possible, connect a good earth ground to the transmatch. It will work without one but, if you can, put in a ground connection.

Let's take the case of coax-to-coax, a coax-fed antenna. Connect the feeder to J_2, tune up the rig on the desired band, and feed enough power through the s.w.r. bridge to get a full-scale reading with the s.w.r. meter switched to read forward power. Next, take the tap lead connected to the J_2 inner conductor and tap onto L_2 on either side of the link. It doesn't make any difference which side you tap on, but for a start put it on close to the link. Switch the s.w.r. bridge to read reflected power and then adjust C_1 and C_2 for a minimum reading of the s.w.r. meter. What you are shooting for is a reading of zero for reflected versus full-scale forward. This would indicate a 1 to 1 match and the transmitter would "see" a 50-ohm load. Also, you'll find several tap points with the tap lead that will give a match, but the one you want is with the tap as far out from the link, towards the outside end of L_2, as possible.

For balanced feeders, connect the feeders to the two stand-off insulators and the tap leads to L_2 on either side of the link. Also, if you happen to have two antennas, one with coax feed, don't leave the coax line connected to J_2 when using the balanced feeders.

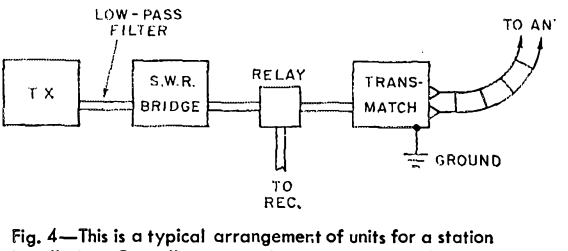


Fig. 4—This is a typical arrangement of units for a station installation. Coax line connecting the units together can be 50- or 70-ohm, depending on the s.w.r. bridge impedance.

Using the s.w.r. bridge the same way as with coax feeders, shoot for zero reading on reflected versus full-scale forward. Also, as with the coax tap, keep the taps as far out from the link as possible. The taps should be equally spaced from the link; in other words if one tap is 5½ turns from the link, the other one also should be 5½ turns. If it is impossible to get a match it means that the load presented by the feeders is so reactive the transmatch cannot handle it. You can try adding some feeder length (or shortening the feeders) as this will present a different load and may well bring it within the range. However, this will only happen in extreme cases as the transmatch will handle a wide range of loads.

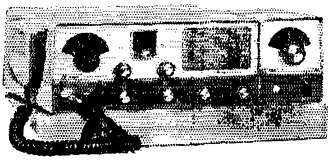
As we said at the beginning, a transmatch will keep you out of trouble and improve the operation of your station. Build one and learn how to use it. QST

[3] McCoy, "The Wavebridge," *QST*, July, 1966. This issue of *QST* is available at ARRL Headquarters for 60 cents.

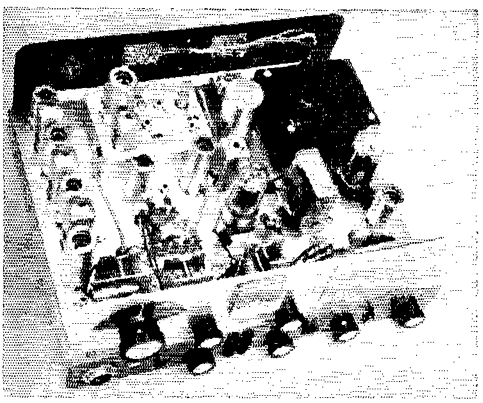
Recent Equipment

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

The Knight-Kit TR-106 Transceiver



THE TR-106 is a 6-meter transceiver kit covering 50 to 52 Mc. The transmitter portion uses the familiar 2E26 at an input power of 15 watts. The receiver portion is dual conversion, with a crystal-controlled converter featuring a nuvistor r.f. amplifier in the front end. The transceiver contains a built-in spot switch, push-to-talk control, a.c. and d.c. power supplies, multiple-position crystal switch, internal speaker, and provisions for a matching v.f.o.



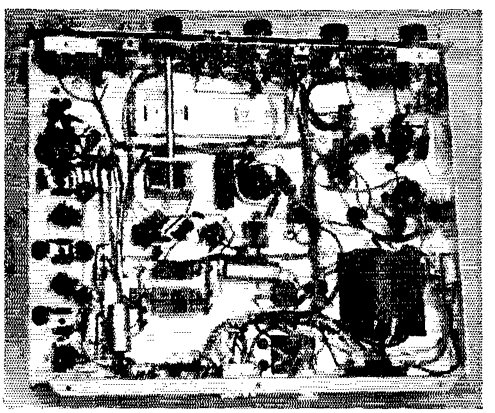
Top-chassis view of the TR-106. The converter chassis is the small box at the rear of the main chassis. The transistors for the inverter are mounted on the back panel.

Transmitter

Fig. 1 shows a block diagram of the transmitter with the receiver components at the top and the transmitter components at the bottom. The Colpitts oscillator, V_9, uses 8-Mc. crystals in the grid circuit. The plate circuit is tuned to the third harmonic. The resonant frequency of this circuit is controlled by the MULT control on the front panel. In the next stage, V_8, the 24-Mc. signal is doubled to the output frequency. The plate circuit of the doubler uses an inductively-coupled double-tuned circuit. This stage is stagger tuned to obtain a 2-megacycle bandwidth. The final, V_7, operates straight through at 50 Mc. using a combination of grid-leak and cathode bias. The latter protects the tube if grid drive is lost. The output circuit is a pi network designed to work into an impedance of 30 to 90 ohms. Transmitter tune-up is merely a matter of tuning all stages for maximum output. A combination S meter and peak-reading r.f. voltmeter is provided for this purpose. Transmitter alignment requires (not furnished) a dummy load and 3 crystals.

Receiver

The receiver uses a crystal-controlled converter which is factory wired and aligned. Installation of the converter requires two bolts and soldering of four wires. A six-meter signal at the converter input is mixed with the signal from the crystal oscillator to obtain an output of 15.6 to 17.6 Mc. which is fed to the second mixer, V_{1A}. The local oscillator, V_{1B}, is coupled to the mixer by interelectrode capacitance, producing a signal at 1650 kc. This signal is fed to a two-stage i.f. amplifier, V_2 and V_3, which uses three double-tuned circuits. The amplified signal is then detected by V_4, and at this point the a.g.c. bias is obtained and applied to the i.f. amplifiers. Also combined in V_4 is a series-gate noise limiter activated by a switch on the rear panel. The detected output is fed to the a.f.



The bottom view of the TR-106 showing the wiring harness. The transmitter is in the center, the receiver on the left, the audio on the right.

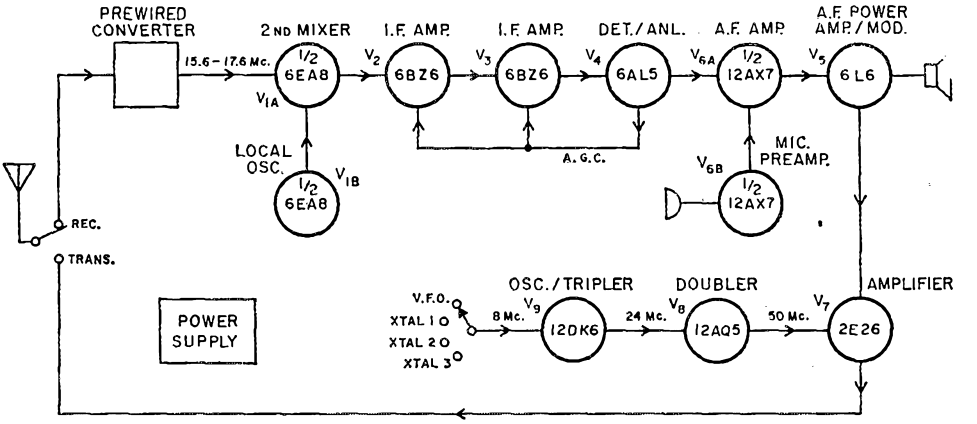


Fig. 1 — Block diagram of the TR-106

amplifier, V_{6A}, the a.f. power amplifier, V_5, and finally to the speaker. Low-impedance earphones may be used at the front-panel jack, thus muting the speaker. The remaining half of V_6 serves as a microphone preamplifier which feeds V_{6A}. The modulator is designed for 300 to 3000 c.p.s. frequency response.

A note of interest for the home constructor concerns the mounting of the a.f. power amplifier. To lower overall cabinet height the socket for this tube is mounted below the chassis level using metal spacers. This also gives added ventilation to the amplifier circuit components as well as the tube.

Three complete turns of the receiver tuning knob are required to cover 50 to 52 Mc. Dial markings are every 100 kc., with special marks for the 49.980-Mc. MARS frequency and 50.0 to 50.1 Mc. for the c.w. portion of the band. To align the receiver two v.t.v.m.s and a 1650-kc. r.f. source are needed for the i.f. section. One v.t.v.m. is used to monitor the a.g.c. bias, and the other is used across the speaker for a more accurate output indication than using your ear. Eight-megacycle crystals can be used to align the r.f. section. No adjustment of the converter should be needed or attempted.

This and That

A spotting switch is located on the front panel; this switch removes the B plus from the doubler and final tubes. The signal from the remaining stage is sufficient for spotting the crystal or v.f.o. frequency.

Power for the transceiver is supplied by a voltage-doubler circuit using a special transformer. For a.c. the transformer functions as a normal step-up. For 12-volt d.c. operation the transformer and two transistors function as an inverter. Two power cords are supplied, one the standard a.c. type, and the d.c. cord which is supplied with a cigar-lighter plug. Changing power cords automatically switches the correct fuse into the circuit.

Transmit-receive switching can be controlled from the front panel or by a p.t.t. switch on the noise-canceling microphone supplied.

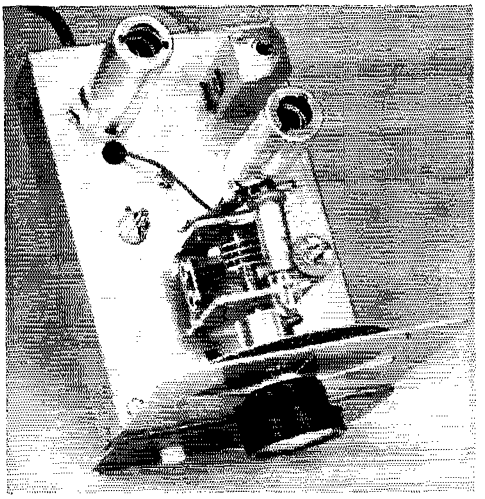
The circuits used are standard types with most of the wiring accomplished through a harness. The use of the harness cuts wiring time in half. The kit is packaged so that all parts are right at hand. — *W1DEJ*

Knight-Kit TR-106 Transceiver

Height: 5½ inches.
Width: 13⅛ inches.
Depth: 11 inches.
Power Requirements:
110-130 volts a.c., 90 watts receive, 105 watts transmit.
12-15 volts d.c., 6.8 amp. receive, 8.1 amp. transmit.
Price Class: $140.
Manufacturer: Allied Radio, Chicago, Illinois.

The Knight-Kit V-107 V.F.O.

The Knight-Kit V-107 is a v.f.o. with 8-Mc. output for transmitters in the 6- and 2-meter bands. The actual output is from 8 to 8.22 Mc. (144–148 Mc.) for 2 meters or 8.333 to 8.666 Mc. (50–52 Mc.) for 6 meters. The v.f.o. must be recalibrated each time the band is changed. To do this, the set screw holding the dial in place must be loosened and the dial rotated 180 degrees and the set screw tightened. The coil and capacitor used to determine the high and low ends of the band, respectively, are then adjusted for correct dial calibration.



Top view of the V-107 v.f.o.

The circuit is a standard Clapp oscillator using a variable capacitor in the grid circuit of a 12DK6. The plate coil is slug tuned to obtain maximum drive to the transmitter. No multiplying is done in the v.f.o. The usual precautions are taken to obtain good stability. No power supply is included since the matching transceivers have sockets for the v.f.o. power plug.

A neon indicator is used in the B plus line to show when power is on. Power is controlled by the OPERATE/STANDBY switch on the front panel.

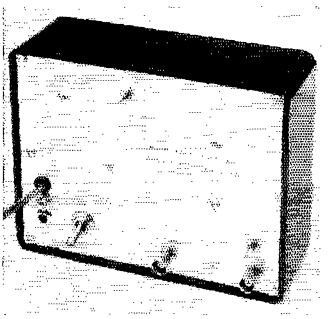
The circuit is designed to operate at low power to keep heating effects to a minimum. A voltage regulator tube is used in the screen circuit.

The cabinet matches the TR-106 and TR-108 transceivers. — *WIDEJ*

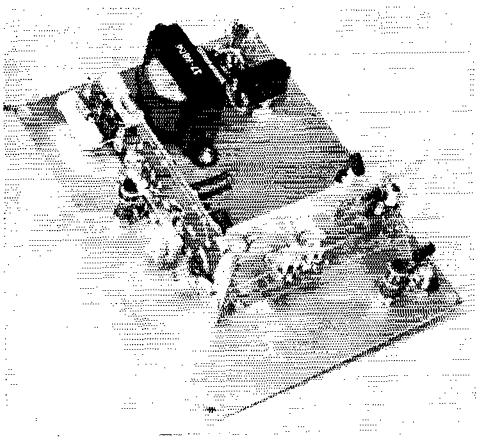
Knight-Kit V-107 V.F.O.

Height: 5½ inches.
Width: 15/16 inches.
Depth: 6½ inches.
Power Requirements: 200 volt d.c. at 30 ma. and 12.6 volts at 0.15 amp.
Price Class: $20.
Manufacturer: Allied Radio, Chicago, Illinois.

The Parks 432-3 Converter



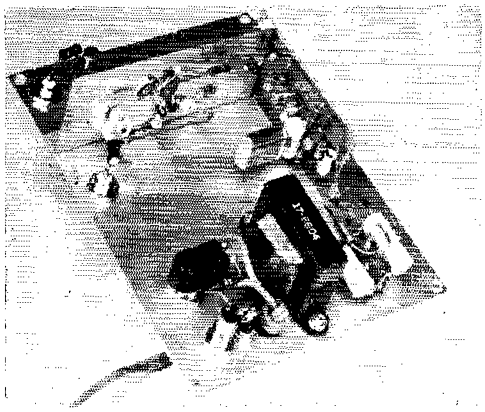
Big news in 432-Mc. circles in recent months has been the development of inexpensive transistors that are capable of beating anything but a parametric amplifier when it comes to weak-signal u.h.f. reception. Here is a crystal-controlled 432-Mc. converter that uses some of them to provide outstanding performance.



The oscillator-multiplier stages are on the circuit board at the left. R.f. and mixer circuits are on a silver-plated brass plate, lower right, with the mixer side showing.

At first glance the Parks 432-3 Converter seems to have very little inside its shiny black and silver box, but closer examination shows that there is plenty for the job at hand. Transistors and diodes throughout, and neatly-designed line circuits for the u.h.f. stages, result in this air of seeming simplicity. To eyes accustomed to vacuum-tube devices for this frequency range the layout is almost devoid of parts and wiring, but the performance exceeds the best obtainable with tubes.

The r.f. amplifier and mixer transistors are TIXM05s or 6s, or possibly others of the TI u.h.f. series, so long as they meet the manufacturer's specifications for noise figure: 4 db. or better. The oscillator and first multiplier stages also use transistors, and two crystal diodes in parallel multiply to the injection frequency. The converter tested has a 67.333-Mc. crystal multiplying to 404 Mc., for an i.f. output frequency of 28.0 Mc. and for a signal frequency of



Looking at the opposite side of the converter shows the r.f. amplifier components at the upper left, and the power supply in the foreground.

432.0 Mc. Other intermediate frequencies from 26 to 52 Mc. are available on order.

The r.f. and mixer stages are mounted on opposite sides of a silver-plated brass plate. The injection stages are on a laminated circuit board, the smaller of the two assemblies, running the long way of the converter. A small solid-state zener-regulated power supply occupies one end of the base plate. All r.f. circuits are silver-plated, and tuned with miniature air trimmers, accessible only from inside the box. The only controls brought out of the converter are the tuning screws for the slugs in the crystal oscillator and i.f. output coils.

The box is the shiny black insulating material which is familiar to all users of Parks v.h.f. and u.h.f. gear. It contrasts nicely with the grey-white of the aluminum base plate. Input and output connectors are BNC fittings.

Performance

Everyone wants a number that he can quote for receiver noise figure, preferably stated in tenths of a decibel. We do not go for such figures, for like most amateurs, we do not have the equipment necessary for accurate noise figure measurement. We are able, however, to make quite accurate comparisons, and on this basis the 432-3 Converter shows up very well indeed. In ability to detect very weak signals it was at least equal to the best we've yet seen, including average ham-type parametric amplifiers, adjusted to their peak performance.

Noise figure remains substantially constant over a range of 430 to 436 Mc., without repeaking of the front-end circuitry. The i.f. output circuit is fairly selective, however, with the result that the gain drops off markedly in covering more than about 500 kc. This is of no concern to most operators as nearly all weak-signal work is done in a narrow segment of the band, starting at 432 Mc. The mixer output circuit peaking affects only gain, and it can be repeaked casually for maximum response anywhere in the band. The r.f. circuits may also be repeaked for parts of the band other than that near 432 Mc., but this should not be necessary in the 430-to-436 region.

Use of a high starting frequency (67.333 Mc. for 28-Mc. i.f.) results in less in the way of spurious response trouble than would be encountered with a lower crystal frequency and more multiplier stages. In a test at W1HDQ, where three u.h.f. TV stations and several v.h.f. TV and f.m. stations are within a few miles, the Parks 432-3 Converter showed far less trouble with TV birdies than does the converter regularly used. The latter has an injection string starting at 21.222 Mc., and a high-Q tank circuit is used in the antenna line to keep TV blips down to level where weak 432-Mc. signals can be copied. This should not be taken to mean that the Parks Converter is free of such troubles. It may need coaxial-tank help in congested areas, depending on frequencies used by nearby stations in the v.h.f. or u.h.f. ranges. The tuned circuits in the converter will not provide a high degree of rejection of unwanted frequencies. — *W1HDQ*

Parks 432-3 U.h.f. Converter

Height: 2¾ inches, including connectors.
Width: 7 inches.
Depth: 5¼ inches.
Weight: 2 pounds.
Power Requirement: 115 volts a.c.
Price Class: $55.
Manufacturer: Parks Electronics Lab, Route 2, Box 35, Beaverton, Oregon.

Next Month

W.R.L. Duo-Bander 84

IMPORTANT NOTICE

Important postal changes in handling second-class mail matter are now in effect. Please advise us *direct* of any change of address. Four weeks notice is required to effect change of address. When notifying please give old as well as new address *and your zip code*. Your promptness will help you, the postal service and us. Thanks.

Technical Correspondence

NARROW-BAND TV USING PSEUDO-RANDOM DOT SCAN

Technical Editor, *QST*:

Various experiments in narrow-band television performed recently at the Polytechnic Institute of Brooklyn indicate that a more efficient narrow-band TV system is possible than the systems which have appeared in *QST* to date.[1] Of particular interest are experiments with 2-kc. and 8-kc. bandwidth systems, including on-the-air testing of the 8-kc. system.

There are three main considerations in a narrow-band TV system: bandwidth, resolution and flicker. The bandwidth of a television system is given by the formula

$$B = FN/2$$

where B = bandwidth, F = frame rate and N = the number of elements per frame. This indicates that to decrease the bandwidth without losing resolution (i.e., without reducing N), we must reduce the frame rate. Unfortunately, reducing the frame rate increases the flicker. Even with a long-persistence phosphor, the flicker associated with a linear scan is disturbing at frame rates below 15 c.p.s.

However, we can use a frame rate of less than 2 c.p.s. and still avoid flicker by using a *pseudo-random dot scan*. Instead of scanning linearly, we break up the field into dots and scan them in a manner which *appears* random to the eye. Fortunately, we can produce a scan pattern which appears random with a few bistable multivibrators.

In the 2-kc. system constructed at Polytech, the scan is produced completely by square waves that are generated by bistables (11 are used). This produces a picture 32 elements wide and 64 elements high, a total of 2048 elements. The frame rate is 1.875 c.p.s. (60 c.p.s. divided by 32). The picture has the same number of elements as a 0.6 × 0.8-inch section of a New York Times photograph. The scan characteristics are shown in the table below.

Frequency of Square Wave c.p.s.	*Direction*	*Amplitude, Elements Peak-to-Peak*
1920	Vertical	32
960	Horizontal	16
480	Vertical	16
240	Horizontal	8
120	Vertical	8
60	Horizontal	4
30	Vertical	4
15	Horizontal	2
7.5	Vertical	2
3.75	Horizontal	1
1.875	Vertical	1

This system is even easier to synchronize than a linear scan. The upper-left-corner element is sent as a large negative (black) pulse. This is detected at the receiver and used to reset the receiver bistables to the transmitter bistables. A weak (30 db. down) sine wave at 1920 c.p.s. is added to the video signal. In the receiver, a 3840-c.p.s. clock is driven by a high-*Q* tank tuned to the 1920-c.p.s. component of the video signal. The 3840-c.p.s. signal is divided by the chain of bistables to produce the square waves for scanning.

[1] Macdonald, "A Slow-Scan Vidicon Camera," *QST* June, July, August, 1965.

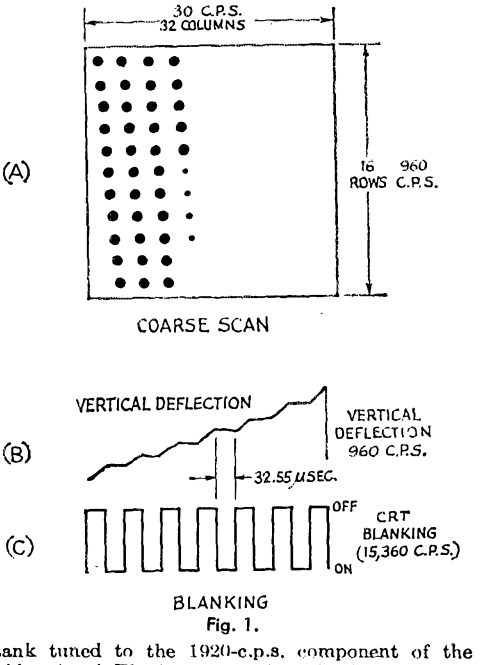


Fig. 1.

In the 8-kc. system a linear coarse scan and a pseudo-random fine scan are used. This done by using 1.875 frames per second and 16 fields per frame. Each field contains 512 dots. Each field is displaced slightly from the preceding one, so that it appears as if we have 512 dots moving in a pseudo-random scan. The total number of picture elements is 512 × 16 = 8192. This provides plenty of detail to recognize a face, and will also reproduce motion if it is not too fast. The dots are formed by using a 960-c.p.s. staircase waveform (see Fig. 1) for the vertical sweep. The staircase waveform has 16 steps. A 15,360-c.p.s. square wave is used to blank the beam as it moves between the dots. A 30-c.p.s. sawtooth is used for the horizonal deflection. To produce the pseudo-random scan (see Fig. 2) square waves of 15 c.p.s. and 3.75 c.p.s. are added to the vertical deflection voltage, while 7.5-c.p.s. and 1.875-c.p.s.

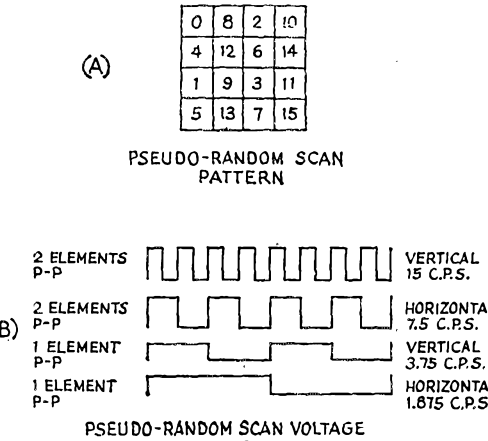


Fig. 2.

square waves are added to the horizontal deflection. Four synchronizing signals are needed in this system, two to synchronize the coarse scan sweep, one to synchronize the pseudo-random scan and one to synchronize the blanking.

On-the-air tests of this system indicate it would be a good system for amateur television. The use of the long-persistence phosphor and pseudo-random scan integrates out noise.

If we cut all sweep and blanking frequencies in half we get a system with a bandwidth of only 4 kc. Such a signal could be transmitted by a single-sideband partly-suppressed-carrier system and would take up no more room than a conventional a.m. phone signal.

Circuit details of systems used at Polytech can be obtained from Professor S. Deutsch, Polytechnic Institute of Brooklyn, 333 Jay St., Brooklyn, New York, N. Y. 11201. — *Raymond Simpson, WA2PYX, 22 Carlisle Place, Merrick, New York 11566.*

LOW-PRICED PREMIUM TRANSISTORS FOR AMATEUR APPLICATIONS

Technical Editor, *QST:*

Selecting the best transistor for an amateur project was once a simple matter; only a few types were within the ham's budget. Today 2N numbers have progressed well beyond 3000 and the builder faces an almost bewildering selection. This problem is further complicated because manufacturers are slow to discontinue outmoded types; these are often sold in kits of transistors for experimenters or as "all-purpose" replacements, and frequently appear in circuits published for amateur construction.

The accompanying list of transistors represents some of the best buys currently available. Many amateurs are already familiar with the 2N404 and 2N706. Several u.h.f. designs in *QST* have suggested the 2N3478 as a possible substitute for the high-priced 2N2857. Many of these transistors would have been considered "exotic" as recently as two years ago. The 2N2102, for example, is one of the most versatile transistors available.

Voltage, current, and power dissipation are maximum ratings. Gain-bandwidth (g.b.w.) is the frequency at which a video amplifier would have unity gain. However, in a tuned circuit considerable gain may still be obtained at this frequency. Note in particular that the high-voltage ratings of some of these transistors do not imply that they cannot be used in low-voltage circuits; the 2N2102 would behave (except for polarity) just like the 2N404 as a low-voltage audio amplifier. This is quite unlike the vacuum-tube case, where full gain depends strongly on plate voltage.

The Texas Instruments 2N3819 is the first low-priced field-effect transistor; its low noise and low intermodulation characteristics make it ideal for receiver front ends.

The 2N404 and 2N1970 are germanium transistors; all the rest are silicon types. Silicon transistors, by virtue of their low reverse saturation currents, are much more stable against thermal runaway. This is important, for example, in mobile equipment subject to temperature extremes, and in hi-fi output stages where germanium transistor designs often had to resort to protective diodes and even thermal circuit breakers. Moreover, germanium power transistors have high-frequency limitations, and considerable feedback is necessary to get full audio-frequency response in hi-fi applications. — *Jon B. Hagen, W7URZ/6, Route 1, Box 93-G, Del Mar, California.*

Transistor Table

Type	*Manufacturer*	*Use and Ratings*	*Price*
2N404	GE, RCA, TI	audio, digital, general-purpose, low-level use, 150 mw., 25 v.	$.47
2N706	GE, RCA, SYL, TI	r.f. osc., am., switching, 300 mw., 25 v., 200 Mc. g.b.w.	$.99
2N3640	Fairchild	r.f. osc., amp., video amp., ½ watt, 12 v., 600 Mc. g.b.w.	$.75
2N3646	Fairchild	r.f. osc., amp., video amp., ½ watt, 40 v., 400 Mc. g.b.w.	$.70
2N2102	RCA	r.f. osc., amp., video amp., (low noise) 5 watts, 120 v., 60 Mc.	$1.41
2N3053	RCA	similar to 2N2102, 5 watts, 60 v., 100 Mc. g.b.w.	$.99
2N3478	RCA	r.f. osc., amp., video amp., (low noise) 30 v., 900 Mc. g.b.w., noise fig., 5 db. at 470 Mc.	$2.06
2N3819	TI	field-effect transistor, 200 mw., 25 v., g_m = 5000 micromhos, noise fig., 2.5 dbm. at 100 Mc.	about $3.00
40264	RCA	power transistor, r.f. amp., 4 watts, 300 v., 50 ma., 25 Mc. g.b.w.	$1.21
40313	RCA	power transistor, 35 watts, 300 v., 2 amp.	$2.23
40251	RCA	power transistor, 29 watts, 40 v., 15 amp.	$2.89
40250	RCA	power transistor, 29 watts, 40 v., 4 amp.	$1.57
2N1970	Motorola	power transistor, 150 watts, 100 v., 15 amp.	$2.35

STATION DESIGN FOR DX

Part II — Economics of Station Design and Construction

BY PAUL D. ROCKWELL,* W3AFM

In the pursuit of amateur radio, dollar limitations are always present. What is the most practical allocation of available funds? Let us first illustrate an analytical approach to this question from the standpoint of effective DX-radiated power (DX e.r.p.). Assume 20-meter operation, flat terrain, no voice modulator, and optimum radiation angle of 1°. As a frame of reference, 0-db. will be taken for 100 watts c.w. input, 30-foot tower height, and 10-foot Yagi boom-length.

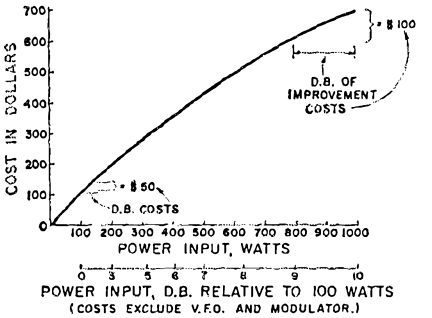


Fig. 3 — Transmitter power costs.

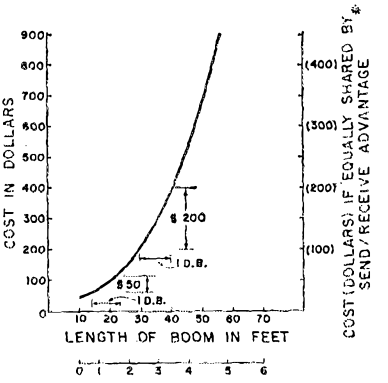
Transmitter power costs run about as shown on Fig. 3. The costs include driver, but exclude v.f.o. The curve would have to be shaded upward for first-class features, and downward for some home constructors. Make your own curve, if you prefer. What is being shown on this and the following curves is a design technique — not a universally applicable set of data. What is important to note, in this example, is that the last db. (from 780 to 1000 watts) costs $100.

Now consider antenna costs. Fig. 4 presents these for Yagis. The db. gain values are relative to a half-wave dipole, same height and foreground. The next db. beyond 30-foot boom length costs $200. Stacking two beams, which gives 3-db. gain at the expense of 40-foot additional tower height is attractive beyond about 30-foot boom length. However, this introduces the problem of rotating both beams without interfering with guys. The Telrex Big Bertha solves this by rotating a self-supporting tower. Such a tower, 112 feet high, equipped with antennas and accessories, costs over $15,000 in place.

Now tower height. Fig. 5 presents costs, based on $10 per foot for ordinary lattice tower, guys, anchors and foundations. Erection costs are added, beyond 40-foot height, up to $400 for the 150-foot height. No allowance is included for rotator, indicator, insurance, etc. Gains are related to the assumed ideal of 1° takeoff angle by use of the image-antenna geometric construction. Analysis by the indicated technique shows that, to a close approximation, DX e.r.p. at 1° increases as the square of tower height. That is, each time the tower height is doubled, 6-db. improvement is appreciated. Because DX signals often arrive (and should be transmitted) at angles considerably above 1°, this figure must be weighted downward. Fig. 5 has been constructed on the basis of linear relation between e.r.p. and tower height — 3-db. improvement for each doubling of height. This agrees fairly well with Utlaut's results for very high effective heights.

The concept being developed is: Cost per db. for the last db. of improvement which can be handled economically. Suppose we can afford $200 for the last db. By examination of the curves, we see immediately we should run 1-kw. input, for in this department the last db. costs only $100. We choose from Figure 4 a boom length of 40 feet. Tower height per Figure 5 is 75 feet. Total cost, adding the corresponding ordinates of Figures 3, 4, and 5 is $1980.00.

Perhaps this cost exceeds our means. Maybe we can afford only $50 for the last db. in each of the three departments principally affecting DX effective radiated power (DX e.r.p.). On this



* COSTS IN PARENTHESES ARE USED FOR APPORTIONMENT PURPOSES IN CONSTRUCTION OF FIG. 6. TOTAL COSTS IN ALL CASES ARE TAKEN FROM THE LEFT ORDINATE.

Fig. 4 — Antenna costs.

* 5800 Hillburne Way, Chevy Chase, Md. 20015

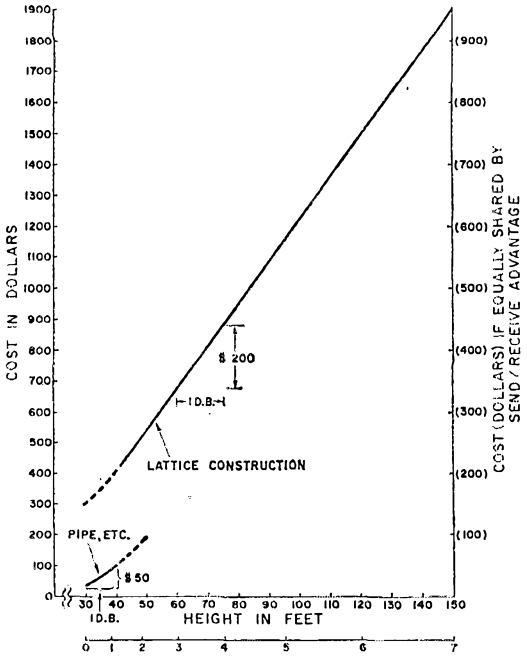


Fig. 5 — Tower Costs.

basis, we choose 150 watts, 23-foot boom, and 40-foot tower height. Total cost is $350.00.

Once the concept is understood, curves may be developed to fit the individual situation, and to take into account all sorts of other variables: cable losses, fixed costs for auxiliaries, commercial increments of sizes, nested-rhombics-plus-real-estate versus Yagis, etc.

An important consideration, so far excluded in order to simplify the discussion, is the fact that antenna db. work both ways: send and receive. Appraisal of antenna and tower costs for DX e.r.p. should therefore be weighted, so as to allocate a share of these costs to the receiving advantage. A reasonable factor is one-half. That is, the dollar values of ordinates of Figs. 4 and 5 can be cut in half, for economic optimization of design with respect to DX e.r.p. only. On this basis, Fig. 6 shows optimum combinations as a function of funds available. The figure is constructed by assuming various dollars-per-last-db. values, and connecting the resultant values by curves. Of course the optimization differs somewhat from the $50/db. and $200/db. examples above, because the receiving components of costs have been broken out separately.

For example, suppose $500 are available for the relevant parts of the station. Refer to "Total Cost" on Fig. 6 at $500. Draw a line straight up. Parameters are: Power, 150 watts; Boom, 27 feet; Tower, 50 feet. Gain relative to the reference installationis 5.3 db.

If $2000 are available, parameters are: Power, 1 kw.; Boom, 40 feet; Tower, 75 feet. Gain relative to the reference installation is 17.2 db.

Fig. 7 presents compatible equipment complements with regard only for DX e.r.p. — no allowance for concurrent receiving advantages. This represents a more conventionally accepted approach. In effect, transmitter power is given greater initial emphasis. These db. are cheap and more convenient than antenna/tower db., but do not bring corresponding receiving advantages. After the legal power limit is reached, optimization proceeds much as on Figure 6. For $500, read off: Power, 275 watts; Boom, 26 feet; Tower, 44 feet; Relative gain, 7.3 db. For $2000: Power, 1 kw.; Boom, 40 feet; Tower, 75 feet; Relative gain, 17.2 db.

Economically, c.w. telegraphy gives by far the most DX per dollar. Not only is this true because more DX stations are available by c.w., but also because of greater efficiency, expressed in db. as follows [17]:

C.w. ..... 0 db.
D.s.b. a.m., order-wire quality. +17 db. required
S.s.b. order-wire quality ..... +14 db. required

S.s.b. DXers will nearly all aver that the table above should be corrected to read "11 db." instead of "14 db" for s.s.b.

After reading this, it is fair to ask: "What does a db. in DX e.r.p. really buy, after all, in terms of DX capability?" The answer is that, *other things being equal*, it buys a lot. Six db. buy, competitively, a decisive advantage.

So far, system-design trade-offs have been discussed. The matter of constructional alternatives is also important in station economics. The remainder of this month's text is on miscellaneous antenna-construction comments. An-

[17] "Median Signal Power Required for Reception of Radio Transmissions in the Presence of Noise," Technical Report 5, U.S. Army Radio Propagation Agency, June, 1961.

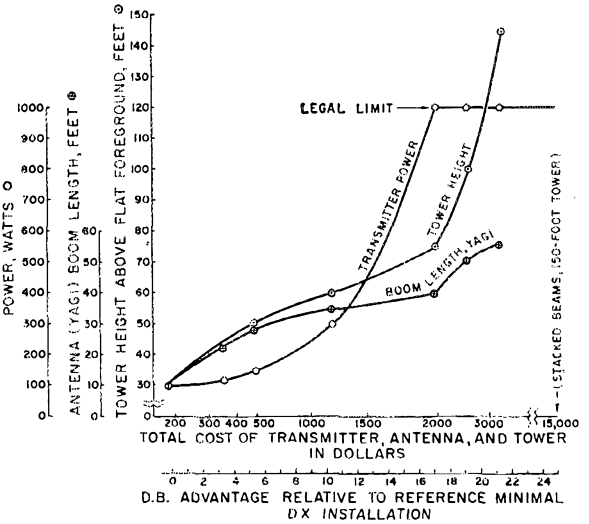


Fig. 6 — Compatible equipment complements (with allowance for receiver advantage).

tenna mounts are frequently the major item of home built equipment.

First, re antenna towers. There are fine products on the market. These firms also sell the numerous necessary and desirable accessories: brackets, clamps, clips, anchors, winches, guys, and even gin poles. Only a small percentage of DXers use these products, because the majority (a) can't afford them, and/or (b) home and neighborhood considerations won't permit them. Speaking in generalized terms, short of all-out optimum performance, a practical and almost universally applicable construction is to use telescoping pipe sizes, side-supported to the house, with a hand-winch for running the antenna up and down. This is what is done at W3AFM. Some particulars follow.

The cheapest and most universally available mast structural element is water pipe. It comes in 21-foot lengths. It should be ordered black, unthreaded. Local suppliers usually deliver. Prices run about $10.00 a length, depending on weight. Figure 12¢ to 20¢ a pound, depending on discounts, location etc. Sizes are confusing, because they are based on nominal i.d. of the standard weight. "Extra strong" and "double extra strong" are of the same material, but smaller i.d. (same o.d., to match fittings) for greater wall thickness. Some examples are given in the table below, in which "XXH" means "double extra heavy":

Size (in.)	*Type*	*o.d. (in.)*	*i.d. (in.)*	*Wall Thickness (in.)*	*Weight (lbs./ft.)*
1½	Std	1.900	1.610	0.145	2.72
	XH	1.900	1.500	0.200	3.63
	XXH	1.900	1.400	0.400	6.41
2	Std	2.375	2.067	0.154	3.65
	XH	2.375	1.939	0.218	5.04
	XXH	2.375	1.503	0.436	9.03
2½	Std	2.875	2.469	0.203	5.79
	XH	2.875	2.323	0.276	7.66
3	Std	3.500	3.068	0.216	7.58
3½	Std	4.000	3.548	0.226	9.11

Many Yagis are made to mount on 1½-inch pipe. Speaking in generalities, and depending on prevalent winds, antenna, etc., 16 feet of unsupported height (i.e., 16 feet above guy attachment or last bracket) can be good design, whereas 20 feet can be risky. It is wise, if using water pipe, to telescope sections, in such a way that the top 10 feet are single-wall, next 10 feet double-wall, next 1 foot triple-wall, etc.

Steel much better than water-pipe iron exists. Chrome-molybdenum electroweld or seamless AISI 4142, heat-treated to 180 k.p.s.i. looks great — but costs ten times as much per pound and seems almost impossible to get in less than mill lots.

A popular mast in the Northeast is Diamond "E" (1020 cold-drawn steel) 2 inches o.d. by 0.25-inch wall × 20 feet long, selling for about $60.00. So far as known, one of these has never folded.

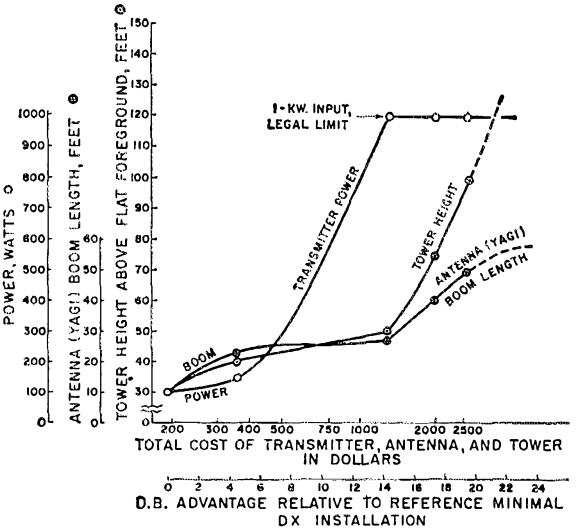


Fig. 7—Compatible equipment complements (DX e.r.p. optimization).

Aluminum alloys have a modulus one-third that of steel. This can make them very willowy, unless kept short, and thick-walled.

In the best installations, the mast or top tubular-section of the antenna-mount, projects only a few feet above the main steel-lattice tower. The rotator is then a few feet below the top of this tower. Sometimes, for reasons previously mentioned, a lattice tower is not practical. In such cases, the pipe mast is extended down to the ground, and the rotator mounted near the ground. Such an antenna support is commonly clamped, loosely so the antenna can be turned, to the side of a house. When this is done, it is important to spread the stress on the house structure. This is done by angle-iron, channels, or wooden members, coupled typically by ½ inch threaded bolts all the way through, for example, the attic walls. At W3AFM, a vertical 2 inch × 6 inch × 12 foot plank is bolted to the side of the house, with 2 inch × 4 inch × 6 foot lateral stress-spreaders horizontally inside the attic wall. The strongest wood commonly stocked is oak. Clear white oak, unfinished, and suitably stained, is used. The vertical plank is attached by four ½ inch bolts, and projects 4 feet above the peak of the roof. Three husky electrical clamps attach the mast to this plank. The second 21 foot pipe section up from the ground is slotted to fit over a ½ inch dowel in the lowermost 21 foot pipe section; so the antenna may be lowered to a height reachable from the roof by first raising it a few inches, then lowering the disengaged part to the ground.

Such a load requires work advantage. Boat winches, available from Sears or Ward's at about $25.00, are well suited to this purpose. Half-inch polyethylene boat rope is a good value.

It can be dangerous and expensive to economize on small hardware fittings: eyebolts, U-bolts, clamps and the like. Items stocked at Sears,

(Continued on page 166)

"QSL . . . Solid Copy"

BY JOHN G. TROSTER,* W6ISQ

"WB6BBO de KH6FHA. Hr SET msg . . .

NR 1 TEST EMERGENCY KH6FHA CK 14 KAILUA HAWAII 1700Z OCT 1 F.E. HANDY ARRL NEW INGTON CONN THIS IS TEST MESSAGE STOP ADVISE ARRIVAL TIME RED CROSS REPRE SENTATIVE STOP ARL SEVEN R. O. DAME KH6FHA

"'KH6FHA de WB6BBO . . . QSL . . . solid copy . . . get it right out . . . 73.' Cheesh, for a emergency message, that fella sure sent a awful lot of mistakes and extrastraineous stuff. A course, he was going about 45 w.p.m. so I might of missed a letter now and again. But in a emergency, there ain't time to slow down and worry about all them dits . . . I always say . . . yeah. Boy, if Mr. Handy ever saw how this thing arrived . . . Whhheeew! Guess I'd better fix it up a bit! Everybody *knows* it's only a *test*, soooo don't need that part. And who needs the 'ck' and 'QTH'? . . . change the time to local . . . and *everybody* knows Handy, sooo . . . and tighten up the text a bit . . ."

"W9BRD de WB6BBO. QTC 1 Conn."

"WB6BBO de W9BRD. Just leaving for a football game, but can shoot it through tonight . . . QRV."

"Good enough . . . (yeah, anything's okay just so's I can get it off *my* Back!) Guess I'd better crank up the keyer wide open. If it's a emergency message, ya gotta send it fast . . . dit.ditditttttttt

KH6FHA 7 AM OCT 1 HANDY TEST XRAY PLEASE ADVISE ARRIVAL RED CROSS REPRE SENTATIVE XRAY ARRL 7 DAME KH6FHA

"WB6BBO de W9BRD . . . QSL . . . solid copy. Get it out tonight after the victory celebration . . . rah rah rah . . ." * * * . . .

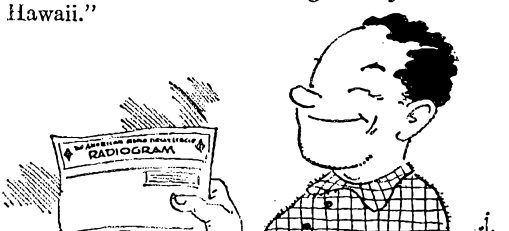
"Oooops, forgot that one for Handy. That victory celebration last night . . . too sweet and too late . . .ooooo. Hmmmmmm, must be a 'SET' message. Guess it's that time of year. Oughta make up a 'number' and 'QTH.' And I'd better fix that 'date' . . . sombody'd get mad if they knew I kept it a day! And what's Handy's first name? . . . and the state. Ooooh, this text needs work . . . much too sloppy. And who needs a 'signature' in a emergency? Okay.! W2ISQ de W9BRD. One for Conn.' "

NR 1 KH6FHA HAWAII 7 AM OCT 2 FRANKLIN HANDY CONNECTICUT TEST MSG X ADVISE ARR RC REP AT ARRL X 73

"'W9BRD de W2ISQ.' QSL . . . solid copy! . . . Boy, Mr Handy would really go into oscillation if he saw what came through! Wow! If I sent this to W1AW like this . . . why, why they'd tear up my ORS! Better fix it. Lessee, it needs a 'precedance' . . . look up KH6FHA's QTH in the book . . . make the time 'zulu!' . . and date! . . eeeee . . . *can't* be Oct 2 in Hywiiee yet . . . or maybe it's Oct 3? . . . oh well, back up one just in case . . . it shouldn't arrive before it's sent. Aaaand, Mr. Handy's kinda sticky about using a complete address . . . and his name ain't what it says here . . . it's ahhhhh . . . oh well, use initials. Annnnd . . . this text . . .wow. Really gotta work this over. This *is* a test *message* . . . use 'stops' . . . spell out words . . . and that RC fella just *can't* be arriving *at* ARRL . . . must be arrival *in* KH6. Sure. And that 'ARRLx73' . . . hmmmmm . . . don't make sense. No time for pleasantries in emergencies. Maybe it's a numbered message . . . like 'ARL 73' . . . but there's no message number '73.' Ahhhhh, yes . . . gotta be 'ARL 7.' Aaaand, 'signature' ? ? ? Hmmm . . . must be KH6FHA. Get his name in the book. And now the 'ck' . . . much better now. 'W1AW de W2ISQ . . . SET tfc for u.' ".

"W2ISQ de W1AW QRV . . . * * * * . . . QSL . . . wl fone FEH immediately."

"Mr. Handy, this is the operator at W1AW. Just received a SET message for you from Hawaii."



QSL . . . solid copy . . .

"Good. Read it to me please and I'll check it against the original we sent to KH6FHA to use in the test."

"Here it is . . .

NR 1 TEST EMERGENCY KH6FHA CK 14 KAILUA HAWAII 1700Z OCT 1 F. E. HANDY ARRL NEW INGTON CONN THIS IS TEST MESSAGE STOP ADVISE ARRIVAL TIME RED CROSS REPRE SENTATIVE STOP ARL SEVEN R. O. DAME KH6FHA

"Astounding . . . perfect . . . absolutely letter perfect. A little late but absolutely remarkable. We can't do this well around here with our office memos! Must be extraordinary operators who handled this. Would you please send a tracer. Get the calls of all stations who handled that message. We must commend each of them publicly in "Operating News." After all, this is the solid copy accuracy and attention to duty and detail we've been striving for all these years."

QST

*45 Laurel Ave. Atherton, Calif.

97.73 — or Bust!

In Two Parts — Part I

BY DAVID A. LIEN,* WA6YMY, ex W4PAI, WØZSR

SAY, OM, I got an "Official Observers Cooperative Report" in the mail today, and he sez my signal is f.m.ing. How does the signal sound to you?"

"Looks O.K. on my scope here. I don't see any f.m."

"Well, . . . guess the OO must have copied the wrong call or something. I've never had f.m. problems here before — that I know of anyway. Thanx fer the check, OM."

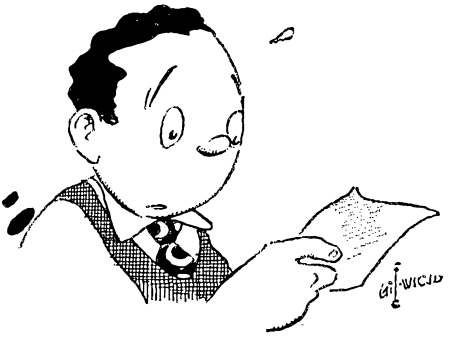
Sounds familiar doesn't it? Just another on-the-air signal check. But did you catch the probable error in the conclusion drawn as a result of this "check"? Unwanted frequency modulation of a signal is easily detected by simply turning on the receiver b.f.o. and noting if the beat note between the incoming carrier and the b.f.o. varies with modulation. F.m. however is NOT readily seen on a scope of the quality usually found outside a laboratory, thus the merits of this test are in considerable doubt.

Step number one following receipt of an OO, Cooperative Report is: Confirm that the problem indicated does (or does not) exist, by monitoring your own signal. With only your station receiver as a testing device, and the knowledge of how to use it, you can discover all sorts of things about your own signal. Add an inexpensive scope (and the knowledge of how to use it correctly) and you're really in the amateur signal analyzing business. But . . . let's start at the beginning.

Who is an OO?

ARRL Official Observers are hams, just like those found in the rest of the fraternity, differing in only the following ways: They have a sincere desire to be of aid to the amateur service, and have so indicated. They have been as carefully screened as is possible in a strictly volunteer no-pay organization, with effort made to screen out the amateur vigilante, those with grudges to bear against certain segments of the fraternity, and those whose sincerity in wishing to aid is doubtful. And perhaps most important, the OO must be technically competent. Part of the screening (by local SCM, and Hq.) is a written paper covering theory as applicable to signal monitoring, with emphasis on the pitfalls which may cause incorrect conclusions to be drawn about a signal under observation.

*7866 Airlane Ave., Los Angeles, Cal. 90045



I got an Official Observers Cooperative Report in the mail today!

The average OO loves to ham, and the time he gives to observing is completely gratis. This time must be subtracted from the normal time he has available for ragchewing, DXing, construction, contests, or whatever he prefers. Likewise, the time he spends personally assisting notice recipients in finding their troubles, both on the telephone and in person, is time which he willingly gives additionally.

As an unpaid volunteer, he helps keep the bands clean by looking for signals which are deteriorating in quality. By catching these signals *before* they are caught by observant FCC monitors, fellow hams are spared FCC citations. FCC citations are not just figments of someone's imagination. They are really being issued, in quantity, but most recipients are too embarrassed to acknowledge a citation to fellow hams. I have one framed and hung on the wall as a reminder of my close scrape with the FCC a few years ago, during sweepstakes. No Official Observer got to me first to point out that my v.f.o. had decided to become a happy wanderer.

There are some gross misunderstandings afield. An Official Observer does not have the authority to "cite" anyone for anything. The "Official Observer Cooperative Reports" are just what

The purpose of this article is to assist hams who have received OO Cooperative Signal Discrepancy Notices in achieving compliance with the Technical Standards of the FCC Rules and Regulations. Particular attention is given to those technical violations covered by section 97.73. This is not a step by step "solder the 3 wires found on pin 7" article, but one that will help you (1) confirm that the trouble does (or does not) indeed exist, (2) locate the probable cause of the trouble, and (3) point out the right direction to follow in curing it. Armed with this knowledge, you should be able to take advantage of the OO's signal report, and return your signal to one in which you can take pride.

their title indicates, and are in the best Amateur tradition of self-policing and mutual assistance. The OO's obligations are of the same order of magnitude as his authority. He *owes* you only as much as the next ham, although he is probably willing to help you considerably more. Since his responsibility ends with the mailing of a discrepancy notice, the final responsibility for the quality of your signal rests with *you*.

The Hams Response

People in general are funny (guess the radio/TV program by the same name proved that), but when it comes to their favorite hobby it becomes especially evident. Hams are not at all unlike owners of TV sets who hit the ceiling when told that there may be something wrong with their expensive "pride and joy." Having sent out nearly a thousand OO Cooperative reports in the last several years, and having kept close track of the responses offered to these reports, here is how the reactions seem to fall:

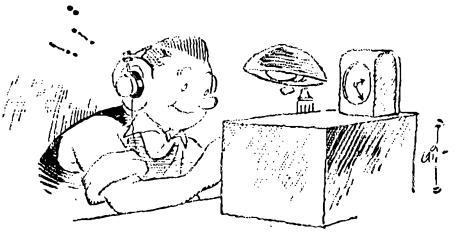
Group A: This group, a large one, realizing that component deterioration is quite normal and is to be expected, will check out the report, perhaps contact the cognizant OO for assistance, find the trouble, repair it, and perhaps send a "TNX" letter or QSL to the assisting OO. (One drawer here is stuffed with them).

Group B: This group throws the card away, having made only a feeble attempt (or no attempt at all) to investigate the report.

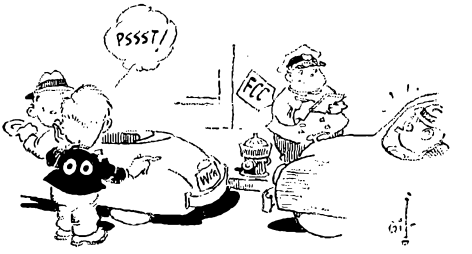
Group C: This group, a small but vocal one, doubts or pretends to doubt the integrity, veracity or competence of the Observer, and calls or writes and wants to argue, or compare technical credentials. It often develops that good test equipment is on hand, but is either not being used correctly or not being used at all. The biggest problem this group seems afflicted with is a bruised ego.

Group D: This tiny group (0.3 of 1% of the attempts to be of help here), for reasons best known to psychiatrists, fly into a rage with perhaps the reaction ". . . I ain't got no time for the ARRL or anyone associated with . . . etc."

Looking at this breakdown, it would appear that amateurs react pretty much as one would expect the general populace to react under similar circumstances: *Group A:* The good guys, conscientious, aggressive, not content to have anything but the best signal possible, quick to investigate any report (from any source) that their signal may be deteriorating, and determined to fix it. *Group B:* More good guys, but for reasons unknown, not motivated to carry a report through to its conclusion. Probable reasons include lack of self confidence to investigate the problem; or, having investigated it by inadequate on-the-air checks, decision that the signal can't be too bad; or forgetfulness; or laziness; or in some few cases, maybe just don't care. *Group C:* In many cases, here are victims of the great volume of electronic misinformation that permeates some of the bands. This group, having overcome a bruised ego, would doggedly pursue the trouble until found. *Group D:* As a certain percentage of the population is made up of "kooks," it's understandable that a few get ham licenses.



OOs are hams just like those found in the rest of the fraternity.



An OO does not have the authority to cite anyone for anything.

Brass Tacks

Enough background information. Let's get down to brass tacks and examine some common technical problems. Let's assume (for our first example) — you've received an OO "Cooperative Report" that indicates your signal was chirping. This is one of the many technical violations covered by section 97.73).

As stated at the beginning, the first step in bringing a report to a satisfactory conclusion is to confirm that the problem indicated does (or does not) exist, by *monitoring your own signal.* This may be done by listening to yourself on your own receiver, or by trading stations with a ham a few miles away and listening to your signal on his receiver. The "strictly amateur" way (and not in the sense in which we like to use the phrase) to check out your signal is to get on the air and get some "reports." This method is notoriously unreliable. Consider for a moment the value of S-meter reports. They are more of a joke than a tool, and the same holds true of most other on-the-air reports. Getting on the air to check your signal is the *last* step in a repair job, not the first. The "professional" way to go about analyzing your signal is to eliminate the vagaries of the atmosphere and the operator on the other end.

Listening to Yourself

One of the popular myths or half-truths that is heard on the bands is that "if the transmitter

and receiver are too close to each other, the receiver will give false readings." As stated, this is wrong. A normally well-shielded receiver, in the proximity of a normally well-shielded transmitter, will function normally. What *is* important is that the amount of r.f. from the transmitter which reaches the receiver's antenna terminals must be limited. If the r.f. at these terminals is such that the S meter reads less than S9 with the r.f. gain up full and the antenna trimmer or preselector peaked for maximum, the receiver will monitor your own signal as well as any other incoming signal. As an engineer I've operated 100-kw. transmitters into dummy loads and monitored the signal with receivers and spectrum analyzers in the same room, without overloading. This monitoring technique is standard operating practice.

Listen to yourself.

Listening to yourself requires a few simple accessories. To listen to a phone signal you will need headphones. A dummy load should be used on the transmitter for extensive testing, but you will want to make a brief test using the antenna, if for no other reason than to exclude it from consideration as a source of the trouble. (Remember what section 97.73 says about excessive on-the-air tuning and testing, though). It will be necessary to bypass the receiver mute terminals, in order that the receiver remain on during the transmissions. Last, but not least, you must control the amount of r.f. that reaches the receiver antenna terminals.

With low-power transmitters it is normally sufficient to disconnect the antenna from the receiver. At higher power levels it may be necessary to short the antenna terminals together with a short wire. If this does not reduce the signal level below S9, it will be necessary to improve the shielding of the transmitter. If you are using a legitimate resistive load (not light bulbs) you should have no trouble keeping the r.f. level below the point of receiver overload. If you find you are so well shielded that you don't get enough r.f. to the receiver for reliable monitoring (how sweet that is) connect enough wire to the antenna terminal to bring the signal level up to S6 or S7.

Having so equipped your receiver for the task, you are ready to monitor your own signal. If you have only a transceiver, borrow a receiver from the ham who keeps borrowing your multimeter.

Chirp

To quote from the keying chapter of the ARRL *Handbook*, "Chirp is an easy thing to detect if you know how to listen for it, although it is amazing how some operators will listen to a signal and say it has no chirp when it actually has." "The least satisfactory way (to determine whether or not it exists) is to ask another ham on the air how your keying sounds, although this seems to be a very popular method. . . . In many cases they don't actually know what to look for or how to describe any aberrations they may observe." Thus the importance of checking your own signal.

Load up the transmitter on the band which was noted on the OO signal report, and tune in the signal on your receiver. Adjust the b.f.o so that a low-frequency beat note is heard (a few hundred cycles or less). Key the transmitter on and off *slowly*, listening for a change in pitch in beat note between the first and last part of the pulse. If the chirp is severe, it will be noted during the first few cycles of the c.w. pulse. If the chirp is less severe it may take several tenths of a second for an appreciable frequency shift to occur. In a properly-operating transmitter, there should be *no* shift in frequency between the first part of the pulse and the end of it.

Adjust the b.f.o. to the other side of your signal. If the chirp was down in frequency before, it will now be upward. Listen to your signal both ways, as some people can hear the chirp better one way than the other.

Having ascertained that the transmitter is chirping, how do we fix it? First, we have to recognize the cause of chirp. Chirp is caused by some electrical change in the oscillator circuit, be it a crystal oscillator or a v.f.o. The most common cause of a change in frequency is a change in oscillator tube screen or plate voltage. As the key is depressed, causing the final tube to draw large amounts of plate current, the power supply voltage drops, and if this drop in voltage is allowed to be reflected back to the oscillator tube, the oscillator frequency will change, or "chirp."

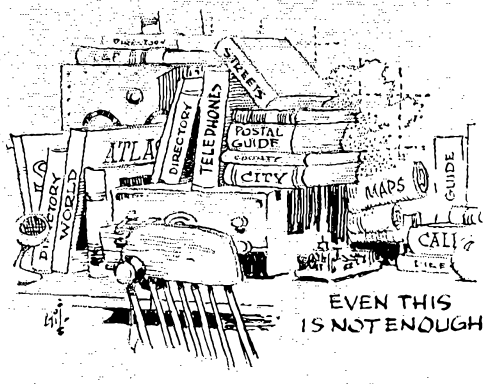
The first place to look for trouble in any piece of malfunctioning electronics gear is the tubes. If you understand how a tube tester works, and what it can and cannot do, it is a powerful trouble-shooting tool. Without taking space here to cover the details of operation of the several kinds of tube testers in use, and the virtues and demerits of each, let the following suffice: If a tube tester says a tube is bad, it probably is. If the tester says the tube is good, it *may* be.

If your transmitter is more than several years old, chances are good (or bad) that the electrolytic capacitors in the power-supply filter have started to deteriorate, and their filtering ability has decreased. This in turn affects the regulation of the power supply. If chirp is still noticeable after having provided the rig with good tubes, look to the filter capacitors.

Another source of potential trouble is the

(*Continued on page 154*)

GBA



Or, Why Not Address Them Right in the First Place?

BY LOUISE RAMSEY MOREAU,* WB6BBO

ONE of these years there is going to be a night when the entire Traffic Fraternity will rise in a moment of solemn, ceremonial silence at their stations, turn to the calendar, put a red circle around the date, and preserve it forever as the most amazing night in all traffic history — the night that every message had a complete address. This eventful night will be followed by a second, equally rare one, when no service message went through the nets with that 120-year-old letter group *GBA* in the text, meaning: "Give Better Address."

The average amateur is very careful to send "name & QTH" when requesting a QSL for his collection for a certain certificate. When he writes to the companies regarding equipment, he makes sure the address is complete. When he writes to his friends, he sees to it that the full name, house number, street, town and zip code are included. He wouldn't think of sending a letter addressed to The Meyers Family, Babcock Boulevard, Pittsburgh, Penna. Nor would he dream of wasting an airmail special-delivery stamp on a letter addressed: Carolyn, % Martha Nicholson, Columbus, Ohio. And, if it were even suggested that a letter be addressed to Thomas Martin, 2116 Evergreen Street, California, USA., he would write the idea off as coming from someone with an awful lot of stamps to waste because the Post Office has a nice rubber stamp in purple ink that reads "insufficient address" that they apply before they shoot it back to him.

If a letter is worth sending at all, it is worth sending with an accurate address, or back it comes.

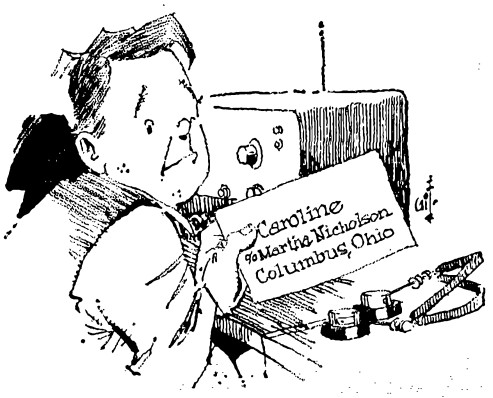
The same is true with radiograms that keep the traffic nets going. Yet night after night the messages come through the system, arrive at a terminal station for delivery, and, the following night, the traffic net version of that purple stamp, Please GBA, follows the reverse route of the message to the station of origin.

So often the zeal to demonstrate this facility of our public service causes us to sacrifice accuracy for show. A neighbor is about to visit a friend in another city and lists the arrival date and time, but can't remember the full address so the message starts on the section net to "The Meyers Family AA Babcock Blvd AA Pittsburgh Penna." A Priority message regarding a very important event ends up delayed because the address is to "Carolyn AA % Martha Nicholson AA Columbus Ohio." An Amateur friend decides to go on vacation, and off go messages addressed to "WA6XXX/3 AA Baltimore Md."

The experienced members of the traffic nets are amply supplied with all sorts of aids to route traffic. Their desks sag under post office directories, call books, telephone directories, maps, city directories, street guides, but it would take the combined services of a crystal ball, ouija board and a fortune teller to route these messages to their destination. The Meyers Family will never get the news of the impending arrival, Carolyn is unaware of her well wishers as she is crowned queen of the prom, and, unless

(*Continued on page 164*)

* 1036 E. Boston St., Altadena, Calif. 91001



Hints and Kinks For the Experimenter

NEON LAMPS

A LITTLE-known source of small neon bulbs for use as r.f. indicators and pilot lights can be found in defunct flourescent-light starters. — *Kenneth G. Kopp, WA4HAA*

V.H.F.-U.H.F. SIGNAL SOURCE

WHILE checking a 432-Mc. converter, I discovered that the simple one-transistor crystal test oscillator described by W3GKP in the "Hints & Kinks" column of *QST* for February 1965 makes a very potent v.h.f.-u.h.f. signal generator if a reasonably good v.h.f. transistor is employed. Using a 2N706 and an 8-Mc. crystal, strong harmonics in the 420-Mc. band were obtained. (Since the 2N706 is an n-p-n transistor, the battery polarity of the original circuit must be reversed as the test oscillator was designed for p-n-p types.) Harmonics in the desired range may be enhanced by connecting the oscillator output to an antenna which is resonant at the desired frequency. With quarter-wave whips on both the oscillator and a 432-Mc. low-noise converter, the signal was easily detected when the antennas were twenty feet apart and was considerably over S9 with an antenna separation of a couple of feet. This simple oscillator compares favorably in signal strength and stability to a complicated signal generator using a 72-Mc. crystal, two good u.h.f. transistors and a diode multiplier. — *Gerald R. Lappin, W4WQZ*

ADAPTER FOR MIKES WITHOUT P.T.T. SWITCH

HAVING recently purchased a Heath HW-12, and not owning a microphone with push-to-talk control, I had to build an adapter for use between my mike and the mike jack on the HW-12. The circuit shown in Fig. 1 enables the operator to use S_2 to control the transceiver in the same fashion as would result from a p.t.t. switch on the microphone. By placing S_2 in the "off" position and activating the circuit with S_1, normal VOX operation results.

The adapter is built in a $1\frac{5}{8} \times 2\frac{1}{4} \times 3\frac{1}{4}$-inch Minibox. Terminals 1, 2 and 3 are connected to a 12-inch length of 2-conductor shielded mike cable which is terminated with a microphone plug that mates with the mike jack on the equipment used. An Amphenol 80MC2M plug is used with the author's HW-12. J_1 can be selected to match the existing plug on the operator's mike. S_1 is a s.p.s.t. toggle switch; S_2 is a d.p.s.t. toggle. — *Norm Bradshaw, W1DJV/W8EEF*

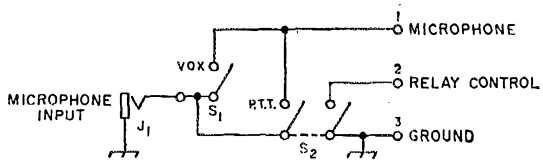


Fig. 1—W8EEF's microphone adapter.

QUICKIE ANTENNA FOR 2 METERS

A low-cost 2-meter mobile antenna can be made from a Millen 37001 high-voltage connector and a 19-inch length of small-diameter brass rod, such as brass welding rod, as shown in Fig. 2. Once the whip has been soldered to the male connector, epoxy cement can be used to fill the top of the cap, making the unit quite rugged. The antenna can be mounted any place on the car and will be weatherproof as long as a rubber gasket is placed between the Millen fitting and the car body. This scheme is particularly useful for center-roof installations. Brass screws are recommended for securing the mount so that rust will not form. When desired, the antenna can be unscrewed from its mount and stored inside the car. — *W1CER*

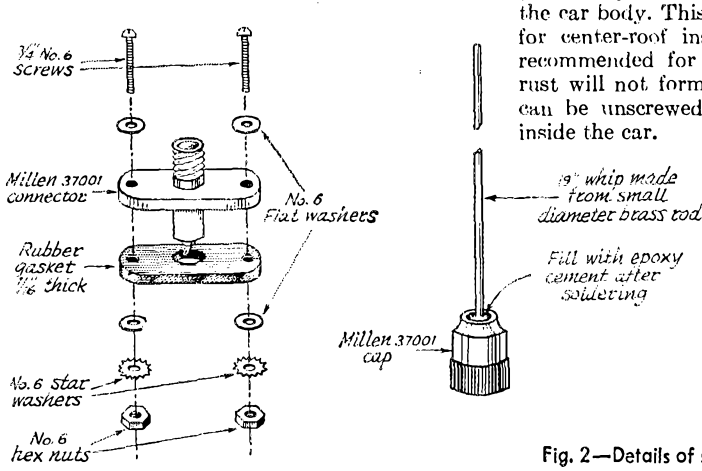


Fig. 2—Details of simple 2-meter mobile antenna.

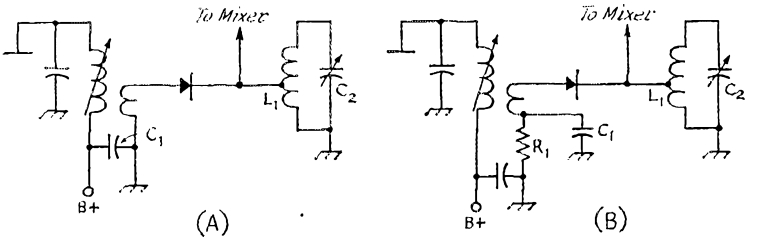


Fig. 3—(A) Typical diode multiplier circuit. (B) Modified multiplier circuit for increased harmonic output.
C_1—Button mica, standoff or feedthrough ceramic. R_1—Bias resistor, value determined experimentally.
L_1-C_2—Tuned circuit, set to desired harmonic.

IMPROVING OUTPUT FROM DIODE MULTIPLIERS

A diode multiplier can be made to produce considerably more harmonic output if it is biased, as shown in Fig. 3. This is particularly effective when the order of frequency multiplication required is high, as it frequently is in converters for 220 Mc. and higher bands. For example, the 220-Mc. converter in the *Handbook* requires quadrupling from 51.5 to 206 Mc.

Particular attention should be paid to the bypass capacitor C_1; preferably it should be a button mica, standoff or feedthrough ceramic type. The tuned circuit, L_1 C_2, should have high Q at the desired frequency to discriminate against unwanted multiples of the driving frequency as much as possible.

— *Frank Greene, K5IQL*

(Several factors determine whether biasing a multiplier diode will increase the level of a particular harmonic. Important considerations include the amount of drive available, the value of the bias resistor, the order of frequency multiplication, the type of mixer and the method of mixer injection. The usefulness of diode multiplier bias in any circuit is best determined empirically. — *Editor.*)

MINIATURE TOROID CORES

With the advent of r.f. transistor circuitry, the small toroid coil and transformer have come into great favor due to the toroid's high coefficient of coupling, low losses and high permeability. However, miniature toroid cores are sometimes difficult to find.

A good source of suitable cores, both ferrite and powdered iron, is the threaded slug with a hexagonal hole through it, intended for use in an inductively-tuned coil. As shown in Fig. 4, these ⅜ inch long by ¼ inch diameter cores make excellent coil forms. The coils can be wound bifilar, and since only a few turns are needed, fine wire can be used without significantly reducing the Q.

Although permeabilities vary greatly with different materials, the threaded cores usually fall into two general catagories: the ferrites, which are dark gray in color and are quite shiny, and the powdered irons, which are lighter in color and dull in texture. The ferrites are good to about 2 Mc., while some of the powdered irons are usable to several hundred Mc. Formulas for approximate inductance using the ¼-inch diameter by ⅜ inch long forms are:

$$L = 0.65N^2 \text{ (for ferrite)}$$
$$L = 0.02N^2 \text{ (for powdered iron)}$$

where L = Inductance in microhenrys.
N = Number of turns.

— *Dan Tomcik, K8ZQE*

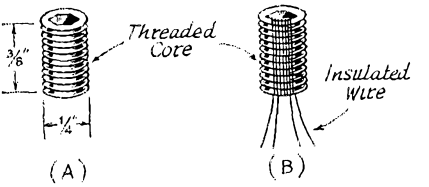


Fig. 4—(A) Threaded core as removed from slug-tuned coil. (B) Miniature core with bifilar-wound coils.

ANOTHER METHOD OF FORMING VINYL CABLE LACING

A HINT by KØPQW on fashioning cable lacing, described in the seventh edition of *Hints And Kinks*, although relatively simple to employ, has several disadvantages. The lacing can become undone easily by vibration and cannot be used readily for harnessed wires that bend at sharp angles. Furthermore, if the cable consists of parallel-oriented wires, which is the usual case, there will be a tendency for individual wires to pop out of the slit.

A method I have used for years overcomes these objections and also utilizes the vinyl jacket from coaxial cable. Instead of splitting the jacket longitudinally, I cut the vinyl covering with a knife placed at an angle to the length of the cable. The cable is simultaneously pulled and twisted with the left hand in such a way as to make a spiral cut in the jacket. The cable can be kept in the correct position by a simple jig consisting of a board and three nails while the knife is held by the right hand. Removing the vinyl spiral from the coax and wrapping it around the new cable completes the operation. For that "professional look," the ends of the spiral may be trimmed with a pair of scissors and secured with a couple of turns of ½-inch black vinyl electrical tape. — *Erling R. Jacobsen, K4OJY/9*

RESULTS ARRL International DX Competition '66

28 MC.

COMPILED BY ELLEN WHITE,* W1YYM

RECAPPING the 1966 ARRL International DX Competition, of the second and fourth weekends of February and March, highlights the poor second weekend c.w. conditions and the tremendous 10-meter phone opening the March 12–13 weekend. Once again entries show the result of generally improved conditions, with 1811 logs received, both modes, from W/VE and DX stations in 121 countries, up 6.5% from 1965.

After compiling the myriad bits and pieces that make up this report there seems hardly anything else *left* to say! Comments and suggestions from hundreds of participants this year, however, paved the way for the changes that will take place in the 1967 Test. Let's get word of the following changes around, particularly to the DX stations you regularly work. For 1967: the first and third weekends of February and March will be the dates, KH6 and KL7 stations will count as DX, no quota for either phone or c.w. W/VE stations, multipliers for DX stations will change from "call areas" to the 48 continental United States plus VO and VE1-VE8, and a handsome plaque will be presented to the highest single operator phone and c.w. DX station in each continent.

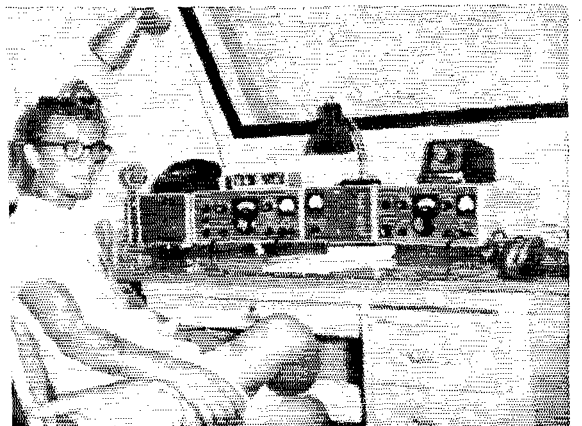
This years' certificate awards are scheduled for October 14 mailing.

*Asst. Communications Mgr., ARRL.

1967 ARRL DX COMPETITION

Phone: February 4–5, March 4–5

C.W.: February 18–19, March 18–19



When it comes to operating, **VP5AR** (K5LMJ) has that contest "know-how." Tony's c.w. score of almost 400-K includes 1852 contacts in 30 hours while his phone 40-hour endeavor totalled close to 1700 two-ways for over 360-K.

The Clubs

It was another big year for the competitive-minded club group. The gavel-winning Frankford Radio Club wound up with an incredible 18,668,219 points, almost 9 million ahead of their 1965 mark. In addition to their savvy single operators, about 5.6 million points of their aggregate is due to some first-rate multioperator performances. Although the Potomac Valley Radio Club had six fewer entries than their previous DX Competition effort, they scored four and a half million more points, a rough 300-K/member! The Northern California DX Club turned to, taking third place well ahead of the balance of the pack reaching for that five-million mark. On c.w., K6ERV was keyed by W6BHY while K6ERV did the honors himself on phone. The Niagara Frontier DX Association did not compete as a group in the 1965 Test but did this year for two million points, c.w. award to K2GXI and phone to W2SSC. Other fine gains were registered by the Rochester DX Association almost doubling their previous effort and the Connecticut Wireless Association almost quadrupling last year's score.

Your club's score didn't appear? The basic requirements for appearing in this club tabulation are: your club must be an ARRL-affiliate, we must receive a "secretary's letter" itemizing your club activity in this competition, and we must receive the indicated logs as entries in the competition.

SOAPBOX

"I hereby retire my aspirin bottle, coffee cup and extra-large ashtray till the phone test next year." — *K3JCT*. "My first phone contest in 35 years of operating and an enjoyable experience." — *W3BIP*. "How the mighty have fallen." — *W3ECR*. "Lots of fun as usual but we have a lot to learn with more than one phone rig going." — *W3WJD*. "Conditions improving every year. The ten-meter phone opening sparked up the last day's activity." — *W3TLN*. "I learned that antenna height is a prerequisite in this MDC area." — *W3BWZ*. "Amazed to work so many stations using 100 watts on phone!" — *W3EVS*. "More pile-ups on 10 than on 20." — *WA3CGE*. "Best phone contest in five years." — *K3CBW*. "On 21 Mc. on March 12, K3EST worked 54 JAs, a BV and an HL9 between 2218–

2335Z. It was bedlam!" — *W3MSK*. "Worked a 9V1 for phone DXCC #305." — *WA2IZS*. "My first DX test and I worked 43 new ones." — *WB2QYO*. "Nicest phone surprises were working the Falklands on 10; and on 40, after a long struggle attempting to read a weak one, found it to be EP3AM. Good to be back after a 3-year absence." — *K2GXI*. "Really tickled to make WAC on 15 phone. Next year we plan an all-out effort on 15 phone to make the box score or bust!" — *W2TAB*. "There is room here for improvement on a few small items such as transmitter, receiver, transceive capability, TVI reduction, antennas, kids (3), wanting to sit on my lap simultaneously while I'm operating, scheduling of out-of-town relatives on contest weekend, and XYL tolerance of ham radio in general and contesting in particular. It must be terrible to become so good, so well-organized, and equipped, that you become stagnant." — *K3KMO*.

"WOW!" — *KJCT*. "I changed bands 51 times. Next year at least one more final." — *W3MWC*. "Picked up a number of new c.w. countries with just a wire, half hanging out of a window and the other half indoors." — *W3CBF*. "Kudos to ZD8AR for making so many contacts in those fantastic pileups and to HA1KSA who seems to have the best receiver and/or ears in Europe." — *WA2KZV/3*. "This 2-transmitter stuff is interesting. With luck, next year we'll have 3 c.w. stations going." — *W3WJD*. "Who says I don't know the code." — *W3ECR*. "New logging system is fine." — *W3GRF*. "The use of a second receiver proved a boon in pileups." — *W3AFM*. "Please, please, please exhort the DX to send the call of the station being worked at the end of the transmission on 40 and 80. Strong locals and long callers clobber the first part of the transmission." — *K2DCA*. "Nice surprise on 80 c.w. working KM6CE VK2EO and 7G1A on the first call." — *WA2UJM*. "Wasted a lot of time listening to T-5/T-8C calls only to find they were U. S. stations." — *WA2GHW*. "You QRX while the guy works 30 stations in a row without signing his call. Then comes the call and you worked him before. This is what happiness is NOT!" — *W2QQ*. "Hooray for the new reporting format." — *W3LOE*.

"The 6-element beam up 70 feet really made a difference." — *WA9HJM*. "Many stations missed out on that 10-meter phone opening." — *K9PPX*. "Hope I'll be able to enter for another 50 years." — *W9EWC*. "Transceivers a problem." — *W9GIL*. "The bands were sure dead Monday." — *W9YT*.

"Congratulations to WB2PXZ/VP9 for all of his operating time signing a call like that *every QSO*." — *W9IRH*. "The excellent operating abilities of most DX stations continue to amaze me." — *W9FNX*. "We have a beagle dog named Fonzo. He is only 5 months old and got into everything. He would jump on the desk and lick our faces, sit on our hand or on the bug . . . take a nap on our lap while we tried to operate or sleep on top of us while we tried to catnap." — *K9OTB*. "15 meters and South America saved the day." — *K9VQK*. "My last and best effort from W9. Hope to have a bigger and better setup next year from W4." — *W9QYW*. "Next year I'll be in from Florida as W4JDR with those big quads back in operation." — *W9ICD*. "The DX test and University tests don't mix, as I found out Monday morning." — *K9ZMS, opr. W9YT*.

"My 100 watts the first half did as well as 500 watts the 2nd weekend." — *WAØHWZ*. "Phone courtesy far superior to last year." — *WØRRW*. "Surprised at the number of W6s who think they are WØs when the DX called Øs only, hi! Glad to hand out the South Dakota multiplier." — *KØCER*.

From top to bottom an array of the world's classiest contest pros: **HKØAI** topping the six-hundred thousand mark and close to 3000 code exchanges; **VK2EO** (keyed by W9WNV/VK2ADY) in a fabulous performance for Oceania and the best dupe sheet kept by anyone in the test (well over 600-K for 78 hours); **CR6AI** top c.w. in Angola, over 220-K points in a 4-band operation (John's antennas include 3-element arrays for 14–21–28 Mc., plus a dipole for 40); **YV1DP** with almost 3000 exchanges for 629-K c.w. points (Gregorio uses a trap beam and vertical).

"Why don't more hams use 15 c.w. other than contest times?" — *WA0MKB, opr. W0YC.* "Phone weekends superior to c.w. Best operators ZD8AR HK3RQ PY2SO CP5EZ HK0AI VP5AR and KG4CX. A salute to a fine gentleman, W0BLZ." — *K0CER.*

"My first 15-meter phone contact was XW8AZ, long path, exemplifying the great openings on both 15 and 10. Old 20 should be getting a much needed rest now." — *W5AJY.* "I worked hard and it paid off, I enjoyed every minute." — *W5KC.* "My country #100, 7G1A." — *WA5EAM.* "Being a math major I have come up with a new formula. The proof is obvious, just ask anyone after the *DX* test (people with shiny new equipment disregard). Lt + O_A + W = P. Little time, plus old age, plus hurricane weather equals PHFFFF (low score.)" — *K5MDX.*

"This contest is still the high point of the year." — *W5GFT.* "W5CKY too tough! Just wait till next year!" — *K5RFJ.* "The XYL made me paint the house the 2nd weekend." — *WA5EHC.*

"I hope I've put Kentucky on the ham map." — *W4BCV.* "Imagine what conditions will be like *next* year." — *W8TWA/8.* (Haaaalp — W1YYM) "JA1DSW completed my 75-meter s.s.b. WAC." — *W8DGP.* "The contest provided hours of pure enjoyment plus a chance to check equipment and antennas under heavy competition." — *K8OVK.* "Made DXCC for the first time in a contest." — *W8NGO.* "Worked my first VK on 40 phone." — *K8AXG.* "Boy am I tired." — *WA8LEO.*

"For the first time in ten years I didn't work or even hear G4CP or JA1VX. I hope their absence is only temporary because I consider them tops in the class when it comes to contest operating." — *W8UCI.*

"Best multiplier yet on 80." — *W8FGX.* "Biggest thrill was beating out the west coast to KM6CE on 7 Mc." — *WA8DXA.* "My log will give you a little practice before W8FGX's arrives. What an operator *he* is!" — *W8GQU.* "Once in a big pile-up on KG6IG on 20, CR4BB called CQ Test zero beat. You can imagine the chaos that followed." — *WA8MQE.* "Merely listening is an interesting experience and something of an education in propagation, etc." — *W8AJW.*

"Our friends to the south fielded the 10-meter calls in

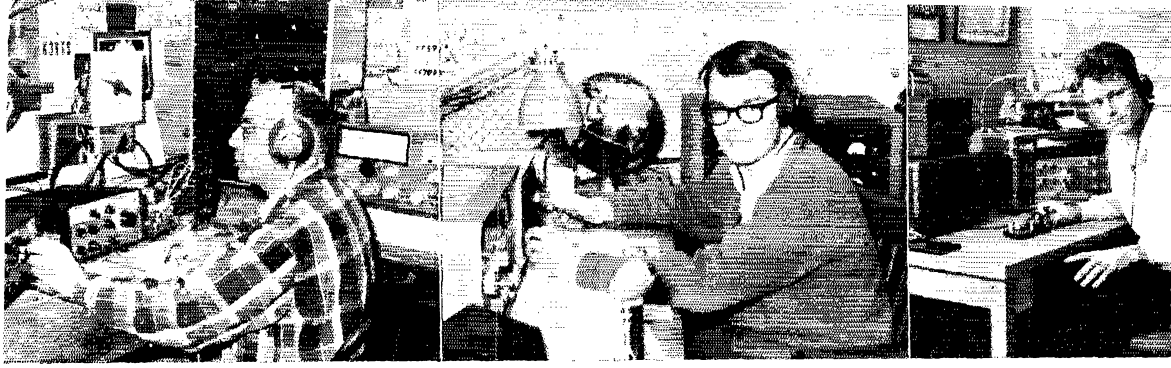
Minimum Number of Countries	30	50	80	60	15
Band	80	40	20	15	10
W1AW*	37			61	
W1BGD	35			62	
W1BIH	31			62	
W1BPW	53	83	102	85	21
K1CDN			92	65	16
K1DIR	50	67	102	67	26
W1ECH	37	56		70	23
W1EOB	36		92		
W1EVT	63	83	96	70	28
W1FJJ	53		80	66	16
W1GOG					18
W1JYH	45	63	101	84	20
K1LPL	54	55			
W1MO					19
K1RQE			88	71	18
W1SWX	53				
W1UUK			84		
W1WLZ	55				
W1WPO			120		
W1WY		38			
K1YKT	39				
K1ZND					23
K1ZVU		56	101	67	
K2AJA		53			
WB2APG	61	67	88	68	26
W2AYJ		51			
WA2BLV*	36	62	94		
K2CHQ	40	56			25
WB2CKS	51	74	93		19
WB2CZZ			95	78	23
K2DCA	46	64	97	71	33
K2DGT	52	65	81	60	21
W2GGE	35	58	89	80	24
W2GGL	32				
W2GKZ			81	62	20
W2HO		61	82		
W2HSZ					20
WA2HUV			83		
W2HZY		58			
W2IRV				66	20
W2KHT					15
W2LXK	35	68		67	27
W2MEL	39		86	69	14
WB2MFX	46	67	85	68	23
W2NEP					17

Minimum Number of Countries	30	50	80	60	15
Band	80	40	20	15	10
WA2OJD	36	50	83	64	27
W2PCJ	43	72	106		19
K2QIL					18
W2QKJ					16
W2RFT			86		20
W2SSC			96		
W2SUC					22
WA2UJM		50		60	
W2VJN	40	63	102	80	28
W2ZKQ			103		
W3AFM			121		
W3BES	44	66	101	82	31
W3BGN*	61	68	109	91	32
W3BIP	43	52			26
W3ECR*	36		86		29
W3EKN	42		84	75	28
WA3EPT*	46	62	88	67	27
W3EQA		52			23
W3GHM	47		8	61	21
W3GHS*	36		80	69	25
W3GRF	62		96	77	34
W3GRS	39		9	52	17
W3HHA	40				
W3HHK	36		82	70	24
K3JCT	35	71	102	81	29
W3KDF		55			26
W3KFQ		54	89	64	15
K3KMO			81		
W3KT			83		
W3LOE	56	79	103	77	30
K3MBF*	51	60	107	64	
W3MCG	31	58		61	19
W3MFJ			80	64	
W3MFW	60	71	85	75	31
W3MSK*	82	104	129	109	42
W3MSR			96	68	
W3MVB		55			17
W3MWC	42	70	91	75	29
K3NHL	44	63	96	60	25
W3NOH		51	91	74	18
W3QQL				61	25
W3VEQ				73	
W3WJD*	80	88	114	99	35
W3WPG*	55	72	104	79	19
W4BCV		58			16

Minimum Number of Countries	30	50	80	60	15
Band	80	40	20	15	10
W4BFA	37	57	91	68	21
W4BGO	55	56		64	21
W4BRB	39			64	22
W4BVV*	83	92	129	100	37
W4BYB		74			
K4CG					23
WA4CGA					17
W4DVT	52				
W4DXI	30		81	62	29
K4EZ	37		90	65	16
W4HOS				65	22
W4HUE	37	63		72	32
WA4IKU	42				18
W4KFC	61	83	107	89	36
W4QXV*	77	86	129	98	31
W4LHW					15
K4OA			80		
WA[illegible]KP	30			60	15
[illegible]					18
[illegible]	47				
[illegible]			101		
[illegible]	26				
[illegible]YE			87	66	24
W4ZYQ			85	89	
K5ABV					27
W5BRR	33			81	25
K5BXG					16
W5CKY	34	60	80	62	30
K5JVF		58			
K5JZY				63	31
W5KC				65	22
W5LJT				62	
W5LUJ					21
W5MUJ				70	22
W5OGS			85		20
K5RFJ		50		73	22
W5WQN		52			
W5ZD					16
W6ANN*		54			22
WB6CEP					16
K6ERV	32		101		19
W6GRX			83		
W6HOC			91		
K6HOR					15
W6ITA	38	70	102		24

Minimum Number of Countries	30	50	80	60	15
Band	80	40	20	15	10
K6KA					18
W6KTW					21
W6LDD					17
W6NIX					20
K6OHJ					17
W6ONZ			95		
W6RW*	50	102	124	72	27
W6UJ					19
W6ULS		51			
W6UMI*			84		18
W6WX	33	50	86		20
W7SFA			89		
W8CJN		50			
W8DUS*					15
WA8DXA					15
W8FGX	48	77	96	76	31
W8GQU			80		
W8KMD			87		
W8UM*	49	62	104	66	18
K8UDJ*			86	60	15
W8VSK		85		74	21
W8ZCQ			91		
W8ZJM	32	54			
W9EWC	38	69	89	69	22
W9GIL			90	61	
W9ICD					19
W9IOP	38	82	105	86	16
W9IRH				61	
W9KMN	30				
W9LKI					18
K9OTB*	30				
W9QYW			97		
W9SCZ			85		
W9VZP					15
WØFDL					16
WØIYH			109		
WØOAW					15
VE1RB		50	81	63	19
VE1ZZ	79				
VE2NV	53		80		18
VE2WA			81		

* Multi-operator Station.



Contest regulars (L-R) Washington's **W7MX** participating in both modes, **W1BPW** edged out of the E. Mass. c.w. award in one of the closest battles this test and **K5ABV** one of the c.w. So. Texas competitors.

fine style." — *WA2OJD*. "I never knew there were so many DEs!" — *WB2MDH*. "Fine phone activity." — *W2WZ*. "A special award should go to the XYLs of contest operators for their help and patience in putting up with those lost weekends." — *K2DGT*. "No laughs at my low score, it took me 30 years to get around to entering one of these contests!" — *W2KJR*. "Much impressed with increasing phone activity this year. W2VCZ had to be off on a space shot the second weekend and decided to leave his effort as is." — *K2HLB*. "Don't know how many OOTs do this *anymore*. I've been *in* almost every DX contest and still get a kick out of it. That Sunday opening on 10 phone was a real thrill." — *W2IUV*.

"Could improve my c.w. score if I gave up the corn cob." — *W2MEL*. "Murphy's Law *never* fails." — *W2HO*. "My only claim to glory in this one was a good start (CR9AH) and a good finish (KG6IG)." — *W2RFT*. "This may be the last big year for 80." — *WA2HLH*. "Have you noticed how the number of 7 Mc. countries seems to closely follow the number of 21 Mc. countries in every multiband contest over the years?" — *K2DGT*. "Biggest c.w. thrill was working VK2GW on 80 at 1000Z. Enjoyed working PJ5ME on 10-80." — *WB2FON*. "Uugghh." — *WA2EFN*. "With the same equipment I can't figure out why my score keeps going up and shows no signs of leveling off." — *W2IUG*. "Terrific to see ten open and also have eighty in fine shape." — *W2NEP*.

"First DX Contest in 30 years of operating. Next year Kansas will kill 'em." — *W0YUQ*. "Hard to work through the east and west coast on 20 phone." — *W0GNX*. "After section awards in other contest, I thought I would give this one a try. Whew, what a shock! The competition in this one makes the SS and FD seem like child's play. The *best* contest I've ever been in." — *K0SCM*.

"New forms a real help." — *W0FDL*. "Best op. PY1-MCC, best signal ZD8AR on 40." — *W0EMA, opr. W0YI*. "Biggest thrill on c.w. was working OD5LX for a new country and have him say FIRST KANSAS-FIRST KANSAS, pse QSL! Two CR4s in one hour — unbelievable." — *K0BHM*.

"Never again a phone contest without something better than dipoles." — *W1BGD*. "Sick most of the 2nd phone weekend. Hats off to Roger, W1JYH." — *K1HVV*. "Never worked so many new countries in such a short time." — *WA1EOX*. "Good opportunity to check on the effectiveness and characteristics of my groundplane as conditions changed by the hour." — *W1TKG*. "Best signal overall; KP4CKU 7 Mc., VP2KJ 28 Mc. There should be a special award for VP2KR with 30 watts on 40 phone." — *W1BVP*. "My first contest and I had a wonderful time, see you again in 1967." — *K1OBT*. "A great opening on ten phone the last Sunday afternoon and it seemed as if every single W was on, with only about 20 DX stations to go around." — *WA6OJM, opr. K1CTQ*.

"Best c.w. QSO was long-path with FB8WW." — *K1ZVU*. "Worked JT1AG on 20, but never heard a JA." — *W1ECH*. "First weekend conditions fantastic. Hard to leave that 250-K score as is for the PJ5ME stint." — *W1BGD*. "Conditions on the whole good, although 15 c.w. disappointing the second weekend." — *W1IWY*. "Gad, almost dropped my teeth when I heard 5A3TX for the first *real* east-west opening on 10. CR4BB absolutely pinned the meter up there." — *K1ZND*. "My first competition and I must say that the spirit of competitiveness is not realized fully until one actually participates in such a test. WOW!" — *WA1APY*. "World's best contest, bar none." — *W1EVT*. "E. Mass. competition is getting to be like down W3-way. It makes for great fun competing with local friends." — *K1DIR*. "Spent more time on top of the tower than in the station" — *K1CDN*. "ZD8AR must be the DX version of W3MSK. Conditions unbelievably good on all bands." — *K1YKT*. "Quite a change from the First Trans-Atlantic Test back in the spark days. Anyway it is just as interesting but a bit more QRM, hi!" — *W1BQL*. "A bout with mononeucleosis kept me at home instead of on a DX trip to Bermuda." — *W1NJL*. "Conditions in the first section poor for 160, the second section — WORSE! — *W1BB*. "Biggest thrill, the VKs on 40." — *W7UXP/1*. "Forty was the bomb. EU very loud from just before sunset and VK2EO audible here four hours after sunrise!" — *WA6OJM, opr. K1CTQ*. "Hope to see more Vermont activity in 1967." — *W1WTE*. "Drove 600 miles for this one." — *W1AVK*.

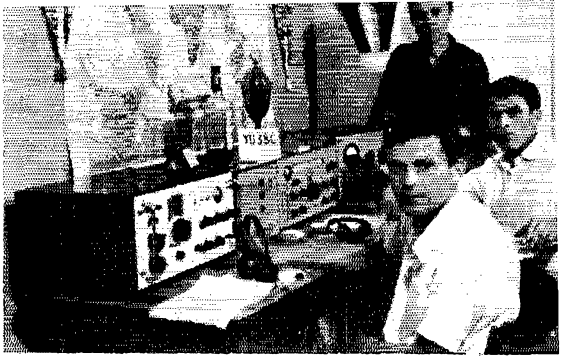
"Excellent conditions here in the Aleutians during the 2nd weekend. Good timing — immediately following this, conditions were unbelievably poor." — *KL7FMM*. "What a mess!" — *WA7ABW*. "Not in the contest for a high score, just looking for #298, 299, 300 — then sanity." — *W7DLR*. "OH2AM and DJ6QT were 40 db. over 9 here on 40 meters and I couldn't touch them. The ten-meter opening on the last day was tremendous." — *K7UDV/7*. "My new 5-L 20-meter homebrew beam on a 48-foot boom up 100 hundred feet works like a bomb." — *K7VAL*. "Good openings to Europe on 20 the last day of the test and a total of 19 new countries worked!" — *K7YDZ*.

"I'll never know how FL8RA popped through all that QRM, my rarest DX to date." — *KL7FMM*. "Amazed at the lack of Oregon competition — quite a change from my Los Angeles QTH." — *WA7ANB/WA6AYU*. "A real feeling of competition, seldom found in other contests. My greatest thrill was working HI8XAL on 7 Mc." — *WA7CGR*. "Transceivers not flexible enough for c.w." — *W7ACC/7*. "Getting too old for this sort of thing and don't know if I can last through another." — *W7MX*. "Standing in line behind the high-powered stations cooled

TOP TEN W/VE High Scorers

Under 150 Watts Only

C.W.		Phone	
VE2NV	353,292	W8LXU	98,640
W4BRB	316,707	WA9HJM	97,536
K2QIL	200,208	WA8MCR	67,980
K1ZND	181,608	VE3BHS	63,012
WB2CON	142,760	W8ECA	51,030
W4WYJ	136,431	K4KZZ	46,800
W2HUG	130,824	WA5LOB	41,612
WB2FIT	114,432	W1EJE	34,272
WA4CGA	99,000	W3BYX	33,441
W3ISE	97,104	VE3DAM	32,550



On the left, the crew manning LU1DAY during the c.w. portion of the test for a resounding 585-K (L-R, LU8s DLG DAY DQ DKG). This contest-minded group feels any idea of shortening the affair is nothing less than criminal! An interesting sidelight, three of the operators celebrated birthdays during the test! YU3BC (seated YU3s LC LB and standing YU3BC) presented a flawlessly typed log recording an impeccable 66-hour performance. Station equipment included a home-brew transceiver plus separate receiver, the antenna in use was a Vee.

my final score considerably." — *WA7BDF.*

"I would like to see Hawaii and Alaska as separate from the U. S. and I am in favor of abolishing the quota system on c.w." — *KH6IJ* (See you in the pileups, Nose!) "KH6/-KL7 should be DX! Most DX stations are beaming mainland U.S.A. and can't hear Hawaii or Alaska. I expanded my pipeline to include Australia." — *WØPAN/KH6.* "The name of this contest should be the ARRL Annual Frustration Contest. Anyway, mucho fun." — *WA6JDT.* "Keep contest two weekends." — *W6WB.* "Only one weekend but FS7RT was worth it." — *W6ZKM.* "Near the end of the contest, KA7AB called me on 15 and said 'Why didn't you answer me? I called you for a half hour on 10!' You guessed it, I needed JA/KA on 10." — *K6OHJ.*

"Is there any truth to the rumor that you contest-checking people spend the rest of the year working with archeologists figuring out hieroglyphics?" — *K6LRN.* "Best 20-meter EU signal as SM6BJM, WOW. Best VK VK2EO (all bands), best G1, GI3OQR on 20." — *W6EOU.* "Trying for 100 on one band but conditions rough. Made 95 which included CR3AD, a new one." — *W6ONZ.* "This year I was determined to break 100-K. I spent almost as much time chasing down man-made QRN as I did operating." — *WA6IVM.* "Best time I've had since before joining the Navy." — *WB6FCE, opr. K6NCG.* "My best score to date, but still not good enough for SCV." — *W6WX.* "51 band changes in 51 hours. No wonder band-switches wear out!" — *W6CUF.* "Best test in years." — *K6HOR.* "Received the same report as W6AM on 40 from 8M1BB, 599. Finally completed WAC on 80, 40 and 15." — *W6KIIS.* "Worked 12 new ones to bring my 6-months total to 66. Hard work from this QTH with just 100 watts input. I'm only 14 and my parents thought I was crazy to spend two whole weekends listening to dots and dashes." — *WB6KRW.* "A very rewarding and interesting experience operating a first-class station from a first-class location." — *W6RGG, opr. K6OHJ.*

"Best operator, VP5AR." — *WA4TLI.* "The phone section was much more strenuous than c.w." — *K4YVL.* "Had to stay close to home to greet the stork." — *K3WUW, opr. K4CG.* "Biggest kick was having 10 phone open up." — *W4WBC.*

"Missed my chance to be a millionaire, so near and yet, so far." — *WA4KFC.* "One of these contests the real BFA (my XYL) and I will multi-op., but with 4 jr. operators ranging from 2½ year-old-twins to the oldest at 9, she is too QRL." — *WA4KPK, opr. W4BFA.* "Don't you feel a pang for WR2PXZ/VP9?" — *W4ZSH.* "Looks like I can hold my own on 80, but on all other bands I'm just another Indian." — *W4DVT.* "Pleased to QSO HP1IE and HI8XAL on 6 bands, also 9V1LP on 5 bands (we missed him on 160)." — *W4BVV.* "This contest gets to be more fun each year. For example, we almost made DXCC on 20 in the first 24 hours. The skill level of the younger operators increases markedly each year." — *W4KXV.* "I was a winner for West Virginia in 1934, how about one more for *this* year? My vote for the most outstanding signal on 40, 20 and 15 was HKØAI. Best operators were HKØAI, OA4PF and PY2SO." — *W8AZD.*

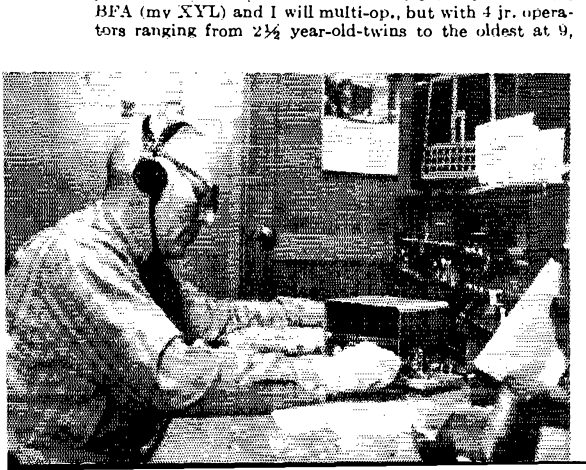
"My first real effort on sideband." — *K5STL.* "My first experience in the phone scramble. I had a great time." — *W7NPU.*

"CO2BO's '090' sounded like 2-KW." — *KØVFN* "Largest score I've ever made. A great c.w. contest with bigger pileups than in previous years." — *W7NPU.* "YJ1DL made my 102nd country." — *K7OXB.*

"Worked G2PL again after working him for the first time 30 years ago. He was my first G back in 1936." — *W4CYC.* "Ten meters was terrific for EU. High points: Working GW3NWV 10-80, hearing ZS9G call me on 10 working KW6EJ on 80, ET3AC on 40." — *WA4PXP.* "Most fun of any contest ever. Worked 3 new ones and worked Asians like never before. You can bet I'll be in this one every chance I can get." — *W4FRO.* "We skipped the 2nd weekend in order to begin planning for next year's multioperator station. Our first real try and we found much in need of change. This call is now kaput, hereafter I'm W4ETO (33% shorter on c.w.!)." — *WA4NGO.*

"Great operating practice by ZD8AR." — *WA4YDR.* "Stood the strain fairly well for my 70-years young. Had a lot of fun." — *W4HUE.* "Good contest but inadequate foreign participation. Biggest thrill was working two Gs on 160 with my QRP 25-watter. Entered my first ARRL DX Test in 1933 and the pileups get bigger every year." — *W4BGO.* "These were my finest hours." — *W4BRB.* "Could you recommend some pills which would send the XYL on a trip or something?" — *K4RQE.* "Sure enjoyed seeing what I could do with my 40 watts and groundplane against all the KWs and hogs." — *WA4SDK.*

"You sure pulled a boo-boo on your new forms." — *W7ENA* (????????) "Phone conditions above average, particularly the second weekend, making the best phone contest in my experience." — *W6ITA.* "I've never worked a European during a phone contest on any band." — *K6KA.* "Poor conditions to Europe. VP2KY my #300." — *K6JIC.*



WØBLZ has won the South Dakota c.w. competition for 15 of the past 17 years. This year "Duke" used an SX-101, HT-32 and T-Bolt feeding either 4-L on 20, a tribander or phased verticals on 40. (Photo by KØCER)

QST for

On the left, three of the four VEs responsible for an almost-half million phone points from the Caymans at **ZF1BP** are (L–R) VE3RX VE3CJ and VE2BK. Absent from the photo is VE8AA a vacationing volunteer reported to be a whiz of an operator averaging 100 QSOs an hour for 6 hours. This is the "line up" responsible for that March c.w. spectacular by **PJ5ME.** (L–R) W2ADE W9GVZ W1BGD PJ2ME W1TCJ W1DYE W1BIH. The 48-hour operation averaged 98 QSOs/-hour. Best signals; VE1ZZ on 80, W1EVT and WA6SBO on 40, W4BGO on 15 and W6RW on 10.

Minimum Number of Countries	30	50	80	60	15
Band	75	40	20	15	10
W1AW*				60	
W1BIH				70	
K1CSQ			80		
W1FJJ					16
K1HVV				63	17
W1JYH			96	74	17
W1RF				69	17
W1YRC					25
K2CHQ					16
WA2CYQ				68	
W2DAJ				62	24
W2EXH			106		
W2FFQ					18
W2GKZ				60	
K2GXI	33	53	87	75	26
K2HLB			96	61	
K2IML					18
WA2IZS				67	22
K2LWR			99		
WB2MDH				70	16
WB2MFX			85	70	
WA2OJD*				61	21
W2PDB					18
W2QWS				67	21
W2TQR			88		
W3AZD				77	25
W3BES					31
W3BGN				65	26
W3BIP					20
K3BNS				67	19
W3BWZ					20
WA3EPT*					26
W3EQA					15
W3GHM					20
W3GRF					28
W3GRS					26
W3HHK					28
K3JCT				69	26
W3LOE	35		103	84	29
W3MSK*	50	71	133	109	35

Minimum Number of Countries	30	50	80	60	15
Band	75	40	20	15	10
W3MVB					19
W3MWC*				79	20
K3NHL	36		90	70	29
K3PSW					16
W3TLN			83	64	31
K3TPL				71	16
W3VEQ				78	
W3WJD*	49		104	99	28
K4AQQ			86	76	25
WA4ARV				74	17
W4BCV			92	80	29
W4BFA			83	72	24
W4BVV			100	80	28
K4CG					20
WA4				79	22
W4C					
W4L					18
K4E					
W4F				86	
K4KZZ					15
K4MSK					18
WA4NGO*			87	80	18
WA4PXP	30		81	93	52
K4RZK			86		
WA4WAO				71	22
K4WJT			85		
K4YYL			95		
K4ZJF				68	29
WA5ALB					17
W5AJY				68	29
WA5AVL*				69	28
W5BRR					20
W5EHR					21
W5EQT/5*					30
WA5GLC*					23
W5IPH					18
K5JZY				74	38
W5KC				65	28
W5KTR				76	38
WA5LOB					17

Minimum Number of Countries	30	50	80	60	15
Band	75	40	20	15	10
W5LUJ					27
W5LXX					21
W5LZZ				66	23
WA5NVY					22
W5ODH				62	27
W5OGS					32
W5PTG					21
K5QMC					18
K5STL					28
W6BSY					24
K6ERV					35
W6GRX/6					27
WA6HAE*					29
K6HOR					20
W6ITA					36
[illegible]A					27
[illegible]CX					25
[illegible]DA					23
[illegible]LDE					29
W6LV					16
WB6MZX					18
W6NJU					15
K6OHJ*				85	31
W6SIA					19
W6UMI*					28
W6VUW					26
W6WB					29
W6WX					31
W6YMV					20
KH6IJ					23
W7ATV					16
W7AYY					20
K7UDV/7				88	16
K8AXG					19
WA8DAU					15
W8DGP				61	24
W8ECA				74	
W8EDU*					16
W8FYR				66	23

Minimum Number of Countries	30	50	80	60	15
Band	75	40	20	15	10
W8LXU					20
WA8MCR					19
W8NGO*			93	73	18
K8TIG*				63	17
W8TWA/8					21
W8WT					19
W8WUO					16
K8YRN					22
W9AQW				60	16
W9EWC				61	27
W9GIL				67	20
WA9HJM					15
W9IRH					18
W9JCZ				80	26
WA9PBW*					17
W9WGQ				70	
W9YT*					22
K9ZBI					19
K9JZV					21
W9ZTD				62	19
W0CU				74	
W0DSP*					16
W0FDL					23
K0FLJ					17
WA0HXW*					22
W0IYH			98		
WA0KXZ*					20
W0LBB					20
W0LBS				70	26
VE1AFY			93		
VE1PL			100		
VE2ANK			80		
VE6GX*			83		
VE6MF			87		
VE7AAA			81		
VE7PV			104		

* Multi-operator Station.

CLUB SCORES

	Aggregate	Entries	C.W. Winner	Phone Winner
Frankford Radio Club	18,668,219	75	W3BES	K3NHL
Potomac Valley Radio Club	14,221,043	41	W4KFC	W4BVV
Northern California DX Club	4,632,464	50	K6ERV[1]	K6ERV
Niagara Frontier DX Assn. (N. Y.)	2,003,528	22	K2GXI	W2SSC
Rochester DX Assn. (N. Y.)	1,725,476	15	WB2MFX	WB2MFX
Connecticut Wireless Assn.	1,720,481	14	W1ECH	W1BIH
Suffolk County Radio Club (N. Y.)	804,975	9	W2GKZ	W2GKZ
Miami Valley Amateur Radio Contest Society	642,927	10	W8ZJM	W8FYR
Louisville's Active Radio Operators (Ky.)	523,361	6	W4BCV	W4BCV
Order of Boiled Owls of Ohio	277,859	4	W8ZCQ	.....
West Park Radiops (Ohio)	218,848	9	W8AJW	W8WHO
Limestone Amateur Radio Club (Ala.)	51,963	5	W4LHW	.....

[1] W6BHY, opr.

"Thanks a lot for sponsoring such an f.b. show!" — *W6RCV*. "Surprised at the results of only using an all-band vertical." — *K0GJD/6*. "Worked DL1JW for a DX-Test WAC." — *WA6KHK*. "Surprised to work ZD8-AR on 40." — *WB6KIL*. "My first DX test and I made up for my poor score with all the fun I had." — *WB6MPE*. "Don't let the WB6 call fool you. I can remember when the contest lasted two weeks. As W2FBS I worked DX from the East for years." — *WB6LZI*.

"Overheard on 15 meters, HK3RQ saying 'I cannot copy a.m., go away.'" — *W5KTR*. "Now I know why I'm a confirmed c.w. man." — *W5OQS*.

"American operator's impatience and crudeness was evident, as usual." — *W5LUJ*. "PJ5ME and ZD8AR were my only 5-banders." — *K5HXG*. "Hey, this is more fun than courting." — *WA5KYY*. "I wouldn't have believed that a VKØ could ever have come in here 599. It happened during the test when VKØMI came through one night for about 2 hours." — *K5LMG*. "The last c.w. section was terrible here in Texas." — *W5BRR*. "Murphy's Law worked overtime in the first half. Wrapped up beam coax lines, tore up lines and broke joint between the prop pitch and beam support mast. Hauled it down in the middle of the night and lost 17 hours of choice operating time." — *W5ZD*. "Conditions fine to AF and SA but punk to EU/Asia. After the pile-ups on the lower bands, it was nice to work CR4BB CR6AI 7G1A ZD8AR and VR2DK all on the first call on 28 Mc." — *K5ABV*. "DX stations just aren't signing their calls often enough." — *W5MXO*. "I hate 'breakers', 'tailend Charlies' and abbreviated 'call boys'. Let's play by the rules." — *W5WQN*.

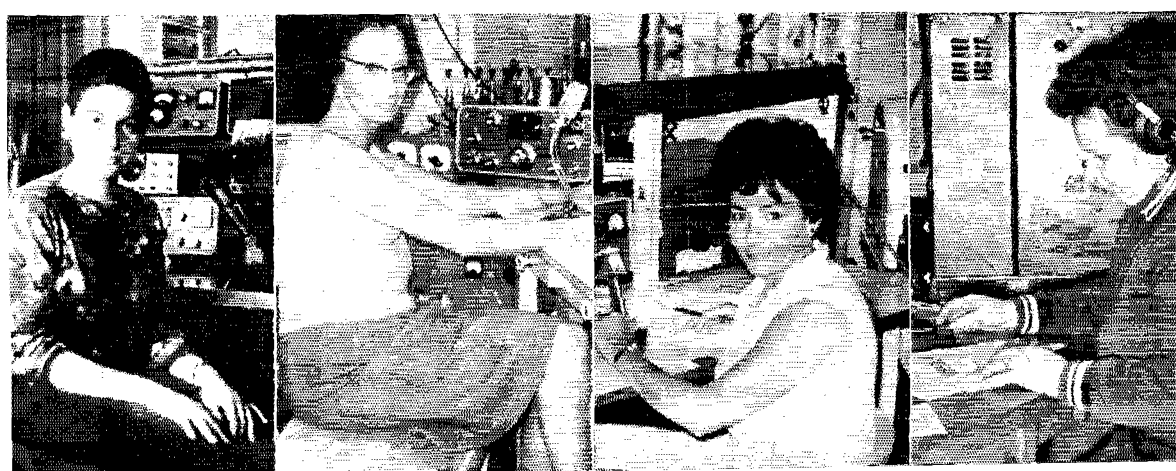
"My first try from VE1 and improvement over past efforts as VE2UX, VE3FLO and VE2UI. There were few surprises except what I worked with the vertical on 40, the wonderful opening to the far east over the North on the night of March 12-13 and the brief 10-meter opening to G-land late on Sunday afternoon." — *VE1PL*. "I could write a book. Two new ones, worked my first ZL on 75 s.s.b., VKs coming in fine L-path the first weekend, topped off by the arrival of twin daughters on March 13." — *VE2ANK*. "VE2AYH's operating ability varies inversely as the level in the Smirnoff bottle." — *VE2BAW*. "Antenna height increase on 20 paid off in 70% score improvement." — *VE3BHS*. "For information concerning WAVE/WACAN write the Nortown ARC, Box 356, Toronto 1, Ontario, Canada." — *VE3EVZ*. "Rules are excellent." — *VE3DEU*. "Picked up ten new ones, though 10 and 15 meters were poor here in Winnipeg." — *VE4SD*. "Conditions best since 1960 at this QTH." — *VE6MF*. "W stations will still call me even though W/VE contacts do not count." — *VE7PV*.

"Conditions in my part of the country were disappointing. I think I've pushed my 150 watts far enough." — *VE2NV*. "My first crack at this single-operator and sure enjoyed myself." — *VE3DFM*. "What a beautiful RAT RACE!" — *VE3DKB*. "In a period of one hour I worked 5 continents on 80, but never heard a single EU during the whole test." — *VE7BDJ*.

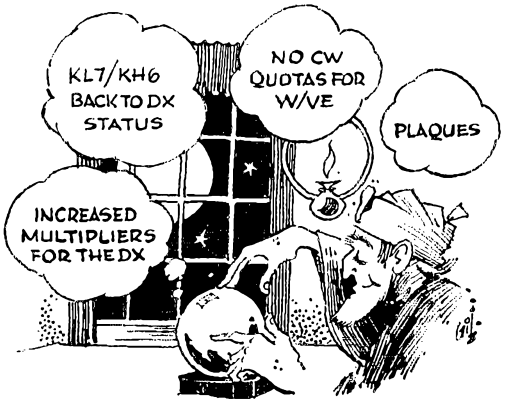
C.W. HIGHLIGHTS

AF *CR3AD*'s appearance made 293 contesters extremely happy. Thanks to some snappy operating by *CR4BB* in this and recent tests, the once-rare Cape Verde Islands are not-so-rare. Tomaz almost doubled his 1965 QSO figure. His few 599 7 Mc. reports went to W6ITA, K3MBF, WB2APF, WØBLZ, W6ANN, WA2OJD, K4YYL, K1ZVU, and just a few others. Reliable *CR6AI* put in a 4-band appearance for well over 1300 exchanges. John too found those W6ITA 10-meter signals a potent 599. In his first ARRL contest, *CR6EI* particularly was looking for Wyoming, to no avail. *CR7IZ* found band conditions fair-to-good on 20 and 15 with 10 a nice surprise. Ru felt his QSO rate would have been higher but for the QRM from some of the chaps who didn't understand that he couldn't QSO them more than one at a time. Though pressed for time, *EL2D* found conditions *very* good topping 120-K and planning bigger thinks next year. *ZD5M* hopes he gave some of the gang a new one and was happy to meet lots of old friends. Des comments on the outstanding signals of W3MSK. Many comments were received concerning the fabulous Ascension Island performance by the *ZD8AR* crew. With 100 watts input, the operators (ZD8s BC RD WZ J) turned in an outstanding performance from Africa joining the select "millionaire's club." Their 5-band performance recorded 263 exchanges on 80, 884 on 40, 1394 on 20, 1343 on 15 and 367 on 10. 3-element beams were used on 10-15-20 plus a groundplane for 40 and a vee and longwire. A superlative performance! *ZS1O*

On the distaff side, some of the finest YL operators in the world (L-R) PY2SO leading some of the toughest c.w. competition anywhere—those savvy Brazilian operators. Sonia's 61-hour effort on five bands topped 600-K by a considerable margin. OH5SM shows a fine phone sum of 449 exchanges on 20 and 15 meters (Carola runs 500 watts p.e.p. to a homebrew linear and uses a quad on 20 and 3-L on 15). YV11K/5 with a one-weekend 132-K phone performance to lead Venezuela and UA9PO, Anna Glotova, one of the fine c.w. operators in Novosibirsk and a Champion of the U.S.S.R.



reported a very short opening on 10 with great storms following the opening of the bands. He reports that he made F.B.T.O.C. twice. (Any interpreters in our reading audience?) *5A3TX* found, all in all, it was another enjoyable contest. He says he had a bit of a problem convincing several stations that he wasn't an HA. Carl says this was his last one from Libya since he planned to be on his way back to the U.S.A. as this report was being prepared. *6O6BW* topped 1,200 exchanges on 80-40-20-15. Bee says his first 35 contacts yielded 11 different call areas and he then had to work 378 additional stations before getting a new multiplier. He found QRN on 80 20 db over S9. Best signal reports on that band (569) sent to W4KXV and W3MSK. Bee thanks all participants for the QSOs and their courtesy . . . a reminder too to QSL via W4HKJ. *7G1A* turned in a superb single operator performance from the Republic of Guinea with better results on 40 and 20 and best of all on 15. Josef topped 2200 QSOs for close to a half-million points. *9G1FQ* experienced the worst of all problems, restriction of 9G1 operating privileges just after the first c.w. weekend.



IN VIEW FOR '67

ASIA The *HL9US* crew (WA2SPL WA6FWE KL7ELD WA3ERL K8ZXP K9UNY K6ETM and K3RIX) found signals the first weekend much stronger. *HM5BF* was a welcome addition to the c.w. ranks with his 445 two-ways. Kim runs 100 watts input to an 811 and used 2 element quads for 20 and 15 and verticals for the lower bands. *JA1IBX*, leading his country both modes, went well over the thousand contact figure on c.w. in a total of 52 hours. His printing is a veritable comfort to the contest checking crew — completely legible! His one-QSO success on 10 was a 2-way with K6ERV. Another superb c.w. endeavor from Japan was presented by *JA1CIB* with close to 130-K. Takeo's big band was also 20 with good reports to 575 thereon. Many fine JA c.w. logs were received and welcomed. Top Asiatic Russian score was *UA0KZB*, single-operated at Petropavlovsk on the Kamchatka Peninsula. Vlad worked 883 stations to take top country honors. His only antenna was a grouudplane. Among many UA9/UA0 logs is one from *UA9PO*, an active YL from Novosibirsk and a Champion of the U.S.S.R. A fabulous multioperator score by the *UA0KFG* crew of UA0EH UW0s FM FK and UA0KFK added up to 278-K and hundreds of QSOs on 4 bands. Their best band was 20, almost 1000 contacts. *VS6BJ* reports the non-contest JAs a problem, plus the specialty of the day, Radio Peking on 40. Maurice reports that the "wolf" howl of the west coast was wonderful. Ranga, *VU2GW*, found it fun working some of the old timers and top DXers and plans another go next year. *9V1LP*'s comments could fill a page. Bob says that every year W4KFC comes up with another first for him in the ARRL c.w. test. This year he was his first east coast station ever worked in a contest on 15 meters. This was his first year to make 5-band QSOs (W6RW 160 through 15 the February weekend). In what he considers an outstanding feat for the east coast, W4BVV managed to make it on 80 through 10. His biggest thrill was late the second night of the March weekend when after vainly trying to make it on 10 with

Over 300 QSOs/band — DX

	80	40	20	15	10
CR4BB			312		
CR6AI			491	500	
EL2D			366		
ZD8AR*		884	1394	1343	367
5A3TX			391	552	
6O6BW			662	413	
7G1A		578	540	684	
9Q5RD			306		
HL9US*			430		
JA1CG			350		
JA1IBX		328	642		
KG6IG*			598		
UA0KFG*		377	984		
UA0KZB			529		
CT1OI		311			
DJ2YC			511		
DJ5BV			530		
DL1RK			524		
DL6VP			427		
DL7BQ			447		
DM4WPL			424		
EI9J			700		
F8VJ			578		
G2QT			437		
G2RO			449		
G3SSO*		333	1178	309	
GI3OQR		303	1153	403	
GM3GUJ*			372		
GW3JI			513		
HA1KSA		352			
HA1SD			360		
HA5KDQ*			497		
HB9JG			525	447	
I1NT			1064		
LA1H			664		
LA9HC			579		
OH1AA*			401		
OH2AM*			885		
OH3AH*			673		
OK1VK			329		
OK3OM			401		
ON4XG			444		
OZ1W			330		
OZ3FL			589		
PA0GMU			395		
PA0LOU			721		
PA0XPQ			388		
SM5CCE			662		
SM5TW			319		
SM6BJI*			1400		
UB5WJ			403		
UP2KNP*			788		
YU1BCD*			494		
YU3BC*		342	556	380	
FG7XX			363	385	
HI8XAL	620	1016	950	917	
HK0AI		354	1050	984	
HP1BR			456		
HP1IE	372	333	677	711	327
KP4BBN			641	421	
KP4BJN			644	700	
WA4MFS/KP4		337			
KV4CK				665	
KZ5JF		402		419	316
PJ5ME*	459	785	1804	1173	
VP5AR	336	533	486	418	
VP6PJ			367		
WB2PXZ/VP9*	385	410	896		
XE1AX				391	
XE2AAG		329			
XE0AL	659	1246	977	748	
KM6CE			357		
VK2EO		798	936	548	
VK2GW		446	364	339	
VK3APJ		415	573	378	
VK3AXK			396		
ZL1DV			466		
ZL1HW			490	450	
CE1AD			585	1130	
HK3BAE			595	492	
HK3RQ		610	1040	1143	
LU1DAY*		414	654	1131	319
LU5AES			303		
OA4PF			595	812	317
PY1MCC			492	602	
PY1NO			427	399	
PY2BGL			808	389	
PY2SO		474	1293	780	
PY7AKQ		487	320	562	
YV1DP	328	308	986	818	515

* Multi-operator station.

W6RW, he heard a wee small signal as from outer space calling. It turned out to be W2GWE for Bob's first W-contact on 10 in 3½ years in Singapore. GWE was followed by W4BVV, W3MSK and W4KXV before the opening gave out.

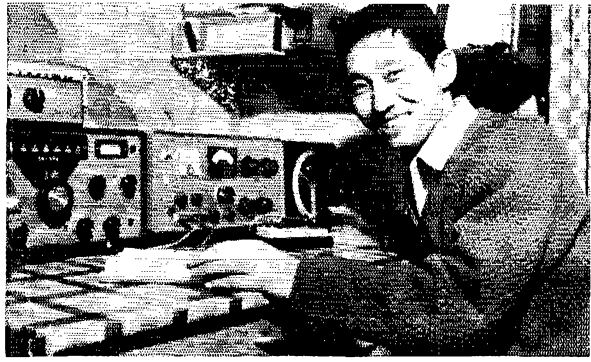
Over 300 QSOs/Band — DX

	75	40	20	15	10
ET3AC			831		
ZS6NM				330	
9L1JW				735	
9Q5FV				574	
EP3AM			320		
JA1IBX			669		
JA8AA			630		
KA7AB			479	308	
OJ18X			522		
DJ5BV			470	392	
DJ5HN				327	
DJ6QT			950	433	
DJ0LDA			508		
DL1LK			568	532	
DL4LG			1071		
DL6VP			550		
EA4DO			709		
F2SY			629		
F3KW			382		
G2QT				309	
G3SVH*			750	721	
G3UML			501	388	
GB2DX*			1186	507	
GW3NWV*			524	520	
I1BAF			1755		
I1CAQ			923		
I1CGE*				305	
I0FGM*			1157		
OH2AM*			1043		
OH5SM			366		
OK1MP			796		
OZ3SK			766		
OZ9SL			604	711	
SM6DLL*			953	484	
SM7CRW			482		
UA2KBD*			553		
UB5WJ			351		
UP2OK			461		
YU3BC*			425		
4U1ITU			307	348	
CO8RA*				337	
FG7XL			933	1005	310
HI8XAL			790	772	
HP1JC			318	382	448
KP4BFF*			633	763	
KP4CKU		439	1210	1129	394
WA4MFS/KP4		330	431		
KV4CF			1100	749	
OX3JV			650		
TG8CJ				991	
VP2AC			510		
VP2KY*				429	
VP5AR			478	800	
XE2JZ			425	349	
YN3KM					316
ZF1BP*			547	1062	376
6Y5OF			364	390	
KG6APD			328		
VK2AAH/p*			333		
VK2APK			407		
VK2FU*			457		
ZL1HW			356		
CE6EZ				577	337
HC1RT			309	905	594
HK3RQ			921	809	335
HK4KL			880	1141	
OA1W				306	360
PJ2CR			458	613	417
PJ3CD			795	913	
PY2BJO			518	795	328
ZP9AY				455	

* Multi-operator Station.

EU *DL1RK* enjoyed the test and hopes it will bring him nearer several awards. Klaus didn't hear a single Nevada, the last state he needs for WAS. He hints he operates regularly around 14,030 from 14–1800Z. He commends the operating skills and discipline of the W/VE group. *DL1QT* found good conditions on 40–20 and 15 and hopes for better luck next year with a beam. *DL6VP* also needs Nevada. Hans found better phone conditions this year than the c.w. section. *DJ2YC* soloed on 20 meters with most QSOs to W2 (104) and W6 (94). *DL1TA* found second weekend conditions shocking, the worst ever experienced in a contest. *DM2ATD* comments that this is the fastest DX contest. *DL6WD* needs Nevada. *EI9J* operated five bands to top the two-hundred thousand mark. His multipliers included 8 on 160. In his 22nd test, *F8VJ* again found the going interesting. Lucien could not make it on 10 although he heard W4KFC, W3BES, W3GRF, etc. We all look forward to his participation in 1967. Another old-timer, *F2PO*, at 72 years of age, found time to operate four bands for over 400 exchanges. *F9OE* always finds this a very fine contest for c.w. operators. *F8TQ* found the lower bands good though poor on 20 and absolutely "shut" on 15 and 10. The ubiquitous *G2RO* led England with 877 two-ways. *G2QT* found 80 disappointing though 10 briefly opening for the first time since the 1960 contest. *G6VC* hopes to round up a few of the crew next year to run multioperator. *G3HLW* says that awful gale in England on the last day must have blown all the signals off of 21 Mc. — it blew the top off of his vertical! The resounding results of *G3SSO* (G2RT, G3s CNW MSV NHF PEOP PY1, G8VX and G8s FF KG) filled all spots on the summary sheet with fine results. Best band 20 (1178 QSOs) then 40, 15, 80, 10 and even 4 contacts on 160. The crew found the test as enjoyable as ever with first-rate conditions in February. *GI3OQR* with close to 400-K put in his first appearance on 160 working a number of his old friends on that band. Dick found both weekends enjoyable and says 'cuagn next year.' *GM2HCZ*'s question "Are there any stations active in Nevada?" begins to have a familiar ring. *HA1KSA* failed to top his previous record due to that giant sunspot prior to the second weekend. Nonetheless Fred topped 1000 exchanges. *I1NT*'s certificate-winning performance netted 1459 two-ways for well over the 200-K mark. *DJ6SI*'s LX-pedition was a popular c.w. tidbit for 67 of the alert ones. The OHs turned out in good numbers despite particularly poor conditions in their area the second weekend. Good multioperator performances from Finland were topped by the *OH2AM* group for 1053 c.w. two-ways. *ON4NM* reports those pileups much fun and will return next year. *OZ3FL* asks us to try one year to arrange the c.w. section without sunspots and with conditions the same as on phone. *OZ1LO* hopes to have antennas up for the higher bands for next year. *OZ7G* stayed on 21 Mc. for 122 exchanges. If the army permits, *OZ5DX* plans more activity in the next one. If conditions had been better, *PA0LOU* would have spent more than 60 hours. Lou's new TH-3 helped greatly on 20 and 15. He reports finally managing to make a few 160-meter contacts although just two W3s heard him. He called, unsuccessfully, W1s BB HGT, W2GGE, W4s etc. Final score, 153-K with over one thousand exchanges. *PA0XPQ*'s funniest experience was hearing the ZD8AR crew work W/VE stations one a minute on ten meters while the band was completely dead there. *SM5CCE* joins the rest of the EU stations commenting on the poor second-weekend conditions. Watch out for *SM5BTS!* Rune is planning a V-beam aimed U.S.A. for next year. The *SM6BJI* operators (SM6s BJI AOE CKV DLL) had hoped to reach the 2000-QSO figure but 21 Mc. failed to open the second weekend. In spite of conditions, *SP5AHL* found it a real pleasure to work the stateside crew. In his last test from the continent, *SV0WAA* found 21 Mc. the lifesaver in his area with 7 Mc. holding its own and 20 poor. *UB5WJ* stuck to twenty meters and managed to snag 403 W/VEs in 18 areas — *spasibo* George! The *UP2KNP* crew offer their thanks for a nice test, with four bands worth of exchanges. Look for their effort in 1967. The savvy *YU3BC* team (YU3s BC LB LC) keyed 1377 exchanges for well over 200-K, with good results on 80–40–20–15.

NA *CO2BO* was the single-operator DX sensation this test with his almost-million pointer. Jan is an old pro at this business, recording an eye-opening 6-band 86-hour performance. At the time of this writing



JA1IBX operated both sections of the test emerging with top phone and top c.w. for Japan. Nob runs 100 watts input on both modes and uses a groundplane for 80 and 40 and quads for 20, 15 and 10.

Jan (ex-OK3MM) planned to return to Czechoslovakia. Another ex-OK, *CM2BL* (ex-OK1AOT) provided Cuban interest, working 1465 on 5 bands. *FG7XX*, an ever-popular multiplier, made 154 W/VEs happy on 80 meters. Maurice had various problems, but nevertheless turned in a fine 40-hour performance. *HI8XAL's* customary top-notch performance itemized 31 exchanges on 160, over 600 on 80, over 1000 on 40, close to 900 on both 20 and 15, and almost 100 on 10 — an almost-million pointer. Work kept *HP1IE* very QRL but Pete still found time for almost 600-K worth of points. He notes this year the caliber of operation was really clean with his dupes way down from the customary percentage. A nice turn out from the KP4s this year, led by *KP4BJM* with over 400-K. The top DX score this year, the multioperator performance by *PJ5ME* (W1s BGD BIH DYE TCJ, W2ADE, W9GVZ and PJ2ME) drew raves from the faithful. This Connecticut Wireless Ass'n.-sponsored 48-hour expedition wound up with well over 1.1 million points. The fellows ran two stations, using a quad for 20–15–10 and an inverted vee for 80–40. W1BGD sums it up nicely with one sentence, "Many thanks to all those who worked us only *once* on each band." The *XE0AL* crew turned in an almost 900-K sum with activity on all 6 bands. 160 provided them with a pleasant surprise. Although they never did work the east coast, they heard W2EQS W3MSK W4BVV and others. W6RW was their only 6-bander.

O *KG6APD* reports the most unlikely DX conditions seen on Guam for the past six months. *VK2EO* (op. W9WNV/VK2ADY, put in a 78-hour 600-K topper from Oceania. Don comments: "Conditions to the east coast on 10 and 15 discouraging, worked W6RW on 160 though I heard W1BB W3MSK and W4KFC f.b., even 10 meters produced 71 exchanges in 7 areas." *VK3APJ* found that the W-operators generally were very good, not enough activity from VE/VO and KL7 and making the report out a chore. *VK2GW's* breakdown clearly illustrates the pipeline between W6 and VK. World-traveler *VK2VN* spent the second weekend overseas and was limited as to time the first session. Using a beam (for the first time) netted Morrie twice as many contacts as during the previous year's 9-hour period. *VK5KO* met his personal goal in making contacts on all six bands. 7 Mc. specialist *VK2QK* worked 275 in 14 areas. Old Blue, *VK9WE*, had his problems too. A power failure in February (just as he was getting going) was attributed to a snake getting across the high voltage lines, blacking out most of Port Moresby. *VJ1DL* operated four bands for 309 exchanges (183 of these with the sixth call area!). Reliable *ZL1HW* presented excellent activity working 984 participants. *ZL2PM* was glad to hear so many new stations. He comments that there are just too many double contacts and that the DX countries must rely upon the W/VEs to avoid these. (We try to make it easy for W/VEs by furnishing a record sheet which will be required by *all* phone and c.w. W/VEs in 1967).

SA *CE1AD's* biggest band was 15, with over 1100 exchanges. *CE6EF* made 35 times his previous score and finds the discipline of the W-hams superb. *HK3RQ* enjoyed the test and will try to do better next year. Bill says look for HK3BAE, a real comer. *HK3BAE*, in his first ARRL c.w. contest (licensed just 8 months) turned in a fine score, well over 200-K. After using a manual key the first weekend he rapidly acquired an electronic one in time for the second period! One of the outstanding multioperator S.A. scores was that of *LU1DAY* (keyed by LU1DAY LU2DKG and LU8s DLK DQ). With 100 watts input on 5 bands they amassed 2583 two-ways for close to 600-K. *OA4PF* found discipline extraordinarily good. He completed his WAS with a Vermont contact. He looks for more of a challenge in the next test which we hope will be furnished by the rules changes. *PY2SO* almost tripled her score over the past year and says, "Wow, this was fun." Sonia writes, as well as operates, in top-notch fashion. Some of her comments: "Only one KL7, where are they hiding? VO1AW is never able to have his QSOs fast, what with everyone asking him to look for them on this or that band, W1EVT my first U.S.A. for my 3.5 Mc. WAC . . . a thrill working operators like him, W1ECH (with welcomed honest reports), W4KFC, W9IOP and others on five bands." Sonia puts in a justifiable plug for her patient OM Joe, PY2CQ. True to her predictions PY activity was superb, with a 343-K score by *PY2BGL*, *PY7AKQ* with 275-K, and big totals by *PY1MCC PY1NO* etc. *YV1DP*, as always with a tremendous performance came close to 3000 exchanges in 70 hours, and an absolutely superbly presented log. *9Y4VU* felt his new prefix accounted for his bigger score.

PHONE HIGHLIGHTS

AF *CR6HG* may have begged his pardon for his submission but 450 neatly typed exchanges made scoring a breeze at Hq. Thanks to W1RF, *CR7FR* submitted a brief extract of 21 Mc. a.m. operation which included (natch!) W1RF and the neverfail W3MSK. *ET3AC's* big band, 20 meters, included 831 two-ways. The contest staff urgently request him to use a better grade of carbon paper in 1967! Just a few received *VQ9EF* credit due to the loss of their original log. John says that their maids clean up just too well at the Satellite Tracking Station! *ZS6NM* stuck to 15 meters, working more sixes than threes. Thanks to K9RNQ for forwarding along the *9L1JW* information and credit for 737! (Of these, 733 were on 15 meters.) *9Q5VV's* 36-K summary and log shows many many repeats reminding us all that the burden of keeping track of previous QSOs must be upon the W/VE. How about it, fellas?

ASIA U. S. Ambassador to Iran, *EP3AM*, is an old pro at the contest game having activated many rare countries in past competitions. Hank's first 8 contacts included 3 KH6s, 3 KL7s and 2 VE8s. His refreshing reporting indicated most everybody was readability 4. Just a few notable exceptions included a 5–9 for K2HLB. The crew manning *HL9US* found band conditions not too great. Their 501 exchanges were due to the efforts of WA2SPL, WA3ERL, K8ZXP, K9UNY, K6ETM and K3RIX. Thanks from Hq. particularly go to the group's activity manager WA2SPL (HL9TM). *JA1IBX's* 100-K-plus phone resume is a wow of a phone effort for Asia. His sole QSO on 7 Mc. records W3MSK, who else? *KA7AB* (K1KTH) topped 100-K, s.s.b. John's first test abroad was faster and more fun for him than the SS. His best hour recorded 97 exchanges. Next year he plans a winning effort on c.w. for Asia. *JA1CG* had sideband-exciter trouble 10 times during the test. *Murphysan* sure gets around! *JA5BJM* notes 20 watts p.e.p. for his input on 40 and 15, with 47 exchanges and 9 multipliers — f.b. Shizuo! *4X4FV* waxed at great length on the merits of states being used as multipliers for the DX contingent. (Great minds run alike, Bill; it's on the books for 1967!)

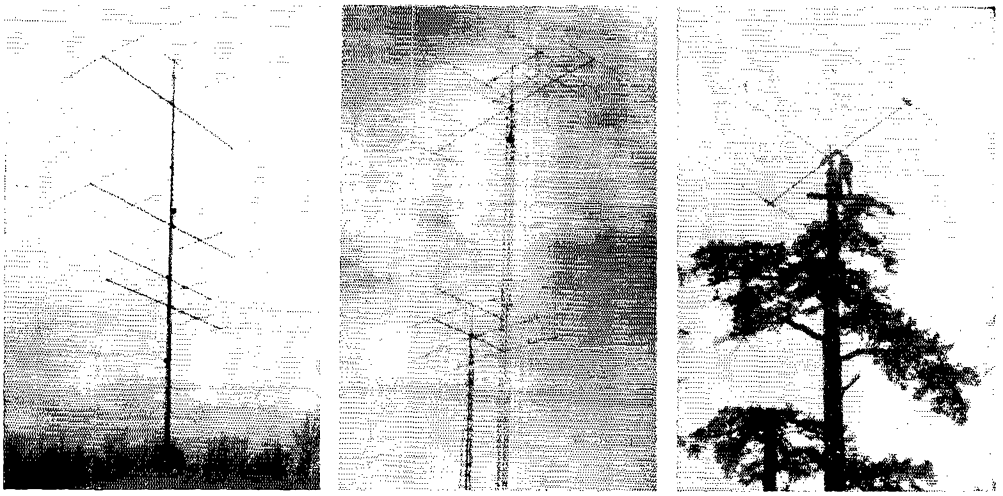
EU *CT1IW* found his first contest lots of fun. He's looking forward to next year *and* Wyoming. DJ6QT topped his 1965 effort. Walter found 80-meter activity as good as last year but no openings to the west coast. In between contest weekends he built a ground plane and with it found good conditions to mid and far west. In his first ARRL contest, *DL4LG* tallied 1071 exchanges on 20 and over 200 on 15, quite a respectable first go! *DL4NS* found the 2nd phone weekend by far better with 15 wide open. His only 10 meter contact was with WA4PXP. *DL6VP* thanks all U. S. and Canadian hams for a fine time. He enjoys working the states and has made

over 3000 U.S.A. QSOs. Next year *DL6JJ* plans to be more successful with a 6-L tribander! Among *EA4DO's* one-thousand-plus contest QSOs were 184 on 75. Young *G3UML* entered his first ARRL contest and won for England. A key to his abilities, however, is his career of SWLing, since before 1959. On the morning of March 13 he found 40 in fine shape producing his first W6s on that band. On that afternoon 15 exploded with activity and in 3 hours he moved frequency just twice . . . just a matter of sorting out the pile-ups! Laurie still needs Nevada and Wyoming for his WAS. *G2QT* comments that many stations have their VOX delay set too short making the operator talk too quickly and leading to many misread calls. The crew at *GB2DX* upped their previous year's performance with a 5-band effort by G3s JOC KFX TUZ and G5AAM/WA6ZIQ. G3s NLY PLD and SVH, manning *G3SVH*, reported local TVI and some unusual neighbor retaliation. They report one neighbor revved up a 2-stroke motorcycle against the shack wall for about an hour while another neighbor amused himself by hammering on a large piece of corrugated sheet iron! GW3s *DIX* and *NWV* continue to be impressed by the considerable operating skill and courtesy of U. S. stations. *IIBAF's* walloping 363-K total includes the big band (20 meters) with 1755 exchanges . . . almost 50 exchanges an hour for a 44-hour stint . . . *and* an impeccable report. *I1CAQ* specialized on 20 meters for a 923-QSO total. *I0FGM*, with 242-K vocal honors by IIs BER LCK GAD and ZSQ reminds prospective QSLers that I1LCK does the honors. *LA9HC* joins dozens of other DXers in a plea for a Nevada QSO. LA9OI, frequent operator at *LA1H*, always enjoys a contest. Olav soon will be radio-operating aboard a ship. Conditions didn't favor Norway, report LA1EE and LA3JJ, operators of *LA1K*. They look for a change in their antenna system during the fall and better results next year. *OE3EGL's* highlights were his first transatlantic 40-meter phone exchanges, thanks to K2GXI and W3MSK. *OH5SM* reports that the OM and older children took care of the baby so she could take part in the test. Carola reports a fine time all 449 QSOs. The *OH2AM* crew type well in addition to operating well. OH2s BC BH BQ SB and QV talked up 1282 contacts running the two stations. WOW, *OZ9SL* wants log forms for 1967, 1968, 1969 . . . ! Guess that 200-K score is just a warm-up. Enthusiastic *OZ3KE* enjoys this affair but reports QSL results only average 50%. Just think, says *OZ7DX*, if my dipoles favored the U. S. instead of the North Pole. Perennial *PA0LOU* regrets no s.s.b. gear for 40 and 75. He *is* sorry about that! *SM7CRW* says *he* QSLs 100% (including 741 in the test) and sure hopes all W and VE stations will do the same. The *SM6DLL* crew (SM6s AOE BJI CKV DLL) report unstable conditions. Saturday mornings on 75 and 40 nice but Sunday mornings poor. They heard all America south of Florida but the only U. S. stations even heard occasionally were W3s MSK or WJD. *SV1BL* reports the 21 Mc. opening from 1410–1900Z March 13 a *very* good one.

NA Monique operating *FG7XL* found both 20- and 15-meter conditions excellent both weekends with 10 meters good March 13. Her 2551 QSO-total covers 5 bands of operation for well over a half-million points. A delightful surprise was the appearance of *FS7RT*, the renowned W6ITH. Reg topped the 2100-QSO figure with multipliers on 6 bands, including a Florida phone contact on 160! *HI8XAL* spent most of the second phone weekend putting up antennas for 40 and 80 for the 2nd c.w. weekend. Under 24 hours at the mike for 1746 two-ways. Fred says please send a brand-new Wouff-Hong to the guy who, after receiving the usual 59000 exchange, said "That's a pretty good signal for no power." *KP4CKU* topped 1100 contacts on two bands for an overall sum of 3335 exchanges, over 790-K. Radiators included a tribander up 35 feet plus an inverted vee for 75 and 40. The *KP4BFF* group (K3SBF, WA5BGW and KØKYE) did an interesting break-down of contacts in call areas on all bands. Best area on 10 was W6, on 15 W4, on 20 W2, and on 40 W8. The fellows operated the station during off-duty military hours and worked all states and provinces except VE8 and VO. *KV4CF* must have writer's cramp recopying those 2000-plus contacts (a signed *legible* copy is sufficient fellows . . . a clean carbon, or photocopies, acceptable). *OX3JV* wishes Ws would realize that the DX portion of 75 is not only 3780–3800. Jorgen says that in most countries it goes all the way from 3600–3800. *TG8CJ* found the contest experience most enjoyable with 15 the best band for stateside contacts. Juan finds duplicate contacts a problem with over 1400 exchanges! 16- and 17-year-old TI2AAC and TI2KR multioperated *TI2AAC* with fine results, 168-K. The Caribbean-west coast path on 10 was proved out by *VP2KR* doing very well indeed though recovering from the flu. ex-VP7CC now *VP5RS* was a popular Turks/Caicos multiplier though getting set up quite late. Chuck plans bigger goings *next* year. *YN1TP's* best area on ten was (ditto) California, for 42 two-ways. In fact, Tomas had his best success into that area on 21 also. The Canadian contingent ably manning *ZF1BP* (VE2BK, VE3s CJ RX and VE8AA) put in a relaxed 38 hours for an almost-half-million-pointer. Their BIG band was 15 with 1062 contacts. Though new to amateur radio, *6Y5OF* presented a first-class able performance to the tune of 206,115. Vic is looking for a *real* breakthrough on 28 Mc. next year. *6Y5BS* enjoyed the 2nd weekend better from Jamaica than the 1st one at home VE3BS. He says he felt more wanted, hi!

O *KG6APD* would like to have spent more time in the test. Bill made schedules on 10 but the path proved fruitless. KØOAZ K1DRD and WA1FDW were pleased to operate *KJ6DA* providing a Johnston Island multiplier for 380 participants. QSL say they via WA6OET. They found 112 to talk with on 28 Mc., in ten call areas. *VK3ATN* promises to enter more seriously one of these years. *VK4LT* found QRN a particular problem on 7 and 3.5 Mc. *VK3ARX* vehemently declaims that one cannot win using a

DX-pedition phases of VP2KY (operated by WØs IIC QUU for 152,703 phone points from Anguilla) include; loading the 51-ft. ketch, erecting the antennas atop the highest hill (213 ft.) with that view towards mainland U. S. A. and operating from the inside of an abandoned police training barracks. Besides talking up almost 900 contacts, the crew stayed on to give some happy Novices their first Anguilla QSO.



First-class antennas in use by top phone contestants (L-R); K2GXI top W.N.Y. using 3-L on 40, 5 on 20, 5 on 15 and 6-L on 10; W4BCV tops for Kentucky with a tri-bander at 51 ft., 3-L on 15 at 37 ft., 5-L for 20 at 115 ft. and 2-L 40 at 125 ft. plus a quarter-wave 80-meter vertical; VE7PV with a quarter of a million points from B.C. showing his 3-L 20-meter antenna up 80 feet. Ian now has a 15-meter Yagi above this one.

transceiver. Rick stayed on 20 for 312 QSOs. *VK2FU* feels single-band classification might be an inducement for those not equipped for all-band operation. (The charts herein point things this way Gil. *Your* 457 exchanges show nicely thereon!). *VK9DJ's* sole 10-meter phone exchange was with W6ITA. *W6KG's* sojourn at VR1Z was more than popular for 700 of the faithful. Nice going Lloyd!

SA *CE6EZ* found 20-15-10 outstandingly good. Ralf heard mostly W6s with their rock-crashing 9-plus signals. What he liked best was the discipline shown by the W-crew. His 2nd-weekend-only stint ran up 993 exchanges. CE8s *CG* and *CM* took turns handing out exchanges on 3 bands from Punta Arenas. *HC1TH* says ten meters was wild and KL7A1Z made *his* day; 50 an hour or better for about 40 hours for well over 400-K. *HC1RT* was a close runner-up down in Ecuador with almost 400-K and a 5-band 30-hour effort. (Just wait till conditions are good . . . Ed.) *HK4KL's* fat log showed 15 his major band with 1141 exchanges — his entire 2396 listing impeccably typed. Contest knowledgeable *HK3RQ* found conditions poorer than last year. Bill congratulates the "WB" gang with doing a superb job with rigs and mikes, as good as, or better than, the older participants. Final score for about 35 hours, 478-K. *OA7AX* found his first DX test very enjoyable. Even with the fantastic pileups, *PJ2CR* found it possible to make many many contacts with a transceiver in the American phone band. His customary good effort produced 326-K . . . best band 15 meters. A nice showing too on 10-417 QSOs. *PJ3CD* down in Curacao commented on the good conditions, particularly on 15. Many of us had the pleasure of meeting Jonas earlier this year on a visit to the U.S.A. Hooray. *PY2BJO* found his Nevada for WAS and doubled his previous score . . . big things planned with a rhombic under construction. *ZP9AY* does his contesting the hard way. His location is without commercial power and Robert uses a gas engine and alternator. 678 exchanges are particularly meritorious under those conditions.

Disqualifications

The calls listed in this paragraph are all deemed ineligible for score listings or awards. In each case disqualification was under contest rule 14 in view of non-observance of FCC rules as reported by at least two accredited Official Observers, or by a single FCC citation. Such violations as out of band operation, key clicks, spurious emissions, etc. were the basis for these disqualifications. *C.w.* — K2LWR, W3EYF, K3NVC, W3ZQ, W6CLZ, WA6EPQ, W6NJU, WA6UUS, W7BTH. W7MVC, WAØGQI, WAØHGY, WØKER and WAØMWZ. *Phone* — W3EVW, KS6BO (W9WNV, opr.).

Thirty-Second ARRL International DX Competition

Operator of the station first listed in each section and country is winner for that area. . . . The multiplier used by each station in determining score is given with the score — in the case of U.S.-Canada this is the total of the countries worked on *each* frequency-band used; in the case of non-W/K/KH6/KL7/VE/VO entries it is the total of the U.S.-Canadian districts worked on each band. . . . The total number of contacts is listed next. . . . The letters A, B, and C approximate the input to the final stage at each station; A indicates power up to and including 150 watts; B indicates over 150 watts, up to and including 500 watts; C indicates over 500 watts. . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Examples of listings: K3NHL. . . . 517,536-288-599-C-76, or final score 517,536 multiplier 288, 599 contacts; power over 500 watts; total operating time 76 hours. . . . Stations manned by more than one operator are grouped in order of score following *single-operator* listings in each section or country tabulation; calls or numbers of participants at multi-operator stations are listed in parentheses. . . . In sections or countries where three or *more multiple-operator* entries appear, the top-scoring station is being awarded a certificate. An asterisk denotes a Hq. staff member, not eligible for an award.

C.W. SCORES

ATLANTIC DIVISION

Delaware

K3NdL	517,536-288-599-	C-76
W3DRD	131,262-167-262-	C-45
K3VSV	675- 15- 15-	A-10

Eastern Pennsylvania

W3BES	690,120-324-710-	C-75
W3MFW	664,620-330-672-	AC-81
K3JCT	618,150-325-634-	AC-79
W3MWC	564,573-307-616-	C-72
W3GHM	128,536-274-522-	C- -
W3NOH	417,381-263-529-	C-50
W3HHK	411,060-260-527-	C-50
W3KFQ	389,550-245-530-	C-70
W3BIP	310,905-235-441-	C-60
W3HHA	306,380-233-444-	C-65
W3GRS	291,084-254-382-	C-32
W3KDF	278,842-214-435-	C-50
W3EQA	231,600-200-387-	C-43
K3JH	179,780-178-340-	C-51
W3KT	169,650-171-325-	C- -
W3EVW	136,245-155-293-	C- -
W3CGS	121,635-153-265-	C-44
W3BN (K3TEJ opr.)	99,396-132-251-	C-27
W3ISE	97,104-136-238-	A-47
W3INH	84,942-143-198-	C-15
W3PN	76,230-121-630-	C-18
W3QMZ	65,637-117-187-	C-35
K3EUR	49,914- 94-177-	A- -
K3HTZ	47,700-106-150-	A-50
W3BYX	46,992- 88-178-	B-28
W3CAA	42,966- 93-154-	B-22
W3CBF	40,950- 91-150-	B-32
K3BNS	36,720- 80-153-	C-23
W3CGB	33,660- 85-132-	C-27
WA2KZV/3	29,580- 85-116-	A-25
W3QLW	29,187-669-141-	B-35
K3JGJ	22,509- 61-123-	C-24
WA3CUO/3	21,829- 68-107-	A-31
W3AEQ (WA8BJD, opr.)	21,384- 66-108-	AC-17
W3IZI	17,493- 49-119-	A-21

W3NM 16,995- 55-105- C-12
W3DBX 15,372- 61- 84- B- -
W3GHD 10,434- 47- 74- B- -
K3RFB 5814- 38- 51- B-25
W3NCW 1734- 17- 34- A-10
W3YUW 507- 13- 13- C- 6
K3ZOL 216- 8- 9- A- 2
W3WJD (4 oprs.)
1,269,216-416-1017- C-96
W3BGN (W3s BGN YUW)
908,276-361-841- C-79
W3WPG (K3WJV, W3s SQX WPG) 699,783-329-709- C-90
K3MBF (K3s JLI LJZ MBF)
503,565-295-569- C-75
W3GHS (K3s YOV YUA, W3GHS)
413,766-254-543- C-78
W3ECR (W3s ECR RRV)
340,860-247-460- C-47
K3WNT (K3s VJA WNT)
5220- 30- 59- A-39

Maryland-D. C.

W3GRF 817,950-350-781-BC- -
W3EKN 482,257-277-598- C-70
W3MSR 437,493-251-581-AC-86
W3MCG 399,645-249-535-AC-59
W3MFJ 328,925-223-492- C-60
W3MVB 274,776-214-430- C-42
W3QQL 207,339-183-379- B-59
K3JYZ/3 132,345-173-255- C-33
W3AFM 124,993-121-345- C-66
W3AXW 57,615-115-167-AC-36
W3EPR 31,734- 86-123- C-23
W3FBE 21,840- 65-112- B-17
W3RNY 20,709- 59-117- C-18
W3ZNB 15,912- 68- 78- C- -
K3WUW 12,936- 56- 77- B-24
WA3EEQ 9333- 51- 61-BC-51
W3LMZ 8880- 48- 63- A-12
K3QDD 4743- 31- 51- C- 8
WA3CRA 27- 3- 3- A- 2
W3MSK (6 oprs.)
1,723-120-476-1208-AC-96
WA3EPT (8 oprs.)
529,248-296-596-AC-96

Southern New Jersey

K2DCA 605-115-315-641-AC-77
WB2APG 570,090-310-615- C-61
K2QIL 200,208-172-388- A-60
W2GGL 132,132-154-286-AC-53
W2QDY 102,816-126-272- B- -
W2DAJ 96,624-132-244- C-27
W2QKJ 66,330-110-201- C-56
K2BG 42,228- 92-153- B-20
K2CPR 40,950-105-130- B-21
K2OEA 38,592- 96-134- A-10
K2AGU 32,784- 79-139- C-21
WA2IZS 24,525- 75-109- C- -
WB2MRA 23,808- 62-128- B-43
WA2KIZ 4386- 34- 43- A-10
W2EBW 1620- 20- 27- B- 7
W2HAZ 672- 14- 16- A- 4
WA2HSP 12- 2- 2- A- -
WA2BLV (WA2s BLV WLN)
380,034-258-491- C-60

K2AA/2 (4 oprs.)
20,088- 72- 93-AB- -

Western New York

WB2MFX 525,402-289-606- C-83
W2SSC 278,460-210-442- C-47
WA2UJM 230,811-203-379- B-90
WB2CON 142,760-166-287- A-62
W2LJX 126,768-152-280- B-60
WA2HUV 125,400-152-275-BC-31
K2INP 119,970-155-259- C- -

WB2PCP 102- 6- 6- A-10
W2TAB (K2BFF, WA2RJZ)
131,930-158-279- C-80

Western Pennsylvania

W3LOE 731,400-345-712- C-82
W3VEQ 217,728-189-385- C-76
K3KMO 186,339-179-347- B-48
K3ZMH 54,282-109-166-BC-27
WA3EIN 15,582- 49-106- B-30
W3VK 363- 11- 11- A- 6

K3MBF, one of the potent c.w. multioperators in Eastern Pennsylvania, produced a half million of those FRC club points. Shown is K3MBF who was aided by K3s JLI LJZ. The major antenna at K3MBF is a 4-L 20-meter rotary on a 130-ft. self-supporting tower accounting for 107 countries on that band.

W2FXA 100,440-135-248- C-22
WB2PGM 53,802- 98-183- C-25
W2SAW 46,197- 87-177- C-25
WA2GHW 44,800- 83-180- C-40
W2BJH 41,325- 95-145- C-25
K2TQC 31,833- 81-131- B-12
WA2NFY 26,492- 74-123- B-40
W2PHT 23,310- 70-111- A-42
W2QQ 22,572- 76- 99- C-15
W2DOD 22,561- 77- 99- C- 8
K2OUS 21,810- 70-104- C-30
K2LAF 20,700- 60-115- C-17
WB2HZH 20,306- 71- 96- A-32
W2PDB 17,088- 64- 89- C-10
WA2PCW 14,691- 59- 83-AB-24
K2KNV 13,167- 55- 77- C-10
W2VXA 12,116- 52- 78- B-37
W2RPP 10,650- 50- 71- A-19
W2SEJ 4104- 36- 38- B-10
WA2JBV 3456- 32- 36- C- -
W2UVE 3450- 23- 50- C- 4
WA2OIL 234- 9- 9- A- 6

CENTRAL DIVISION

Illinois

W9IRH 188,916-182-346- C-44
W9JGV 169,812-159-356- C-69
WA9KQU 80,682-119-226- C-50
W9UX 74,613-119-209-BC- -
W9WIO 39,897- 93-143- C-12
W9EFS 38,130- 82-155- C-30
WA9MFX 28,050- 85-111- B-42
WA9HJM 24,921- 71-117- A-36
WA9LMY 16,320- 64- 85- B- -
WA9KQS 13,050- 58- 75- C-20
W9BZW 8208- 48- 57- C-33
W9MZP 6348- 46- 46- C- -
W9DGK 6042- 38- 53- A-18
K9DWG 4968- 36- 46- B-10
W9KMN 3420- 30- 38- C- 9
W9FNX 2340- 26- 30- C- 8
W9EVX 2040- 24- 29- A- 9
WA9MWA 270- 9- 10- A- 9
K9YRA 147- 7- 7- B- 5

K9OTB (K9s BGL OTB)
220,800-200-368- C-77
K9YHB (K9RHY, WA9EJD)
86,016-112-256- C-24

Indiana

W9IOP 696,837-327-717- C-85
W9LKJ 79,380-126-210- B- -
WA9ITB 54,510-115-158- B-35
K9VQK 15,996- 62- 86- A-38
K9FIC 630- 14- 15- A- 5
WA9KDC 468- 12- 13- A- 7
W9ACS 108- 6- 6- B- 2

Wisconsin

W9EWC (W9AQW, opr.)
514,878-287-598- C-75
W9GIL 313,941-227-461- C- -
W9QYW 301,644-228-441- C-67
W9VZP 217,086-194-373- C-67
W9ICD 197,208-198-332- C-75
W9YT (K9ZMS, opr.)
138,060-156-295- C-52
W9KXK 108,504-137-264- C-45
W9NLJ 89,010-138-215- B-10
W9OW 64,974- 98-221- C- -
W9SCZ 54,315- 85-213- B-52
K9KKU 40,248- 86-156- C-43
W9IHN 35,334- 78-151- B- -
K9YBC 21,507- 67-107- B-20
WA9JDK 1083- 19- 19- B- 6
WA9AQE 546- 13- 14- B-10
WA9PBW (K9s FWF IBI)
27- 3- 3- C- 2

DAKOTA DIVISION

Minnesota

WAØKDI 39,897- 93-143- C-44
WØAIH 16,461- 59- 93- C- 5
WØYC (WAØMKB, opr.)
6048- 36- 56- B-18
WØRXL 4410- 35- 42-ABC-23
WØKUI 27- 3- 3- B- 5
WAØKQU 3- 1- 1- B- 1
WØIVZ (WØs ISJ IVJ)
34,104- 87-131- C-26

South Dakota

WØBLZ 63,345-103-205- C- -
KØCER 28,413- 77-123- C-15
WAØCJI 3567- 29- 41- B-16

DELTA DIVISION

Arkansas

K5TYW 69,469-127-183- C-25
W5GFT 12,150- 54- 75- B-35
WA5KUD 300- 10- 10- B- 3

Louisiana

W5KC 235,476-211-372-AC-50
W5BUK 46,800-104-150- C-30
WA5EAM 8640- 45- 64- B- 9
W5MOQ 4830- 35- 46- C-17

Mississippi

W5CKY 379,316-266-476- C-60
K5RFJ 313,782-241-434- C-65
W5MUG 112,140-140-267- C-15
W5OER 18,837- 63-101- - -
WA5EHC 9225- 45- 69- A-28

Tennessee

WA4CGA 99,000-150-221- A-43
K4SXD 77,625-125-207- A-41
W4ZWZ 9720- 45- 72- B-49
K4QZV 4092- 32- 44- A-12

GREAT LAKES DIVISION

Kentucky

W4BCV 261,294-214-407- C-50
W4MPV 56,547-103-183- C-25
K4RZK 20,679- 61-113- C-36
WA4ZIR 1242- 18- 23- B- 6

Michigan

W8VSK 445,775-275-541-BC-62
W8UCI 209,223-189-369-BC-59
W8VPC 108,360-140-258- C-50
W8EW 71,568-112-213-AC-29
W8NDG 45,441- 99-153- C-26
WA8SJS 41,310- 90-155- C-28
K8ERO 19,341- 63-110- C-52
W8TJQ 19,158- 62-103- A-24
K8ZVF 9027- 51- 59- C-16

DIVISION LEADERS

C.W.			Phone	
Single Operator	*Multioperator*		*Single Operator*	*Multioperator*
W3GRF	W3MSK	*Atlantic*	K2GXI	W3MSK
W9IOP	K9OTB	*Central*	W9EWC	W9YT
WØBLZ	WØIVZ	*Dakota*	WAØKDI	WØIVZ
W5CKY	.....	*Delta*	W5AJY	.....
W8FGX	W8UM	*Great Lakes*	W4BCV	W8NGO
W2VJN	WB2MDH	*Hudson*	K2HLB	W2SKE
WØFDL	WAØHXW	*Midwest*	WØCU	WAØKXZ
W1EVT	W1AW	*New England*	W1JYH	W1AW
W7SFA	.....	*Northwestern*	K7UDV/7	KL7EFT
K6ERV	W6UM	*Pacific*	K6ERV	K6OHJ
W4KFC	W4BVV	*Roanoke*	W4BVV	W4KFC
K5STL	.....	*Rocky Mountain*	WØGAA	WØYDM
W4HUE	W4ZYQ	*Southeastern*	WA4PXP	WA4NGO
W6ITA	W6RW	*Southwestern*	W6ITA	.....
W5BRR	.....	*West Gulf*	W5KTR	WA5AVL
VE1RB	VE6GX	*Canadian*	VE1PL	VE6GX

W8DSO	3780-	28-	45-	B- 6
W8TBZ	2760-	24-	39-	B-27
W8SCU	1710-	19-	30-	C- 4
WA8OSL	540-	12-	15-	B-10
W8UM(6 oprs.)	595,077-301-659-AC-90			
K8UDJ (5 oprs.)	229,482-209-366- C-78			
W8DUS(K8ZQE, W8sCRD DUS)	134,541-151-297- C-46			
WA8GUF (WA8s GLY GUF)	88,968-132-225- C-43			

Ohio

W8FGX	711,480-330-720-AC-85			
W8ZJM	228,744-216-353- C-50			
W8ZCQ	203,130-183-370- C-62			
WA8DXA	153,974-167-309- B-75			
W8GQU	148,797-167-297- C-69			
W8CJN	144,495-169-285- B- –			
WA8FDL	79,650-118-225- B-42			
WA8MQE	57,552-109-177- C-38			
W8NPF	53,530-101-178- C-46			
W8KMD	53,268- 92-193- C-38			
WA8CIA	52,116- 88-202- B-62			
WA8FAE	38,364- 92-139- B-35			
W8YGR	38,223- 93-137- B-16			
WA8NAZ	34,710- 89-130- B-21			
W8AJW	33,019- 89-124- A- –			
WA8KPO	30,843- 69-149- C-23			
W8KC	28,416- 74-128- C-33			
W8YPT	26,334- 77-114- C-15			
W8OKF	25,308- 57-148- C-25			
WA8MCR	21,780- 66-110- A-28			
W8ELE	20,577- 57-122- C-29			
W8FDC	20,340- 60-113- B-50			
W8DWP	17,304- 56-103- B-32			
W8GMK	11,457- 57- 67- B-15			
K8ZXM	11,400- 50- 76- A-27			
W8GOC	8742- 47- 62- A- –			
WA8FCH	7200- 40- 60- A-13			
WA8ADJ	6120- 40- 51-AB- –			
K8BPX/8	4128- 32- 43- C- 6			
K8PYD	3534- 31- 38- C-15			
W8KMF	3075- 25- 41- B- 6			
W8PCS	2883- 31- 31- B- 6			
W8IBX	884- 17- 18-AB- –			
K8BSM	588- 14- 14- A- 2			
K8PXD	363- 11- 11- C- 6			
W8VDF/8	243- 9- 9- A- 9			
WA8ETX	243- 9- 9- A- 2			
W8EDU (WA2USG, WA8LEQ)	WA8ZA, 61,936-112-185- C-70			

HUDSON DIVISION

Eastern New York

WA2OJD	408,720-280-524- C-68			
W2MEL	394,970-254-522- C-70			
W2HO	227,141-223-489- C-66			
W2RFT	267,120-212-420- C-58			
W2HSZ	229,800-200-383- B-50			
K2AJA	145,425-175-277-BC-33			
W2LWI	116,313-137-282-AC-42			
W2AWF	102,108-127-268- C-44			
WA2HLH	85,932-126-228- A-60			
W2VIR	17,160- 55-104- C- –			
W2KFB	16,640- 65- 86- C-20			
W2IP	1020- 17- 20- B- –			
W2APH	900- 15- 20- B- 6			

N.Y.C.-L. I.

WB2CKS	533,986-291-618- C-74			
W2PCJ	523,844-298-586- C-66			
W2GGE	520,806-286-607- C-66			
K2DGT	502,680-284-590-AC-93			
W2LXK	464,304-272-575-BC-70			
K2CHQ	368,220-255-483-AC-58			
W2IRV	291,720-220-442- B-53			
WB2CZZ	278,756-227-412- B-68			
W2GKZ	228,552-214-356- C-22			
WB2FON	189,888-172-368- C-62			
W2WZ	151,179-161-313- C-24			
W2YCW	139,278-167-278- C-23			
W2SUC	111,249-141-263- C-29			
W2RDD	104,520-134-260- C-24			
W2AYJ	101,835-155-219- C-20			
W2ZKQ	94,392-114-276- C-50			
W2GKW	72,846-114-213- B-34			
WA2UWA	72,324-123-196- B-10			
W2EXH	65,076-116-187- C- –			
W2AZS	54,054- 91-198- C-30			
W2ZV	35,112- 88-133- A-40			
WA2GLU (WA2EFN, opr.)	19,950- 70- 95- C- –			
WB2CKO	17,400- 58-100- B-20			
W2CKR	14,996- 46-110- B-22			
K2KD	13,020- 62- 70- A- –			
W2DUS	10,965- 43- 85- A-12			
WB2JJF	10,812- 53- 68- A- 8			
W2EQG	9660- 46- 70- B-16			
WB2QKS	8184- 44- 53- B- 5			
K2QOU	8004- 46- 59- B-15			
WA2TGL	7155- 45- 54- B- 6			
W2BOT	5940- 33- 60- B- 6			
WB2PBA	5355- 35- 51- A-15			
WB2QGA	5181- 33- 54- B-10			
WB2FAJ	4902- 38- 43- B- 6			
W2JB	4620- 35- 44- A-13			
WA2EFN	3672- 34- 36- C- 2			
W2HAE	3060- 30- 34- B- –			
W2ASE	1728- 18- 32- C-15			
W2OBU	1035- 15- 23- B- 4			
WB2JOX	560- 14- 14- A- 7			
WB2FOV	507- 13- 13- C- 2			
WB2PCF	216- 8- 9- B- 2			
WB2EZG	175- 5- 12- A- 6			
W2RPZ	75- 5- 5- B- 4			
W2MDH (WB2s MDH MVA)	62,328-106-196- C-48			
WA2LQO (2s IYK MFY, W2QUV)	40,803- 87-159- C-37			

Northern New Jersey

W2VJN	538,986-313-579- C-48			
W2HUG	130,824-158-276- A-50			
WB2FIT	114,432-149-256- A-55			
W2HZY	108,624-124-292- C-26			
W2IWP	88,312-133-224- A-54			
WB2OHK	72,352-112-216- C-28			
W2NEP	66,286-131-170- A-35			
W2KHT	66,066-121-182- B-40			
WA2HIU	46,332- 99-156- B-51			
W2HL	45,736- 99-154- C-18			
K2DNL	43,710- 94-155- B-26			
WB2NZU	43,065- 87-165- A-50			
WB2PYN	30,420- 78-130- A- –			
W2EHN	29,376- 88-144- B-30			
WB2GGO	20,724- 66-105- A-38			
WB2NYN	5472- 38- 48- B-20			
W2CIY	5307- 29- 61- B-12			
WB2JID	540- 12- 15- A- 1			
W2MNW	90- 5- 6- B- 4			

MIDWEST DIVISION

Iowa

WØFDL	235,458-206-381- C-66			
WØIYH	196,596-172-381- C-64			
WØHNA	50,676-103-164-AC-42			
WØYI (WØEMA, opr.)	42,224- 91-156-ABC-32			
WØEQN	32,163- 71-151- C-18			
WØKHL	29,889- 81-123- C- –			
WØBSY	27,216- 81-112- C-25			
KØFIJ	20,394- 66-103- B-23			
WØDCP	6192- 43- 48- C-10			
WAØIJS/Ø	3024- 28- 36- A-40			
WAØFWN	2604- 28- 31- B-16			
WAØKXJ	504- 12- 14- A- 8			
WØLBS	297- 9- 11- C- 1			
WAØKIR	3- 1- 1- A- 1			
WAØHXW 4 (oprs.)	29,250- 78-125- C-19			

Kansas

WØINH	95,760-144-222- C-65			
KØBHM	69,006-106-217- C-43			

Missouri

WØTDR	183,488-188-327- C-72			
WØOAW	98,421-159-207- C-70			
WØGNX	67,881-121-187- C-59			
WØCVZ	47,430- 93-170- B-57			
WØGAX	14,760- 60- 83- B-26			
WAØFVI	13,104- 56- 78- A-50			
KØJPJ	8448- 44- 64- C-15			
KØJPL	4032- 32- 42- B- 7			
WAØAJV	3627- 31- 39- A- –			
KØYIP	1260- 20- 21- A- 6			
WAØJNF	216- 8- 9- A-24			
WAØNOH	75- 5- 5- A-26			

NEW ENGLAND DIVISION

Connecticut

K1ZVU	456,960-265-576- C-71			
W1ECH*	361,560-262-460- B-60			
W1BGD*	249,402-211-384- C-30			
W1BIH	247,200-200-415- C-31			
W1WY	212,100-202-350- C-43			
K1ZND	181,608-184-329- A-48			
W1TX	178,992-176-339-AC-46			
W1FTX	128,205-165-259- B-34			
W1WPO*	115,560-120-321- C-48			
W1AH	95,852-124-261-BC-55			
W1DIT	65,637-117-189-BC-40			
K1LMS	51,392- 88-196- A-50			
K1HTV	43,200-100-144- A-17			
W1CNU	42,588- 91-156- A-28			
WA1APY	36,696- 88-139- C-16			
WA1DJG	35,424- 82-146- B-35			
W1DEP	12,972- 47- 99- B-35			
WA1FHU	11,970- 57- 70- A-34			
W1BDI*	9045- 45- 67-AC- 9			
K1WJB	6627- 47- 53- B-30			
W1RZG	3192- 28- 38- C- 9			
W1NJM*	1701- 21- 27-BC- 2			
W1JMY*	1512- 21- 24- C- –			
K1QPN	741- 13- 19- B- 4			
WA1CYT	730- 15- 16- A- 4			
K1DPB	432- 12- 12- A- 5			
WA1CQW	18- 2- 3- A- 6			
W1AW (W1WPR, K2BJR)	296,262-218-453- C-80			

Eastern Massachusetts

W1EVT	792,272-340-782-BC-86			
W1BPW	780,880-344-764-AC-74			
K1DIR	630,864-312-674-BC-77			
W1JYH	617,862-313-658- C-54			
W1FJJ	341,880-259-440- C-44			
W1WLZ	304,425-225-451- C-46			
K1CDN	241,968-213-379- C-72			
K1YKT	204,001-193-355-AB-55			
W1EHT	102,108-127-268- B-46			
W1CT	94,804-137-236- B-48			
W1MO	79,785-135-197- B-31			
WA1CTN	45,032-104-145- C-38			
K1TLJ	36,267- 77-157- B-22			
W1BQL	32,228- 79-142-BC-18			
W1CSP	22,248- 72-103- A-15			
W1NJL	19,557- 53-123- A- –			
WA1BYA	7548- 37- 68- A-22			
W1PLJ	6678- 42- 53- B-20			
W1BB	759- 11- 23- A- 6			

Maine

K1RQE	264,168-216-409- C-53			
W7UXP/1	169,150-170-344- C-36			
W1DEO	117,045-153-261- C-2			
W5NGG/1	39,840- 83-160- C-22			
K1GAX	6885- 45- 51- C- 9			
W1EM	4212- 27- 52- B-11			

New Hampshire

K1NBN	173,628-182-318- C- –			
W1DYE	42,594- 93-153- A-15			
K1CTQ (WA6OJM, opr.)	38,700- 86-150- B-19			
W1PEG	29,336- 76-129- B-50			
W1SWX	10,971- 53- 69- B-19			
WA1CBP	8064- 48- 56- A-18			
K2EPP/1	6882- 37- 62- A-29			
K1HK	2448- 24- 34- A- 4			

Rhode Island

W1GGG	249,900-196-425- B-65			
K1LPL	65,163-107-203- C-20			
W1YRC	41,676- 92-151- C-16			
K2KMF/1	29,631- 83-119- B-26			
W1AGP	22,422- 74-103- A-27			
W1HIJ	10,293- 47- 73- B-14			
WA1FCC	6201- 39- 53- B-16			
W1AWE	5472- 32- 57- C- 7			
WA1FDB	351- 9- 13- A-12			

Vermont

W1WTE	115,056-141-272- B-48			
W1AYK	25,380- 60-141- C-12			
W1WFZ	23,184- 69-112- A-20			
W1FPS	18,117- 61- 99- B-23			

Western Massachusetts

W1EOB	262,080-210-417- C-46			
W1EZD	178,500-175-340- C-54			
W1UUK	154,448-157-328- B-50			
W1COI	49,470- 97-170- B-33			
W1CKD	31,284- 79-132- B-45			

NORTHWESTERN DIVISION

Alaska

KL7FMM	3140- 20- 54- B-12			
KL7EWP	2772- 21- 44- A-20			

Idaho

K7CPC	4836- 31- 54- A-22			

Montana

W7QB	1425- 19- 25- A- 6			

Oregon

WA7ANB	26,928- 68-132-AC-53			
WA7ABW	22,230- 65-114- C-30			
WA7CGR	7560- 36- 70- A-16			
W7ACC/7	1440- 15- 32- B-10			
W7JRI	1419- 11- 43- A-14			
K7STK	2280- 20- 38- C- –			

Washington

W7SFA	214,263-179-399- C-53			
W7MX	80,598-115-236- C-65			
W7RGL	33,210- 82-135- C-31			
W7MH	31,968- 72-148- B-30			
W7VRO	26,496- 64-138- C-20			
K7WQD	16,014- 51-106- B-55			
K7QXL	13,818- 49- 94- B-36			
W7IPX	5070- 26- 65- B-27			
W7WKB	2440- 20- 41- B-30			
WA7BDF	1710- 19- 30- B-19			

PACIFIC DIVISION

East Bay

W6LDD	263,862-214-411- C-72			
WA6UFW (WA6VAT, opr.)	90,090-130-231- C-30			
W6BSY	70,485- 27-185- C- –			
WA6IVN	55,728-108-172- C- –			
K6LRN	20,280- 65-104-BC-24			
W6AW	7665- 35- 73- B-24			
W6KEK	4350- 29- 50-BC- 8			

The message is clear at **W8UM**, the University of Michigan Amateur Radio Club, top Great Lakes Division multi-operator c.w. at almost 600-K. Operators shown are WA8CZH, W8s CQN FAW aided by K8MFO and KP4s BJD BJU.

W6FLT 3675- 25- 49- C-15
W6YLL (W6s QQW YLL)
3900- 26- 50-AB-14

Hawaii

KH6IJ 27,750- 74-125- C-24
KH6FRL 9348- 38- 82- C-25
KH6FIE 9143- 41- 76-AB- -
WØPAN/KH6
4941- 27- 61- B-19
KU6FON 825- 11- 25- A- 5

Nevada

W7VIU 3588- 26- 46- B- 6

Sacramento Valley

W6GRX 217,168-196-370- C-70
W6EOU 89,914-122-247-BC-70
W6SIA 77,172-118-218- B-50
W6ONZ 27,075- 95- 95- C-37
WA6JDT 5510- 30- 59- A-27
K6DQB 2925- 25- 39- A-14

San Francisco

W6WB 188,616-174-362- C- -
WA6IVM 115-479-141-273- C-55
W6ERS 86,580-130-222- C-80
K6NCG (WB6FCE, opr.)
71,955-117-205- C-67
K6IXS 31,710- 70-151- C-26
K6ANP 22,878- 62-123- C-24
WA6DJI 7056- 42- 56- B-17
WB6CMA 1422- 22- 67- B-21

San Joaquin Valley

W6UJ 170,850-170-335- C-80
W6KTW 160,776-174-308-BC-66
W6WWD 18,786- 62-101- C-15

Santa Clara Valley

K6ERV (W6BHY, opr.)
370,500-247-500- C-85
W6WX 325,108-238-456- C-74
W6CUF 182,196-189-322- C-51
W6HOC 153,576-158-324- C-67
WB6CEP 120,498-151-266- C-70
K6HOR 114,972-143-268- C-40
K6ALH 88,375-125-236- C-72
W6BJH 86,688-126-230- C- -
W6FYM 64,975-115-189- C-32
WA6YMX 63,612-114-186- C-42
WA6NYK 61,632-107-192- C-57
W6KHS 55,278-111-166- B-41
W6RFF 29,526- 74-133- C-30
W6GQK (W6SRI, opr.)
29,016- 78-124- C-26
WB6LEI 22,035- 65-113- A-35
W6ATO 16,380- 52-105- C-21
WB6KRW 14,382- 51- 94- A-10

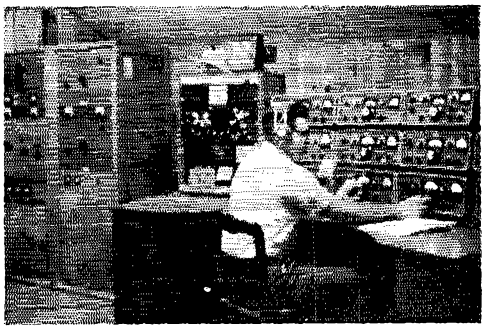
W6QDE 12,495- 49- 85- C-14
WA6TQK 10,191- 43- 79- A- -
W6VVR 6264- 36- 58- C-11
W6BVB 4371- 31- 47- A- 9
W6QBY 3828- 29- 44- C- 9
W6CLM 3225- 25- 44- C-32
WA6PMK 2475- 25- 33- C- -
WB6KMV 2337- 19- 41- A-17
K6OZV 2220- 20- 37- C- -
K6VTC 720- 18- 40- C- 4
W6JKJ 108- 4- 9- C- -
W6UMI (W6UMI, WA6SID)
204,088-194-352- C- -

South Carolina

K4YYL 385,140-245-524- C-73
K4WJT 146,169-149-327- C-47
WA4IKU 273,762-227-402- C-35
WA4VZK 9900- 50- 66- B-20
WN4YZC 504- 12- 14- A- -

Virginia

W4KFC 990,600-381-867-AC-70
W4BFA (WA4RPK, opr.)
138,126-274-533- C-68
W4ZSH 146,685-165-298- C-20



W4BVV was manned solo during the phone test to top Virginia with 869,799 and multioperated by 6 of the PVRC crew for 1½ million c.w. points. In front of Tom are 4 S-lines and a KWM-2. The short rack to the left contains control units, beam indicators etc. and the large rack to the left houses four separate 4-1000Z finals.

K6OHJ (K6OHJ, W6RGG, WA6QGW)
191,862-187-342- C-64
K6LY (7 oprs.)
177,671-173-343- C-86
WA4HSM/6 (K4EID, WA4HSM oprs.)
180- 5- 12- A-26

ROANOKE DIVISION

North Carolina

W4OMW 76,614-113-226- B-39
K4ADT 39,900- 95-140- B-26
WA4MQW 29,250- 78-129- A-41
WA4UXU 6156- 38- 54- A-12

W9IOP's Central Division c.w. score is an eye-opener, almost 700-K topping Indiana with one of the high single-operator code performances this test. Larry worked different 125 countries over-all in a 5-band performance producing 327 multipliers and 717 exchanges.

W4DVT 145,512-172-282- C-57
W4CQI 130,746-154-283- B-38
W4YGY 123,120-144-285- B-20
W4GF 122,706-153-269-AC-27
K4CG (K3WUW, opr.)
101,430-147-230- C-38
W4RKV 76,680-120-213- C-39
W4WBC 67,374-114-197- B-36
W4ZM 63,180-117-180- C-15
W4DKU 52,884-113-186-AC-16
W4VZC 46,620-105-148- C-15
W4WSF 10,656- 48- 74- C-10
W4CRW 7200- 40- 60- A-30
WA4VAI 5610- 34- 55- C-26
W4KMS 4851- 33- 49- B-14
W4NXE 1026- 18- 19- B-16
W4BVV (6 oprs.)
1,512,448-448-1126-AC-96
W4KXV (8 oprs.)
1,357,433-427-1061-AC-96

West Virginia

W8AZD 56,448- 96-196- B-44
WA8QYK 2054- 26- 27- A- -
K8UZX 960- 16- 20- C- 3
W8BKK 75- 5- 5- A- 3

ROCKY MOUNTAIN DIVISION

Colorado

KØVFN 41,322- 97-142- C-38
WØJKA 8184- 44- 62- A-36

New Mexico

K5STL 116,208-144-269- C-53
W5VWU 74,052-121-204- C-50
W5ODJ 51,410- 97-178- C-96
W8BZY/5 39,336- 88-149- C- -
W5HMT 8235- 45- 61- C- 9

Utah

W7NPU 104,520-134-260- C-62
K7OXB 3402- 18- 63- C-10

Wyoming

W7PSO 26,670- 70-127- C-40
W7GGG 1026- 18- 19- B- -

SOUTHEASTERN DIVISION

Alabama

K4NMN 71,370-122-196-AB-40
W4KVC 58,824-114-172- C-32
K4EDF 38,280- 88-145- C-40

W4LHW 28,755- 71-135- C-27
W4NML 8280- 46- 60-AC-19
W4AYDR 864- 16- 18-AB- 7
K4KJD 210- 7- 10- C- 3

Eastern Florida

W4HUE 487,760-280-581- C-76
W4BGO 485,248-272-599-AC-78
W4BRB 316,707-229-468- A-80
W4HOS 247,293-213-387-ABC-68
WA4PXP 223,713-201-373- C-59
W4WYJ 136,431-163-279- A-37
W4WHK 124,476-164-253-AB-50
WA4IJH 51,345-105-163-AB-33
K4RQE 51,150-110-155- A-22
W4EIE 45,288-102-148- C-38
W4BYB 37,074- 74-167- A-52
W4NTE 22,356- 69-108- A-40
WA4SDK 5700- 38- 50- A-25
K4QIJ 1764- 21- 28- B- -
K4ZD 1122- 17- 22- C- -
W4EEO 300- 10- 10- C- 4
WB4CAP 75- 5- 5- A-12
W4ZYQ (W4s ZYQ ZYS)
302,967-229-443- C-76

Georgia

K4EZ 391,560-251-520-BC-60
W4DXI 321,836-244-442-AC-76
WA4EPM 9555- 49- 65- A-23

Western Florida

K4OA 125,268-146-286- C-53

SOUTHWESTERN DIVISION

Arizona

W7IMA 118,692-157-252- B-34
W7ATV 86,496-136-212- C-41
W7AYY 36,024- 79-152- C-12
W7ENA 16,530- 58- 95- A-11
WA7BOA 1425- 19- 25- B- 6
W7UUU 432- 12- 12- A-11

Los Angeles

W6ITA 501,389-286-583- C-80
W6NIX (W6AJJ, opr.)
190,920-185-344- C-84
K6KA 188,672-176-358- C-70
W6PQT 117,025-151-259- C-31
W6LDA 116,328-148-262- C-35
K6JIC 89,652-124-242- C-34
W6VNJ 61,236-108-189- C- -
W6NKR 50,700-100-169- C-20
W6NEX 46,906- 94-167- C-36
W6RCV 42,861- 91-157- C-32
W6APH 34,263- 81-141- C-53
WB6EUZ 37,296- 84-118- B-35
KØGJD/6 29,484- 78-126- B-25
W6KPC 28,125- 75-125- C-60
W6PBI 21,321- 69-103- C-40
WA6KHK 20,220- 60-113- A-38
K6YYQ 16,695- 53-105- C-34
W6ONG 14,946- 53- 94- B-40
W6ANB 12,495- 49- 85- C-23
WB6CNO 6765- 41- 55- A-18
WB6KIL 6372- 36- 59- A-20
W4SAT/6 3861- 27- 48- A-25
W6IBD 3483- 27- 43- C- -
W6AM/6 12- 2- 2- C- 1
W6RW (8 oprs.)
934,235-379-825-AC-96

Orange

K6HZP 132,312-149-206- C-60
K6CYX 70,983- 99-242- C-38
WA6TLL 43,407- 91-519- A-51
WB6RTJ 12,015- 45- 89- C-19
W6HJ 6666- 36- 62- C-25
W6WNR 6660- 37- 60- B-23
WB6MPE 2457- 21- 39- A- -
W6ANN (W6s ANN DFY)
270,756-218-414- C-75

San Diego

WB6LZI 142,188-164-289- C-42
W6CHV 80,892-126-214- B-53
W6KNE 29,748- 74-134- C-24
WA6DMN 11,421- 47- 81- B-22
K6CNV 5100- 34- 50- A-15

Santa Barbara

W6ULS 102,258-138-247- C-48
W6PQW 53,016- 94-188- C- -
WA6OJM 39,411- 87-151- B-27
WB6LIV 32,417- 77-141- B-40

African activity was evidenced by (L-R): **5A3TX** with almost 200-K c.w. and an additional nice phone log, **9G1FQ** top Ghana c.w. who finds this event always enjoyable and **9Q5FV**, top Republic of Congo phone.

W6JTA (W6JTA, WA6QDA, WB6PGK)
61,692-106-194- C-60

WEST GULF DIVISION

Northern Texas

W5OGS 251,664-214-392- C-70
W5LUJ 167,007-179-311- C-70
K5BXG 105,111-153-229- C-60
K5QMC 71,955-117-205-BC-24
WA5JMK 47,595- 95-167- C-37
WA6JSI 29,868- 76-131- B- –
W5VLF 5586- 38- 49- A-17
WA5KYY 3813- 31- 41-AB-20
W5M8G 714- 14- 17- A- 6

Oklahoma

K5LMG 39,330- 90-146- C-55
W4SKI/5 25,272- 72-117- C-53
K5JVF 19,314- 58-111- B-40

Southern Texas

W5BRR 391,090-259-504- C-87
K5JZY 249,480-216-385-BC-60
W5ZD 214,890-190-377-BC-66
W5LJT 96,744-139-132- C-30
K5ABV 81,606-134-203- A-41
W5LZG 63,283-121-175- C-18
W5MCO 62,586-114-183- C-46
W5WQN 12,844- 52- 85- C-33
WA5AUZ 4590- 34- 45- C-22
WA5MUF 27- 3- 3- A-22

CANADIAN DIVISION

Maritime

VE1RB 363,490-223-550- C-51
VO1AW 109,434-122-305- A-41
VE1ZZ 41,949- 79-177- C-68
VE1WP 24,705- 61-140- A-16
VE1EK 11,850- 50- 79- A-13

Quebec

VE2NV 353,292-236-499- A-75
VE2AYU 153,990-145-354-AB-64
VE2WA 144,900-161-300- C- –
VE2CK 3564- 27- 44- B- –
VE2JD 1800- 20- 30- C- –

Ontario

VE3ES 123,120-144-285- C- –
VE3DBB 77,589-111-233- B- 5
VE3DFM 62,100- 92-225- A-33
VE3FID 56,307-137-137- C-23
VE3DKB 21,452- 62-116- B-39
VE3DGB 243- 9- 9- A- 4

Saskatchewan

VE5PM 24,340- 71-110- B- –

Alberta

VE6AKV 7215- 37- 65- B-21
VE6GX (5 oprs.)
56,289- 87-129- C-38

British Columbia

VE7BDJ 55,200- 96-193- C-55
VE7CE 36,720- 80-154- C-24

Yukon — N. W. T.

VE8BB 20,832- 56-125-AB-30

AFRICA

Portuguese Guinea

CR3AD 21,096- 24-293- A- –

Cape Verde Islands

CR4BB 195,975-65-1005- A-49

Angola

CR6AI 220,304-56-1315- B-57
CR6EI 71,250- 50-475- A-40
CR6HG 21,321- 23-309- B- –

Mozambique

CR7IZ 13,608- 24-189- A- –

Ghana

9G1FQ 82,115- 47-585- C-26

Republic of the Congo

9Q5RD 20,097- 21-319- A- –
9Q5PA 5364- 12-149- A- 4

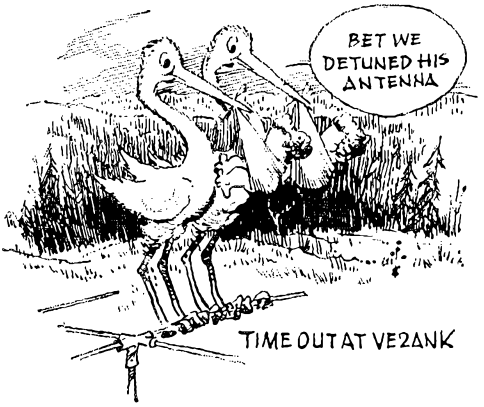
ASIA

Iran

EP3AM 23,328- 36-216- B-36

Korea

HM5BF 48,060- 36-445- A- –
HL9US (multiopr.)
53,070- 29-610- A- –



Liberia

EL2D 120,204- 53-756- A-21

Ethiopia

ET3AC 1764- 12- 48- A- –

Swaziland

ZD5M 1485- 11- 45- A- –

Ascension Island

ZD8AR (4 oprs.)
1,096,758-8E-4251- A- –

South Africa

ZS6FN 29,160- 42-235- A- 9
ZS1O 513- 9- 19- A- –

Libya

5A3TX 195,858-54-1210- A- –

Nigeria

5N2AAF 23,436- 31-252- A- –

Somali Republic

6O6BW 155,493-44-1226-AC-29

Republic of Guinea

7G1A 183,114-73-2220- A- –

Japan

JA1IBX 166,504-52-1069- A-52
JA1CIB 129,438- 51-846- A- –
JA1CG 56,203- 37-512- A-36
JA1DFQ 31,328- 32-333- A-27
JA8SW 20,944- 22-319- A-72
JA1LWI 6272- 14-151- A- –
JA2CPD 5628- 14-135- A-24
JA8GIR 5343- 13-137- A-19
JA7BJL 3926- 13-101- A-43
JA7CVB 2010- 15- 45- A-10
JA2CUS 1908- 12- 53- A- –
JA2XI 960- 8- 40- A- –
JA2BNN 400- 5- 27- A- –
JA8CCZ 72- 3- 8- A- –
JA2CPK/1 27- 3- 3- A-12

Bonin & Volcano Islands

KG6IG (K3HPS, WA4YLP)
126,420- 43-980- C-39

Lebanon

OD5LX 18,009- 23-263- A-11

Asiatic Russian S. F. S. R.

UA0KZB 84,768- 32-883- B- –
UA0KZD 24,024- 22-363- B- –
UA0KCO 15,181- 17-298- B- –
UW0IX 14,307- 19-251- A- –
UA0KZD 13,923- 21-221- B- –
UW0IW 9027- 17-177- A- –
UA0TR 4488- 11-136- A-12
UA0DT 1560- 10- 52- A- –
UA9MR 1218- 14- 29- A- –
UA0AG 828- 12- 23- B- –
UA9MX 486- 9- 18- A- –
UA9PO 234- 6- 13- A- –
UW9CS 216- 8- 9- A- –
UA0GF 153- 3- 17- B- –
UA0KFG (4 oprs.)
277,704-56-1704- B-96
UA0KCA (3 oprs.)
13,419- 21-213- B- –
UA9KUA (3 oprs.)
7650- 17-150- B- –
UA9KTE (2 oprs.)
1683- 11- 51- B- –

Turkoman

UH8DH 72- 3- 8- A- –

Kazakh

UL7RN 1353- 11- 41- A- –
UL7CQ 918- 9- 34- B- –

Hong Kong

VS6BJ 1896- 8- 19- A- –

India

VU2GW 1071- 9- 41- A- 4

Singapore

9V1LP 70,560- 48- 500-A-40
9V1MT 612- 6- 34- A- –

EUROPE

Portugal

CT1OI 64,476- 36-597- A-50
CT1SQ 7392- 28- 89- B- 7

Germany

DJ5BV 178,002-58-1046- B-66
DL1RK 108,100-46-784-A-45
DM4WPL 93,312- 48-648- B- –
DL7BQ 55,242- 33-558- B- –
DL8CM 42,180- 37-388- A- –
DL1QT 37,872- 48-263- B-23
DL6VP 28,050- 22-430- B-35
DJ2YC 27,270- 18-511- B- –
DL4LG 22,050- 25-294- B-13
DL1TA 6840- 19-120-AB- 8
DL3CM 4731- 19- 83- B- –
DM2ATD 4560- 19- 80- B- –
DL6WD 3348- 18- 62- B- –
DJ6HE 2244- 11- 68- B- 7
DL1JC 424- 8- 18- A- –
DM2BBE 225- 5- 15- A- –
DL6JA (7 oprs.)
34,221- 33-347- B-38

Spain

EA3KT 43,622- 34-432- A-50
EA2DT 13,450- 25-182- A-11
EA3NA 7038- 23-104- A- –
EA2CR 6165- 15-137- A- –

Republic of Ireland

EI9J 200,187-59-1134- A-34
EI5F 16,375- 25-220- A-18

France

F8VJ 161,512-52-1038- A-44
F9ZF 90,850- 46-665- A-40
F8CS 65,106- 43-504- A- –

F2PO 57,546- 46-422- A- –
F8OP 50,280- 40-419- A- –
F9OE 22,464- 26-229- A- –
F8TQ 11,840- 20-198- A-12
F8TM 10,602- 31-114- A- –
F5NG 8064- 14-192- A-11
F2GO 3570- 10-119- A- –
F5EF 3195- 15- 71- A- –
F8SF 3- 1- 1- A- –

England

G2RO 138,701- 53-877- A-51
G2QT 117,600- 50-784- A- –
G2DC 95,472- 52-612- A- –
G3APN 44,550- 55-271- A-40
G6VC 31,008- 34-304- A-32
G3KSH 8208- 36-228- A- 8
G3HLW 6800- 25- 91- A- –
G2AJB 3840- 20- 64- A-12
G3SSO (8 oprs.)
414,060-67-2060- A-95

Northern Ireland

GI3OQR 387,072-64-2016- A-62

Scotland

GM2HCZ 34,020- 30-378- A-21
GM3JDR 14,208- 16-296- A- –
GM3GUJ (GM3s GUJ UBK)
63,843- 39-549- A-96

Wales

GW3JI 137,000- 50-916- A- –
GW3ITZ (4 oprs.)
58,800- 36-545- A-96

Hungary

HA1KSA 163,080-54-1027- B-60
HA1SD 52,299- 39-447- A-32
HA5DJ 41,144- 37-377- A- –
HA1KVM 37,476- 36-347- A- –
HA1VA 4182- 17- 82- A- –
HA1ZH 3318- 14- 79- A- –
HA5KQD (HA5s DI FK KDQ)
111,390- 47-797- B-47

Switzerland

HB9JG 227,563-59-1288- B- –
HB9KC 85,536- 44-648-AB-28
HB9DX 68,166- 42-541- B- –
HB9RX (HB9s ADJ RX)
54,432- 36-507- B-39

Italy

I1NT 218,850-50-1459- B-49
I1LAO 137,853- 51-918- A- –
I1AV 36,371- 37-337- A- –
I1KE 33,785- 29-420-AB-19
I1PPI 31,581- 29-365- A-24
IT1AGA 30,600- 34-303- A-46
I1HL 6688- 19-118- A- –

Norway

LA9HC 96,360- 40-803- A-35
LA1H (LA9OI opr.)
65,569- 32-705- A-35
LA5HE 22,828- 26-293- A- –
LA2Q 9056- 16-189- A-49
LA7H 8100- 18-150- A- –
LA8PF 2805- 11- 85- A- –
LA1K (5 oprs.)
54,450- 30-605- A-91

Jan Mayen

LA6XF/P 3009- 17- 51- A- –

Luxembourg

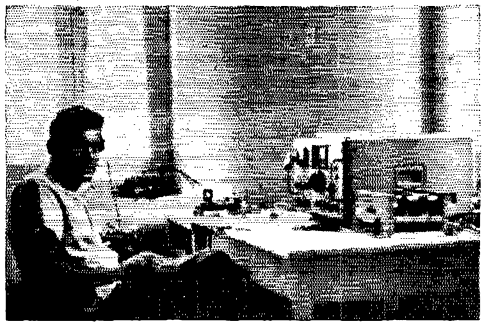
DJ6SI/LX 2814- 14- 67- A- –

Bulgaria

LZ1KAA (6 oprs.)
49,440- 32-575- B-73
LZ1KKZ (3 oprs.)
15,720- 20-263- B- –

Finland

OH1XX 65,310- 35-633- B- –
OH2FS 11,220- 17-220- B-34
OH3MF 5778- 18-107- A- –
OH5VT 2310- 14- 56- A-15
OH2BEE 957- 11- 29- B- –
OH2YL 371- 7- 18- B- –
OH6VR 357- 7- 17- A- –
OH5UX 165- 5- 11- B- –
OH2AM (7 oprs.)
149,904-48-1053- B- –
OH2TI (5 oprs.)
104,841-33-1059- B- –
OH3AH (6 oprs.)
60,117- 29-691- B-85



For a serious contester there seems hardly a better spot in the world than the Caribbean. **CO2BO** proved this point the c.w. weekends in a first-rate performance for close to a million c.w. points. Jan ran 90 watts input and operated all bands with homebrew transmitters (6146s) crystal controlled. Recognize that old OK3MM style?

OH1AA (OH1s VR WK)
22,800- 19-101- B-18

Czechoslovakia

OK3CCC 33,300- 30-370- A- –
OK1VK 30,156- 28-359- B- –
OK1AHZ 21,780- 33-220- A- –
OK3OM 19,248- 16-401- B-27
OK2PO 17,024- 19-300- A- –
OK1AFO 7335- 15-163- B- –
OK2DB 6045- 13-155- B- –
OK1AEZ 4845- 19- 85- A- –
OK1UK 4485- 13-115- B- –
OK1KDT 2604- 14- 62- A- –
OK3KGI 2568- 8-107- A- –
OK1AJR 2310- 10- 73- A- –
OK1AES 2046- 11- 62- A- –
OK2ABU 1960- 14- 47- B- –
OK3CED 1776- 8- 74- A- –
OK2QX 1080- 8- 45- A- –
OK2BCI 513- 9- 19- B- –
OK1AOX 450- 6- 25- A- –
OK1KDO 180- - 15- A-

Belgium

ON4XG 92,619- 41-753- A-35
ON4NM 40,194- 29-462- A- –

Faroe Islands

OY6FRA (multiopr.)
18,333- 21-291- A- –

Denmark

OZ3FL 100,674- 42-799- A- –
OZ1W 51,012- 39-436- A-40
OZ1LO 40,494- 34-397- A-52
OZ7X 22,194- 27-274- A-46
OZ4UN 8910- 18-165- A- –
OZ7G 3660- 10-366- A- –
OZ8E 3486- 14- 83- A- –
OZ7BG 1776- 16- 37- B- –
OZ4DX 972- 9- 36- A- –
OZ3FI 756- 12- 21- A- –
OZ5DX 330- 5- 22- B- –

Netherlands

PA0LOU 153,250-50-1043- A-60
PA0XPQ 72,696- 39-623- A-42
PA0GMU 40,977- 29-479- A- –
PA0FLX 18,720- 32-196- A- –
PA0WAC 10,164- 22-154- A- –
PA0VB 4920- 20- 82- A- –

SM5CCE 66,528- 33-693- B-32
SM5TW 12,291- 37-381- B- –
SM5CEU 10,149- 17-199- B- –
SM5UU 8944-26- 115-B-21
SM5BNX 7776- 18-144- B- –
SL6BH (SM7CUY opr.)
5355- 17-105- A- –
SM7DVF 4452- 14-106- B- –
SM3CJD 4368- 14-104- A- –
SM5BTS 3008- 16- 64- B- –
SM5ALJ 2592- 12- 72- B- –
SM5BRL 1521- 13- 39- A- –
SM7TV 1342- 11- 41- A- –
SM6CMR 616- 8- 26- A- –
SM5BDS 75- 5- 5- B- –
SM6BJI (4 oprs.)
253,980-51-1663- B-60

Poland

SP7HX 47,538- 38-417- B- –
SP6AKK 11,995- 37-393- A-35
SP6AAT 24,480- 30-275- B-12
SP8MJ 18,270- 30-203- B- –
SP6AKY 13,296- 16-279- A- –
SP5AHL 11,730- 23-170- A-35
SP5ADZ 6900- 25- 92- A- –
SP6SO 2520- 12- 70- A- –
SP6IP 1620- 10- 54- B- –
SP9AMA 522- 6- 29- A- –
SP3AOT 456- 8- 19- A- –
SP8KBM (SP8s AJE ARY)
7054- 19-122- A- –

Dodecanese

SV0WF 3- 1- 1- A- 1

Greece

SV0WAA 26,022- 29-308- A-24

Iceland

TF3AB 4320- 18- 80- A- –

European Russian S. F. S. R.

UA1ZW 9027- 17-177- A- –
UA6XQ 1190- 10- 40- A- –
UA1SW 744- 8- 31- A- –
UW3CS 384- 8- 16- A- –
UA1KCR 336- 8- 14- A- –
UA3KRO 300- 5- 20- A- –
UA1MA 231- 7- 11- B- –
UA1YY 198- 6- 11- A- –
UW3BX 180- 5- 12- A- –
UA1SP 144- 3- 16- A- –
UA4ZA 180- 5- 12- A- –
UA1NA 40- 2- 7- B- –
UA4AZ 27- 1- 9- A- –
UA6KAF (2 oprs.)
41,013- 49-279- A- –
UA1KUA (2 oprs.)
28,455- 21-451- B- –
UA3KAO (2 oprs.)
5355- 15-119- B- –
UA1KUZ (3 oprs.)
2706- 11- 82- A- –

Kaliningradsk

UA2KAW (LIA2s BO CA CD)
29,634- 22-449- B- –
UA2KAP (3 oprs.)
5187- 13-131- A- –

Ukraine

UB5WJ 21,762- 18-403 A-20
UB5HN 480- 8- 20 A- –
UB5TR 415- 13- 29- B- –
UT5KKL 255- 5- 17- A- –
UT5EP 24- 2- 4- A- –
UB5KFF (3 oprs.)
7722- 26- 99- A- –
UB5KHQ (3 oprs.)
3444- 14- 82- A- –
UB5ARTEK (3 oprs.)
782- 8- 33- B- –
UB5KGL (3 oprs.)
390- 5- 26- B- –

White Russian S. F. S. R.

UC2AW 7776- 18-144- A- –
UC2WP 2460- 10- 82- A- –
UC2KMZ (3 oprs.)
3105- 15- 69- A- –

Azerbaijan

UD6BZ 1845- 15- 41- A- –

Georgia

UF6LA 1728- 12- 48- A- –
UF6IK 105- 5- 7- A- –
UF6KAF (UF6s GE GM)
24,186- 29-278- B- –

Lithuania

UP2PT 6474- 13-166- B- –
UP2KDA 2178- 11- 66- A- –
UP2KNP (5 oprs.)
98,064- 36-908- B- –
UP2KBA (2 oprs.)
19,080- 24-265- B- –

Latvia

UQ2HO 1980- 11- 60- A- –
UQ2GQ 1728- 8- 72- A- –
UQ2MK 255- 5- 17- B- –
UQ2KDM (3 oprs.)
3432- 13- 88- A- –

Estonia

UR2LO 4395- 15- 99- B- –
UR2BU 1234- 11- 38- B- –

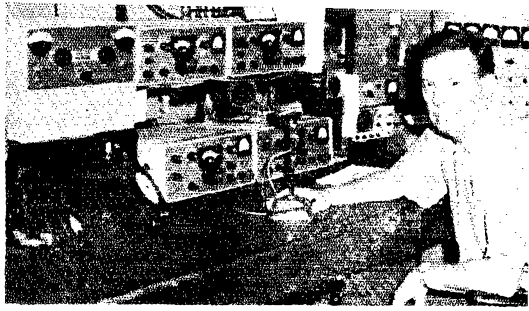
Rumania

YO8DD 15,057- 21-243- B- –
YO3RO 3861- 11-117- A- –
YO3JW 3180- 10-106- A- –
YO3CR 2604- 14- 62- B- –
YO7VS 1944- 9- 72- A- –
YO3RF 792- 12- 22- B- –
YO9HH 711- 9- 27- A- –
YO5LN 330- 5- 22- A- –
YO5KOL 115- 5- 8- A- –
YO3KSD (YO3s AAJ GU)
6318- 26- 81- A- –

DX CONTINENTAL CHAMPIONS

	C.W.			Phone	
	Single Operator	*Multioperator*		*Single Operator*	*Multioperator*
	7G1A	ZD8AR	*Africa*	ET3AC	.....
	JA1IBX	UA0KFG	*Asia*	JA1IBX	.....
	GI3OQR	G3SSO	*Europe*	I1BAF	GB2DX
	CO2BO	PJ5ME	*N. A.*	KP4CKU	ZF1BP
	VK2EO	KG6IG	*Oceania*	VR1Z	KJ6DA
	HK3RQ	LU1DAY	*S. A.*	HK4KL	.....

A half-million points c.w. and even more on phone were registered by Los Angeles top single operator **W6ITA**. The 5-L on 20, 4-L on 10 and 15 and 3-L on 40 (plus an 80-meter dipole) produced fabulous reports seen in hundreds of DX logs received for this test.



Yugoslavia

YU4JOP 840- 8- 35- A- –
YU3BC (YU3s BC LB LC) 213,512-52-1377- B-66
YU1BCD (4 oprs.) 112,894- 47-832- B-96
YU1EXY (2 oprs.) 61,308- 39-537- A- –

I. T. U., Geneva

4U1ITU (4 oprs.) 31,976- 28-385- C-15

NORTH AMERICA

Cuba

CO2BO 978,924-97-3364- A-86
CM2BL 263,700-60-1465- B- –

Guadeloupe

FG7XX 214,272-64-1116- A-40

Dominican Republic

HI8XAL 972,290-90-3627- C-58

San Andres & Providencia

HKØAI 609,606-71-2862- B-

Panama

HP1IE 569,322-78-2433- A-65
HP1BR 23,256-17- 456- B-20
HP1AC 6660-20- 111- A- –

Puerto Rico

KP4JM 419,040-72-1960- B- –
KP4BBN 306,068-68-1515- C-45
WA4MFS/KP4 67,824-36- 628- A-14

Virgin Islands

KV4CK 184,800-55-1120- B- –

Canal Zone

KZ5FX 682,560-80-2851- C-54
KZ5JF 331,062-69-1608- A-54

Sint Maarten

PJ5ME (7 oprs.) 1,167,714-87-4474- A-48

Costa Rica

TI2KR (TI2s CJH KR) 34,476-39- 295- B- –

St. Kitts, Nevis

VP2KR 61,053-47- 433- A-19

Turks and Caicos Islands

VP5AR 394,476-71-1852- A-30

Barbados

VP6PJ 140,508-54- 868- A-17

Bermudas

WB2PXZ/VP9 (5 oprs.) 362,565-63-1943- A-96

Mexico

XE2AAG 100,150-50- 676- A-37
XE1AX 85,520-40- 718- B-11
XE2DD 32,400-36- 300- A-13
XEØAL (12 oprs.) 867,396-86-3362-AB-96

Nicaragua

YN1AA 119,190-58- 685- A- –
YN6BF 9288-24- 129- A- –

Cayman Islands

ZF1XX 2052-19- 36- A- 1

OCEANIA

New Caledonia

FK8AH 16,215-23- 235- A- 8

Guam

KG6APD 20,010-23- 290- C-10

Midway Island

KM6CE (K7RSM opr.) 157,950-54- 975- B-45

Australia

VK2EO (VK2ADY/W9WNV opr.) 606,771-81-2497- A-78
VK3APJ 295,745-66-1497- A- –
VK2GW 242,580-65-1244- A-63
VK3AXK 123,921- 49-843- A-42
VK2VN 69,972-49- 476- A-10
VK5KO 31,650-50- 211- A-16
VK2QK 11,550-14- 275- A- –
VK3XB 6222-17- 122- A- –
VK3KS 1080-10- 36- A- –

Papua

VK9WE 1872-12- 52- A- 3
VK9TB 16- 2- 3- A- 1

Fiji

VR2DK 44,268-42- 356- A-10

New Hebrides

YJ1DL 25,029-27- 309- A- –

New Zealand

ZL1HW 129,668-44- 984- A- –
ZL3II 108,000-50- 720- A-37
ZL1DV 74,052-33- 748- A- –
ZL2PM 56,595-35- 539- A-18
ZL1AMQ 28,080-27- 347- A- –
ZL1QW 6072-22- 92- A- 8

SOUTH AMERICA

Chile

CE1AD 390,060-66-1974- B- –
CE6EF 6384-99- 112-AB- 9
CE3AG 3822-14- 91- A- 2

Bolivia

CP3CD 10,416-14- 248- A- –

Uruguay

CX1OP 39,560-43- 308- A- –
CX1FB 8910-30- 99- A- –

Colombia

HK3RQ 714,680-74-3220- C-54
HK3BAE 209,952-54-1296- B-45
HK3ASJ 39,350-25- 539- A- –

Argentina

LU3DSI 69,462-34- 681- A- –
LU5AES 57,482-41- 534- A- –
LU8BAJ 44,100-35- 420- B- –
LU1DAY (4 oprs.) 585,352-76-2583- A-90

Peru

OA4PF 376,788-68-1847- B- –

Brazil

PY2SO 620,475-75-2838-ABC-61
PY2BGL 343,125-75-1525- C-57
PY7AKQ 274,700-59-1552- A-50
PY1MCC 243,573-61-1332- C-34
PY1NO 152,496-54- 948- A-84
PY1BLG 76,222-46- 554- B-48
PY7AEE 39,270-42- 316- A- –

Venezuela

YV1DP 629,415-71-2955- B-70
YV1OB 41,240-40- 345- B-12

Trinidad

9Y4VU 60,108-42- 490- A-24

PHONE SCORES

ATLANTIC DIVISION

Delaware

K3NHL 567,378-266-711- C-83
K3NYG 44,121- 77-191-ABC-30

Eastern Pennsylvania

W3BES 523,146-247-708- C-75
K3JCT 405,544-224-602- C-76
W3BGN 313,296-214-488- C-39
W3WPG 284,040-180-526- C-93
K3TPL 282,576-203-404- C-68
K3BNS 199,479-161-413- C-47
W3EQA 155,344-146-356- C-40
W3GRS 123,669-151-273- C-23
W3HHK 113,766-134-283- C-34
W3CGS 109,620-126-290- C-49
W3NOH 99,099-121-273- C-35
W3GHM 86,652-116-249- C- –
K3PSW 71,173-103-231- C-44
W3BIP 62,037-113-183- C-40
W3QMZ 52,488- 81-216- C-36
W3NM 50,797- 79-215- C-25
W3KT 48,804- 83-196- C- –
W3BYX 33,441- 71-517- A-30
W3UZF 32,472- 88-123- C-26
W3KDF 31,968- 74-144- C-20
W3GHD 15,399- 59- 87- B- 6
W3QLW 6300- 35- 60- B-16
W3ECR 3744- 32- 39- B- 3
W3IZI 396- 11- 12- A- 3
W3WJD (4 oprs.) 1,112,576-328-1132- C-96
W3MWC (K3JLI, W3MWC) 378,336-221-563- C-80
W3GHS (W3GHS, K3YUA) 34,656- 76-152- C-20
K3MBF (K3s LJZ MBF) 11,616- 44- 88- C- 7
W3KFQ (K3JGF, W3KFQ) 7956- 34- 78- C- 8

Maryland-D. C.

W3AZD 511,104-242-704- C-70
W3TLN 393,714-207-634- C-61
W3BWZ 264,153-191-461-AB-70
W3GRF 218,940-164-445- C- –
W3MCG 178,200-165-360-ABC-58
W3MVB 99,960-119-280- C-43
W3AXW 40,992- 96-143-AC-42
K3KME 36,984- 92-134- B-48
W3FYS 31,725-75- 141- A- –
W3ZNB 16,512- 64- 86- B-14
WA3CGE 12,267- 47- 87- B-17
K3CBW 11,376- 24- 45- C-22
K3WUW 7620- 44- 55- B-32
K3UTH 1920- 20- 32- B- –
W3MSK (7 oprs.) 2,290-092-398-1918- C-96
WA3EPT (8 oprs.) 225,090-183-410- C-96
K3LCH (K3s JYZ LCH) 30,396- 68-149- B-19
K3JYZ/3 (K3s JYZ LCH) 22,464- 64-117- C-20
K3QDD (K3s OAE QDC QDD) 5916- 34- 58- C- 8

Southern New Jersey

WA2IZS 222,894-174-427- C- –
W2DAJ 157,680-146-360- B-35
K2PZF 67,164-116-193- C-38
W2QKJ 64,701- 91-237- C- –
W2QDY 51,030- 81-210- B- –
W2EWR 32,943- 79-139- C-72
WB2QYO 25,272- 52-162- B-39
W2ORA 15,552- 54- 96- A-19
K2AGU 6642- 41- 54- C-10
W2SDO 2016- 24- 28- C-10
K2OEA 1512- 21- 24- A- 4
WA2HSP 240- 8- 10- A- –
K2AA/2 (4 oprs.) 44,100- 98-150- A- –

Western New York

K2GXI 621,432-274-756- C-88
WB2MFX 471,040-230-683- C-84
K2LWR 206,400-160-430- C-67
W2QWS 197,334-171-386- C-60
WA2WVL 140,118-121-386- C-60
WA2UJM 125,934-139-302- B-75
K2IML 122,411-167-250- C-28
W2TQR 105,616-112-315- C-30
W2SSC 103,152-112-307- C-33
W2PDB 41,400- 92-150- C-27
WA2CYQ 41,208- 68-202- B-24
W2FXA 38,595- 83-155- C-20
W2FZJ 29,430- 90-109- C-18
WA2EOQ 15,975- 71- 75- B- –
WB2CON 15,732- 57- 92-AB-20
W2SNI 14,151- 53- 89- C-30
W2ILY 7134- 41- 58- C-16
K2INP 1980- 20- 33- C-4
WB2PGM 1794- 23- 26- C-8
K2KNV 969- 17- 19- C-6
K2TQC 702- 13- 18- B-2
WA2OIL 297- 9- 11- B-6
WA2JBV 189- 7- 9- C-8
W2TAB (4 oprs.) 9165- 47- 65- B-13

Western Pennsylvania

W3LOE 562,888-284-662- C-82
W3VEQ 194,880-145-448- C-74
K3KMO 103,194-126-273- B-40

CENTRAL DIVISION

Illinois

W9JCV 261,600-200-436- C- –
K9ZBI 98,736-136-242- B-48
WA9HJM 97,536-126-254- A-63
W9IRH 90,768-122-248- C-32
K9PPX 81,396-114-238- B-33
WA9KQU 70,278-106-221- C-40
K9ZJV 63,828-108-197- C-62
W9WGQ 56,700-100-189- B- –
W9BZW 26 805- 73- 95- C-46
W9MZP 6810- 40- 77- C-21
W9WKU 4290- 26- 55- C- –
K9IDQ 3045- 29- 35- C-15
WA9OIT 855- 15- 19- A-14
W9WIO 714- 14- 17- C- 4
K9BJM (2 oprs.) 3960- 33- 40- C- 7

Indiana

W9AQW 118,272-154-256- B-51
W9ZTD 81,774-118-231- C-25
WA9CYV 32,400- 60-180- C-47
WA9BXO 1584- 22- 24-BC-10

Wisconsin

W9EWC 309,168-226-456- C-60
W9GIL 170,232-164-346- C- –
W9KXK 45,390-89-170- B-32
K9YBC 1560- 20- 26- B- 5
W9YT (K9ZMS, WA9s CBP QMP) 88,920-130-228- C-60
WA9PBW (K9IBI, WA4GBM) 7656- 44- 58- C-14
K9FWF/9 (K9FWF, WA9BZY) 432- 12- 12- 5

DAKOTA DIVISION

Minnesota

WAØKDI 46,926- 99-158- B-49
W3IJM 15,930- 59- 90- A-29
WAØHWZ 6000- 40- 50-AB-20
WAØKEQ 3807- 27- 47- B-11

W0IVZ (W0s 1SJ IVZ YDX)
56,430-110-171- C-86

North Dakota

W0RRW	22,572- 66-114-	C-20
W0CAQ	14,952- 56- 89-	B-14
WA0GQI	1320- 20- 22-	A- 6

South Dakota

K0CER	37,191- 77-161-	C-20
WA0CPX	8370- 45- 62-	A-26

DELTA DIVISION

Arkansas

W5QKZ	5394- 31- 58-	- 6
W5RIT	36- 3- 4-	B- 4

Louisiana

W5AJY	186,069-169-367-	C-50
W5KC	158,256-157-336-BC	-50
W5ODH	83,634-106-263-	C-58
WA5GLC	31,200- 80-130-	B-33
W5LXX	21,507- 67-110-	A-24
WA5EAM	11,808- 48- 82-	B-12

Mississippi

K5MDX	84,546-122-231-AB	-26
W5OER	25,461- 69-123-	-

Tennessee

WA4LSK	20,412- 54-126-	C-35

GREAT LAKES DIVISION

Kentucky

W4BCV	500,181-253-659-	C-80
K4RZK	55,212- 86-214-	C-36
W4NWT	1095- 35- 49-	B- -
WA4ZIR	12- 2- 2-	B- 1

Michigan

W8TWA/8	166,815-165-337-	C-84
W8DGP	140,760-170-276-	C-41
W8RXY	90,243-111-271-	C-42
K8OVK	87,264-108-270-	C-51
W8WT	70,596-106-222-	C-46
WA8RSL	7304- 44- 56-	C-16
WA8CZH	900- 15- 20-	A- 2
W8NGO (W8s CLR NGO ONA)	503,388-237-708-	B-90
K8TIG (6 oprs.)	194,910-178-365-AB	-65
WA8GUF (4 oprs.)	113,850-138-276-AC	-86
WA8PMI (WA8s PJZ PMI)	2450- 25- 33-	A-24

Ohio

W8FYR	156,894-158-331-	C-56
K8AXG	129,630-149-290-	B-51
K8YRN	129,360-154-280-	C-47
WA8HXR	104,118-134-259-	B-55
W8LXU	98,640-137-240-	A-50
W8WC	50,925- 97-175-	C-38
W8WUO	71,595-111-215-	C-36
WA8MCR	67,980-103-220-	A-23
W8ECA	51,030- 81-210-	A-42
WA8MQP	17,124- 84-187-	B-35
WA8NAZ	35,532- 84-141-	B-21
WA8LEO	32,175- 75-143-	A-27
W8BF	26,220- 76-115-	C-14
W8CFG	23,004- 71-108-AB	-22
W8KYY	20,178- 59-114-	B-22
W8IJZ	18,762- 53-118-	C-33
K8TBQ	18,126- 53-114-	B-42
WA8KPO	16,068- 52-103-	C-20
W8NPF	15,930- 59- 90-	C-25
WA8DNT	11,439- 41- 93-	A-13
K8BSM	11,169- 51- 75-	A-16
WA8HAX	10,374- 38- 91-	A-19
W8YGR	10,140- 52- 65-	B- 8
K8DWQ	11,094- 43- 86-	C-22
W8IBX	7560- 40- 63-	A-11
W8CHX	7056- 42- 56-	C-16
WA8FCH	6480- 40- 54-	A- 9
W8ZJM	5880- 40- 49-	A- 5
W8DWP	3276- 26- 42-	A-21
WA8ETX	624- 13- 16-	A- -
W8AJW	27- 3- 3-	A- -
K8PYD	12- 2- 2-	C- 1
K8PXD	3- 1- 1-	C- 1
W8EDU (4 oprs.)	44,856- 89-169-	C-46

HUDSON DIVISION

Eastern New York

K2OIX	28,677- 79-121-	B-14

W4BRB, one of the low-power champs with over 300-K c.w. in Eastern Florida. Gene's maximum input was 120 watts using a 32V-1, plus a modified AT-1 for 160 and a 75A-2 to supplement a superlative pair of ears. He says these were his "finest hours."

K2AJA	756- 14- 18-AC	- 2
W2VIR	624- 13- 16-	C- -
W2SKE/2 (K2UYG, W2s IWC SKE)	384,336-204-628-	C-54
WA2OJD (WA2s OJD TIF UKS)	156,000-160-325-	B-49

N.Y.C.-L.I.

WB2MDH	187,461-159-392-	C-48
W2WZ	181,440-160-378-	C-53
W2EXH	180,624-106-568-	C- -
W2GKZ	178,284-166-358-	C- -
K2DGT	148,248-142-348-	C-65
WB2FON	142,128-144-329-	C-60
K2CHQ	127,296-144-296-	B-50
W2FSK	46,440- 86-180-	C-30
WB2CKS	41,580-110-126-	C-17
W2KJR	11,168- 83-166-	C-20
WB2RIJ	24,723- 67-123-	A-24
K2QOU	19,620- 60-109-	B-26
W2AZS	11,952- 48- 83-	C-21
WA2UWA	11,040- 46- 80-	B-10
W2PCJ	4992- 32- 52-	C- 7
W2AYJ	3366- 33- 34-	C- 3
WA2EFN	3132- 29- 36-	C- 3
WB2FOV	2880- 30- 32-	C- 4
WB2FAJ	816- 16- 17-	B- 4
WB2MJD	360- 10- 12-	A- 3
WA2FQG (WA2FQG, WB2CKO)	71,280- 99-240-	B-30
WA2LQO (K1YRB K2s IYK UAT)	2850- 25- 38-	C-10

Northern New Jersey

K2HLB (W2VCZ, opr.)	317,781-201-527-	C-36
W2FFQ	91,410-120-254-	B-60
W2JSX	66,435-103-215-	B-24
W2AGM	48,576- 88-184-	C-40
W2IUV	35,520- 80-148-	A-23
WB2KQC	6688- 38- 59-	A- -
WB2OHK	6549- 37- 59-	C- 7
WB2VFT	6156- 36- 57-	A-24
WB2QGB	4557- 31- 49-	C- 7
W2MNW	855- 15- 19-	A-20
W2HL	756- 14- 18-	C- 2

MIDWEST DIVISION

Iowa

WØLBS	188,046-186-337-	C-60
WØIYH	72,885-113-215-	C-53
WØFDL	71,955-117-205-	C-48
KØFLJ	12,100- 55- 74-	A-18
WAØFWN	4350- 29- 50-	A- -
WAØIRP	3219- 29- 37-	B-23
WAØKRL	1482- 19- 26-	A- 9
WØKER	1254- 19- 22-	B- 6
WAØHXW (4 oprs.)	28,440- 79-120-	C-21
WØDSP (WØDSP, WAØIJS)	17,940- 65- 92-	C-16

Kansas

KØBHM	24,276- 68-119-	C-33
WØYUQ	16,008- 58- 92-	B-19

Missouri

WØCU	208,653-157-443-	C- -
WØLBB	85,278-122-233-	C-56
WØGNX	41,571- 93-149-	B-47
KØIFL	7881- 37- 71-	A- 8
WAØAJV	6360- 40- 53-	A-10
KØVTP	3534- 31- 38-	A- 9
KØJPJ	243- 7- 9-	C- 4
KØJPL	243- 9- 9-	B- 2
WAØKXZ (4 oprs.)	122,925-149-275-	C-96

Nebraska

KØSCM	77,910-106-245-	C-53
WAØMOB	30,240- 80-127-	C-28
WØIZR	2376- 24- 33-	B-24
WAØHGY	1449- 21- 23-	B-11

NEW ENGLAND DIVISION

Connecticut

W1BIH	162,498-159-341-	C-28
W1BGD*	84,750-125-226-	B-60
WA1DJG	5100- 34- 51-	A-24
WA1EJB	2604- 28- 31-	C-12
W1JMY*	144- 6- 8-	B- -
W1AW (4 oprs.)	144,102-146-329-	C-88
WA1APY (WA1s AHQ APY)	20,679- 61-113-	C-27

Eastern Massachusetts

W1JYH	509,010-235-722-	C-65
K1HVV	361,884-212-569-	C- -
K1SCQ	68,400- 80-285-	C-45
W1FJJ	96,744-139-232-	C-30
WA1CTN	44,436- 92-161-	C-28
W1EJE	34,272- 68-168-	A-17
WA1EOX	12,096- 36-112-	A-30
W1TKG	7140- 35- 68-	A-14
W1BVP	5439- 37- 49-	A-26
W1PLJ	3750- 25- 50-	B-14
K1TQW	3612- 28- 43-	C- 8
W1MO	2938- 26- 38-	B- -

Maine

K1RQE	279,840-176-530-	C-53
W7UXP/1	137,013-109-419-	C-38
W1FDL	11,055- 55- 71-	B- -

New Hampshire

K1ORT	96,513-104-310-	B-33
K1NBN	71,820-114-210-	B- -
K1CTQ (WA6OJM, opr.)	49,128- 92-178-	B-25

Rhode Island

W1YRC	86,760-120-241-	C-25
K1USJ	82,026- 98-282-	C-42
W1GOG	10,836- 43- 84-	B-11
W1AWE	9840- 41- 80-	B-16
K2KMF/1	1035- 15- 23-	A- 3

Western Massachusetts

W1RF	163,898-161-348-	C-40
W1FAB	45,360- 90-168-AC	-46

NORTHWESTERN DIVISION

Alaska

KL7FMM	7140- 20-119-	B-13
KL7EFT (4 oprs.)	26,334- 57-154-	C-21

Montana

W7RLL	27,900- 50-186-	C-23

Oregon

W7RVM	9720- 40- 81-	B-20
WA7ABW	7980- 38- 70-	C-10
K7STK	5487- 31- 59-	C- 8
W7DLR	5481- 29- 63-	C-12
WA7CGR	152- 4- 13-	A- 4
W7BTH	75- 5- 5-	B- 1

Washington

K7UDV/7	243,036-172-471-	C-68
K7VAL	104,664- 98-356-	C-54
K7QWI	91,887-109-281-	C-65
W7MX	10,449- 43- 81-	C-21
W7MH	6324- 34- 62-	A-21
K7YDZ	3525- 25- 47-	B-24

PACIFIC DIVISION

East Bay

W6LDD	68,526- 94-243-	C-32
W6PQW	44,943- 71-211-	B- -
WA6UUS	12,282- 58-243-	C-35
W6BSY	38,376- 82-156-	C-25
WA6HAE (W6RGG, WA6HAE)	124,488-133-312-	B-06

Hawaii

KH6IJ	94,860- 85-372-	C-36
KH6FRL	35,750- 55-218-	C-55
WØPAN/KH6	31,506- 59-178-	A-36
KH6FQB	21,996- 47-156-	B- -

Nevada

W7KOI	5032- 34- 50-	C-22

Sacramento Valley

W6SIA	53,568- 96-186-	B-36
W6GVM	51,975- 77-225-	C- -
WA6JDT	792- 11- 24-	A-12
WB6MZX (WB2OVB, WB6MZX)	4773- 37- 43-	B-15

San Francisco

W6WB	54,684- 93-196-	C- -
W6ERS	10,535- 43- 82-	C-40
K6IXS	2304- 16- 48-	C- 9
WA6AUD	2016- 21- 32-	B-11

San Joaquin Valley

W6MMH	561- 11- 17-	B-14

Santa Clara Valley

K6ERV	304,395-195-521-	C-70
W6WX	264,060-180-489-	C-74
W6VUW	90,843-107-283-	C-41
W6CUF	28,992- 64-151-	C-17
W6FYM	18,939- 59-107-	C-24
K6UXV	10,395- 45- 77-	B-27
W6LV	5358- 38- 47-	B-17
K6ALH	6300- 35- 60-	C-40
W6ZKM	5952- 32- 62-	C-20
W6VVR	5168- 34- 51-	C-25
K6HOR	1182- 34- 41-	B-10
K6LY (WA5FRL, opr.)	2057- 17- 41-	C- 4
W6HOC	1620- 18- 30-	C- 3
W6QBY	1302- 14- 31-	C- 4
K6OZV	336- 8- 14-	C- -
W6JKJ	45- 3- 5-	C- -
K6OHJ (W6BHY, K6OHJ)	159,192-212-722-	C-94
W6UMI, (WA6SII, W6UMI)	210,330-171-410-	C- -

ROANOKE DIVISION

North Carolina

WA4TLI	88,128-108-272-	C-30
K4KZZ	46,800-100-156-	A-36
WA4KWC	120- 5- 8-	A- 3

South Carolina

K4MSK	261,855-165-529-	C-55
K4YYL	247,923-163-507-	C-51
K4WJT	156,021-131-397-	B-50

Virginia

W4BVV 869,799-291-997-AC-79
W4BFA (WA4RPK, opr.) 436,821-217-673- C-66
K4AQQ 373,032-198-628- C-65
W4NJF 267,273-171-521-BC-58
K4CG (K3WUW, opr.) 72,594-109-222- C-37
W4JVU 15,675- 55- 95-AC-26
W4DKU 8250- 50- 55-AC- 8
W4GF 8184- 44- 63-AB-10
W4WBC 5772- 37- 52- C- 8
W4ZM 3645- 27- 45- B- 3
K4PRT 3078- 27- 38- B- 6
W4WSF 396- 11- 12- B- 3
W4KFC (W1FRR, W4KFC) 7560- 45- 56- A- 5

West Virginia

WA8DAU 113,664-128-296- B-52
WA8AIN 48,786- 94-173- B-40
K8UZX 1638- 21- 26- C- 3
W4WSF/8 684- 12- 19- B- 3
WA8QYK 3- 1- 1- A- -

ROCKY MOUNTAIN DIVISION

Colorado

W0GAA 85,935-105-273-AC-57
W0YDM (W0YDM, WA0s 1MX IOR) 168,276-148-379- C-77

New Mexico

K5STL 72,468-122-198- B-50
W8BZY/5 4128- 32- 43- C- -
W5EQT/5 (K5CLV, W5EQT) 111,580-140-267- B-78

Utah

W7NPU 55,803- 89-209- C-56
W7LEB 14,700- 50- 98- B-12

Wyoming

W7PSO 1056- 16- 22- C- 3

SOUTHEASTERN DIVISION

Alabama

WA4GCS 253,602-193-438- C-84
WA4WAO 99,665-155-215- B-33
W4CYC 44,745- 95-157- C-22
W4HA 31,257- 69-151- B-20
W4LHW 22,509- 61-123- C-21
K4KJD 297- 9- 11- C- 3
WA4GNK 192- 8- 8- A- 2

Eastern Florida

WA4PXP 661,380-292-755- C-81
W4FRO 159,768-168-317- C-55
W4DRK 66,240-115-192- C-51
WA4IIO 13,500- 45-100- C-23
W4EEO 630- 14- 15- C-10
K4RQE 108- 6- 6- A- 1
WA4NGO (5 oprs.) 450,720-240-626- C-48

Georgia

WA4ARV 252,324-172-489- B-75-
K4EZ 65,712-111-199- B- -
WA4TWQ 21,708- 67-108- B- 5

Western Florida

K4ZJF 245,520-186-440- C--6

SOUTHWESTERN DIVISION

Arizona

W7AYY 27,522- 66-139- C16
W7ATV 8364- 41- 68- C-18
W7ENA 216- 8- 9- A- 2

Los Angeles

W6ITA 576,675-233-825- C-82
W6LDA 148,212-138-358- C-47
K6KA 100,233-111-316- C-80
W6NJU 48,804- 98-168- C-48
W6PQT 20,178- 57-121- C-16
W6ANB 13,677- 47- 97- C-21
W6RCV 8436- 37- 76- B-17
WB6LCS 5610- 34- 55- B-24
WB6URS 5355- 35- 51- A-12
K6JIC 4446- 26- 57- C- 7
W6NKR 2160- 20- 36- C- 6

Orange

W6LCX 123,816-134-308- C-64
W6YMV 90,420-110-274- C-80
W6RKP 88,822- 89-334- - -
WB6OJU 20,340- 60-121- C-96

San Diego

WB6GGI 1275- 12- 25- B- 9

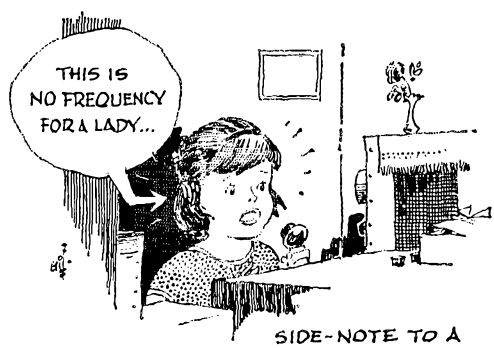
Santa Barbara

W6ORX/6 90,384-112-269- C-53
WA6EYP 7720- 40- 63- C-13
WB6LIV 4020- 30- 46- B-12

WEST GULF DIVISION

Northern Texas

W5KTR 265,359-197-450- C-70
W5OGS 140,343-163-287- B-65
WA5ALB 109,032-132-276- C-33
WA5NVY 76,560-116-220- C-43
W5LUJ 63,690-110-193- C- -



SIDE-NOTE TO A YL, OVERHEARD IN A 10-METER PILE-UP

K5QMC 58,656-104-188- B-70
W5PTG 40,128- 88-152- C-32
WA5JSI 34,935- 85-137- B- -
W5IPH 27,594- 73-126- C-16
K5BXG/5 3861- 33- 39- B- 8
W5MSG 12- 2- 2- A- 2
WA5AVL (WA5s AUS AVL) 196,416-176-372- C-96

Oklahoma

WA5LOB 41,612-101-138- A-34
WA5HTS 35,757- 87-137- B-30
W5EHR 19,998- 66-101- A-24

Southern Texas

K5JZY 230,958-182-423-AC-68
W5LZZ 75,516-116-217- B-42
W5LJT 20,928- 64-109- C-14
W5BRR 18,297- 57-107- C-10
WA5IPM 4860- 30- 54- A-11

W5RO 3906- 31- 42- B- -
W5EDX 588- 14- 14- B- -

CANADIAN DIVISION

Maritime

VE1PL 309,206-206-501- C-65
VE1AFY 173,808-136-426- C-41
VE1NV 90,889- 97-313- C-55

Quebec

VE2ANK 211,680-160-441- C-50
VE2WA 120,960-140-288- B- -
VE2JD 31,062- 62-167- C- -
VE2CK 5655- 29- 65- A-10
VE2BAW (5 oprs.) 78,498- 98-267- B-73

Ontario

VE3UX 218,772-177-412- C-56
VE3ES 87,670-110-271- C-39
VE3BHS 63,012- 89-236- A-26
VE3DAM 32,550- 70-155- A-33
VE3BS 25,728- 64-136- A-17
VE3EVZ 10,707- 43- 83- B-11
VE3DEU 2484- 23- 36- A-11
VE3BSJ 585- 13- 15- A- -
VE3AEV 60- 4- 5- A- 3

Manitoba

VE4SD 50,778- 91-186- C-54

Saskatchewan

VE5DP 18,060- 60-101- A-38
VE5GF 2964- 26- 38- B-12

Alberta

VE6MF 63,609- 91-233- C-42
VE6BR 59,940- 90-222- C-45
VE6IN 11,745- 45- 87- C- -
VE6AKO 10,578- 41- 86- B-30
VE6GN 8820- 42- 70- B-12
VE6GX (8 oprs.) 116,466-118-329- C-40

British Columbia

VE7PV 221,850-150-493- B- -
VE7AAA 18,843- 81-201- C-48
VE7BDJ 648- 12- 18- B- 3

Yukon-N.W.T.

VE8BB 26,880- 64-140- B-44

AFRICA

Angola

CR6HG 52,650-39- 450- B- -
CR6HF 27- 3- 3- B- 7

Mozambique

CR7FR 75- 5- 5- A- -

Ethiopia

ET3AC 96,390-35- 918- A- -

Seychelles

VQ9EF 195- 5- 13- A- -

Swaziland

ZD5R 38,892-28-463- A- -

South Africa

ZS6FN 24,651-33- 249- A- 8
ZS6NM 11,880-12- 330- A- -

Libya

5A3TX 15,980-20- 267- A-20

Nigeria

5N2AAF 17,850-25- 238- A- -

Sierra Leone

9L1JW 39,798-18- 737- A-20
9L1HX 26,901-21- 427- B- -

Republic of the Congo

9Q5FV 35,760-20- 597- A-42

ASIA

Iran

EP3AM 44,544-32- 464- B-36

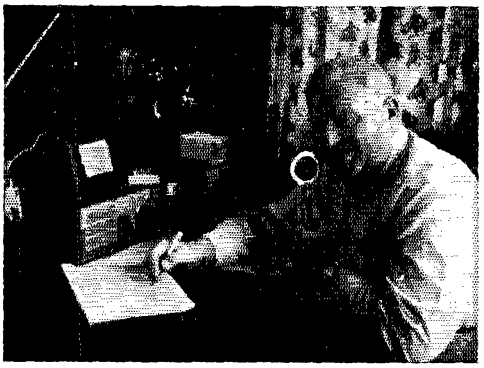
TOP TEN

Single-Operator DX

C. W.		*Phone*	
CO2BO	978,924	KP4CKU	790,395
HI8XAL	972,290	FS7RT	642,300
HK3RQ	714,680	HK4KL	560,664
YV1DP	629,415	FG7XL	542,724
KZ5FX	682,560	HK3RQ	478,000
PY2SO	620,475	HC1TH	420,003
HKØAI	609,606	PY2BJO	400,554
VK2EO	606,771	HC1RT	395,541
HP1TE	569,322	IUBAF	362,691
7G1A	483,114	VP5AR	362,043

In an excellent "first-try" in an ARRL contest, 15-year-old **G3UML** took top phone honors for England. Laurie scored 137,664 points and almost 1000 contacts. He found 75 particularly good although there appeared to be a scarcity of W/VE stations on that band.

VE1PL, top Canadian phone with over 300-K, feels the test is about the only time to say hello to friends each year. Sort of like sending Christmas cards!



OT **W2IUV** has been a regular in DX contests for most of his 42 years of hamming. Chas. got a particular thrill out of that Sunday opening on 10-phone.

Korea

HM5BF	16,254-21-	258-	A-	–
HL9US (6 oprs.)	48,096-32-501-		A-	–

Japan

JA1IBX	102,256-44-	777-	A-	42
KA7AB	101,205-39-	865-	AB-	28
JA8AA	35,872-19-	630-	C-	–
JA8CKC	35,700-34-	351-	A-	26
JA1CG	26,610-30-	301-	A-	25
JA2BAY	6501-11-	198-	B-	24
JA1RJU	5616-13-	144-	A-	–
JA1DDZ	4650-10-	155-	A-	–
JA7DY	4257-11-	129-	A-	–
JAØBLU	3456- 9-	128-	A-	–
JA5BJM	1260- 9-	47-	A-	14
JA8AIP	864- 9-	32-	A-	11
JA8GR	810- 5-	54-	A-	5
JA1TTE	405- 9-	15-	A-	–
JA1PAH	322- 7-	16-	A-	–
JA1KPA	180- 5-	12-	A-	3

Lebanon

OD5BZ	69,597-33-	703-	A-	25

Asiatic Russian S.F.S.R.

UAØKKB	15,390-19-	270-	B-	–

Hong Kong

VS6AJ (OZ7SM, opr.)	12- 4-	1-	A-	–

Israel

4X4FV	3564-11-	108-	A-	–

EUROPE

Portugal

CT1IW	14,904-23-316-		ABC-	13
CT1SQ	2244-17-	44-	A-	2
CT1BB	2160- 9-	80-	B-	–

Germany

DJ6QT	284,160-60-1580-		B-	66
DL1LK	192,132-54-1186-		B-	–
DJ5BV	176,073-57-1037-		B-	60
DL4LG	126,621-33-1279-		B-	28
DJ6LDA	83,196-36-	772-	B-	38
DJ5HN	50,406-31-	542-	A-	–
DL4NS	43,065-29-	496-	B-	46
DL6VP	42,050-25-	562-	B-	26
DJ1SX	28,804-19-	522-	B-	28
DJ8YQ	5967-17-	117-	A-	15
DL9HC	5472-16-	114-	B-	14
DL1TA	3213- 7-	153-	AB-	9
DL6JJ	2196-12-	61-	B-	–
DJ9MH	1464- 8-	63-	A-	–
DM3XED	1950-10-	65-	A-	–
DL3RA	1344-14-	32-	A-	–

Spain

EA4GZ	142,545-43-1105-		A-	–
EA2EL	10,992-16-	229-	B-	–
EA4DO (2 oprs.)	173,826-54-1075-		A-	84

France

F3KW	65,205-35-	621-	A-	–
F2SY	35,853-19-	629-	A-	–

England

G3UML	137,664-48-	956-	A-	51
G2QT	88,215-45-	609-	A-	–
GB2DX (4 oprs.)	305,816-56-1823-		B-	88
G3SVH (G3s NLY PLD SVH)	210,936-47-1496-		B-	42

Wales

GW3NWV (GW3s DIX NWV)	192,780-54-1190-		C-	64

Hungary

HA5KBB (3 oprs.)	11,220-17-	220-	C-	–

Switzerland

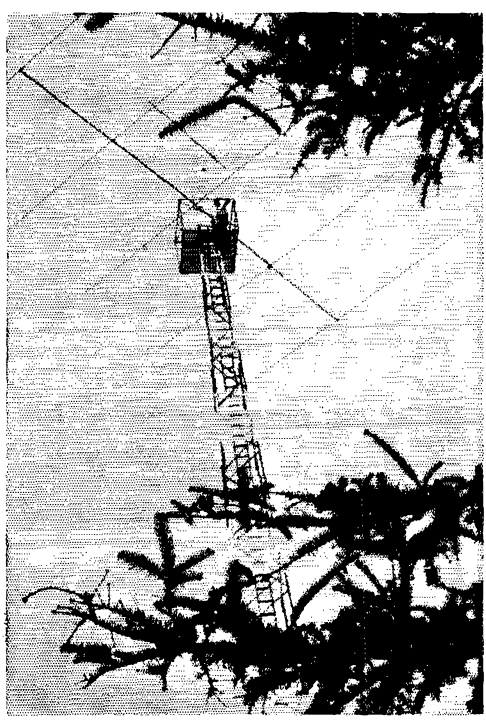
HB9DX	2760-10-	92-	B-	–
HB9RX (HB9s ADJ RX)	882- 9-	33-	B-	3

Italy

I1BAF	362,691-57-2121-		B-	44
I1LAO	28,928-32-	303-	A-	–
I1KE	1800- 8-	75-	AB-	–
IØFGM (4 oprs.)	241,733-53-1521-		B-	52
I1CAQ (I1s CAQ CZW)	55,180-20-	923-	B-	22
I1CGE (I1s CGE FLD)	44,190-30-	495-	B-	16

Norway

LA9HC	26,892-27-	332-	A-	35



As he promised after the last test, **I1BAF** had a new antenna ready for this one. Mino used a 5-element wide-spaced array atop a home-built 100-foot tower. On the other bands: dipoles 80-foot up for 40 and 75, and 3 elements 60-foot up for 15 meters. Final results an outstanding two-thousand plus contacts.

LA1H (LA9OI opr.)	9456-16-	199-	B-	16
LA5HE	4752-18-	88-	AB-	–
LA4ZB	1806-14-	43-	A-	–
LA4LG	1584-11-	48-	A-	2
LA1K (LA 1EE 3JJ)	29,568-28-	352-	AB-	92

Austria

OE2EGL	165,120-43-1280-		A-	–

Finland

OH2TI (OH5SE opr.)	82,068-28-	977-	B-	–
OH5SM	32,475-25-	449-	B-	–
OH2WI	31,475-25-	420-	B-	–
OH2CP	1230-10-	141-	B-	–
OH8OS	3068-13-	79-	A-	5
OH2AM (5 oprs.)	157,686-41-1282-		B-	–

Aland Islands

OHØNI	1215-15-	27-	B-	–
OHØNJ	120- 4-	10-	A-	–

Czechoslovakia

OK1MP	117,219-41-	953-	B-	43
OK1AHZ	2340-13-	60-	A-	–

Belgium

ON8UA	17,651-19-	310-	A-	22
ON4ZU	5976-12-	166-	B-	–

Denmark

OZ9SL	206,100-50-1374-		A-	32
OZ3SK	70,383-29-	809-	A-	–
OZ3Y	34,254-33-	346-	A-	20
OZ3KE	24,702-23-	358-	A-	18
OZ7DX	2522-13-	65-	A-	8
OZ7HM	1323- 9-	49-	A-	–
OZ1RH	336- 7-	16-	B-	–
OZ7BG	165- 5-	11-	A-	–
OZ3FI	3- 1-	1-	A-	–

Netherlands

PAØEEM	68,727-31-	739-	A-	–
PAØDEC	27,950-26-	459-	A-	18
PAØLOU	17,472-26-	227-	B-	10
PAØXPQ	8778-22-	133-	A-	15

Sweden

SM7CRW	68,758-31-	741-	B-	–
SL6BH (SM7CUV opr.)	38,970-30-	433-	A-	–
SM5WT	6345-15-	141-	B-	–
SM8ALJ	81- 3-	9-	B-	–
SM6DLL (4 oprs.)	197,280-48-1370-		B-	–

Poland

SP7HX	4545-15-	101-	B-	–

Greece

SV1BL	8532-12-	237-	A-	7

Dodecanese

SVØWF	4004-11-	122-	C-	–

European Russian S.F.S.R.

UA1IG	5130-15-	114-	B-	–

UW3BJ 2170-10- 77- B- 4
UA3KAG 483- 7- 23- B- -
UA3KAO 27- 3- 3- B- -

Kaliningradsk

UA2KBD (3 oprs.) 31,521-19- 553- A- -

Ukraine

UB5WJ 20,880-20- 351- A-15
UB5FG 546- 7- 26- A- -
UB5ARTEK (2 oprs.) 306- 6- 17- B- -

White Russian S.F.S.R.

UC2BF 714- 7- 34- A- -

Lithuania

UP2OK 33,534-23- 486- B- -

Yugoslavia

YU3BC (YU3s BC LB LC) 108,231-43- 839- B-60

Cyprus

ZC4RM 6864-16- 144- A-24

I.T.U., Geneva

4U1ITU (4 oprs.) 34,350-25- 469- C-22

NORTH AMERICA

Cuba

CO2FA 32,487-39- 279- A- -
CO8RA (2 oprs.) 84,456-51- 552- A-33

Guadeloupe

FG7XL 542,724-71-2551-AC-60

Saint Martin

FS7RT 642,300-100-2141- A- -

Dominican Republic

HI8XAL 340,470-65-1746-BC-23

Panama

HP1JC 332,280-78-1420-AB-37

Guantanamo Bay

WA4FIJ/KG4 14,124-22- 214- A- 9

Puerto Rico

KP4CKU 790,395-79-3335- B- -
WA4MFS/KP4 88,725-35- 845- A-39
KP4BFF (K3SBF, WA5BGW, KØKYE) 399,924-69-1932-AB-52

Virgin Islands

KV4CF 357,222-58-2053- A-35

Canal Zone

KZ5FX 65,415-49- 450-BC-16

Greenland

OX3JV 118,266-46- 857- B-40

HM5BF (shown with his XYL HM5BG) submitted winning logs for both test modes. Kim runs 100 watts input to a homebrew 811 transmitter and uses quads on 20 and 15, verticals on the lower bands.

Guatemala

TG8CJ 244,776-56-1457- A-44

Costa Rica

TI2AAC (TI2s AAC KR) 168,012-52-1077- B- -

Antigua

VP2AC 35,397-23- 521- A-15

Anguilla

VP2KY (W0s IIC QUU) 152,703-57- 893- A-44

St. Kitts, Nevis

VP2KR 67,056-44- 509- A-29

Turks & Caicos Islands

VP5AR 362,043-69-1747- A-40
VP5RS 10,080-20- 168- A- -

Mexico

XE2JZ 182,195- 65-936- A-29

Nicaragua

YN3KM 102,771-57- 601- B-24
YN1TP 52,632-34- 516- B-40
YN3FP 48,060-45- 356- C- -

Cayman Islands

ZF1BP (4 oprs.) 494,361-78-2115- A-38

Jamaica

6Y5OF 206,115-65-1057- A-39
6Y5BS 134,520-57- 791- A-24

OCEANIA

Guam

KG6APD 36,738-26- 471- C-16

Johnston Island

KJ6DA (WA1FDW, K4DRD, KØOAZ) 46,740-41- 380- B-19

Midway Island

WAØGFS/KM6 3318-14- 79- C- 4

Australia

VK2APK 59,394-38- 521- A- -
VK3ATN 49,248-48- 342- A-10
VK4LT 33,048-36- 306- A- -
VK2WD 27,693-51- 181- A-17
VK3ARX 15,912-17- 312- A-13
VK3ZR 9135-29- 105- A- -
VK3XB 1485-11- 45- A- -
VK3AWI/P 414- 6- 23- A- -
VK3KS 120- 5- 8- A- -
VK2FU (2 oprs.) 23,307-17- 457- A-29
VK3AAH/P (VK2s AAH SG 19,608-19- 344- A- -

Papua

VK9DJ 8262-17- 162- A- -

Gilbert Islands

VR1Z 71,400-34- 700- A- -

New Zealand

ZL1HW 56,256-32- 586- A- -
ZL1AGO 7236-12- 201- A- -
ZL4BO 4872-14- 116- A- -

SOUTH AMERICA

Chile

CE6EZ 115,986-39- 993- C-46
CE8CG 47,040-35- 448- B-33
CE8CM 23,670-30- 263- B- 7

Ecuador

HC1TH 420,003-69-2029- B-40
HC1RT 395,541-71-1857- C-31

Colombia

HK4KL 560,664-78-2396- B- -
HK3RQ 478,000-73-2186-ABC-35
HK3AYA 7425-15- 165- A- -

Peru

OA1W 208,824-66-1056- C-26
OA7AX 27,180-30- 302-BC-14

Netherlands Antilles

PJ2CR 326,000-68-1600- A- -
PJ3CD 239,355-45-1773- A- -

Brazil

PY2BJO 400,554-77-1734- B- -
PY3BAD 68,770-46- 507-AC-17
PY2BGO 720-10- 24- C- 1

Venezuela

YV1IK/5 132,328-56- 788- B- -

Paraguay

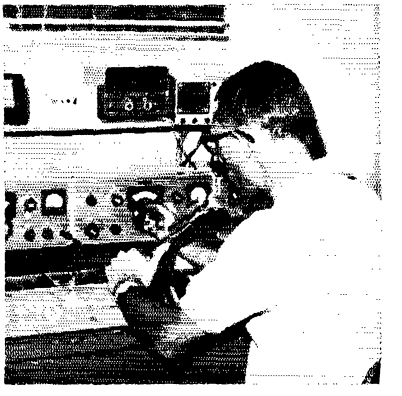
ZP9AY 54,702-27- 678- A-23

Trinidad

9Y4VU 231- 7- 11- A- -

Check Logs: (*C.W.*) W1FDL W1JKB WB2BTV W2EGI WB2ODI W2PXL W3BVO W3NNL K4BD W4JUK W6DQZ WB6IUH W6PIZ W7LNG KL7PI W8EGR W8FEM W8FLX W9PWM KØHIL KØIIR VE4MF VO2AI CX2FD DJ2RE DM2CEL DM2KYO DM4BO EI9F F3TZ HK3ADO LA4LG OH1SH OH3YH OH0NI OK1ALG OK1ALZ OK1DK OK1US OK2BZR OK2KLI OK2KOS OK3DEG OK3KAS OK3XW OZ4H PY2BKO SM5BXT SM5DFM SP2IU SP6AZY SP9ZW/6 UA1ZM/MM UC2AR XE1KD YO8CI ZF3JJ ZL1HY 9V1MT; (*PHONE*) W1DEP WB2QKS W4DS W4HOS WA4TXD W4LYJ W6EUF WB6IUH W7LNG W8EGR W8PCS W9MG W9UAZ KØHIL KØIIR VO1AW VO2AI VE2DYB VE3EWE CP8AB DL1RO DJ2RE KP4AXM OH1SH OH2AF OK1FV OK3KGI OZ3FI SM5BFJ SM5BUT SM5CAK SM5IC SM5MC SM6AEK. QST

On the left, **6Y5OF**, just newly licensed and top Jamaica phone with over 200-K. On the right, **KP4CKU** (now W9JOE) one of the big test scores almost 800-K phone with 3335 vocal two-ways.



Armed Forces Day—1966

Communication Test Results

THE annual Armed Forces Day communication tests conducted by the Departments of the Army, Navy and Air Force on 21 May 1966, successfully demonstrated to the world the close partnership and mutual respect enjoyed between U. S. radio amateurs and the U. S. Department of Defense.

This year several military radio stations participated in the communication tests which included military-to-amateur crossband operations and receiving contests for both c.w. and RTTY modes of operation.

Crossband Results

Military radio stations WAR, NSS, NPG and AIR had a combined total of 7008 QSOs during the twelve hours and forty-five minutes devoted to the military-to-amateur crossband portion of the communication tests. Commemorative QSL cards have been mailed to all contacts that could be identified in the Spring 1966 issue of the *Callbook*. Any amateur who has not received a QSL card confirming his contact should address a request for clarification to the Armed Forces Day Contest, Room 5A522, The Pentagon, Washington, D. C. 20315. This request must include the amateur's call sign, the station worked, time of contact and the frequency utilized by the military station.

C.W. Receiving Contest Results

There were 482 perfect entries for the 25-w.p.m. c.w. broadcast message originated by the Secretary of Defense. The complete text of the 25-word-per minute International Morse Code message is printed below and followed by the call signs or names of individuals who received a Certificate of Merit for submitting a perfect contest entry:

THE 17TH ANNUAL OBSERVANCE OF ARMED FORCES DAY AFFORDS ME THE OPPORTUNITY TO EXTEND MY BEST WISHES AND PERSONAL THANKS TO ALL AMATEUR RADIO OPERATORS PD WITHOUT YOUR HELP AND DEDICATION DASH YOUR TRAINING AND PREPARATION DASH THE RELAY OF MESSAGES ON MARS AND AMATEUR CIRCUITS TO AND FROM OUR MILITARY FORCES THROUGHOUT THE WORLD AND ESPECIALLY IN VIET NAM WOULD NOT BE POSSIBLE PD THE THOUSANDS OF MESSAGES HANDLED EACH MONTH BY THE MILITARY AFFILIATE RADIO SYSTEM AND AMATEUR RADIO OPERATORS ACROSS THE COUNTRY CONTRIBUTES IMMEASURABLY TO THE MORALE OF OUR MEN OVERSEAS AND BRINGS THEM A LITTLE CLOSER TO HOME PD YOUR ACCOMPLISHMENTS IN PERFORMING THIS SERVICE REFLECT CREDIT UPON THE ENTIRE AMATEUR RADIO FRATERNITY SGD ROBERT S MCNAMARA CMM SECRETARY OF DEFENSE."

C.W. Certificate Winners:

K1AAA, W1AIJ, W1BDI, W1BGW, WA1BKQ, WA1DUK, WA1DWE, WA1DYZ, W1ECH, W1EJJ, WA1EWQ, W1GBB, W1HJP, K1KGF, W1LZL, W1MCG, K1NOW, W1OFY, W1OMN, K1PLP, K1QZV, W1RXP, K1RYP, K1TFF, W1TO, W1UPG, W1WPR, K1YSD, W1ZLX, K1ZND, W1ZYO, W2BVE, W2BXW, W2CLQ, WA2CKL, W2DBQ, K2EQP, W2GOR, W2GQN, W2HGY, WA2HLH, WA2HSP, WB2HZY, K2JUA, W2JZG, WA2KIP, W2KLD, WB2LHF, W2LRW, W2LYH, WA2NDC, W2NEP, WA2NGP, W2NVB, W2OE, WA2OQV, WA2OWQ, W2PVY, K2QDG, WB2QZ, W2RJ, W2RN, W2RUK, W2RUZ, WA2SAB, WB2SCK, K2SEN, W2SKX, WB2SLI, K2SSX, WB2SXX, W2TUK, K2UBG, K2UGZ, W2UK, W2URP, WA2UPC, W2VEH, WA2VSQ, WA2VYS, W2YJS, K2YQK, W2ZMK, W2ZUX, WA2ZPR, WA2ZQH, WA3AHK, W3BFF, WA3CGE, K3EAI, W3ECP, WA3EEQ, W3EOV, WA3FKC, WA3G, K3GMA, K3GOH, W3GRB, W3HC, K3HNP, VE3IA, W3JRV, W3JZY, W3KSQ, W3LBC, W3MCG, K3MQE, K3NAS, K3PZU, K3WIK, W3ZLP, W3ZN, K4AO, K4ASU, KP4ATS, W4BBZ, W4BP, A4BWR, W4BXV, W4CCC, KG4CG, WA4CJV, WA4CTD, K4DNZ, DL4DX, W4EFV, WA4EJU, W4FRO, WA4GOC, W4HOS, W4JRA, WA4JWV, K4JXG, W4KIS, W4KVO, WA4LUO, W4LY, W4MHW, W4MKU, K4MXZ, W4NEI, DL4NK, W4NPG, W4NTE, W4NWK, W4NZP, W4OSC, W4OZB, W4PED, WA4PWF, K4QWQ, W4RQB, WA4RPU, W4RXY, W4SCF, WA4UBX, W4UHA, K4URA, W4UUI, WA4UYT, K4UYY, W4VDY, WA4VPO, WA4VYZ, W4WHF, W4WJK, WA4WKL, WA4YDR, K4ZSX, W4ZV, W5AIR, W5AJG, W5AQN, W5ARK, WA5BNK, K5CAT, W5CCF, WA5CZR,

Some of the personnel who manned military radio stations during the Armed Forces Day Communication Tests. Shown (l. to r.) are Sgt. O'Leary, W4DIN, K3IMG, Sp4 Dingle, Sgt. Reasons, W4YNZ, Sgt. Eardley, Sgt. Atterson, K3LMM, W4LWG and (seated) WA4UOY.

W5EGX, W5EJV, DL5EO, W5EWF, W5FBJ, WA5FHM, W5FIW, W5GKV, W5GRT, WA5GVB, DL5HH, W5IDZ, K5JCZ, WA5JMK, W5JPC, W5JWL, WA5KOI, K5LKI, K5MCM, W5NEO, WA5NOM, WA5NUT, K5OKR, WA5PAE, K5PEV, K5QVH, W5RCF, W5RTZ, W5SGA, K5URS, W5UY, W5ZU, W6AAH, W6AAQ, WB6ADY, W6AEE, WA6AEL, W6AJJ, KH6AO, W6ASH, W6AW, W6AWP, KH6AX, W6AXV, K6BCJ, KH6BGW, W6BGX, W6BHG, K6BPI, W6BVB, WA6BYZ, W6CBX, W6CJB, W6CKU, W6CLB, K6DCF, W6DDB, W6DHX, K6DLY, WB6DRY, W6DVD, K6DYX, K6EA, W6EEH, W6ELT, W6ENA, K6EPT, WB6ERT, KH6ETB, W6EY, W6FB, W6FHI, W6FLW, WA6FPM, KH6FX, W6FYM, W6FYW, W6FZC, W6GC, W6GEB, W6GUQ, WB6IAO, W6ID, W6IDY, WA6IGY, K6IMJ, W6IQ, WB6IRJ, W6IZJ, W6JF, W6KF, WB6KGG, WB6KYI, WA6KZI, K6LJ, W6LMC, K6MHW, W6MMG, W6MXO, K6NCG, W6NRK, WB6NXK, W6OJW, WB6OZX, W6PCP, K6PRN, K6PWD, W6PYN, W6QIL, W6QNV, W6QQ, K6QXP, W6RDK, W6RFF, W6RXT, W6SAW, K6SHZ, K6TWE, W6TZK, WA6TZT, WA6VGE, WA6VHL, W6VPC, W6WAW, W6WPF, W6WUU, W6WXY, K6YKG, K6ZYY, W7BAJ, WA7BEV, K7BPR, W7CBB, W7CZY, W7DIE, W7DKB, W7ESV, K7EXT, W7FOS, W7GVG, W7HNA, K7ICV, K7IWD, W7IZE, W7JMH, W7JX, W7KEG, W7KOI, W7KQV, K7KYG, W7LPM, W7MAE, W7MCU, W7MME, W7NGW, W7QUM, W7RBE, W7SMR, W7TCQ, K7UCJ, K7VKR, K7WSW, W7YAQ, W7YKG, K7ZMR, W8BEK, W8BTW, K8COU, WA8CYT, W8DJD, WA8DXS, K8EKG, W8FFK, WA8FTK, W8GMX, K8HKU, W8HSW, W8IJV, W8JBQ, K8KEM, K8KIR, WA8KKD, WA8KPO, WA8LBR, W8LEX, W8NEM, WA8NYC, WA8OBF, WA8OHX, W8OMY, W8QLJ, W8QMI, W8QQK, K8RKE, W8RLR, K8RMY, W8SQU, W8SSL, W8TZO, W8VMP, W8VPC, K8VWN, W8VZ, W8WVL, W8WXM, K9AHH, W9BIN, W9BRY, W9CBE, W9CF, W9CHD, WA9DHI, W9DJX, W9EGR, W9FFD, W9FKH, W9GCX, K9GDF, W9HTO, W9IDO, K9IZD, W9JCK, WA9LAE, WA9NFO, K9OJJ, WN9QDM, W9SUF, W9UA, W9UBA, K9UQN, W9VHD, W9VUD, K9YRL, W9ZEN, K9ZPZ, WØAIH, WØASY, KØBLH, KØBRS, WAØCND, KØEEN, WØFA, WØFDJ, WØFWD, WØGNS, WØGRW, WØGTK, WØJAP, WØJHY, KØJPJ, WØKIK, WØLJO, WØLQK, KØMIDS, KØOAL, KØODF, KØOKQ, WØTDH, WØWHE, KØWMD, WØWWI, WØZGB

AMSTER, Z. M., Jr. ANT2, USN; ARCHER, F. O., Sr. RMC, USN(Ret); ALYSWORTH, R. L.; BABB, J. W., RM1, USN; BEAUPRE II, A. Z., RMC (SS), USN; BELL, J. L., RM2, USN; BEWSON, Ralph E.; BOHNS, R. L., RMC(SS), USN; BROTHERMAN, J. O., RM1, USN; CLIFFORD, J. P., RM1, USNR; COLYAR, Floyd C.; DANIELS, Frank, Jr.; DAVIS, J. F., RMC, USN; FERGUSEN, D. P.; FREEMAN, C. P., RM1, GATES, J. L.; HERSEY, G. G., RM1, USN; HINKEL, J.; HYLEN, Walter M.; KELLY, T. J., Jr., RM2(SS), USN; KNIGHT, W. P., RM2, USN; KORNS, John M.; KULEMIC, Daniel E.; MATHENY, Ralph E.; MAXWELL, James A.; PANNOZZO, Jr., D., RM3, USNR; RAIN, C. F., RM2, USN; ROGERS, R. F., RM2, USN; SENICAL, R. L., RMC(SS), USN; SHERMAN, J. N., Jr. RM1, USN; SHOTWELL, C. M., RM2, USN; SMITH, H. J.; STEFFEN, Albert W.; STEWART, J. E., RMC, USN; SYRIAC, R. R., RM1, USN; TOEWS, Nathan E.; WALSH, John C.; WATERMAN, J. T., RM2, USN; WATKINS, J. D., RM3, USN; WHITE, C. J., Jr.; USNRTC Fort McHenry, Baltimore, Maryland; USS CHARLES R. WARE (DD-865)

RTTY Receiving Contest Results

There were 541 perfect entries for the 60 w.p.m. RTTY broadcast message originated by the Secretary of Defense. The complete text of the 60 word per minute radioteletypewriter message is printed below followed by the call signs or names of the successful participants who received a Certificate of Merit for submitting a perfect contest entry:

"I TAKE THE OPPORTUNITY AFFORDED ME BY THE 17TH ANNUAL OBSERVANCE OF ARMED FORCES DAY TO EXTEND MY PERSONAL THANKS AND BEST WISHES TO ALL AMATEUR RADIO OPERATORS. IT IS WITH

A well-deserved coffee break during the Armed Forces Day Communication Tests. Shown (l. to r.) are W4DIN W3ECP, K4KNV, W4YNZ and J. R. Johnson.

YOUR HELP AND DEDICATION — YOUR PREPARATION AND TRAINING — THAT RELAY OF MORALE MESSAGES ON MARS AND AMATEUR NETWORKS TO AND FROM US MILITARY FORCES THROUGHOUT THE WORLD AND ESPECIALLY IN VIET NAM IS POSSIBLE. AMATEUR RADIO OPERATORS ACROSS THE COUNTRY AND THE MILITARY AFFILIATE RADIO SYSTEM ARE HANDLING THOUSANDS OF MESSAGES EACH MONTH. THIS CONTRIBUTES IMMEASURABLY TO THE MORALE OF THE MEN AND WOMEN IN OUR MILITARY FORCES AND BRINGS THEM A LITTLE CLOSER TO HOME. I CONGRATULATE YOU ON YOUR ACCOMPLISHMENTS IN PERFORMING THIS SERVICE. THE AMATEUR AND MARS OPERATORS INVOLVED IN THIS ACTIVITY REFLECT CREDIT UPON THE ENTIRE AMATEUR RADIO FRATERNITY SGD ROBERT S MCNAMARA, SECRETARY OF DEFENSE"

RTTY Certificate Winners:

K1AAA, K1CLF, W1EFF, WA1FWQ, W1GKJ, K1GZH, JA1GZY, W1HJP, K1IOW, W1KOT, W1MCG, K1OCS, W1OMN, K1OOZ, W1OQC, K1PLP, W1QP, K1YZG, W1ZJL, W1ZLS, K2AGI, W2BLV, W2BVE, W2BXW, WB2CTU, WA2CUB, WA2EMB, WB2FYB, WB2FYW, W2GOR, W2GQN, WA2GTH, WA2HDP, K2IF, W2JAV, WB2JRU, WA2JSW, K2JTU, W2KCX, W2KLD, K2LEQ, WA2LKF, W2LUW, K2MZP, W2NCA, W2NVB, W2OAP, K2OWC, K2OWD, WA2QEB, WA2QMC, W2RGO, K2RJF, W2ROB, K2ROI, WA2SAB, K2SBD, K2SEV, W2SUH, WB2SXO, K2TSN, K2VRK, K2VTB, WA2VYS, W2ZBS, WA3BBI, W3BFF, K3BHK, K3BIG, WA3BZO, VE3CM, W3CRO, W3DJZ, W3DNN, W3EOV, WN3EYQ, K3GWX, K3GYS, W3HID, W3JRV, K3LMM, K3LTI, W3MHD, W3NNV, W3NSI, K3RCM, K3RHO, K3RTR, K3SYM, K3UMJ, K3UWJ, K3UWL, W3VXV, K3WAL, K3WGK, W3YPI, W3ZN, K3ZUC, W3ZVJ, W4AAD, K4ACZ, W4ADN, W4AMY, K4ANJ, WA4AQG, K4AWB, W4AWY, W4AZT, W4BWR, WN4CCM, KG4CG, WA4CJV, W4CVQ, WA4DPQ, WA4DQE, K4DSI, K4EPM, WA4EPZ, WA4EVU, K4FPW, W4FR, K4FVO, WA4FZD, W4GJY, K4GLQ, W4GMT, WA4GOC, K4GXJ, K4GXO, WA4HCI, W4HHH, K4HTM, W4HNF, W4HT, W4IJA, W4IMZ, W4IRZ, W4ISF, W4IU, WA4IUU, W4IYT, WA4JOF, W4JWG, K4JXG, W4KIS, WA4KNO, W4KR, W4LDR, W4LPR, W4MDS, W4MHS, WA4MZZ, DL4NK, W4NTE, W4NTK, W4NWK, K4PGV, WA4QKQ, K4QOE, WA4RMX, W4SCF, W4SKX, WA4SSB, WA4TFF, WA4UDB, W4UHA, K4UMK, WA4UYT, W4VBD, K4VDM, W4VEY, WA4VYZ, WA4WND, W4WPI, W4YBT, W4YLO, W4YSU, W4ZAG, W4ZBA, K4ZBG, W4ZXI, W5AJG, W5ANH, W5ARK, K5AYX, W5BOT, WA5BPM, K5BQA, WA5CON, W5CUD, K5DKR, WA5EIB, W5EJV, K5EPO, W5FCP, W5GMM, W5GRT, K5GRV, W5HFN, W5IDZ, W5IFH,

(*Continued on page 172*)

• *For Public Service*

Announcing 21st Annual ARRL Simulated Emergency Test

October 8–9, 1966

SOME of you, tuning casually across the band during the Oct. 8–9 weekend, looking for DX or a ragchew, may come across a flurry of message-handling activity with some of the same frantic aspects as the SS or Field Day. Some will sigh or snort and say "Another one of those blankety-blank ARRL contests!" But you won't be included in this group, because having read this you'll know what it's all about.

No siree, the SET is *not* a contest. True, it does call for points and score, but nobody is competing with anybody and the purpose of the score is to make a contribution to the national total to see if we can better our last year's total, and to see if *you* can beat *your* last year's score. The only competition that exists is between sections, and we don't make too much of a point of this.

What It Is All About

The SET has two principal objectives. One is to give our organized amateur public service setup a gruelling annual test, loading it to the limit to see how it performs under duress and get some idea when and where it breaks down and why. This part of the test is strictly introspective. The other part is just the opposite; it's a public demonstration of our capabilities, a showing of our wares to the agencies we serve, and in general a "brag" session.

Which of the two is the more important? Who can say? If we have something worth showing, it's a mighty good thing to make the most of the opportunity to show it. Thus, the best-organized ARPSC groups will want to make much of the public relations aspect of the SET. On the other hand, organizations that are just getting started or are otherwise somewhat shaky may prefer to conduct their sessions in private until they achieve enough efficiency to want to do some public bragging.

Scope of Test

The Amateur Radio Public Service Corps has three branches. Principally for natural disaster and other peacetime emergency communications is the Amateur Radio Emergency Corps, (AREC) the oldest and largest, in point of numbers, of the three branches. For civil defense and possible wartime communications is the youngest of the three branches, the Radio Amateur Civil Emergency Service (RACES). Then, since both AREC and RACES are organized mostly on a local basis, for medium and long haul communications we have the National Traffic System (NTS). Each branch has its own function to perform, each has the duty and responsibility of coordinating its activities with the other two branches, and each will receive a thorough testing in the SET. A few salient details about the operation of each might be in order.

AREC Role

This will be nothing new for the 1200-odd emergency coordinators of the AREC; it has been happening to them every year since 1946. The procedure is to spring a test drill of some kind on the unsuspecting AREC members, go through certain motions, originate certain messages to be put on NTS, and make a full report to the SEC and headquarters on the results, including the point score. Some ECs plan the SET far in advance, some even letting the AREC members in on it so the turnout will be maximum for publicity purposes. Others pull it as a complete surprise. Somewhere in between these two

(*Continued on page 160*)

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

During the SET, *all* NCEFs will be operated on a full-time basis, from 1900 GMT Oct. 8 to 0600 GMT Oct. 10, just as though this was a period of actual emergency. The following are the most-used frequencies:

3550	7100
3875	7250

Other NCEFs which can be used during the SET are:

14,050	28,100
14,225	29,640
21,050	50,550
21,400	145,350

The procedure: In case of simulated emergency, call "TEST QRRR" on one of the c.w. NCEFs, or "CQ Test Emergency" on one of the phone NCEFs. When contact is made, move off the frequency to handle any traffic.

For clearing regular traffic, call CQ followed by the destination of your traffic. When contact is made, move off the frequency to clear it.

Do not call CQ or make any but a *real emergency* call on any of the NCEFs during the first five minutes of any hour!

Section Emergency Coordinators of the Amateur Radio Emergency Corps

The Section Emergency Coordinator is appointed by the SCM to take charge of the promotion of the Amateur Radio Emergency Corps organization throughout the Section. He acts as the SCM's executive in the furthering of provisions for emergency amateur radio communications in every community likely to suffer in case of a communications emergency. One of the duties of the SEC is to recommend the appointment of Emergency Coordinators for the various communities in his Section. Does *your* town have an EC? If not, recommend the name of a likely prospect to the SEC. The SEC invites your questions concerning the status of the AREC in your Section.

ATLANTIC DIVISION				
Delaware	K3NYG	John L. Penrod	Eagle Nest Road, RFD 1, Blackbird	Townsend 19734
Eastern Pennsylvania	W3ELI	George S. Van Dyke, Jr.	4607 Convent Ave.	Philadelphia 19114
Maryland-D.C.	W3CVE	Conan W. B. Barger	7512 Foster St., S.E.	District Heights 20028
Southern New Jersey	W2BZJ	Walter H. Grover, Jr.	P.O. Box 212	Pennington 08534
Western New York	W2RUF	Clara Reger	435 Best St.	Buffalo 14208
Western Pennsylvania	K3KMO	Al Brogdon	RD 1, Box 390-A	State College 16801
CENTRAL DIVISION				
Illinois	W9RYU	Harry J. Studer	705 Hillcrest Rd.	Milan 61264
Indiana	K9WET	Ralph L. Piercy	RFD 1	Walton 46994
Wisconsin	K9ZPP	Bernard E. Tower	6921 W. Bennett St.	Milwaukee 53219
DAKOTA DIVISION				
Minnesota	WA0IEF	Gary G. Hanson	719 North 18th Ave., E.	Duluth 55812
North Dakota	WA0AYL	David E. Beach	Apt. 7, 1116-19th Ave., S.	Grand Forks, 58201
South Dakota	W0SCT	Lester R. Lauritzen	R. 3, Box 32	Centerville 57014
DELTA DIVISION				
Arkansas	WA5KTX/ WA5ORE	Don Corley	c/o Ark. Baptist Medical Center, 13th & Wolf Sts.	Little Rock 72202
Louisiana	K5KQG	Daniel J. Babin	217 Bellaire Drive	Houma 70360
Mississippi	W5JDF	Charles R. Boone	1111 Mobley St.	Columbia 39429
Tennessee	K4RCT	Harry A. Phillips	960 Bonnie St.	Memphis 38122
GREAT LAKES DIVISION				
Kentucky	W4OYI	George S. Wilson, III	2114 Robin Rd.	Owensboro 42301
Michigan	K8GOU	Donald R. Van Sickle	20925 Westpointe Court	Southfield 48076
Ohio	W8HNP	Arlington A. Garn	5034 Oak Ridge Dr.	Toledo 43623
HUDSON DIVISION				
Eastern New York	W2KGC	William L. Stahl	Shirley Ave.	Fishkill 12524
N.Y.C. & Long Island	K2OVN	John S. Brandau	1659 East 46th St.	Brooklyn 11234
Northern New Jersey	K2ZFI	John W. Banke	Main Rd., Box 177	Towaco 07082
MIDWEST DIVISION				
Iowa	KØBRE	Verlin B. Rowley	1008 So. Third St.	Fairfield 52556
Kansas	KØEMB	Norman Stackhouse	1409 Willow Rd.	Newton 67114
Missouri	WØBUL	Charles O. Gosch	711 South Oakland	Webb City 64870
Nebraska	KØJXN	Larry Abbott	Abbott Ranch	Almeria 68711
NEW ENGLAND DIVISION				
Connecticut	W1PRT	John R. Barber	19 Bidwell Parkway	Bloomfield 06002
Eastern Massachusetts	W1AQG	Donald F. Guptill	17 Park St. Ct.	Medford 02155
Maine	K1QIG	Cliff Stowers	38 West St.	Fairfield 04937
New Hampshire	W1ALE/ W1TNO	Edward F. Everett	RFD 4,	Concord 03301
Rhode Island	W1YNE	Gordon F. Fox	151 Whipple Road	Esmond 02917
Vermont	W1V8A	Harry A. Preston, Jr.	Box 26	Charlotte 05445
Western Massachusetts	K1JJU	C. Norman Peacor	139 Cooley St.	Springfield 01128
NORTHWESTERN DIVISION				
Alaska				
Idaho				
Montana	W7RZY	Harry Roylance	P.O. Box 621	Harlowton 59036
Oregon	W7AJN	Everett France	3335 S.E. 116th Ave.	Portland 97266
Washington	W7UWT	Raymond H. McCausland	2812 Hayton St.	Bremerton 98310
PACIFIC DIVISION				
East Bay	WA6OLF	Jack Palmatier	4135 Porter St.	Oakland 94619
Hawaii	KH6CCL	Ernest J. Kurlansky	748 Kil St.	Honolulu 96821
Nevada	WA7BEU	L. L. "Mike" Blain	560 Cherry St.	Boulder City 89005
Sacramento Valley	WB6BWB	Donald F. Stromsted	6435 Orange Ave., Apt. 14A	Sacramento 95823
San Francisco	W6KZF	Bill Ray	52 Matilda Ave.	Mill Valley 94941
San Joaquin Valley				
Santa Clara Valley	WA6HVN	Harold L. Whitfield	3148 Jenkins	San Jose 95118
ROANOKE DIVISION				
North Carolina	W4MFK	James W. Botsford	P.O. Box 452	Hillsborough 27278
South Carolina	WA4ECJ	Richard H. Miller	403 Hancock St.	Beaufort 29902
Virginia	K4LMB	Ethel M. Smith	2012 Rockingham St.	McLean 22101
West Virginia	W8SSA	E. K. Chambers	P.O. Box 62	Bluefield 24701
ROCKY MOUNTAIN DIVISION				
Colorado	WØSIN	Charles M. Cotterrel	430 South Swadley St.	Denver 80228
New Mexico	K5HTT	William Helland	61 Isleta Drive	Whiterock
Utah	W7WKF	McCarroll Petersen	4815 Yorktown Drive	Salt Lake City 84117
Wyoming	W7YWE	Frederick L. Hildebrand	P.O. Box 143	Douglas 82633
SOUTHEASTERN DIVISION				
Alabama	W4NML	William C. Gann	2115 Brookline Dr.	Huntsville 35805
Canal Zone	KZ5MV	Marvin G. Flynn	Box 1087	Albrook AFB
Eastern Florida	W4IYT	Andrew C. Clark	41 Lenape Drive	Miami Springs 33166
Georgia	W4DDY	W. Homer Connell	2608 Apricot Lane	Augusta 30904
West Indies (P.R.-V.I.)				
Western Florida	W4MLE	George L. Thurston	2116 Gibbs Drive	Tallahassee 32303
SOUTHWESTERN DIVISION				
Arizona	K7NIY	George Mezey	P.O. Box 73	Sun City 85351
Los Angeles	W1KUX/6	Wallace R. Calkins	814 E. Cameron Ave.	West Covina 91790
Orange	W6WRJ	Ralph E. Alexander	12621 Red Hill Ave.	Tustin 92680
San Diego	W6SK	J. D. Campbell	3235 Idlewild	San Diego 92117
Santa Barbara	WB6NDP	Bob Weaver	5575 Somerset Drive	Santa Barbara 93105
WEST GULF DIVISION				
Northern Texas	W5PYJ	James M. Cotten	208 East Oak	Weatherford 76086
Oklahoma	K5DLP	William B. Pierce	901 Bell Ave.	Lawton 73501
Southern Texas	K5QQG	E. Wayne Smith	1801 Ruth Ave.	Houston 77004
CANADIAN DIVISION				
Alberta	VE6FK	Don Sutherland	444-25th Ave., N.E.	Calgary
British Columbia	VE7FB	Harold E. Savage	4553 West 12th Ave.	Vancouver 8
Manitoba	VE4OL	John H. Bell, Jr.	453 Rita St.	Winnipeg 12
Maritime	VE1HJ	F. R. Fraser	12 Albert St.	Dartmouth, N. S.
Ontario	VE3EUM	Harry Walker	956 Lakeshore Rd.	Burlington
Quebec	VE2ABV	Ken Ransom	30 Ninth Ave.	Roxboro
Saskatchewan	VE5CU	W. H. Parker	1008-10th St., E.	Saskatoon

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Thoughts on RACES in ARPSC

SOMEONE recently, when advised that studies are being conducted regarding the inclusion of RACES in ARPSC, remarked: "What's headquarters up to *this* time?"

What headquarters is "up to," this time as all the time, is finding what steps are necessary to implement Board of Directors' decisions — in this case the order to include RACES in ARPSC. One thing obvious is that we cannot formally "adopt" RACES, because it's not ours to adopt. AREC and NTS, the other two divisions of ARPSC, were originated, sponsored and developed by ARRL. Administration is in the hands of officials appointed by elected heads or by the ARRL communications manager. While ARRL was instrumental in the formation of RACES and more than a little responsible for the form and shape it took, its active sponsorship and its entire administration has been in the hands of civil defense at various levels, its regulation in the hands of FCC, and its administration in the hands of radio officers appointed by civil defense directors and certified to FCC.

Thus, the dilemma: How can RACES be a part of ARPSC as AREC and NTS are, under these circumstances?

The solution? There is no simple one. But what we *can* do is extend our best cooperation and coordination and recognition to RACES as a part of the League's public service program. Since this has always been our intention, what we can aim for now is an expansion of this coordination and recognition by including RACES in all ARPSC activities as a part and parcel of ARPSC, to the extent this is possible.

We have heard it said that AREC and RACES are being "merged." This is a favorite word, these days, with big business mergers going on all around us: what it usually means is that one corporation is swallowing another in order to diversify products, or to extend an empire. The inclusion of RACES as a part of ARPSC does not at this time constitute a "merger" of RACES and AREC. Both AREC and RACES will continue to exist as separate parts of ARPSC — as the Emergency Division and the Civil Defense Division respectively. ECs will continue to direct the efforts of AREC groups under guidelines set down by SECs and headquarters. RACES radio officers (ROs) will continue to operate RACES at its various levels, under guidelines set down by state and federal civil defense; we couldn't change this if we wanted to — at least, not at present. The principal difference will be that RACES is now considered an official part of the ARPSC family.

Now, the next question is, how will this change be in evidence? The principal evidence of it will be in the official inclusion of RACES in all ARPSC activities. In the forthcoming SET, RACES ROs are being asked to participate in the same status of ARRL ECs, and we are diligently at work trying to get a mailing list of ROs so we can communicate with them. The proposed ARPSC emblem and decal will be modified to include RACES. The League's Public Service Communications Manual will be modified, next printing, to show the three divisions of ARPSC, instead of two. The ARPSC slide collection will be modified, as soon as possible, to show the new order of things. These steps we can surely take. What others are appropriate will come from further study.

In August *QST*'s editorial you will have noted that plans are being made for amateur radio to serve in the event of a national emergency. How much, if at all, such plans will affect any of the above we do not know at the present time. Meanwhile, RACES *is* a part of ARPSC but it is *not* being "merged" with AREC (except as found desirable at local level), and practical operations are pretty much as before. — *WINJM.*

Diary of the AREC

Tornados and Kansas are old friends. Each year, the state is visited by hundreds, some of which just knock at the door while others really raise the roof. From June 7 through 12, an untold number danced their way through

On May 7, AREC members (l. to r.) K2PBE, WB2GCN and WB2UEX were part of the crew from Glens Falls who provided communication for the annual White Water Derby. The clocks were used to keep the official race time and the crew relayed time signals to race officials (see Diary of the AREC for details).

* National Emergency Coordinator.

the state, giving AREC members plenty to do. The typical tornado is accompanied by heavy rain and hail. In this case, it was reported that the hail was as big as golf balls in some areas.

WØFRC, EC Topeka, sent us a detailed report of the activities of the Kansas Storm Net's operation for part of the emergency. He took over as NCS at 2005 CST, June 7, at which time all stations reported no sighting of any tornadic activity, although there was evidence of severe weather in the area. Fifteen minutes later, KØATS reported storm warnings for southeast Kansas. WAØEHA reported a tornado, unconfirmed, east of Russell and a strong storm cell in the north central part of the state. KØBDP reported lightning all around his area while KØKED advised that the AREC in Salina was on watch. KØMZZ, EC Salina, informs us that at the request of the chief of police, fifteen mobile units were sent into the field to watch for any funnels. After four hours of waiting and looking, no tornados were sighted and the mobile units were called back.

All through the night, reports from the Storm Net continued to pour in regarding the location of storm cells and tornados, hail and rainfall amounts, wind speeds, any power outages and loss of telephone service. Thirty-two stations checked into the net, to make reports, handle traffic for their local areas and receive any warnings issued by the weather bureau. By 0100 CST, storm activity declined to a point where the net's operation was unnecessary.

WØFRC received a report of tornado activity in Topeka on June 8 at 2030 CST. He drove to Topeka where he was instructed by WØQNI to report to the Red Cross headquarters for instructions. For the next 10 hours, WØFRC gave first aid to the injured and helped them to hospitals. On June 9, he assisted in locating missing persons, relaying the information and receiving instructions from Red Cross headquarters.

KØMZZ took WØHIJ's bus, with radio equipment and 5-kw. generator to Topeka where he aided the communication effort in the disaster area. He and WØQNI were on the air from Friday night, June 10, to Sunday afternoon.

— • • • —

On July 19, W1WKJ/mobile came upon an accident involving a truck and a car at the intersection of Pine Street and Post Oak Road in Bellaire, Texas. He had just initiated contact with W5SVL/mobile in Houston. An immediate clearing of several interfering stations on or near the frequency was accomplished and emergency traffic passed to W5SVL who telephoned the police and fire departments for aid. Help arrived within five minutes after the message had been delivered and the injured parties taken to the hospital.

On July 22, W1WKJ/mobile again came upon the scene of an accident, again involving a truck and car at the intersection of Interstate 410 and 10. Two women and an infant were injured and required immediate first aid which W1WKJ administered (he's a doctor). A distress call was attempted, without success; although several QSOs were in progress, no one acknowledged WKJ's call. Luckily, a motorcycle policeman arrived and was able to call for an ambulance using his two-way radio. The lesson learned by W1WKJ was to try the NCEFs in time of emergency and the lesson each amateur should learn is to keep his ears open at all times for any possible emergency call. — *W1WKJ/5.*

— • • • —

On July 26, VE1KK/mobile was at the scene of an accident on the St. Leonards-Campbelltown highway in which a man was killed and another injured. He sent emergency traffic to VE1YU for the Royal Canadian Mounted Police. An RCMP officer came to VE1YU's home for the traffic. scene of the accident was located in extremely hilly territory and the police were unable to maintain communication using their v.h.f. system. VE2WM and *VE1s* FQ PX AJC assisted in the relaying of traffic. — *VE1WB, SCM Maritime.*

— • • • —

On the morning of August 4, VE2BWS was on his way to work when he heard from a newscast that three children were lost in the woods of Sainte Marguerite du lac Masson and had not been seen since the previous evening. VE2BWS gave a general call on the local emergency net frequency and was answered by VE2AKM, who in turn called the SEC, VE2ABV. VE2ANH, EC for Montreal, was called at work and while he was driving home, started getting a search team organized. Shortly thereafter, VE2AUU, Canadian NEC, joined the crew.

Walkie-talkies, supplied by VE2AUU, were distributed and communication was established with VE2AKM, Montreal, and VE2BMS who went with the search party, and who, at one time, was the only communication link between the organization point and the search party.

The next morning, the children were found safe and sound by a provincial police helicopter. — *VE2ANH, EC Montreal-Laval, Que.*

One of the tornados that struck Topeka, Kans., on June 8, really tore up the city. WØIPV, who took the photo, notes that WØKOL was mobile on the spot where the twister is now. A few minutes earlier, he spotted the funnel and decided it was high time to get going (I don't blame him, do you?). See the Diary of the AREC for details.

— • • • —

Alerted by KØCEV, on May 11, the PHD Net was activated with WØAMO, KØIQS and WAØFLL standing by for any tornado activity in or around Clay County, Mo. Reports had been received that a storm cell was in the vicinity, but no tornados struck the area. — *WAØFLL, PAM Missouri.*

— • • • —

AREC members in Alexandria, Va., were asked to provide communication for a rowing regatta on the Potomac River, the competition being between two local high school rowing teams on Apr. 9. W3JSL located himself at the Woodrow Wilson Bridge starting point, W3DHQ and WB4CSO at the half way point, W4KVG stayed at the end of the pier to relay the judges' decision. K4SUM was up on the boat club deck so he could relay information to the public address announcer, while K4BAV was aboard the judges' boat, relaying all decisions and checking on the progress of the boats through the course and relaying same to the judges. — *W4JXD, EC Alexandria, Va.*

— • • • —

The Augusta and Richmond Co., Ga., AREC furnished communications for the movie crew making the club movie of the 1966 Masters Golf Tournament at the Augusta National Golf Course on Apr. 4-11. Sixteen 2-meter walkie-talkies operating on 146.94 Mc. were used, a base station was set up in the tournament headquarters and the director of the film was furnished an operator who relayed instructions to operators assigned to six camera crews, one sound man and two mobile units assigned to move crews from place to place on the course.

No formal traffic was handled but each operator gained valuable experience in voice communications and net discipline. Each man learned the value of transmitting only when required to and to remember details of information received without writing it down. — *W4DDY, EC Richmond Co., Ga.*

— • • • —

On May 21-22, amateurs in Wayne Co., Mich., provided communication for two parades, one in Detroit and the other in Ecorse. Two-meter f.m. rigs and walkie-talkies were used to coordinate the divisions of both parades. Base stations were set up at the starting and finishing points and mobiles placed within the parade itself to en-

able all divisions to move along at the proper speed without any tie-ups or large gaps. — *W8MPD, EC Wayne Co., Mich.*

—•••—

Members of the Glens Falls Area, N. Y., AREC again provided communications for the annual White Water Derby, a canoe and kayak race held in the upper reaches of the Hudson River. On May 7, the novice and giant slaloms were held, and amateurs provided such information as timing and starting signals, and last minute entries and cancellations of participating teams. Stations were set up at the starting line and one at each finishing point. As per last year, the operation went smoothly and the assistance of the crew was greatly appreciated by the racing officials. — *K2AYQ, EC Glens Falls, N.Y.*

—•••—

For the fourth year in a row, AREC members in Harris Co., Tex., provided communication for the gathering of election results in that county. An election was held on May 7, and with 289 precincts to report, some will be late and information may be inaccurate. Election officials requested K5HXR (EC) and his crew to gather election results and relay same to election headquarters. Local radio and t.v. stations were also kept abreast of the results via amateur radio and periodically made announcements to the general public that this information was relayed via amateur radio. A total of 19 amateurs participated in this operation. — *K5HXR, EC Harris Co., Texas.*

—•••—

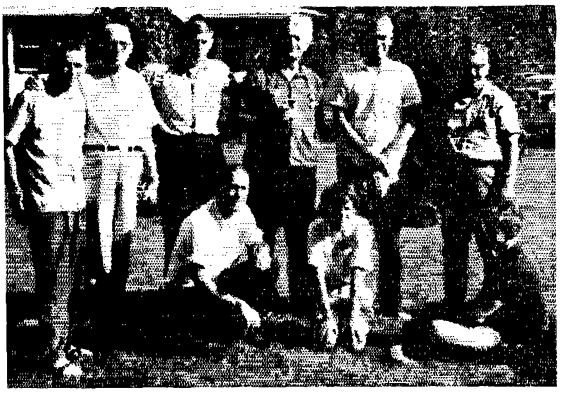
AREC members of Monroe Co., Mich., provided communication for a civic undertaking to clean debris from Sterling State Park in Monroe. This took place on May 14, shortly after the Lake Erie flood when the park was under water.

The activity started at 0900, with WA8MTX activated in the Red Cross building, and mobile units were dispatched to the park where telephone service was not available. Command traffic was handled throughout the day for Red Cross and other agencies. AREC operators kept close watch for any accidents since much heavy equipment was being used and, in some cases, by untrained persons. — *W8NDM, EC Monroe Co., Mich.*

—•••—

Forty-five SEC reports were received for June, representing 17,973 AREC members. This is 4 more SEC reports and 656 more AREC members. We still seem to be having trouble getting those reports. How about it, fellows! Those Sections reporting are: Conn., E. Mass., N.Y.C.-L.I., N.N.J., S.N.J., E. Pa., W. Pa., Del., Ala., E. Fla., Ga., Ky., N.C., Tenn., W. Fla., Ark., Miss., N. Mex., Okla., S. Tex., E. Bay, Orange, Los A., S.F., S.V., Hawaii, Mont., Nev., Ore., Utah, Wash., Wyo., Mich., Ohio, W. Va., Ind., Colo., Kans., Mo., S. Dak., Ont., Man., Sask., Alta., B.C.

At the half way mark for 1966, 280 SEC reports have been received from 59 different Sections. This represents an increase of 33 reports and 9 Sections over last year. Those Sections at the 100% mark so far are: E. Mass., N.Y.C.-L.I., N.N.J., E. Pa., W. Pa., Del., Ala., E. Fla., Ga., N.C., Miss., N. Mex., Okla., S. Tex., Orange, S.F., S.V., Hawaii, Mont., Nev., Ore., Wash., Wyo., Mich., Ohio, Colo., Mo., S. Dak., Ont., Man., Sask., Alta., B.C. Good work, men. Keep those reports coming in.



At the Empire Slow Speed Net picnic held on July 9 at the QTH of W2JMZ, net manager WA2VYS took this photo of some of the crew present. Standing (l. to r.) WB2IFN, W2ANV, WB2QYZ, W2THE, W2JMZ, W2LYG. Kneeling (l. to r.) WB2GAL, WA2VYT, WB2HZY.

RACES News

On June 19, seven members of the RACES unit of the Amateur Radio Club of Jackson Co., Mo., went mobile to the Rotary Camp for Handicapped Children. A base station was set up at the camp and four mobile units took the children, one at a time, for a trip around a lake. During the trip, the children talked with each other and with the children back at camp via amateur radio. As an outcome, other clubs in the area are investigating the possibilities of providing similar services to camps in their area.

National Traffic System

Elsewhere in this issue you will find the announcement of the annual Simulated Emergency Test (Oct. 8–9). NTS leadership officials have already received full information on the part the system will play in the exercise. We now wish to acquaint you NTSers with some of the details and urge your participation.

The function of NTS in the SET, as always, will be to relay traffic expeditiously from place to place — from anyplace to any other place, whether origin and destination be within the confines of a Section, Region, Area or between Areas. We call it a "simulated" emergency, but there are limits beyond which simulation cannot go. For example, we cannot simulate the tension and electric excitement and the chaos which would accompany a real emergency; nor can we simulate the dedication and extra effort that would undoubtedly accompany it. Therefore, since we cannot simulate these, we are not trying to do so. NTS will not operate officially 24 hours per day for the full two days of the test, as it undoubtedly would if the real thing occurred. It will operate during a scheduled period for eight hours on Saturday (Oct. 8) and Sunday (Oct. 9), or sixteen hours in all. No NTSers (except a few TCCers) will be required to "burn the midnight oil," as they would in a real emergency.

This is the third year that NTS has been included actively and intensively in the SET. The first year it was pretty shaky. Last year was a great improvement. This year we hope and confidently expect that NTS will take its rightful place as the principal means of message relay for the other two divisions — AREC and RACES. But it's going to take some doing, and your participation is required. Reserve this weekend for this purpose. If you had other plans, *cancel 'em!*

NTS operation will commence at 1900 GMT in the East and terminate at 0600 GMT in the Pacific. During this period, six complete cycles of NTS operation will have been completed. While the above spread of time is *eleven* hours, in any one NTS Area the operation will last only eight hours — that is, in Eastern Area it will be 1900–0300, in Central 2000–0100 and in Pacific 2200–0600.

How do we get six cycles into eight hours? Well, it ain't easy, and it means, in effect, continuous operation of all categories of NTS nets down through Section, including TCC, for four hours in each Area.

How do we get that way? Well, the system will operate in overlapping cycles this year. We start with Section nets in the Eastern Area at 1900, then Region nets at 1930 and the Area Net at 2000. While the Area net is meeting, the *second* cycle starts, with Section nets meeting at 2000. At 2100, a *third* cycle starts while the first and second cycles are still in operation, and at this time all three cycles are operating simultaneously, although in different parts of the cycle. Each cycle, as it is completed, repeats itself. Thus, at 0100 the second session of the first cycle ends and simultaneous operation of all three cycles no longer exists; only the second and third cycles are still operating. At 0200 the second session of the second cycle ends, and only the third cycle remains in operation. At 0300 this cycle ends and NTS operation ceases in the Eastern Area.

In the Central Area, of course, NTS operation commences an hour later, and in the Pacific Area three hours later, but the same pattern is followed. This procedure is repeated *both* days of the SET, Oct. 8 and 9.

Confused? We don't blame you. Like most NTS operation, it is basically simple once you get the hang of it, but difficult to explain in words when you are dealing with different time zones and the unfamiliarity of simultaneously-operated cycles of the system. You don't have to understand how it works, although it is helpful if you do, so please give the above another reading. Follows herewith a rundown of the meeting times of all nets at Section level and above in each of the three Areas, for both days; pick your level and your Area and prepare to lend a hand. All times are GMT.

Eastern Area: Section nets at 1900, 2000, 2100, 2130, 2200, 2230, 2300, 2330, 0000, 0030, 0130, 0230. Region nets at 1930, 2030, 2100, 2130, 2200, 2230, 2300, 2330, 0000, 0030, 0100, 0200. Area nets at 2000, 2100, 2200, 2300, 0000, 0100.

Central Area: Section nets at 2000, 2100, 2200, 2230, 2300, 2330, 0000, 0030, 0100, 0130, 0230, 0330. Region nets at 2030, 2130, 2200, 2230, 2300, 2330, 0000, 0030 0100, 0130, 0200, 0300. Area nets at 2100, 2200, 2300, 0000, 0100, 0200.

Pacific Area: Section nets at 2200, 2300, 0000, 0030, 0100, 0130, 0200, 0230, 0300, 0330, 0430, 0530. Region nets at 2230, 2330, 0000, 0030, 0100, 0130, 0200, 0230, 0300, 0330, 0400, 0500.

Most of you will get this before the SET date, and thus be able to participate effectively and intelligently. A few will not get it until *after* the SET date, in which case it will be an explanation to what went on, in case you were confused. Hope to see all you NTSers in there doing your bit for amateur radio and NTS. — *W1NJM.*

June report:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation (%)*
EAN	31	1151	.891	37.1	94.6
CAN	31	1041	.861	33.5	100
PAN	31	1566	1.122	50.5	88.2
1RN	62	296	.225	4.8	92.2
2RN	59	419	.696	6.8	99.7
3RN	62	493	.364	8.0	99.5
4RN	59	430	.305	7.3	88.4
RN5	62	797	.347	12.8	93.0
RN6	62	1593	.968	25.6	100
RN7	31	466	.481	15.0	49.6[1]
8RN	62	402	.272	6.5	88.8
9RN	31	474	.738	15.3	96.0[1]
TEN	62	766	.566	12.3	69.8
ECN	29	85	.172	2.9	65.6[1]
Sections[2]	1868	9832		5.3	
TCC Eastern	124[3]	495			
TCC Central	93[3]	569			
TCC Pacific	124[3]	899			
Summary	2542	21,744	PAN	7.8	RN6/CAN
Records	1918	20,658	1.267	15.2	100

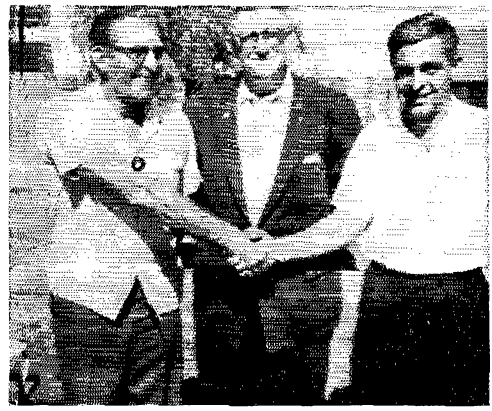
[1] Representation based on one or less sessions per day.

[2] Section/Local nets reporting (64): OZK (Ark.); ALTA-SSB (Alta.); QFN FMTN WFPN GN (Fla.); CPN (Conn.); Iowa 75; MDDS (Md.-Del-D.C.); WSN (Wash.); WPA PTTN EPAEPTN (Pa.); VSBN VSBNL VN VSN (Va.); QIN (Ind.); NJN NJEPTN (N.J.); BUN (Utah); BN-OSSBN (Ohio); NCN NCNL NCSSB THEN (N.C.); EMNN (E. Mass.); PHD MOTTN (Mo.); NTTN (Tex.); VTNH (Vt.-N.H.); ILN (Ill.); GBN (Ont.); OQN (Ont.-Que.); PTN SGN (Me.); MSN MJN (Minn.); SCN SVN SoCal 6 (Cal.); LAN (La.); QMN Wolverine (Mich.); TN TPN TSSBN ETPN (Tenn.); AENB AEND AENH AENM AENO AENP(e) AENP(l) AENR AENT (Ala.); WSBN (Wis.); RISPN (R.I.); NYCLIPN NYCLIVHF NLI NLS (N.Y.C.-L.I.).

[3] TCC functions not counted as net sessions.

Well, we have some more new records. Conditions have been fairly good during the summer, except when thunderstorms have plagued the nets. You haven't lived until you try handling a TCC sked on 80 meters when signals are S-5 and the static crashes are S-9.

W9DYG and WA5JOL have produced an interesting CAN bulletin. Well, CAN now has two years of 100% representation. W6VNQ submits his first PAN report, noting that summer QRN is taking its toll (the Rate and Average figures sure don't back it up, tho). W1EFW is proud of the 1RN crew for the fine representation this month. In between murder stories, which seem to be a regular feature in WA2GQZ's newspaper, Joe continues



WB6BBO was present (with her camera) at the summer meeting of the Eight Ball Traffic Net. From left to right, we have K6MDD, PAM and manager of the 8 Ball net; W6BHG, SCM Los Angeles and WB6JFO, SoCal Six manager.

to run 2RN in fine style. The only problem he is faced with is trying to get 100% reporting of all net sessions. K3MVO is gratified at the new faces appearing on 3RN. Silent W4SHJ seems to be following the Roosevelt philosophy (speak softly and carry a big stick). K5IBZ plans to hold a meeting of RN5 personnel at the North Alabama Hamfest in August. A closed meeting is planned for the morning and a general ARPSC meeting for the afternoon. RN6 is being bolstered by the tremendous amounts of traffic going to and coming from Viet Nam. K7JHA notes that in some respects July was an improvement over June, but the QRN really hurt the rate department. Representation seems to be a serious problem in Montana, VE5 and KL7. W9QLW and others are planning to be at the Muskegon convention on Oct. 21-22 and hope to see lots of traffic men there. WØLGG reports traffic and representation about average despite the warm weather and vacations. VE3BZB made good use of his vacation in VE1, trying to stir up some activity for ECN.

Transcontinental Corps: W3EML had to go back to 1963 to find a month comparable with July. Station D had the highest percentage of failures because of vacations and no replacements. Poor conditions are hurting the Station F schedule according to W4ZJY/9. Dave is still having trouble getting reports, but this should settle down now that he has permanently relocated. WØHXB/4 and WA9NFS were recipients of TCC certificates. W7DZX is having his troubles on the west coast with poor conditions, vacations and some sleepy east coasters who can't keep awake for the late skeds.

July report:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Net Traffic*
Eastern	124	80.7	1351	495
Central	93	70.9	1183	569
Pacific	124	70.9	1798	899
Summary	341	74.8	4332	1963

TCC roster: Eastern Area (W3EML, Dir.) — *W1s* BGD EFW NJM, K1ZND, *W2s* GVH SEI, K2SSX, *WA2s* BLV UFI UPC, *WB2s* AEJ DXM, *W3s* EML NEM, *K3s* FHR MVO, *W4s* DVT ZM, K4LJK, *W8s* CHT RYP, *K8s* KMQ NJW QKY, WØOHJ. Central Area (W4ZJY/9, Dir.) — *W4s* OGG ZJY/9, *WA4s*TPB WWT, W5GHP, *W9s* CXY DYG HRY KQB VAY ZYK, *WA9s* BWY IZR NFS, K9DHN, *KØs* AEM GSY, WØHXB/4, WAØIAW.

Net reports:

Net	*Sessions*	*Check-ins*	*Traffic*
Interstate SSB	20	478	991
Mich. 6 Tfc.	26		88
Mike Farad	30	474	508
North American SSB	26	530	701
7290	39	1180	643
HBN	31	435	584

QST

Happenings of the Month

CANADIAN CENTENNIAL CALLS

Canadian Amateurs will have the option, in 1967, of using the prefix 3C in place of VE and 3B in place of VO, to call attention to the hundredth anniversary of Canada as a nation. No special application or endorsement of the licenses will be necessary, nor will it be essential to continue using the 3C/3B call throughout the year. Under the scheme, VE3XXX could simply decide to use 3C3XXX during calendar year 1967 and just begin doing so!

Andy Devine, WB6RER, well-known to old radio fans and two generations of movie-goers for his gravel voice, introduces Sandra Watkins, "Miss Orange County" at the Southwestern Division convention, while General Chairman Syd Cullum, WA6NJZ, looks on.

TEMPORARY TRAFFIC WITH 4U1ITU

A third-party message agreement has been renewed by the Department of State with the headquarters of the International Telecommunications Union, permitting the handling of such traffic between U.S. stations and 4U1ITU in Geneva only. The agreement is temporary, and is expected to terminate on March 1, 1967.

Bill Nelson, WA6FQG, right, accepts the Cover Plaque Award from ARRL Southwestern Division Director Howard F. Shepherd, Jr. W6QJW at the division convention in May. The Board of Directors had chosen Bill's article on electrical interference as the best in the April issue.

FAMILY OPERATING PRIVILEGE DENIED

The Federal Communications Commission has denied a petition, RM 972, by Nathan Gold, K1MIA, that the amateur rules be amended to allow operation of an amateur station by unlicensed members of the family. Petitioner had asked that the privilege be restricted to voice operations above 28.5 Mc., 50-watts input or less, crystal controlled and to communications only with the licensee operating mobile.

MORE AMATEUR RADIO WEEKS

California's Governor Edmund G. Brown declared Amateur Radio Week in California to coincide with ARRL's Founders Week commemorating the birthday September 2 of Hiram Percy Maxim. In issuing his statement, the Governor said:

"These citizens perform numerous acts of public service, including the relay of communications during times of emergency — fire, flood and earthquake — until normal public utility services are restored."

Governor William A. Egan of Alaska proclaimed the week of June 20–26, 1966 as Amateur Radio Week in the biggest state. In addition to the emergency facet, the governor touched on amateur fraternalism and everyday public services.

CB REQUEST ON CALLS DENIED

A citizens-band operator in the Bronx a short time ago had petitioned FCC to grant continuity of call signs in the Citizens Radio Service, RM-960. The Commission has denied the request, citing its earlier decision in Docket 14,843. At that time the Commission pointed out that

some 300,000 CB calls had been issued before automatic data processing had been installed. To provide continuity of call, all of these license records would first have to be transferred to the machine, at costs not warranted by the benefits.

We can think of few places better for an amateur radio station than the Space Needle at Seattle, and few places where we'd be more anxious to let others do the climbing. Seattle amateurs have it both ways—they were invited to put an amateur station at the 520-foot level of the Needle, and its manager, a mountain climber named Warren Saunders, volunteered to hitch the antenna to the top of the structure, 607 feet above the ground. The Space Needle Amateur Radio Club has been formed with some thirty members, led by W7GWA, president; K7VCD, vice president; W7HLP, secretary and W7CJL, treasurer. The club meets in the Needle the first Monday of each month at 8:30 P.M.

Dr. Lawrence J. Dunn, W2LP
Charles M. Bove, WØMXC

We are sorry to report this month the deaths of two prominent radio amateurs identified with the League.

Dr. Lawrence J. Dunn W2LP/W2CLA, passed away in July. First licensed in 1912, he was president of the Radio Club of Brooklyn in 1922 and helped establish other clubs in the Metropolitan area. When the ARRL Board of Directors established a new Hudson Division effective January 1, 1925, he was chosen as its first director. He had much to do with the growth of the Army Amateur Radio System, having served as chief radio aide to the Chief Signal Officer in the mid-twenties.

Charles M. Bove, WØMXC, ARRL vice director from the Dakota Division since January 1964, died in August at the age of 66. He was a founding member, past vice president, past secretary and past director of the Minneapolis Radio Club and has been trustee of its station WØCKF since 1946. He was Section Communications Manager for the state of Minnesota from 1951 to 1957.

FAMILY MEMBERSHIP

For families where two or more members are interested in amateur radio and the League, the ARRL By-laws now provide that, after one individual has become a member of the League at the regular dues rate ($5 in the U.S., $5.25 in Canada) additional members of that family may join the League for a special dues rate of $1, with all rights and privileges appropriate to the grade of membership held, except the receipt of additional copies of *QST*, subject to these conditions:

1. There must be an immediate family relationship — i.e., husband or wife, brother or sister, father or mother, son or daughter.

2. All Family Membership must be concurrent — i.e. expire in the same month.

3. The initial membership fee is the standard $5 in the U.S., $5.25 in Canada, plus $1 for each additional family member.

FCC DENIES POWER REDUCTION

Some time ago Robert H. Mitchell, WA2VAF proposed to FCC in RM-519 that the amateur rules be amended to provide that, effective January 1, 1966, the maximum power input to an amateur transmitter shall be 500 watts; effective January 1, 1968, 250 watts; and effective January 1, 1970, 125 watts. He based his request on "ever-increasing crowding of the amateur bands, and the fact that technological progress has moved beyond the 1 kw. power need. The state of the art will be improved by the necessity of finding better ways to establish and maintain amateur contacts than by sheer power."

The Commission in denying the petition pointed out that the power difference would really have little effect on mutual interference between amateurs. QST

Roanoke Division amateurs presented P. Lanier Anderson, W4MWH, with a plaque honoring him for his 14 years of service as director from the division. The presentation was made at the Roanoke convention by Joseph Galeski, W4IMP, at left.

I.A.R.U. News

QST continues its series on amateur radio in various countries of the world, with particular reference to regulations. The article on Israel presented here was written by Philip M. Kane, 4X4UQ. Phil, a U.S. amateur holding the calls W6VQM and K2ASP, expects to be operating on 10, 15 and 20 meters from Israel until next summer, when he plans to return to New York.

ISRAELI AMATEUR RADIO

The *Israel Amateur Radio Club*[1] is the organization of amateurs, potential amateurs, and SWLs in Israel. At the present time, there are about 450 licensed amateurs in the country, and approximately 1000 members of the IARC. The Club has a general meeting in May of each year, for the purpose of reviewing the year's events in Amateur Radio in the country, to award prizes for various contests held during the year, and to elect the executive board. This board, composed of seven members, is responsible for the guidance and operation of the club during the year. In addition, the IARC has very recently started a program similar to the ARRL OO Corps to "self-police" the bands. The IARC supports a number of clubs in cooperation with youth groups and the military. A monthly journal (in Hebrew), *HaGal* (the wave) is sent to IARC members.

Licensing

Licensing and regulatory matters are handled by the Frequency, License, and Legislation Section of the Engineering Services, Ministry of Posts. Three classes of amateur license are issued: Grade "C" (Novice), Grade "B" (General), and Grade "A" (Advanced). Each grade requires a code test in International Morse (code groups and English clear text) and a suitable theory and practice examination. The Grade "C" examination is written, while at present the other examinations are conducted orally by a panel of examiners. Each class of license is renewable on a biennual basis, and nominal fees are charged for the operator's certificate, station license, and renewals.

[1] More information on the organization of, and membership in, the IARC may be obtained from the Secretary, IARC, P.O. Box 4099, Tel Aviv, Israel. This address, too, is the correct address for the QSL Bureau.

Call signs are issued to licensees to reflect the grade of the license. Grade "A" and Grade "B" licensees receive the standard "two-letter" call while Grade "C" licensees receive three-letter call signs beginning with N. When they advance in grade, the N is dropped. A call sign once issued is not reissued to anyone else, even if the license is not renewed. True mobile operation ("mobile-in-motion") is denoted by a suffix of /M, maritime mobile by /MM, and portable operation ("fixed-portable" or "mobile-at-rest") by /4. Call signs for club stations are two- or three-letter call signs from the series starting with H or with Q.

In the past, the call signs for Israeli stations were issued from the 4X4 series. At present, this series is exhausted, and new call signs will be issued from Israel's 4Z4 series.

Operation

Grade "C" operators are limited to crystal-controlled c.w. operation, 10-watt maximum plate power input, in portions of the 40-meter and 15-meter bands only.

Grade "B" operators are permitted to operate in all bands with maximum power input of 75 watts (a.m. or c.w.). S.s.b. operation is permitted with maximum output of 200 watts p.e.p.

Grade "A" operators are permitted to operate in all bands with maximum power input of 500 watts (a.m. or c.w.). S.s.b. operation is permitted with maximum output of 1333 watts p.e.p.

In Israel, talking into the microphone of a 'phone station has been considered as "operating the station." This is permitted only to licensed amateurs, of any grade, under the control of the station licensee. The one exception to this rule is the club station, where any bona-fide member of the club may operate the station in the presence of the station trustee.

Third-party traffic is permitted at the present time only with the U.S. Curiously, third-party traffic is prohibited between Israeli stations!

The great bulk of amateurs-in-the-making lies in the clubs. Club stations are set up primarily for training purposes by such organizations as Army units, technical schools, city youth departments, etc. They are, in general, not used for "spare-time-operating" by licensed amateurs (except of course the trustee!).

Reciprocity

Any licensed amateur visiting Israel is eligible to act as "second operator" at an Israeli station under the control of the station licensee. He may,

also, receive a Grade "C" license of his own with no further examination. In addition, for higher grade of licenses, full or partial credit may be given for examinations taken in other countries.

At present, formal reciprocal operating agreements are in effect with the U.S. and with the U.K. U.S. General Class amateurs visiting Israel are eligible to receive a permit for Grade "B" operation for up to three months. If operation beyond that time is desired, the amateur may be required to take a suitable test in radio theory, credit being given for the U.S. code test.

Similarly, U.S. Extra Class amateurs are eligible to receive a permit for Grade "A" operation for up to three months. After that time, they may be required to take a test in radio theory, credit again being given for the U.S. code test.

U.S. Extra Class amateurs and Canadian Advanced amateurs are eligible for Grade "B" privileges without limit to time or examination.

Foreign amateurs intending to apply for operating privileges or a station license here should contact the Ministry of Posts, Engineering Services, P.O. Box 850, Tel Aviv, Israel. The offices are located at the Shalom Tower Building, Tel Aviv.

It is preferred that the applicant contact the Ministry directly rather than work through individual amateurs or groups here, since in any event personal contact is required for the processing of forms and payments.

It may be mentioned here that when a foreign amateur brings radio equipment to the country, (*including* 100-miliwatt "CB" walkie-talkies), it will be held at Customs until a release from the Ministry is obtained. This will be granted only after the amateur has secured suitable operating permits or a station license.

You might call this, taken at ON4UB, "Presidential Row." Left to right, G2BVN, president, *Radio Society of Great Britain;* WØNWX, president, ARRL; PAØDD, president, *Vereniging voor Experimenteel Radio Onderzoek in Nederland;* ON4AK, president, *Union Belge des Radioamateurs;* F8BO, vice president, *Reseau des Emetteurs Francais* and DL1QK, president, *Deutscher Amateur* Radio Club (Photo courtesy of ON4VY)

It should also be noted that amateurs applying for station licenses or permits should be prepared to submit a copy of their "home" license, and at least one copy of the schematic diagram of the transmitter. This should be presented only when the forms are filled out, and should not be sent with preliminary inquiries.

Miscellaneous

Unfortunately, I can't say anything about amateur public service work — there isn't any. The Civil Defense and disaster communications are in Government hands, and amateurs have no part in that. It should be noted that many of the army communications people are themselves hams. Since third-party traffic is forbidden in the country (except as noted above), message traffic is also out.

Amateur radio, then, is a purely personal hobby — except that it provides the trained manpower pool for industry and the military. — *4X4UQ*

—•••—

The C.C.I.R. {International Radio Consultative Committee} is a technical-study arm of the International Telecommunications Union. At its XIth Plenary Assembly in Oslo in July, A. Prose Walker, W3BMX/W4CXA, made the following statement on behalf of the U.S. delegation.

I have asked for the floor at this time, Mr. President, to express the sentiments of the United States delegation to you, personally, on a matter which has been most pleasantly received by our delegation, and I am sure, by many other delegations as well. The subject of my remarks is the authorization and establishment of Amateur Radio Station, LA1ITU, during the period of this XIth Plenary Assembly of the C.C.I.R.

If you will permit me, Sir, I would like to make some observations concerning amateur radio and its relation to the expanding period of technology throughout the world. I venture the opinion that a significant number of delegates here at this conference received their initial exposure in the field of electronics through the medium of amateur radio. Initially, amateurs were influential in opening the possibilities for long distance communication via the high frequencies, after having pioneered in the area of the spectrum which administrations then found too valuable not to utilize for the benefit of all their people.

All of us here know the history of the development of radio communications and the continued experimentation and development by amateurs, which although mostly unheralded, has been of significant value. Countless advances in theory, techniques and equipment have been contributions of either an amateur or those who received their early stimulus and training in that

medium. Today with the vastly more complex science of communications, we still find amateurs keeping abreast of developments and maintaining the pace laid down by large national laboratories and developmental organizations in our respective countries. Even satellite communication does not daunt the amateur, and in the near future Oscar IV will be in orbit enabling amateurs throughout the world again to communicate on v.h.f. by means of an orbiting satellite. A chronicle of all these events and their significance would take entirely too much time.

Allow me to say in a personal vein, that it has been most gratifying to meet face-to-face here in Norway and at this conference, fellow amateurs with whom I have communicated over the past thirty years or more. I learned here that a member of the delegation of Portugal was formerly the licensee of CR5AR on Sao Thome Island, whose QSL card is in the files of my own station; that my good friend Mr. Ivanov of the Soviet delegation was formerly EU9BU and that in many other delegations, active and former amateurs are included amongst them. Through amateur radio at station LA1ITU, many delegates were able to communicate with their families at home, in an informal atmosphere, with gratifying results.

There is, without question, a close correlation between the sponsorship and encouragement of amateur radio in countries of the world, and the technological advancement of those countries. If I might offer a suggestion to all countries represented here at this conference, it is that they encourage to the utmost the participation of their technically inclined students in amateur radio. For I'm sure they would find a bright new zeal and thirst for learning in the communications field, by application of technical knowledge to equipment they build and operate themselves.

Mr. President, amateurs throughout the world will experience a thrill and pride, upon learning that the newly elected Director of the C.C.I.R., Mr. Herbstreit, also is an active radio amateur, WØIIN. I am equally certain that in the years to come he will continue his interest and activity, although he will be surrounded by all our problems and their most satisfactory solutions.

Therefore, Mr. President, I tender you personally our thanks and gratitude for your wisdom and appreciation of amateur radio, in your approving the establishment of station LA1ITU. Nearly 2000 contacts have been made with approximately 85 countries, in all continents of the world. Our gratitude also is expressed to the Norwegian Radio Relay League, whose members have spared no effort to facilitate the success of the station in cooperation with your administration, and to make us all feel welcome here in your beautiful country. It was with sadness that we learned of the sudden death of the President of the Norwegian Radio Relay League, Mr. Per Gunderson, who was present in this hall at the opening ceremonies.

Although I speak only on behalf of our Delegation, I know that all delegations and amateurs everywhere will join me in this salute to you, Sir, and in wishing you the best of life's pleasures and time to enjoy them all.

I would appreciate having my remarks included in the minutes of this session of the Plenary Assembly.

Thank you, Sir.

CHILEAN PRESIDENT THANKS AMATEURS

John Hellyer, CE3OX, several months ago made contact with a number of U.S. stations, seeking a special form of blood plasma to aid a 7-year-old boy suffering from hemophilia and infection. The plasma was found and flown to Chile by Navy jet (additional details and photo, June *QST*, pages 67 and 69), and at last report the youngster was in fairly good shape.

OM John has received the following message, translated from the Spanish:

Esteemed Friend:

Some time ago, I noted in the press that you, as a radio amateur, had obtained concentrated plasma which a child suffering from hemophilia had needed for an operation.

I want to thank you for this action of yours which has done so much good for a child of our country, and to congratulate you in the most cordial way for such a noble hobby, which can render such useful services to our nations . . .

I beg you to congratulate and thank the radio amateurs of the United States, through whose participation it was possible to obtain this help.

With affectionate regards,

Eduardo Frei,
President,
Republic of Chile

LONDON EXHIBITION

The International Radio Communications Exhibition will be held October 26 to 29 at the Seymour Hall, London, W.1. The Radio Society of Great Britain will hold a reception for foreign visitors at 1930 Friday October 28.

Amateurs expecting to attend the Exhibition should get in touch in advance with R. F. Stevens, president of RSGB, 28 Little Russell Street, London, W.C. 1. The phone number is HOLburn 7373.

YUGOSLAVIAN ANNIVERSARY AWARD

As part of its 20th Anniversary celebration, the *Savez Radioamatera Jugoslavije (SRJ)* is issuing a Jubilee Award for working YU stations, as below, between January 1 and December 31, 1966. Europeans need 20 contacts, Asians, Africans and North Americans 5 contacts, and South American and Oceanean stations 3 contacts. All bands and modes may be used, but each YU can be counted only once. A list of claimed contacts with log data, certified by two licensed amateurs, should be sent with 5 International Reply Coupons to SRJ Awards Manager, Box 48, Beograd, Yugoslavia. QST

Correspondence From Members-

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

DX CONTEST QUOTAS

¶ I congratulate the decision of the contest committee to eliminate quotas in the c.w. ARRL DX contest. You can't know how delighted I am that quotas have gone the way of outdoor plumbing, iceboxes with real ice and hand-crank starters — I never got the hang of changing hands so I could count to six. I appreciate the courage it took to make such a decision — my heartiest congratulations to your fine staff . . . *Fred Capossela, W2IWC, Baldwin, New York.*

FREELOADERS — PRO AND CON

¶ . . . ARRL should immediately adopt a policy of free service for League members only. No one should be refused aid, but all non-members should be charged a nominal fee of not less than $3.00 for such services as certificates, answers to technical problems, etc. This action will either result in an increase in League membership or a reduction in the work load of the Headquarters staff. Either way, we win.

It will cause a lot of anguished screaming from the freeloaders and no doubt some of our soft headed members will object, but who cares? Why should the ARRL membership be required to pay the freight for the entire amateur radio fraternity?

Don't let the softies sway you, gentlemen. They will be the first to howl if the League finds it necessary to raise the dues in order to cover the cost of the League's present policy of free service to all radio amateurs. — *Mick Morrow, W6BWV, Loleta, California.*

¶ . . . One possible solution would be to charge $1.00 for anything they ask from the League except things such as the *Handbook*, *License Manual*, etc. If they were making use of the ARRL by requesting assistance they will soon find out that it does not prove economical, and if they cared anything for the League they would then become members. This policy could hurt those non-members that find it hard to obtain the membership dues, but are the members to suffer because of the non-members putting our organization into financial jeopardy? — *Bill Morris, WA5MUF, El Paso, Texas.*

¶ ARRL and *QST* have, as a result of non-partisan, non-political, helpful, good-for-the-order attitudes in their work, gained a high order of respect and support from all radio amateurs. I have participated in the benefits of "ham radio" for 35 years, not always as a member of ARRL, and not always in agreement with them. The thing that finally won me over as a dues-paying member, however, was its unselfish, honest endeavor to serve the interests of amateur radio *generally*, not for only those willing (or able) to contribute to the cause. I could see no discrimination in services rendered to paying and non-paying licensees, so long as the state of the art was furthered. It was ARRL's ability to stand above the pecuniary level in its administration and representation of the entire amateur fraternity that finally won my admiration and respect. The magnetism of this image did the trick. Also, maintaining this position in view of commercial pressures to the contrary impressed me as quite an accomplishment. But then, isn't "non-commercialism" a basic precept of amateur radio? . . .

It is understandable in present society that such an idea as "freeloading" could come up for mention at a board meeting, but I'm surprised it rated a discussion. I'm of the opinion that a non-discriminatory policy regarding non-members could be one of your best morale and membership boosters. A few non-members may abuse the privilege. It is better they be out than in the organization. I doubt anything much closer to mandatory membership would help. I would like to think that League membership was influenced more by obvious excellence of its work toward its declared purpose than by threats to reduce service standards or to increase the tab. Certainly the stature of ARRL will suffer less with the former. — *Norman S. Allen, WØHOZ, Independence, Missouri.*

¶ . . . The League is a long-time leader in providing help and guidance for *any* amateur needing it. The League awards are the most worthwhile available — let's keep them off the "market" . . . — *Ren Flagg, W8OQH, Cedarville, Michigan.*

MEMBERSHIP DUES

¶ I read in *QST* that ARRL went for a loss money-wise this year. This problem likely could be solved by increasing dues or getting more members.

Everyone, including the League, should stress to all hams, members or not, that without an organization of some type, amateur radio's future would be very dim. By having all hams possible support an organization, the ham fraternity's voice would be much stronger to all, including FCC and government officials.

I think one of the League's aims should be to recruit new members and get present members to do the same. A strong and active organization will win influence and have more "say-so:" without one — — nothing. — *William R. Bradford, WA7AUW, St. Murray, Utah.*

[EDITOR'S NOTE: WA7AUW hit the nail on the head in his final paragraph. Right now, the League and local radio clubs are in the middle of HamQuest 67, a campaign to bring in new members on the national and local level. There are prizes for the clubs and their "salesmen," too. If your club hasn't started on the program yet, write to Hq. for a HamQuest 67 kit.]

¶ Most scientific societies are having some difficulty meeting financial obligations due to increased costs. I belong to four societies and all of them (except ARRL) have had to raise their membership fees in the past two years. — *James P. Gillespie, W4LQC/-W8BKK, Nashville, Tennessee.*

A PLEA FOR UNITY

¶ I am writing about an article I read in June *73* Magazine dealing with ARRL . . . This matter is not only childish but becoming rather annoying.

After all, what is amateur radio becoming when radio journals are taking up more and more of the room we pay for to punch below the belt and tear down the opposing magazine instead of what we amateurs are interested in? I can only say that if ARRL wasted some 3½ pages to tear down *73*, *CQ* or any other journal, like *73* did, I would be rather doubtful as to the sincerity of the League — as I am with *73*. I am sure all journals and organizations have a few faults, most of them only in the minds of some readers . . . What I am trying to say is that a single copy of a journal made to please all is almost impossible because of the world we live in today we all have different ideas and viewpoints.

. . . If we are to survive, . . . we should work together as one . . . Let's stop tearing down other organizations and weakening amateur radio. As can be proved by past history, nations can not withstand a war nor are they as strong if they are fighting among themselves. This holds true with us in the battle to keep amateur radio good, organized and honorable — let's keep together. — *Devern Dean, W1SAHB, APO, New York, New York.*

QZZ

¶ I heartily endorse the suggestion by K9CZV (*QST* August) that QZZ? be added to the Q-signed list. The abbreviated question: "Is anyone using this frequency?" not only lends an air of courtesy to our hamming but will help reduce unintentional c.w. QRM. QZZ would mean "This frequency is in use."

We need this in c.w. operation. — *David P. Shafer, W4AX, Glen Allen, Virginia.*

¶ The suggestion . . . seems to be a good one, because conditions are such, at times, that signals from the distant station are not too strong and consequently are likely to be overlooked . . . *William G. Gerlach, W6BG, Oakland, California.*

HERTZ *VS.* CYCLES

¶ Never have I felt more strongly about something as I do about the recent change by some mags to the use of Hertz for cycles. This is the most disgusting thing that has happened in recent years. I have never written to anyone before, but this is too much. May I call upon other amateurs to rally against this change? I am most pleased that *QST* has not as yet adopted the use of this term.

Long live "cycles per second." — *George Gatliff, K5KOC, Notrees, Texas.*

¶ I agree with the Paul Harris letter, page 48, August *QST*. Here is one vote for the Federal regulatory agencies, and *QST*, letting "cycles per second" stand. — *Henry Morrison, Jr., WØBBW, St. Paul, Minnesota.*

¶ Congrats on your "Hurts" stand. Let me add one QRP voice in support. You may have to join 'em, but let's drag our feet as hard as we can. — *Harry E. Adams, W9JX, Spencer, Indiana.*

¶ . . . I have a suggestion for the cycle-Hertz controversy. I am with, I believe, the majority who feel that this was an unnecessary and unbeneficial change. I hope that it will be repealed. But if it is not, then why not have the ARRL lead the crusade for a new abbreviation for Hertz? kHz is a cumbersome thing to type, so lets use the small letter "c" as the abbreviation for Hertz. Then kiloHertz becomes kc, MegaHertz becomes Mc, etc. Why not? If they can change traditions, why can't we? — *Gary Huff, K9AUB, Springfield, Illinois.*

¶ . . . Why must we in the U.S. and other English-speaking countries, and also in all countries speaking French, Spanish and Portuguese — and all these add up to quite a number of people — obsolete a perfectly good self-explanatory term in favor of something that until very recently was known only in a few continental European countries?

Hertz does not mean a thing to us — it would be about the same to decree, that from now on we will have to call radio "Popov" and television shall be known as "Nipkov," according to the names of their Russian "inventors."

So — why Hertz? — *Ulo Vilms, WB6LNS, Pacoima, California.*

¶ It is difficult to quarrel with the use of the terms "cycle" and "cycles per second" as elaborated by G3GFN, provided one remembers that these are two separate, distinct, technical terms with different meanings.

If we then look farther up the page, we read" . . . drift is less than 3 kilocycles . . .," "Major calibration marks at 1-megacycle intervals," ". . . at every 200 kilocycle point. . . ."

This is current jargon and it is just possible that many readers will be unaware that each and every one of these should read cycles *per second*. Or, better still, Hz.

The excellent reasons for using volt, weber, maxwell, and such units are that they are single words that do not translate into other words with other abbreviations and contractions in other languages.

I say the use of Hertz is a worthwhile and long overdue reform. — *Walter H. Anderson, VE3AAZ, Toronto 12, Ontario.*

RUDENESS

¶ How many amateurs would barge into a room where two people are talking and interrupt them at top voice? Few, I daresay. Yet this sort of consumate rudeness is in evidence every day on the hambands, both phone and c.w. Do some amateurs just ignore common manners when they sit down at their rigs?

As a DX station, for the nonce, I find increasing difficulty in properly finishing even the shortest QSOs without having the station at the other end, who may be only a S3 or S4, smothered by stations calling me without having the decency to wait for either me or the other fellow to finish our QSO. Is life all that short?

This complaint is a common one in this part of the world and certainly is one reason that many stations in this area are less active than they might otherwise be. Sometimes it seems that trying to finish a QSO just "ain't worth the trouble."

Several of us have developed a sort of counteraction: Whenever possible we note the calls of the persistent, long-winded "breakers" so that we may studiously ignore them, even after our hashed-up QSO is finished and we're ready to work another.

This isn't the best answer to the problem, of course. Just a bit of common politeness on the part of all concerned will go a long way toward making our hobby enjoyable to the fullest. — *Robert F. Franklin, 9Q5CZ, APO New York, New York.* QST

Hamfest Calendar

California — The Fifth Greater Bay Area Hamfest will be held at the Edgewater Hotel off Nimitz Freeway in Oakland, California on October 22 and 23. Write Box 113, Hayward California for details.

Illinois — The Chicago Area Teleprinter Society will hold its twelfth annual "CHI-RTTY" meeting and dinner on Sunday, October 2, in Meeting Room 7 of McCormick Place, Chicago, preceding the National Electronics Conference. No admission is charged for the meeting. Further information may be obtained from Robert Paculat, W9JBT, 1327 N. Hamlin Ave., Chicago, Ill. 60651.

Indiana — The 5th Annual Hamfest of the Hoosier Hills Ham Club will be held on Sunday October 9 at Spring Mill State Park, Mitchell, Indiana, in the village near the old mill. There will be entertainment for the ladies, playground for the children, picnic area, plenty of parking space, swap shop, eyeball QSOs, free donuts and coffee and many other activities. Bring the family and enjoy the beauty spot of scenic Southern Indiana. S.s.b. dinner at 1900 EST, Saturday night, October 8 at the Spring Mill Inn. Communications will be on 3.910 and 50.4 Mc. For more information write The Hoosier Hills Ham Club, Inc., P.O. Box 375, Bedford, Indiana 47421.

Kentucky — Louisville Ham Kenvention date is October 15. Technical forums, exhibits, banquet and giant indoor trade-o-rama (bring your goodies). Ladies program (advance registration only). Details from P.O. Box 20094, Louisville, Ky. 40220.

New Hampshire — The Manchester Radio Club will hold their Annual Banquet on October 22. For time, place, etc., and other information, contact WA1DZX at P.O. Box 661, Manchester, New Hampshire 03105.

New York — The Annual Fall Banquet of the Finger Lakes Chapter of the QCWA in central New York will be held on Saturday evening, October 22, at the White Elephant Restaurant in Canastota, N. Y., one mile from Thruway Exit 34. The social hour will commence at 6:30 P.M. and a prime rib roast beef dinner will be served promptly at 7:30 P.M. Ladies are invited. Featured speaker will be F. E. Handy, W1BDI. Tickets are $5.00 and include meal, gratuities, tax, etc. Reservations are expected and should be made with Donald L. Farrell, WA2WEE, 207 Seneca St., Chittenango, N.Y. 13037.

New York — 12th Annual Syracuse V.h.f. Roundup, October 8, at Dellemort's Country Manor, Cleveland, N. Y. Registration $6.00 in advance, $7.00 at the door, starts at 10 A.M. Send remittance to James Stewart, K2PKK, 268 Hopper Road, Syracuse, N. Y. 13207. Dellemort's Manor is on the north shore of Oneida Lake.

Pennsylvania — The Tri-State Sideband Dinner, Pittsburgh Area, will be held October 29 at John Garneau's, Smorgasbord, Monroeville, Penna. 7:00 p.m. C. J. Tirk, W3KTP, Turtle Creek, Penna 15145 will supply additional details upon request.

South Carolina — The Rock Hill Hamfest is scheduled for the middle of October.

Texas — The Brownfield Free Swapfest is October 29 and 30 this year.

Washington — The Puget Sound Council of ARCs will hold their Fifth Annual Banquet, October 23 at Waller Road Grange Hall, Tacoma.

ARRL HUDSON DIVISON CONVENTION

Tarrytown, N. Y. **October 15–16, 1966**

Amateurs in the Northeast will have a unique opportunity this year to enjoy a "big-city" convention without having to put up with all the disadvantages of the city location.

The 1966 ARRL Hudson Division Convention is being held at the Hilton Inn, Tarrytown, N. Y., just south of exit 9 on the New York Thruway near the Tappan Zee Bridge. The site is therefore easy to reach by car, and is served by convenient train schedules both from New York City and from Albany. The World's Fair station, K2US, will provide talk-in on 2, 6, 10 and 75 meters.

ARRL President Robert W. Denniston, WØNWX, will be on hand, along with technical speakers from ARRL Hq. and from industry. Technical displays, manned by men from the top amateur equipment companies, will be open to all from 9:30 A.M. to 6 P.M. on Saturday and 9:30 to 5 on Sunday. Talks and forums will be held on public relations, the Amateur Radio Public Service Corps, Military Affiliate Radio System, DX, s.s.b., traffic, antennas, mobile operations, the YLRL, getting started in amateur radio and an idea exchange for clubs.

Jean Shepherd, K2ORS, famous in the metropolitan area as star performer of WOR-Radio, will headline entertainment at the Saturday Night banquet. Banquet seating is limited, so early reservations are wise.

Advance registrations are $3.00 and banquet tickets are $8.00. At the door, registrations will be $4.00, and banquet tickets, if any remain, will be $9.00. Tickets can be obtained from ARRL Convention, Post Office Box 112, Flatbush Station, Brooklyn, N. Y., 11226.

Motel registration requests go direct to the Hilton Inn, 455 South Broadway, Tarrytown, N. Y. (mentioning the amateur convention) or through your local Hilton hostelry. Rates are $14 single, $18 double.

GREAT LAKES DIVISION CONVENTION

Muskegon, Michigan **October 21–22**

The Great Lakes Division ARRL Convention will be held Friday and Saturday, October 21 and 22, at the L. C. Walker Arena, Muskegon, Michigan, under the auspices of the Muskegon Area

(Continued on page 168)

COMING A.R.R.L. CONVENTIONS

October 15–16 — Hudson Division, Tarrytown, New York
October 21–22 — Great Lakes Division, Muskegon, Michigan
January 21–22, 1967 — Florida State, Miami
April 22–23, 1967 — New England Division, Swampscott, Massachusetts
July 1–3, 1967 — ARRL National, Montreal, Quebec

Prospective convention sponsors are urged to check with ARRL Hq. to avoid possible date conflicts.

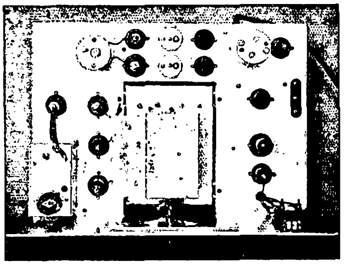
A Noise-Silencing I.F. Circuit for Superhet Receivers

An Effective Method of Coping With Auto Ignition and Other Electrical Interference in C.W. and 'Phone Reception

By James J. Lamb*

Here is another development of Jim Lamb's! And darned if we don't think it destined to the same widespread application in amateur and commercial radio as is now given his "Single-Signal" development. The new scheme is, without doubt, a second solid whack at the interference problem. Too bad that we can't ship out a receiver test booth or at least some moving cathode-ray tube pictures to establish once and for all that the scheme really works—but it certainly does.—EDITOR

THE problem of noise interference from electrical equipment in radio reception is one that becomes increasingly acute as we expand our use of the radio spectrum farther in the high and ultra-high frequencies and, simultaneously, electrical equipment capable of causing interference becomes more widely used. It is not so long ago that the only kind of QRN which really bothered was just plain natural static. But now, at least on our higher frequencies, the interference from atmospherics is practically negligible, while that from automobile ignition and oil burner systems, domestic and industrial equipment in infinite variety, is really disastrous. Admittedly this kind of interference is controllable at the source—provided all the manufacturers and all the users of the offending devices could be persuaded forthwith to take the necessary steps with the individual equipments. This utopian state may some day arrive, of course. But what about the immediate situation? Is there anything like a generally applicable shot in the arm that we individually can give our receivers to immunize them, more or less, from the electrical noise epidemic? We now believe that at least several more or less effective solutions are not just possible but, better still, have been developed to the practical stage. These are methods applicable to our present system of communication with amplitude modulated waves and adaptable as supplements to existing types of receivers, to be used within the receiver itself without compromising its normal characteristics. In addition to the one which is the subject of this article, descriptions of several others will be found in this and recent issues of *QST*.[1] Truly, we are getting somewhere.



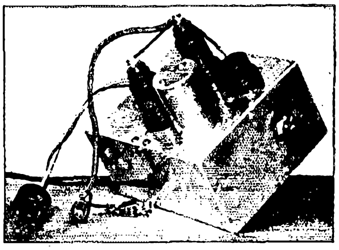
TOP VIEW OF THE METAL-TUBE RECEIVER USING THE NEW NOISE-SILENCER CIRCUIT

The receiver is completely described, except for this feature, in Chapter Seven of the 1936 A.R.R.L. Handbook. From left to right, behind the tuner unit and to the right of the second i.f. transformer, are the i.f. silencer-amplifier tube, the second detector coupling transformer and the diode second detector. Behind these, in corresponding positions, are the noise amplifier tube, coupling transformer and noise rectifier.

* Technical Editor, *QST*.

[1] Thompson, "Detector Circuit For Reducing Noise Interference," April, 1935; Hull, "A New Receiving System for the Ultra-High Frequencies," Nov. and Dec., 1935; Robinson, "Output Limiters," this issue; and Thompson, "Detector Circuit For 'Phone," this issue.

one case. Such disturbances are generally non-uniform in amplitude and in duration, although frequently of high amplitude relative to the radio signal, and may result in receiver noise output of a "plunky" character. Still another type of more or less common interference is that peculiar to old and faulty incandescent lamps. But these types usually represent the dying rattle of sick equipment and end shortly with its demise. The degree to which these miscellaneous interferences can be silenced in the receiver depends on their wave form. If in the form of short-time discrete pulses, then they are most readily handled; if in the form of a more or less solid envelope, then they are less tractable. Interference effects of all types, however, have been found reducible by the system described, the amount of reduction ranging up to practically total elimination for ignition noise, clicks and similar types.



THE SILENCER ADAPTER UNIT FOR USE WITH STANDARD SUPERHET RECEIVERS, AS DESCRIBED AT THE END OF THIS ARTICLE

From left to right, grouped around the diode coupling transformer, are the 6J7 noise amplifier, the 6L7 i.f. silencer-amplifier and the 6H6 noise rectifier. The knob on the side controls the noise threshold adjusting resistor.

In view of the characteristically ultra-short duration and relatively large separation of the electrical pulses principally responsible for noise interference, it might be wondered how they can be so devastating in effect. The electrical pulses individually may be of less than one-thousandth second duration, as previously mentioned, and in a typical case may occur 120 times per second. But the ear is supposed to be insensible to acoustical impulses so widely separated and of such short duration. Obviously something is occurring to increase the effective length of each pulse before it reaches our ears so as to give it a character it did not have originally. One element of the receiving system which certainly is capable of accomplishing this change in character is the telephone receiver or loud speaker. By its very nature it responds with a reverberating crack or a boom to the shortest high-amplitude impulse, vibrating at some natural period of its own long after the original electrical jolt. Then also the pulses can be given appreciably increased electrical duration in audio-frequency circuits and even in radio-frequency stages of the receiver. This is especially likely if their amplitude becomes sufficient to drive a grid positive in any r.f. or audio stage. When this occurs, grid current representing the rectified envelope of the pulse flows through the input return circuit of the afflicted stage, which may include resistance-capacitance networks of relatively large time constant in addition to the coupling circuits and bias source. This gives rise to the secondary effects of cross-modulation and blocking.

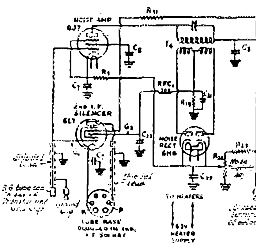


FIG. 2—CIRCUIT OF THE SILENCER ADAPTER UNIT

Components are the same as for corresponding designations in Fig. 1, excepting R_{31} which is a 50,000-ohm screen-voltage dropping resistor. Two separate 100,000-ohm resistors may be used, as in Fig. 1.

With r.f. or i.f. circuits of high selectivity and low decrement, particularly with a crystal filter, shock excitation from high-amplitude pulses results in prolonged wave trains of relatively small damping. In a typical instance, spark

SOME CHARACTERISTICS AND EFFECTS OF ELECTRICAL INTERFERENCE

From the experience of others, and from our own observations during work on the present development, it appears that ordinary electrical disturbances affect the receiver circuits as highly damped waves and may be classified generally as of two basic types. One is the "pistol shot" or "machine gun" variety, usually resulting from a spark discharge across a gap. Ignition systems, light switches, key clicks, power leaks, "violet ray" gadgets and the like are common sources. The other is the "hash" type identified with d.c. and a.c. series motors.

The disturbances of the first (spark-gap) type show up on the oscillograph as distinctly separated and more or less uniform pulses, each of extremely short duration (one-thousandth second or less). Before they ruin intelligible reception, they may have an amplitude as great as twice that of the desired signal. But more often than not their amplitude runs 20 or more times that of the desired signal, so that they can even overload circuits (drive grids positive) and cause secondary effects which demand special consideration, as will be explained farther on. The main pulse of small duration may be accompanied by subsidiary "whiskers," as when the spark occurs with 60-cycle mains supply. The omnipresent auto ignition pulse, however, is characteristically clean and relatively free from "whiskers."

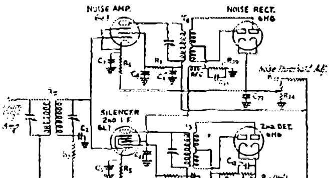


FIG. 1—CIRCUIT OF THE SILENCER SECTION ADAPTED TO THE 1936 A.R.R.L. HANDBOOK METAL-TUBE SUPERHET

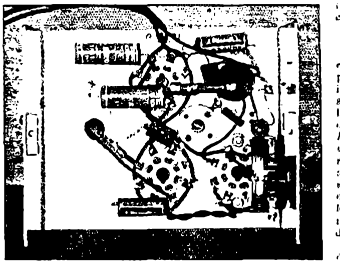
Components are designated to correspond with the description given in the Handbook, to which the reader may refer for other circuit details.

C_2—0.01-µfd. grid by-pass condensers, 200-volt tubular.
C_3—0.01- to 0.1-µfd. plate by-pass condensers, 400-volt tubular.
C_7—0.1-µfd. cathode by-pass condensers, 200-volt tubular.
C_8—0.01- to 0.1-µfd. screen by-pass condensers, 400-volt tubular.
C_9—0.25-µfd. main by-pass condenser, 600-volt tubular.
C_{12}—50-µµfd. detector load by-pass, mica midget.
C_{13}—50-µµfd. beat osc. coupling condenser, mica midget.
C_{16}—0.1-µfd. detector output coupling condenser, 200-volt tubular.
C_{21}—0- to 250-µµfd. noise rectifier load by-pass, mica midget.
C_{22}—0.1-µfd. threshold resistor by-pass, 200-volt tubular.
C_{23}—50-µµfd. silencer r.f. by-pass, mica midget.
R_2—100,000-ohm grid filtering resistor, ½-watt.
R_5—350- to 1000-ohm cathode resistors, ½-watt.
R_7—100,000-ohm screen-voltage dropping resistors, ½-watt.
R_{13}—5000-ohm manual r.f. gain control.
R_{14}—1-megohm volume control.
R_{15}—50,000-ohm detector load resistor, ½-watt.
R_{23}—20,000-ohm threshold bleeder resistor, 1-watt.
R_{24}—5000-ohm threshold control potentiometer, volume-control type.
R_{28}—100,000 ohm noise rectifier load resistor, ½-watt (see text).
R_{30}—1-megohm a.v.c. filter resistor, ½-watt.
RFC—80-millihenry r.f. choke.
T_2—Double air-tuned i.f. transformer (Hammarlund ATT-465).
T_3—Single air-tuned full-wave diode coupling transformer (Sickles 456-kc.) (see text).
T_4—Same as T_3.

The commutator-type interference is considerably more complicated in form. A d.c. series motor gives prominent pulses of commutation frequency, more or less uniform in amplitude, with an almost solid intervening "whisker" accompaniment of considerably smaller but non-uniform amplitude. A series (universal) motor operating on a.c. has the commutation-frequency pulses superimposed on a supply-frequency component (and the "whiskers" as well), making the picture still more complex. In both cases, the principal noise component heard is the commutation-frequency rattle, filled in with hash from the "whiskers." As compared to the spark-gap type, which has effective value relatively small compared to amplitude, the commutator-type interference is of more solid wave form and has greater effective value in proportion to its peak amplitude. Amplitude operated limiting and silencing systems accordingly find it much more difficult to handle. Fortunately interference of this type is considerably less prevalent than the jump-spark type; and, unlike the machine-gun variety, it is effectively disposed of by selective circuits such as the i.f. crystal filter.

Besides these two main types, several others which we have encountered also might be classified. Some have characteristics not unlike natural static—that from a faulty high-tension transformer which was having internal trouble being

interference wave trains of approximately a thousandth-second duration with a straight transformer-coupled two-stage i.f. superhet have been observed to increase to over one-hundredth second duration with the crystal filter switched in. In c.w. reception with the receiver's beat oscillator on, the aural effect on switching in the crystal is conversion of machine-gun rattling to continuous "pinging" and ringing at beat-note frequency—from which the signal cannot be distinguished.



BOTTOM VIEW OF THE ADAPTER UNIT

To the left of the threshold adjusting resistor are the noise rectifier and i.f. silencer-amplifier tube sockets, the noise amplifier socket being above the latter. The r.f. filter choke is mounted centrally, other components being placed to give short leads and minimum stray r.f. coupling.

With these characteristics and peculiarities of the most common types of electrical interference in mind, it appears entirely reasonable that something in the nature of eliminating their effects should be possible. They are inherently of short duration until prolonged in effect by some element of the receiving system. They generally cause only objectionable background so long as their amplitude does not exceed the desired signal amplitude at the output of the receiver. Advantage of these characteristics have been taken in devising output limiting circuits of various types, several of which are described elsewhere in this issue. But these can only cut off the peaks of interference which extend above the desired-signal level in amplitude, and leave the earlier circuits of the receiver without protection from the secondary effects of overloading. Why not go farther? Why not try to bring the amplitude of the interference below the desired-signal level, and do the job in an earlier circuit of the receiver before the stages most susceptible to overloading and cross-modulation are reached? Why not amplify the noise peaks extending above the desired signal amplitude at radio frequency, rectify them and use the rectified voltage to control the gain of a subsequent radio-frequency stage, automatically and instantaneously?

THE SILENCER CIRCUIT

The essential circuit of a typical example of this method of noise peak silencing applied in the i.f. amplifier of a superhet is shown in Fig. 1, the receiver being the metal-tube superhet described in the 1936 A.R.R.L. *Handbook*. This receiver originally used a separate a.v.c. amplifier and rectifier, which section was adapted to serve as the noise amplifier and rectifier in the present arrangement. The same silencer circuit is, of course, readily adaptable to other superhet designs.

As shown in the diagram, the control grids of the noise amplifier and second i.f. amplifier are fed in parallel from the secondary of the conventional tuned i.f. transformer. The output circuit of the noise amplifier is coupled to the full-wave diode noise rectifier by means of transformer T_4, which is also tuned to the intermediate frequency (456 kc. in this case). The cathodes of both the noise amplifier and noise rectifier are connected to the movable contact on the resistor R_{24} so that the control grid of the noise amplifier and the diode plates of the rectifier can be biased negative with respect to the cathodes of these tubes. This bias determines the input amplitude at which rectification starts in the diode, being normally set so that action begins for noise peaks extending above the desired signal level. For 'phone reception with automatic gain control, the bias developed in the a.v.c. circuit of the receiver is also applied to the control grid of the noise amplifier, augmenting the fixed bias developed across R_{24} and automatically maintaining the proper noise threshold level over the range of signal strength normally encountered with fading.

The rectified noise voltage developed across the diode load resistor R_{28} is applied to the No. 3 grid of the 6L7, biasing this grid negative in proportion to the amplitude of the noise pulse and, accordingly, reducing the gain of this i.f. stage for the i.f. components of the same noise pulse on the grid of the i.f. amplifier tube. The object is, in effect, to make the noise commit suicide in the final i.f. stage by partly or wholly blocking this amplifier during the noise pulse,

The amplifier is also disabled correspondingly for the desired signal, of course, but the time is so short that no audible gap is discernible. For instance, with spark pulses occurring 120 times per second and each pulse lasting as long as one-thousandth second, only every 120th cycle is lost at a signal modulation frequency of 1000 cycles per second. This requires a small time constant and freedom from instability in silencing action, demanding not only proper circuit constants but also tubes of suitable characteristics.

TUBES AND CIRCUIT FEATURES

In earlier experiments with the silencer circuit before the metal type tubes indicated in the diagrams were introduced, various combinations of glass types were used. One combination was a 6H7 pentode-diode in the noise amplifier-rectifier section and a 6A7 pentagrid as the i.f. silencer-amplifier, the rectified noise voltage being applied to the No. 1 grid of the latter. Fair success was obtained with this combination, but not without a tendency to instability and reduced gain in the 6A7 as an intermediate amplifier. Apparently there was considerable internal capacitive coupling between the pentode and diode sections of the 6H7, allowing more fundamental r.f. to reach the diode load current than was desirable. As a further complication, considerable i.f. coupling through the 6A7 was evident even when the No. 1 grid was biased sufficiently negative to cut off the plate current. Both of these factors handicapped the silencing action, although the results obtained showed the principle to be sound.

With the newer types made available in the metal tube line, these problems were solved. The 6H6 diode-diode permitted separation of the functions of noise amplifier and rectifier in different envelopes and, more important, the 6L7 was ideally adapted to use as the i.f. silencer-amplifier. With this tube, full normal amplifier gain is obtained, its No. 1 grid's variable-mu characteristic permits convenient automatic and manual gain control, and its No. 3 grid is excellently suited to the noise-silencing action. Its internal shielding is such that there is practically no i.f. output when the No. 3 grid is biased to cut off the plate current and there is no abnormal tendency to instability. While a combination pentode-diode (6J7 or 6H7) might be used for the noise amplifier-rectifier, no other type available as the 6L7 has been found for the i.f. silencer-amplifier. It is to be noted also that a sharp cut-off 6J7 is used as the noise amplifier, rather than a variable-mu type tube. The sharp cut-off type has been found considerably more effective in this position, giving more decisive threshold action. In glass types, a 57 or 6C6 would be alternatives to the 6J7.

Apart from the tubes, the circuit of the silencer section is not especially critical. Considerable tolerance is permissible in bias and screen voltage values, and even in the diode load and output filtering network. Variations are also possible in the method used to set the noise threshold bias. Alternative to biasing both the noise amplifier and rectifier by the common cathode resistor R_{23}, biasing only one or the other has been tried. However, the combination shown has been found to give the most satisfactory *threshold setting*. Note that a small fixed resistance is used in the cathode of the noise amplifier. This gives the 6J7 a small minimum bias with the threshold adjustment at zero ground, so that it grid will not be operated at zero bias.

Of a variety of resistance and capacitance combinations tried in the diode load and silencing-grid circuit, those specified with Fig. 1 appear to be as suitable as any. Resistance of between 100,000 and 250,000 ohms for R_{29} satisfies requirements, with the lower value preferred as giving the smaller time constant. Capacitances C_{21} and C_{20} also are fairly tolerant as to value, the largest capacitance permitted by time constant considerations being desirable for best r.f. filtering. Some tolerance in the inductance of *R.F.C.*, the *silencing current filter choke*, also is allowable. In no case should the inductance be so large as to affect the time constant appreciably. Resonant combinations were also tried for filtering in this circuit, but were found to cause instability.

Typical voltage values in the circuit, measured to ground with 225-volt B supply and the r.f. gain control set at maximum are as follows: 6L7 screen, 90 volts; 6J7 screen, 90 volts, 6L7 cathode, 3 volts; 6H6 cathode, normal operating setting of R_{29}, 6 volts, 6L7 silencer grid (No. 3), peak voltage across R_{29} necessary to block amplifier, approximately 10 volts. It is to be noted that this blocking voltage is added by the cathode bias drop across R_{23} of the 6L7 and the manual gain control, the diode load resistor being returned to ground. Tests indicate that this connection gives better action in general than return of the diode load resistor directly to the 6L7 cathode.

Although the usual type of i.f. double-tuned input transformer is satisfactory for T_3, the single-tuned full-wave diode type transformer is essential for T_4. This transformer should have relatively poor selectivity (low effective Q_2), the untuned secondary being closely coupled to the primary. The full-wave diode rectifier circuit is an essential feature. It minimizes the fundamental i.f. component in the load circuit and simplifies the problem of keeping this undesirable r.f. voltage from reaching the silencing grid of the 6L7. The full-wave arrangement also insures rectification of the maximum half-cycle of i.f. noise, which is likely to be most unsymmetrical at the rectifier input.

CONSTRUCTION AND OPERATION

No unusual constructional features have been found necessary in the several applications of this silencer system to conventional superhet receivers. A photograph shows the layout of the silencer section and second detector of one receiver in which it is used. (Complete constructional details of this receiver are given in the 1936 A.R.R.L. *Handbook*, Chapter Seven.) The only extra shielding beneath the base is a baffle separating the noise amplifier-rectifier from the i.f. amplifier-silencer and second detector sockets and wiring. Precautions should be taken, of course, to prevent c.w. beat oscillator r.f. output from getting into the noise silencer circuit. Usual good design will take care of this.

After the circuit connections have been proved by ohmmeter and voltage tests, and with the other receiver circuits in normal alignment, the silencer section is ready for adjustment. The secondary of the input transformer (T_3) will be tuned to i.f. resonance using second detector output or tuning meter peak indication. The remaining tuning adjustment is that of the noise rectifier coupling transformer T_4. Resonance of this transformer will be indicated by peak reading of a d.c. voltmeter connected across the diode load resistor R_{29} on a test signal tuned in with the noise threshold adjustment (R_{24}) set at minimum resistance. Operation of the silencer circuit will then be indicated by complete blocking of the output when a moderate-strength signal is tuned in with R_{24} at this same setting. Backing off on R_{24} will allow the signal to come through in normal fashion. The adjustment of T_4 should be *made precisely. If no d.c. voltmeter is available*, this transformer can be tuned for *minimum* noise output from the receiver, using a buzzer, spark coil or similar noise source.

In operation it will be found that the most effective setting of the threshold adjustment R_{24} will vary with different settings of the manual r.f. gain control. For c.w. reception (a.v.c. off) it has been found desirable to set R_{24} for a comfortable no-signal noise level and then to adjust the manual r.f. gain to accommodate the signal in normal fashion. Extremely strong signals may cause silencing of the receiver, naturally, if the r.f. gain is set too high. A few minutes' experience will suffice to make the operator familiar with the proper combination, however. The settings are not especially critical and the silencer actually operates as an *effective signal limiter* over a considerable range of amplitude, an incidental feature which is of no little use in itself. Under extremely bad noise conditions, especially when receiving a weak signal, close adjustment of the threshold control will give the best signal-noise ratio.

PERFORMANCE DATA

Weak Signal–Phone Reception, Spark Interference

Silencer Off		Silencer On	
Control Meter Reading	Oscilloscope Amplitude	Output Meter Reading	Oscilloscope Amplitude
Signal Alone	5 v.	5 v.	1
Signal + Noise	15 v.	2 v.	
Noise Alone	15 v.	0.5 v.	0.6
Noise/Signal	1	0.17	0.6

Improvement in signal-noise voltage ratio, 30 times (approximately 30 db)

Medium-Strength Phone Signal, Spark Interference

Silencer Off		Silencer On	
Output Meter Reading		Output Meter Reading	
Signal Alone	5 v.	5 v.	
Signal + Noise	15 v.	5 v.	
Noise Alone	15 v.	0.5 v.	
Noise/Signal	3	0.1	

Improvement in signal-noise ratio, approximately 30 db

C.W. Beat-Note Reception, Spark Interference

Silencer Off	Silencer On
Output Meter Reading	Output Meter Reading
Signal Alone ..... 5 v.	5 v.
Signal + Noise ..... 5 v.	5 v.
Noise Alone ..... 5 v.	0.5 v.
Noise/Signal 1	0.1

Improvement in signal-noise ratio, approximately 20 db

In 'phone reception with a.v.c., the manual r.f. gain adjustment may be left at its normal setting and the threshold control set for best signal-noise ratio. A single setting of this control will serve for a wide range of signal strengths, since the noise amplifiers grid is tied into the a.v.c. circuit so that the threshold point is maintained proper over a considerable range of signal amplitude, even with rapid fading.

PERFORMANCE CHECKS

Noise interference being what it is, so variable in character and inconsistent, it is difficult to give generally applicable qualitative description or quantitative data on the performance of this silencer system. A great many tests have been made on various kinds of interference with reception of all kinds of signals throughout the frequency range from 30 mc. to the broadcast band. In every case it has been possible to bring the noise amplitude down to or below the maximum signal amplitude at the receiver's output. Most of these tests have been made using a "Model T" spark coil in the same room with the receiver, usually right on the operating table, and typical results obtained with this set-up are summarized in the accompanying table. Without the silencer, the interference from this noise source was so great that all signals were completely unintelligible and the audio circuits of the receiver were overloaded even with the r.f. gain reduced for strong signals and the audio gain adjusted for no more than normal loud speaker or headset volume on the signal. With the silencer in operation, it is possible in every case to bring the output noise down to a level which permitted intelligible reception of any signal above the receiver's normal sensitivity level.

A particularly helpful feature during 'phone reception is the protection to voice operation afforded by the silencer. By taking out the noise peaks ahead of the second detector, where a v.c. *reluctance normally takes place*, the noise pulses are prevented from taking control of the gain by building up high bias voltage on the necessarily slow acting a.v.c. circuit. Provided the noise amplitude is not so great as to overload the last current of the i.f. amplifier and develop a v.c. bias from rectified grid current through the filtering and diode load resistances, this protection is practically complete.

When the silencing is applied to the final i.f. stage of a single-signal receiver with the crystal filter operating ahead of it, the behavior is somewhat different. If the noise interference without the silencer is of sufficient amplitude to cause the crystal to "ping" (with the c.w. beat oscillator on), the silencer will be considerably less effective—less effective with crystal in than with it out of circuit. The explanation for this was given earlier in this article; namely, the low decrement of the crystal circuit increases the duration of the noise wave trains. This is not a fault of the crystal. It results from the very property of the crystal which gives it desirable high selectivity. Nor is it the fault of the silencer circuit. It still tries to perform its function but is handicapped by the increased duration of the noise pulses. The two devices are simply in the wrong relative positions. The silencer should be ahead of the crystal filter, permitting it to give its full benefit and to protect the crystal from shock excitation by high-amplitude noise pulses. Since the crystal must work in a low-level stage of the i.f. circuit and since the noise rectifier requires a fairly high level of noise voltage for effective operation, additional i.f. stage gain between the first detector and crystal filter should be *used for the i.f. silencer-amplifier*; and *an* additional stage of low selectivity and fairly high gain should be put in ahead of the noise rectifier. This might seem like undue elaboration of the receiver circuits; but if it means the difference between no reception and successful reception, which is an infinite difference, then it is well worth while.

ADAPTING THE SILENCER CIRCUIT

An adapter unit suitable for superhet receivers using a two-stage i.f. amplifier and having at least one r.f. stage ahead of the first detector is diagrammed in Fig. 2 and illustrated by top and bottom views. It is connected into the i.f. circuit by the tube-base plug which replaces the 58 or 6D6 second i.f. tube, and by the grid-cap lead which connects to the second i.f. transformer grid clip. The shielded grid and plate leads should be as short as permissible. The circuit otherwise is the same as that of Fig. 1, the diode input transformer, T_4, being tunable to the receiver's intermediate frequency.

With the connections made, the adjustment procedure is identical with that outlined for the other circuit—not overlooking retuning of the second i.f. transformer in the receiver which is necessitated by the increased capacitance of the shielded grid lead and the input of the two noise-limiter tubes in parallel.

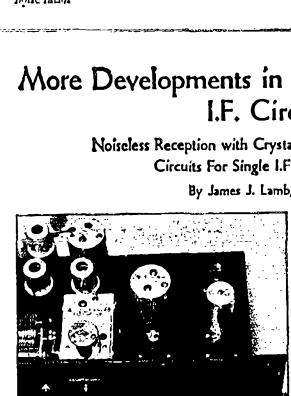
No trouble with instability or i.f. oscillation should be experienced if the receiver was stable in the first place. If there is such instability, *however, good silencing action is unlikely.* When receiver and silencer circuit are properly coordinated, silencing performance in accordance with that previously described should result.

The twin problems of interfering signals and non-signalling types of noise have always plagued receiver designers. In the 1930s a concentrated attack led to the single-signal receiver (QST Classic, August, 1966) and to the Lamb Noise Silencer. Here is the original silencer article complete, from February 1936 QST, along with the title page of a follow-up in the April 1936 issue.

More Developments in the Noise-Silencing I.F. Circuit

Noiseless Reception with Crystal-Type S.S. Receivers—Circuits For Single I.F. Stage Types

By James J. Lamb,* W1AL



THE NOISE SILENCER UNIT, AT THE RIGHT, COMBINES WITH THE CRYSTAL FILTER OF THE SX RECEIVER TO MAKE C.W. TELEGRAPH RECEPTION PRACTICALLY IMMUNE TO ELECTRICAL NOISE INTERFERENCE

The silencer-amplifier and input coupling transformer are at the left, with the noise amplifier, diode coupling transformer and noise rectifier at the right. The threshold adjustment control is on the front panel, at the lower right.

EVERY user of a crystal-filter S.S. receiver is familiar with the drastic reduction in background noise and ordinary electrical interference racket which can be obtained with the crystal switched in circuit. By measure, this improvement in signal-noise voltage ratio runs to ten times and higher (20 db or more), as compared with the straight two-stage i.f. noise ratio in typical superhets. But every user of such a receiver is also familiar with the apparent *failure of the crystal filter* to maintain this performance under conditions of extraordinary electrical interference—the kind that sets the crystal to "pinging" and makes the signal lose its identity completely. The crystal is highly effective in cutting down background noise such as tube *hiss*, motor "hash," and even "machine-gun" type interference such as automobile ignition interference of *relatively low amplitude*. This it accomplishes by virtue of straightforward circuit selectivity. But, when interference of large amplitude relative to the signal level is encountered, the high-selectivity circuit appears to undergo a radical change in character. Let the ignition system of the oil burner in the basement start up, or a hard-working bus pass immediately in front of the house, and all is lost but the noise.

The explanation of what happens under such conditions was given in the first article on the noise silencer development in February *QST*.[1] Shock excitation of the low-*decrement crystal circuit* results in *prolonged* wave trains of relatively small damping. These are of intermediate frequency, of course, and pass on to the second detector where they beat with the c.w. oscillator voltage to give audio output which sounds almost as if an actual c.w. carrier with some weird kind of modulation were being received. With sufficiently small time interval between the interference pulses (say one-hundredth second or less), the individual wave trains actually overlap, and really cause a continuous

*Technical Editor.

[1] Lamb, "A Noise-Silencing I.F. Circuit," QST, Feb., 1936.

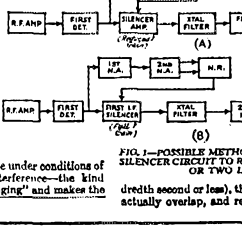


FIG. 1—POSSIBLE METHODS OF ADAPTING THE SILENCER CIRCUIT TO RECEIVERS HAVING ONE OR TWO I.F. STAGES

QST for

Sixth World-Wide RTTY Sweepstakes

October 22-24, 1966

This is a competition between stations throughout the world to determine their ability to exchange messages via two-way radio teleprinter.

1) Test period 0200 GMT Oct. 22 to 0200 GMT Oct. 24.

2) Bands used will be 3.5, 7, 14, 21 and 28 Mcs.

3) Points: All two-way contacts with stations in ones own zone will receive two points. Two-way contacts with stations outside ones own zone will receive the points stated in the exchange points table.

4) Stations may not be contacted more than once on any one band. Additional contacts may be made with the station on different bands.

5) A multiplier of one is given for each country contacted, including your own. The same country may not be claimed again on a different band.

6) Scoring: Total exchange points times the number of countries worked equals final score.

7) The ARRL Country List will be used, (KL7, KH6 and VO will be considered as separate countries:)

8) Messages will consist of message number, RST, time in GMT, zone number and country.

9) Logs must contain band, number, times, calls, zones, countries and exchange points claimed.

10) Certificates will be awarded the ten highest scorers.

11) Logs and score sheets should be received by *RTTY, Inc.*, 372 Warren Way, Arcadia, California 91007, by November 30, 1966. QST

EXCHANGE POINTS TABLE

YOUR zone \ CORRESPONDENT zone	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	14	10	13	16	18	22	20	25	30	36	37	39	21	22	19	20	17	11	25	29	29	22	22	16	28	25	31	39	35	14	36	25	29	34	39	40	47	44	15
2	14	2	15	8	7	16	16	12	16	23	24	30	30	12	14	16	19	20	19	19	25	31	26	30	28	35	35	40	50	50	25	47	14	21	21	28	33	36	37	6
3	10	15	2	8	11	9	13	14	18	21	28	28	30	26	28	27	29	27	21	32	37	39	32	31	24	37	33	40	43	35	11	32	29	35	35	42	48	50	52	20
4	13	8	8	2	3	8	10	8	12	18	22	25	27	19	21	23	26	26	22	26	33	37	32	34	30	40	38	44	52	44	20	40	21	28	26	33	40	41	44	14
5	15	7	11	3	2	9	9	6	10	17	20	24	25	18	20	22	26	26	24	35	32	38	33	35	31	41	40	45	54	46	22	41	19	27	24	31	38	39	42	13
6	18	16	9	8	9	2	4	7	10	12	19	19	21	27	29	31	34	33	29	34	40	46	40	40	33	46	42	49	47	38	17	32	28	36	30	37	44	43	48	22
7	22	16	13	10	9	4	2	4	6	8	15	15	17	26	29	31	35	36	33	33	40	47	42	44	38	50	46	53	49	40	22	34	26	34	26	33	40	38	44	22
8	20	12	14	8	6	7	4	2	5	11	15	18	19	22	24	27	31	32	30	29	35	42	38	42	37	47	46	51	54	44	24	38	21	30	23	30	38	36	41	13
9	25	16	18	12	10	10	6	5	2	8	10	14	15	23	25	29	33	35	34	29	35	41	45	41	50	50	55	52	45	28	38	21	30	23	27	35	32	38	21	
10	30	23	21	18	17	12	8	11	8	2	9	7	9	31	33	37	41	43	41	36	42	51	49	52	45	58	52	54	44	37	28	31	28	36	24	29	38	31	38	29
11	36	24	28	22	20	19	15	15	10	9	2	9	7	26	28	33	36	41	43	30	34	42	45	51	52	49	55	49	42	41	37	35	22	29	16	20	28	23	29	27
12	37	30	28	25	24	19	15	18	14	7	9	2	3	35	37	41	45	49	48	39	42	49	53	58	50	52	52	48	37	33	32	27	31	37	34	27	33	27	33	34
13	39	30	30	27	25	21	17	19	15	9	7	3	2	33	35	40	43	48	49	37	39	46	50	56	53	50	52	46	34	34	35	29	29	34	21	24	30	24	30	34
14	21	12	26	19	18	27	26	22	23	31	26	35	33	2	3	6	10	14	18	7	14	21	19	25	27	27	30	32	42	49	34	55	5	10	15	19	21	26	26	6
15	22	14	28	21	20	29	29	24	25	33	28	37	35	3	2	5	9	13	18	6	11	18	17	23	27	25	29	30	39	47	36	54	6	7	15	18	19	25	24	8
16	19	16	17	23	22	31	31	27	29	37	33	41	40	6	5	2	4	8	13	6	10	15	12	18	22	21	24	26	36	42	33	49	10	9	20	21	21	27	25	9
17	20	19	29	26	26	34	35	31	33	41	36	45	43	10	9	4	2	5	12	7	8	12	8	14	19	17	20	22	32	38	32	45	14	10	22	22	20	27	23	12
18	17	20	27	26	26	33	36	32	35	43	41	49	48	14	13	8	5	2	7	12	12	12	6	11	14	15	16	20	30	35	29	40	13	15	27	28	24	31	27	14
19	11	19	21	22	24	29	33	30	34	41	43	48	49	18	18	13	12	7	2	18	19	16	10	10	9	16	15	20	30	32	21	36	23	21	33	34	30	38	33	16
20	25	19	32	26	35	34	33	29	29	26	30	39	37	7	6	6	7	12	18	2	6	14	14	20	26	21	26	25	34	43	39	49	8	3	15	16	15	22	20	12
21	29	25	37	33	32	40	40	35	35	42	34	42	39	14	11	10	8	12	19	6	2	9	11	17	24	16	21	20	28	37	40	43	14	6	18	16	11	19	15	19
22	29	31	39	37	38	47	46	42	43	51	42	49	46	21	18	15	12	12	16	14	9	2	6	10	18	17	13	11	21	29	36	35	22	14	26	22	15	22	16	24
23	22	26	32	32	33	40	42	38	41	49	45	53	50	19	17	12	8	6	10	14	11	6	2	6	13	8	12	14	24	30	31	37	22	16	29	26	21	28	22	20
24	22	30	31	34	35	40	44	42	45	52	51	58	56	25	23	18	14	11	10	20	17	10	6	2	8	6	6	10	20	24	26	30	28	22	35	33	25	32	25	25
25	16	28	24	30	31	33	38	37	41	45	52	50	53	27	27	22	19	14	9	26	24	18	13	8	2	13	9	15	23	30	18	27	32	28	41	40	33	40	33	25
26	28	35	37	40	41	46	50	47	50	50	49	52	50	27	25	21	17	15	16	21	16	7	8	6	13	2	6	5	16	22	31	29	29	21	33	29	21	27	20	29
27	25	35	33	38	40	42	46	46	50	52	55	52	52	30	29	24	20	16	15	26	21	13	12	6	9	6	2	7	15	18	25	25	34	27	40	35	27	32	26	30
28	31	40	40	44	45	49	53	51	55	54	49	48	46	32	30	26	22	20	20	25	20	11	14	10	15	5	7	2	10	17	31	24	34	25	36	30	22	26	19	34
29	39	50	43	52	54	47	49	54	52	44	42	37	37	42	39	36	32	30	30	34	28	21	24	20	23	16	15	10	2	9	15	32	42	33	39	31	24	24	20	44
30	35	50	35	44	46	38	40	44	45	37	41	33	34	49	47	42	38	45	32	43	37	29	30	24	30	22	18	17	9	2	24	7	51	42	17	40	33	32	29	48
31	14	25	11	20	22	17	22	24	28	28	37	32	35	34	36	33	32	29	21	39	40	36	31	26	19	31	25	31	15	24	2	22	39	42	46	53	52	56	51	28
32	36	47	32	40	41	32	34	38	38	31	35	27	29	55	54	49	45	40	36	49	43	35	37	30	27	29	25	24	32	7	22	2	57	48	47	42	38	34	33	50
33	25	14	29	21	19	28	26	21	21	28	22	31	29	5	8	10	14	18	23	8	14	22	22	28	32	29	34	34	42	51	39	57	2	9	10	14	18	22	23	10
34	29	21	35	28	27	36	34	30	30	36	29	37	34	10	7	9	10	15	21	3	6	14	16	22	28	21	27	25	33	42	42	48	9	2	13	12	12	18	16	16
35	34	21	35	26	24	30	26	23	20	24	16	34	21	15	15	20	22	27	33	15	18	26	29	35	41	33	40	36	39	47	46	47	10	13	4	7	15	15	19	20
36	39	28	42	33	31	37	33	30	27	29	20	27	24	19	18	21	22	28	34	16	16	22	26	33	40	29	35	30	31	40	53	42	14	12	7	2	8	8	11	24
37	40	33	48	40	38	44	40	38	35	38	28	33	30	21	19	21	20	24	30	15	11	15	21	25	33	21	27	22	24	33	52	38	18	12	15	8	2	7	5	28
38	47	36	50	41	39	43	38	36	32	31	23	27	24	26	25	27	27	31	38	22	19	22	28	32	40	27	32	26	24	32	56	34	22	18	15	8	7	2	6	32
39	44	37	52	44	42	48	44	41	38	38	29	33	30	26	24	25	23	27	33	20	15	16	22	25	33	20	26	19	20	29	51	33	23	16	19	11	5	6	2	32
40	15	5	20	14	13	22	22	18	21	29	27	34	34	6	8	9	12	14	16	12	19	24	20	25	25	29	30	34	44	48	28	50	10	16	20	24	28	32	32	2

SURPLUS WU PRINTERS

July *QST* "Operating News" carried an item indicating procedures under which excess Western Union machines, that could be useful for amateur radio RTTY work, may be distributed to amateurs. Frank White, W3PYW, ARRL-WU coordinator, indicates the decentralization of distribution to each WU district. *Certified amateur radio club organizations* in each district will establish their priorities for clubs or individuals, a customary criterion being whether the interested party has a working terminal unit ready to use. The names of the amateur radio organizations certified to arrange distribution of surplus WU machines as they become available, and the individual address of the WU district to contact can be obtained by sending a self-addressed stamped envelope to the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111. Ask for the "surplus WU printer information sheet."

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

> One point does stand out over the years in the matter of newcomers to amateur radio — their real exposure and the effective planting of the ham virus comes with a visit to the shack of an already licensed friend or acquaintance. Ham magazines, booklets and promotional pieces seem to have had little direct effect. It is the personal approach which has produced results.
>
> — *Editorial, Feb. '66* QST

Our musings here last month touched on FCC regs Part 97, subpart A, 97.1 (e). You know, that chunk about amateur radio's unique position in the promotion of international good will at the personal level. We stressed that no other radio service licenses ordinary folk to sit around the house chewing the short-wave rag with other ordinary folk beyond the seas, just for the fun of it.

That's important: *just for the fun of it.* It's vital because that's why almost every one of us became a ham in the first place; just for the potential *fun* of it. DX hounds aren't originally seized with a zeal to serve humanity as wireless ambassadors of good will, any more than would-be traffic men run down to get their tickets with a burning intention of serving in RACES and NTS. Desire for such service comes later as an amateur matures, a precious distilled by-product of the fun product.

This should be pointed up from time to time because there are some among us who, deeply concerned about hamming's "image", espouse the idea that our chosen avocational pursuit should be painted as some sort of grimly serious nonhobby chock full of nonfun. Nonsense. Let there be no mistake, especially among prospective amateurs. Ham radio — DX, traffic, experimentation or what have you — *is* a hobby and it *is* fun!

That is the image sought by could-be would-be amateurs. We've got to make them say to themselves, "This hamming thing looks like great sport — I want in!" For if this overriding invitational image ever tarnishes to the point of casual unattractiveness we can kiss those other treasured derivative images good-bye.

Consider controversial Citizens Band radio. Most of the CBers we encounter aren't engrossed in it as the wireless tool it was intended to be. They see it instead as a shining example of instant fun. And they will accept the greater challenge of amateur radio only on like appeal.

Hamdom's DXers are advantageously situated to promote a regeneratively healthy amateur radio. Get some of those colorful juicy QSLs back up on the shack walls where they belong, make the place look like a happy ham station again, and invite some prospects over for adventurous chats with the antipodes. Stir in an extra dash of that old ham spirit. You'll soon convince some VIPs, future amateurs, that 27-Mc. Brand-X DX, by comparison, is greasy kid stuff.

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

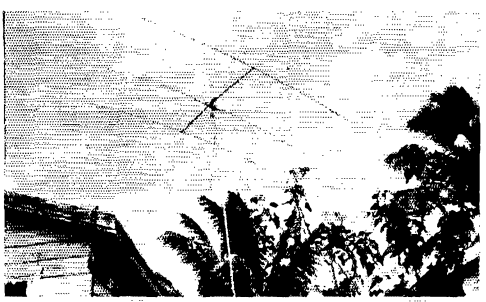
What:

How you like our New Sound? Sharp, eh? Lots of lively DX noise all the way up through 28 Mc, as those sunspot numbers creep up and up. True, this will give 160, 80 and 40 meters a more slippery grip on the DX stick but that's the price of propagational progress. Early seasonal returns are fragmentary but the trend is already obvious. For example, take . . .

10 c.w., no longer just a blank spot on a DX man's dial, where **WAs** 1CUN 2VFA, **WB4CAP** and **G3IDG** dig the radiotelegraphs of **CRs** 6AI 1800 GMT, 6FI 11, 6HH 16, 6JJ 7IZ 10-18, **CX1OP** 20, **EL2D**, F9VN/**FC** 11, **GD3TIU**, **HI8XAL**, **HK3AAE**, I1IZ, **KV4CI** 17, **OA4KF**, **OD5AP**, **PYs** 1CKV 20, 2BGL 18, 5ASN 19-20, 7AKQ 19, **UA2KAP**, **UP2KNS**, **VK4YP**, **YO2BM**, **YV3DM** (160) 22, **ZB2AM** 17, **ZC4s** GB 16-19, JU 9-17, PC 16, TX, **ZDs** 7IP 15-16, 7RH 16, 8AR, **4X4HK** 17, **7Q7RM** 16, **7X2AH** 11, **9H1s** AB 11, AI 19, **9J2s** IE MM 17, WR 17-19, **9Q5s** HD 20 and LJ 17-19. That number in parentheses, incidentally, is kc. above the lower band edge. Ten-meter quantity's still down, of course, but there's some quality in there.

10 phone comes to life for K1ZJA, **WAs** 2VFA 4QBX 4WIP 9MQI, **WB4CAP** and **G3IDG** with **CE3JM*** (580) 23, **CX4DE*** 23, **FG7XT*** 22, G3SJ/**CT3** 20, **HP3RL*** 23, **KP4CQC*** 23, **KS6s** BO BT, **KZ5s** BE* 21, GL* 21, JW* (650) 20-23, NH, **LUs** 1DTL (557), 2DJB* 19, 3AAT 20, 6ACU* 23, 8DAF (600), **PY2CDS** 20, **TG9EP** (600), **TI2CRC**, **VKs** 2ADE* (480) 2, 3AMK (620) 1-2, 3AVY* 3BG (600) 1, 3VL* (480) 1, **VPs** 2GLE (625), 2KJ 2KQ* 23, 2KR 9FB (625), **XEs** 1CK (625), 1JP 1JP 3AB, YN4JAB* (665) 22, **YVs** 1BL (581), 1PF (578), 3KX (600), **ZC4s** KF 19, MO 19, **ZD7RH**, **4X4s** HF 16, IH 18, **6Y5OF** (611) 17, **9J2DT** 20 and **9Y4VS*** 20, the asterisks blinking for non-s.s.b. signals. Looks as though a DXer should keep some straight-a.m. handy for 10 meters, at least until the sideband set moves in solidly.

15 c.w. approaches its prime if the reports of "How's" correspondents **Ws** 1CNU 3JZJ/9, **Ks** 1ZJA 5VTA, **WAs** 1CUN 3AZI 3GGV 4YDR 6DVV 7BOA 7BOB 8MGD 9AQE 9MQI 9NXH ØKIR ØKYB, **WBs** 2LBJ 2LDX 2UHZ 6KIL and 6NXK are indicative: **CEs** 1RV (30) 2, 2CR (40) 19, **CM**1AR, **CN8s** BF BU FB FF 22, **CO**2BB (50) 19, **CP**2BH (4), **CRs** 6AL (5) 18, 6CK 6DX (47), 6EI (30) 9, 6IH 6LAS 7IZ (80) 17, 9AH, **CT1s** GE IX 11, CX1JM, DM4PL (61), **EA8s** BG (10) 17, ER FF 12-14, **EL2s** AH AK D (40) 9, FD (70), J K (40) 18, **Y**, **EP**2BQ (35) 3, ET3GB/mm, F5EC/**FC** (50) 22-23, **FG7s** XQ XT (108), XX (13), **FH8**CD, **FL8**MC (40) 2-3, **FR7**ZD, **GC3**HFE 10, **HAs** 4KYB (50) 22, 5DA 5DJ (40) 22, 5KFR ØHR (25) 21, **HC1**MF (5) 18, numerous HKs, **JAs** 1KHP 1PZG 1RKI 1SJO 1THL 1UTQ 1VWP 1WNR 2GNR (45) 20, 2IAU 2YBG 3HCJ 3KVU 4CEA 5AGR 7CUA 8BXC 8QR 9BFW ØYAN, **KG6**AAY 10-12, **KV4**CX, **KZ5**GL (65), **LUs** 1DEN (47) 18, 3EX (50) 21, 5OI, **LX2**UW 10, **LZ1s** BK (31) 21, BT (2), **MP4s** BDF (40) 11, BEU (35) 9, **OA4s** NV (42) 22, QN (50) 19, QZ UO, **OD5s** EE (40), EF (50) 16, EJ, scads of OEs, OK4BI/mm (40) 19, **OX3s** BS (40) 20, UD, **OYs** 2H 2J 3H (30) 17, 4R (50) 18, PJ3CG 20, **PZ1s** CJ CP, a dozen or more PYs, many SPs, SU1DL, SV1CX (20), **TF2**WJS 22, **TL8**SW, **TT8**AF (25) 12, **UAs** 9WS ØKZB (50) 22, **UB5ES** (62) 18, **UC2**OM (50) 18, **UL7**PF, **UM8**IE (80) 20, **UQ2s** HQ KCT (27), **UW3**DR (40) 18, **VK9s** CJ 4, GM, **VPs** 1LP 19, 1WS 2AR (60) 18, 2AZ (30) 18, 6AK (30), 6BX 6PJ (20) 20, 9BP (28) 22, **VQ9**HB (95) 18, **VRs** 2DK (10) 9, 6TC (60) 21-22, **VSs** 6FK (36) 12, 9AJC (90) 12, 9ATH, **VU2s** JA (35) 3-16, TZ, **WP4**CPL (160) 23, XE1AAG 20, YO3JW (50) 21, **YUs** 2RAK (30) 21, 3NP (55) 20, YV5s AAG (50) 20, BHI (49) 22, **ZB2s** A 23, AM (11), **ZC4s** PC (80) 18, TX (65) 19, **ZD8s** BJ (80), J (82) 21, RH SKI (40) 18, WZ (20) 22, **ZEs** 1AA 1AS (45) 17-18, 8JV (50) 9, **ZLs** IHY IRK 3IS (45), 4UHTU 16, **4X4s** HK NWP, **5H3**JJ (45) 12, **5Z4**JD (100) 20, **6O6**BW (30) 20, **6Y5**BB (80) 22, **7Q7**LC (50) 15-16, **7X2**WW (18) 16, **9G1s** FQ FY, **9H1**AM (60) 19, **9J2s** GJ (45) 19, IE (90) 18, JC 16, WR (85) 18, **9L1**TL, **9Q5s** JR (40) 16, LJ (30) 14-17, LP (50) 18, QR (50) 21, **9V1s** LK (72) 13, LP (150) 18, MT (11) 17, MX (30) 19, NT and **9Y4**VU.



VP2AC's 521 contacts in the '66 ARRL DX Contest won him the Anguilla radiotelephone championship. Gerald is a writer-photog for the Antigua *Star* when not busy chasing rare ones. (Photo via W1YYM)

15 **phone** is almost S.R.O. again, **Ws** 2DY 8YGR, K1ZJA, **WAs** 4QBX 4WIP 4YDR 6DVV 8GGN 8MGD ØKYB, **WBs** 2LBJ 2LDX 6KIL 6NXK and listener P. Kilroy huddling with **CEs** 1DD 6EZ (410), **CO**7JB* 20, **CN8**FF (350), **CPs** 1AG (405), 1EG 1EK 1EN 18, 1EO (410) 4, 8AB 0, 8BC (358), **CRs** 5CA (115) 10, 6BX (345) 17, 6HG (350) 12-17, 7GF (375) 14, **CT1s** GE* 0, JJ (350) 18, KT (375) 18, **CXs** 1BS 0, 2AAW (395) 0, 8AAW (410), **DU1s** AP 11-12, FR 14, **EP**2BQ 15-17, **EL2R** (377) 21, **ET3s** GB/m (350) 18, RB 15, WH (390) 20, **FB8WW** (350) 11-12, **FG7**XL (365), **FH8**CD, **FK8**AB (330) 4, **FL8**MC 15-18, **FO8BR*** 0, **FR7**ZD (385) 13, **GCs** 2XU (350) 18, 8UT (350) 20, **GD3RFK**, **HA5DU** (415) 21, **HCs** 2JN* 23, 8FN (400), **HIs** 4ARM (390) 22, 8NZI 18, 8NZT (368) 0, 8XJG (370) 20, **HK6**AI (365) 21, **HRs** 1JMF (390) 15, 1MN (390) 22, 5LB 2, **HZ1**AB (385) 16, **JAs** 6CMI (394) 14, 9JX, **Ks** 2DET/**KV4** (346), 5HWH/**VP5** (349) 19, 6KRU/**KB6** (385) 4, **KG4s** AN (400), BQ (410) 22, CX (380) 0, **KR6s** CF 11-12, DO 17, **KS4s** CB (402) 16, CC (400) 1, **KV4s** CX (352) 12, ES (395) 0, **KX6**EA, **KZ5s** CD (390), CJ (410), EX LI (400) 21, RW (410), SO (385), **LU2s** AV* JV* 22-1, **MP4**-BBA* (187) 18, TBM 14-15, **OAs** 4J 3, 4UO* 21, 5AO 19-21, 5AQ (356), 5C 7Z 22, **OD5s** BZ (395) 20, EE, **PYs** ICJP (390) 20, 2JI (375) 0, **SV**ØWU (420) 21, **TG**9OP (390) 22, **TI2s** JH (360), RO (373) 19, **TL8SW** 12, **TU2**AM, **VKs** 1JL 6XX 6, **VPs** 2AP (388), 2DC (300) 17, 2GLE (348) 20, 2KD (350) 0, 2LS* 0, 2NS 2, 3YG (380) 21-22, 5AR 14, 5RS 0, 6AQ (300) 2, **VQ9**EF (380) 17, **VR6**TC (400) 22, **VS9s** AJC (395) 13, OC 10, W8TNC/**KW6** (400) 1, **XEs** 1HHM 3ME 1, **XW8s** AL 16, BJ 12, **YN1s** JAD 1-2, RE* 22, RS* 23, **YO9**CN (345) 20, **YS1s** DSE (350) 22, GEC (373), JAV (385) 1, THM (355), **YVs** 1BL (400), 5BUP* 5CEY (380), **ZC4s** CI CN (370) 18, **ZDs** 7RH (340) 16-19, 8J (320), 8SKI 21, 8WZ (361), **ZL2s** ASJ* BE 23, TB, **ZPs** 5DH (370) 0, 9AY (370), **ZS8**L (403) 15-17, **4U1s** ITU (410) 22, SU (383) 18, **5A4**TI (385) 23, **5H3**JR (420) 20, **5N2s** AAW (383) 17, AAX (340) 17, **5R8AS** (380) 16, **5Z4**JW (365) 22, **6O1s** AU 18, GB (350) 18, PF (366) 20, **6Y5**BB 21, **7Q7**PS (361) 18-19, **9G1s** FL FR RW 17, **9H1**A 21, **9J2**GR, **9Ms** 2GJ 16-17, 2LO (410) 16, 2OV (380) 14, 4MT 16, 6AP (400) 16, 6MQ 12, **9Q5s** CZ 21, DL 19, FM 18, FV (360) 19, RC, **9U5**DP (358) 20, **9V1s** CN 13, DO (350) 14, MX (396) 16, MY (400) 18, NM 14, **9X5s** AV (415) 21-22 and WM 18, the stars for rare non-s.s.b.ers.

15 **Novice** action intensifies. **WNs** 2UIY 2UVD 5NTI 6SAZ and 7FLR gobble up **CM**1AR (100) 23-0, **COs** 2EJ 6AH, **CX**1JM (100) 1-2, **FG7**XT (115) 20-21, **FO8BJ** (126) 0-1, **Gs** 3JYP 6AH, **HA**1SD, **HR1s** JAP (140) 20-21, SAP, I1IZ, **JAs** 1IDY 1LPZ (129) 20-21, 1PLF 1RKW 6BZI 7BMT 7CDU 7CDV ØBDY, **KØRAX/KL7** on Shemya, **KA**2DJ, **KH6s** FQY FST, **KL7s** AIZ FPX, **KX6BQ** (102) 0, **KZ5s** CBN EX (115) 22-23, IKN (120) 22-23, OWN (130) 23-0, **LUs** 5OI (101) 23-0, 8OI, **PYs** ICGU ICLG 2BBO (115) 21-22, 2BVL 2PU (120) 22-23, 2SO, 5ASN 5AUC (131) 23-0, **SM5BNX**, **SP3**AIJ, **VKs** 2EW 3ABA 3APJ, **VR2**DK (126) 0-1, **XEs** 1AAG 1ZV 2HN, **YVs** 2HO/1 5BOA, WB2PXZ/**VP9**, **WP4**CPG (120) 22-23, **WV4**EY, **ZD8**WK, **ZLs** 2RC 3FX 3IO and **6Y5**JB.

40 **Novice** doings in the DX line are the snappiest in months. **WNs** 2UVD 6SAZ and 7FLR ducked those SWBC slopbuckets to the tune of **KH6s** BRA FQY (172) 8-9, FRI (170) 4, **KL7**FJK (170) 5, **KP4**AQL (164) 10-11, **KS4**CC (161) 8-9, **WH6s** FQW (171) 7-8, FST (171) 7-8, GAE (174) 8-9, GBC (178) 10-11, GBQ (171) 8-11, **WL7s** FNV (172) 10-11, FOT (160) 7-8, FPG (176) 8-9, FPX (155) 7-8, WN7FHZ/**KL7** (170) 5, **WP4**COZ (167), **XE2s** COS LF (181) 21-22, LLP (170) 19-20, PYW and, last but hardly least, **VK3**APN (175) 7-10.

40 **c.w.** sport among five-year licensees takes the upbeat again, **W7**AYC, **Ks** 1ZJA 3FKU, **WAs** 8GGN ØFRM, **WBs** 2LDX 2TGA 6NXK and s.w.l. C. Durnavich listing the presence of **CEØAC** (10) 7, **CO**2BB (5) 4, **CR6**EI (10) 5-6, **DM2**ANG, **EA8**EY (7) 7, **HA**1KYB (4), **HI7**NRC (20) 5, HH9DL (4) 5-6, **HKs** 3ASJ (5) 6, 1EX (5) 6, **HR5**LB (11) 6, **IT1**AGA, **KL7**EWY (100) 2, **LUs** 1DZ (11) 6, ZG, **LZ2s** AW (31), KHN, **OA4**VE (2) 11, **OH1**XX, **OKs** 1NB (8) 3, 3CEG (1), **PYs** 1NEW 7AEW, **SP5**XA (10) 3, **UF6LA** (20) 4, **UL7s** AF (10) 5, MD (5) 22, **UT5**PX, **VKs** 7SM (14) 8, 9GC (W) 10-11, 9SM (100) 6, **VPs** 5FH (2) 3, 6AK (12) 20, 7EA (14) 6, 9BP (4) 7, 9BP (20) 8, 9WB (30) 7, **VR2**DK (14) 8, XE2TW (170) 22, **YO6**AW, YS2OB, **YV2**AH, ZB2AR/mm (20) 2, **ZDs** 7IP (5) 8, 8J (14) 8, ZL2BW (14) 7, **ZS5**AAC (10) 6, **5R8AL** (6) 11, **9G1**FY (6) 0, **9Y4s** AR 8 and LT 7 . . . . . On 10 phone **WA8**GGN and friends account for **GM3**RFR 22, **HI8**XAL, **KH6**FQG, **KJ6**HZ (201) 4, **PY4**ND (45) 22, **VKs** 2AVA (40) 21, 2ID 2UG 3AVA, **UW9**AF (45) 22, **ZLs** 2WX 3RV and **9M2**DW, all monosidebanders.

80 **c.w.** starts the season conservatively, feeding CO2BO, GM3TNT, DL1RK, VR4ED, ZL4IE and **6Y5**BB to K1ZJA and **WA8**MCQ . . . . . **HI8**LC 24, YV5s BPJ and BTS hold the fort on 75 phone. Retreating static levels should reveal plenty of sideband DX ready for another bang-up season just off the low edge of our U.S. phone segment.

160 is a big question mark at this stage of the solar cycle but **W1**BB and 1.8-Mc. associates are optimistic. Stew says, "Conditions probably won't be as good as last year but there should be some excellent DX worked. Remember, there was DX on 160 during the last sunspot maximum!" W1BB underscores this opinion by reporting contact with the 600-watter of CX3BH in June

for what looks like the U.S.A.-Uruguay topband first. Eastern W/K/VE/VOs worked Europe sporadically *through midsummer on 1.8 Mc.*, so keep those long-wires taut, OMs.

—...—

No space for **20** this month but next "How's" we'll check 14-Mc. DX developments described by (phone) **Ws** 1BGD 2DY 3HNK 3LE 8QXQ 8YGR, **K**1ZJA, **WAs** 3GGV 4QBX 4YDR 6BSO/1 8GGN, **WBs** 2LDX 2UFN 4AYD and Mr. Kilroy; (c.w.) **Ws** 1APU 1BGD 1CNU 3HNK 8QXQ 8YGR, **Ks** 1ZJA 5VTA 8OQL 0DEQ, **WAs** 1CYT 3GGV 4YDR 5EQA 6BSO/1 6SLU 7BOA 7BOB 8GGN 9MQI 9NXH, **WBs** 2LDX 2NLH 2UHZ 4AYD 6MTB 6NXK, **VE**2DCW and tuner R. Wilcox, plus additional correspondents still due to report Jeevesward. Your turn to feed kitty?

Where:

EUROPE — W3LE, LA5HE and VERON'S *DXpress* point out prefix changes in Norway's farflung outposts. LA/p stations on Jan Mayen becomes JXs, suffixes remaining the same. Recent actives include *JXs* 2IK 4WH 5AK 5CI and 6XF. Spitzbergen takes the JW label, so former LA3NI now is JW3NI. Norwegian antarctic possessions, Bouvet isle, etc., adopt the 3Y prefix . . . . W3LE also notes that those ON8U- signals come from Yanks in Belgium . . . . W2GHK, in the Long Island DX Association organ, reports that DXpedition of the Month QSLing for DJ6QT/LX, LA1EE/p and 3A0EB got under way in August . . . . DL5LN supplies a revised Yanks-in-Germany bureau address: DL4/DL5 QSL Bureau, % MARS Radio Stn., Hq. 93rd Sig. Bn., APO, New York, N.Y., 08175 . . . . FRA's OY7MIL says OYs 2G 3BB and 7U are not legit. New OYs include 2YL 3H 7J 8YL and 9IM, the YLs being just that . . . . DL7FT's Balearics EA6AR QSOs took place April 4-23, 1966. EA6AR contacts on other dates should be confirmed through the regular licensee . . . . SV1BA complains about unauthorized use of his call and other pirate activity over Athens way.

HEREABOUTS — All hail our QSLers of the Month: CN8FF, CR6DX, CT1LL, CXs 1JM 2CN, EA8EN, FG7XK, FP8CK, FY7YG, Gs 3OIZ 6KQ, GCs 5ACH/-W6KG 8HT, GD5ACH/W6KG, HA5DQ, HC8FN, HI8WSR, HK3RQ, HL9TH, HM5BG, IT1AGA, KG6s AIG IF IJ, KS4CC, OD5EE, ON5DS, PY5ASN, SVØs WF WU, UA0LS, UWØs 1K IX, VE1ASJ/1, VKs 2PX 3AXK 3TL 6RS 9CJ, VPs 1LP 2KJ 2LS, VQ8AX, VRs 2ER 4CR 6TC, W5VWU/KS6, WA4EJU/KS4, XE1FFU, XW8AZ, YU1NHH, ZL2AWT, 5A3TX, 5H3JR, 5N2AAX, 5W1AZ, 9G1FU, 9H1AK and 9Y4LT, as well as QSL aides Ws 2CTN 2SNM 3KT 4ECI 4TAJ 6KTE 6UNP and WA4KXC, all nominated by "How's" reporters Ws 1CSP 4VZD 8QXQ 8YGR, Ks 1AFC 1ZJA 9WDY, WAs 2HIU 4QBX 4YDR 7BOA 7BOB 8GGN 8NXH, WBs 2NLH and 6NXK for outstanding QSL promptitude. Anyone omitted from this accolade? . . . . *Help!* DL7FT needs assistance toward QSLs from CR9AI, VP6s GT HR, VQ8BS; W4WRG hunts hints on EL8X, FK8AT, LU8DQ, VP6BW, ZB2BB, ZD8AR; W8GQU is stumped over CR3AD, XZ2ZZ; W8QXQ needs nudging on CE3RE '55, 5A2TZ '56; and K8OQL will settle for scoop on VP8GQ and ZD8SH pasteboards. Any word on these birds? . . . . W3HNK and WB2LDX offer QSL managerial assistance to any overseas DXer(s) in bona-fide need of such help . . . . "Those wishing QSLs for QSOs with OX5BA on July 12-17, 1966, should apply to my home address," advises K4HAV. "Unless s.a.s.e. — self-addressed envelopes with stamps — are supplied I'll QSL via bureaus." . . . . "QSLs for HH9DL QSOs made by visitors W8s LUZ and LXU on July 7-10, 1966, should be sent to P.O. Box 13, Dayton, Ohio, 45359," declare W8LUZ and WA8GGN . . . . WA9HFU has some back-issue *Callbooks* he'd like to deliver to overseas stations yearning for same. Any candidates? . . . . XE1NE-XE1PNE points out that when a Mexican amateur changes QTH his mail is *not* automatically forwarded. This is rough on DXers at both ends.

ASIA — "I have the logs for BV1USA and will soon have those of BV1USF," notifies K7KPM. "I've made arrangements to continue receiving mail at [the address in the listings to follow] until I leave Taiwan, probably next March. After that I will have to ship the records to someone in the States. Self-addressed stamped envelopes are appreciated." . . . . "Finally got some QSLs to take care of my 600-QSO backlog," cheers KA7AB, mailing out the first 450 . . . . WB2MFX learns, "As of mid-July MP4BEU was some 2000 cards behind but Alec says he does intend to QSL 100 per cent. Says he just spends too much time on the air." Don't knock off, OC — perhaps some W/K/VE could help solve that pasteboard problem.

AFRICA — "I'm QSL manager for ZD8SKI for QSOs after May 23, 1966," states WA5KGW. "For earlier contacts cards should be sent to Al Klapetzky, RCA/MTP, Ascension Island, *Box 4036*, Patrick AFB, Fla., 32925, s.a.s.e. required for direct reply. ' . . . . K6CYG says

CO8RA, assisted by a fellow DX bug, worked 552 W/K/VE/VO radiophones in ARRL's 1966 DX Competition. Rod, licensed since 1935, uses a homespun 140-watter and HQ-110 in Santiago. (Photo via W1YYM)

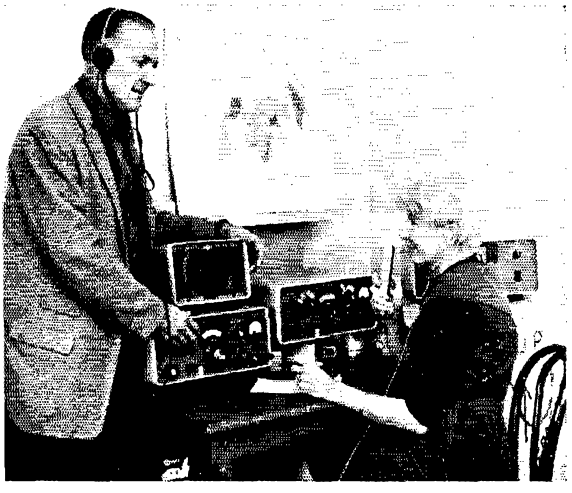
QSLs for CT3AR and 3AØDX work by WB6CIY were to hit the mails by mid-September . . . . —LIDXA's *DX Bulletin* has it that printshop delay held up FB8ZZ QSLs via manager FR7ZD, also that W1BPM holds logs for TL8SW's TT8 travels.

OCEANIA — VKØMI's QSL tender, G. Johnston, 3 Inglis St., Newton, Hobart, Tasmania, writes W1WPO of ARRL's DXCC Desk: "To keep things moving here we usually hold outbound cards only for a month or so after QSOs, replying direct to cards including International Reply Coupons. After the month elapses the remainder, usually a hundred or so, go out via the bureaus route. QSLing is 100 per cent for sure. Col's successor on Macquarie, due in December, may retain the *VKØMI* call and I may continue as QSL manager." . . . . K3SWW/KG6 now QSLs Stateside stations only on receipt of their cards, s.a.s.e. appreciated. Conrad regrets this policy became necessary in financial self-defense after he passed the 6000-QSL mark. He urges W/K/VEs to keep self-addressed stamped envelopes on file with their local ARRL QSL Managers . . . . ZL2AON, formerly VR2EL, records, "I operated from Tarawa atoll, Gilbert & Ellice group, as VR1L on June 3-6, 1964. All QSLs received have been answered but there are about 250 on hand waiting to be claimed. I'd like to clear my files — s.a.s.e. appreciated." . . . . "Due to my transfer to Honolulu, the Wake Islands QSL bureau is taken over by KW6EJ," declares KH6COY via W1ECH.

SOUTH AMERICA — 9Y4LT tells W1ECH, "Cards for all 9Y4s/VP4s will be accepted at my address." Les's latest QTH appears in the rundown upcoming . . . . W1LVQ learns that the LU2CN-LU6CN Gang handles QSLing for LU1s ZA, So. Orkneys, and ZC, Deception isle, dispatching via bureaus in the absence of IRCs . . . . FG7XL will be back at the task of handling FY7YL's QSLs this month after a vacation in France. The Teudrons write W1WPO, "This will not be an easy job because records are damaged. FG7XL QSLing also was delayed by our homeland visit." . . . . Here we go with the month's itemized suggestions, cautioning that the specifications are necessarily neither "official", complete nor accurate. . . .

ex-BV1s USA USF, H. Epley (K7KPM), % Taiwan A.R.C., Box 8, USARSCAT, APO, San Francisco, Calif., 96263
CT3AR (via K6CYG)
DJ0PC (to K8ITH)
DL4BF (via WA4WKL)
EA8FE, A. Jiminez, Box 860, Las Palmas, Canary Islands
EL2AT (via W4NJF)
F0BU (to HB9UD)
F0CH/FC (via HB9TL)
FK8AC, F. Franchette, Box 104, Noumea, New Caledonia
FY7YM, P.O. Box 63, Laurent, French Guiana
G3OIZ (via WA4KXC)
G3TYL/W9, D. Kerslake, RR5, Oriole Dr., Melody Acres, Warsaw, Ind., 46580
GC3s POI/p SHZ/p (via W2CTN)
GM3FZW/m (to G3FZW)
GW3DZJ (via W3HNK)
HB0AGH (to HB9AGH)
HB0UP (to HB9UP)
HB0XCO/m (via DL4/DL5 QSL Bureau; see preceding text)
HC1CV, A. Cajaio, P.O. Box 289, Quito, Ecuador

IIII9DL (see preceding text)
IILINM/mm/TR8-W6NMC/mm (via K1MZU)
IIARI/M1 (via IIZJG)
IIAV/M1 (to IIAV)
IIGRO/M1 (to ON5GA)
ID1IDA (via I1SMN)
IP1s CSG GAI (to I1CSG, IT1GAI)
JX5HE (to LA5HE; see preceding text)
K3SBF/KP4 (via WA4WKL)
K7NKN/KM6, Dr. C. Bruch, Box 15, USNAVSTA, FPO, San Francisco, Calif., 96640
KA8HC, Box 120, APO, San Francisco, Calif., 96519
KC6CK, Koror, Palau, W.C.I., 96940
KG6AQA, P.O. Box 445, Agana, Guam
KH6CH/KW6, Y. Arakaki, Box 365, Wake Islands
KJ6DB (via KH6EOQ)
LA1EE/p (via W2GHK)
LU1HDZ, L. Tosiani, Box 574, Cordoba, Argentina
LU1s ZA ZC (see preceding text)
LU5HG, CC-17, Villa Dolores, Cordoba, Argentina
LX3NF (to DL9NF)
MP4BEU, A. Cairncross, P.O. Box 138, Bahrein, Bahrein Islands (or via RSGB)
MP4BGA (via VE1AKZ)
OK4BI/mm (via CAV, attn. OK1BI)
OX5BA (to K4HAV; see preceding text)
PA6AA (via VERON)
PA9GU (to PJ2CU)
PA0COE (via W3HNK)
PX1s IE JS (to F9s IE JS)
PY3BTQ, R. Sayago, 60 Andradas St., Livramento, RS, Brazil
PY0XA (via W4ECI)
ST2BSD, P.O. Box 303, Khartoum, Sudan
TIs 2RO 8BJH/2 (via W1HKXC)
UA9OH, V. Simonov, Box 183, Novosibirsk, U.S.S.R.
VE8NO (via WA4KXC)
VK8HA, H. Andersson, P.O. Box 1418, Darwin, Australia
VK9JK, Fr. J. Knoebel, Fatima College, Banz, W.H.D., T.N.G.
ex-VR1L-VR2EL, Sgt. Harding, AGF (ZL2AON), % Sgts. Mess, RNZAF Base, Ohakea, N. Z.
VR1S, P. Dunbar, P.O. Box 288, General P.O., Suva, Fiji
VR2DK (via W2CTN)
W5VWU/KS6 (via W5HJ)
W8DGP/KL7, E. Cunningham, % Gen. Elec. Co., APO, Seattle, Wash., 98736
W9QQR/M1 (to W9QQR)
WA1GIV/OA4 (via W1MD)
XE1AAG, A. Melgarejo, Box 518, Vera Cruz, Ver., Mexico
XE1EEI, R. Corcuera, Box 197, Guadalajara, Jal., Mexico
XE1s NE PNE, A Calleja, P.O. Box 2807, Mexico 1, D.F., Mexico
XE3PI, P.O. Box 329, Merida, Yuc., Mexico
YA1DAN, E. Daniel, USAID, APO, New York, N. Y., 09668
YS1HKE, Box 726, San Salvador, El Salvador
YS1VST, P.O. Box 585, San Salvador, El Salvador
YS2DJE, Rev. D. McLeod, M. M., Aptdo. 173, Santa Ana, El Salvador
YS2JS, J. Guerra, Box 125, Santa Ana, El Salvador
YV5BPJ (via WA4KXC)
YV5BZJ/6, Box 73, Puerto Ordaz, Venezuela
ZB2AX, *Yasme* Foundation, P.O. Box 2025, Castro Valley, Calif.
ZD8CN (via K8CNQ)
ZD8SKI (via WA5KGW; see preceding text)



4X4HT/p, operated in one of Israel's rarer biblical regions, was a springtime DXcursionary enterprise by (left to right) 4X4s MZ on 7 Mc., MT on 144 Mc., and SK on 3.5 Mc. The area, ancient site of the Macedonian city of Marissa (now Tel Maresha), is not only bleak and weather-beaten but is frequented by extremely unfriendly tribes. (Photo via W2IWP)

ZF1GC (via VE4DQ)
3A0DX (via K6CYC)
3A0EB (via W2GHK)
4X4XL (to K8ITH)
5A3TT, D. Hutchin, 58th Air Rescue Sqdn., Box 2143, APO, New York, N. Y., 03231
ex-5As 3TX 5TR (via W3HNK)
6Y5GH, Box 100, Kingston 10, Jamaica
6Y5VV, 2c Highland Dr., Kingston 8, Jamaica
7X0AH (via ARA)
9Q5RH, APO, New York, N. Y., 09662
9X5SA, A. Staley, B.P. 28, Kigali, Rwanda
9X5WM, Box 302, Kigali, Rwanda
9Y4LT, L. Thomas, Los-Iros Rd., Erin, So., Trinidad, W. I.

The preceding is offered by donors **Ws** 1APU 1BGD 1CNU 1CSP 1ECH 1LVQ 1MD 1WPO 1YYM 2APH 2DY 3LE 7UVR 8QXQ, **Ks** 5VTA ØDEQ, **WAs** 1CYT 2YBR 4QBX 4YDR 6BSO/1 6DVV 7BOA 7BOB 8GGN, **WBs** 2MFX 2NLH 2UFV 6NXK, **WN7FLR**, P. Kilroy, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DLs 1EP 3RK), DX Club of Puerto Rico *DXer* (KP4RK), Far East Auxiliary Radio League *News* (KA2LL), Florida DX Club *DX Report* (W4MVB), FRA *Frøyskir Radio Amatrar* (OY7ML), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WB2MXD), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025) and VERON's *DXpress* (PA0s FX LOU TO VDV WWP). Good goin', gang!

Whence:

ASIA — ARSI (India) and RSC (Ceylon) invite your participation in the 3rd VU2/4S7 DX Contest to be held (c.w.) from 0600 GMT October 15th to 0600 the 16th, and (phone) October 29th-30th, same times. The customary RS- or RST001, RST002, etc., serials will be exchanged, everybody working everybody. Non-VU2/4S7s earn 2 points for each QSO with a VU2/4S7 per band, 1 point per contact per band with stations in the rest of the world. Logs showing date, GMT, calls of stations worked, band, serials swapped (separate tabulations for each band) accompanied by a summary sheet indicating your own call, name, address, equipment description, total score and a signed declaration that rules and regulations were observed, must be mailed no later than November 30, 1966, to ARSI Contest Committee, P.O. Box 534, New Delhi 1, India, to qualify for possible certification of meritorious performance. Single-band categories will also be acknowledged.

W6KG and WB6QEP, those revolvin' Colvins, now follow Pacific and European DXpeditionary stops with a DXtensive African tour. In the past year Lloyd and Iris, under Yasme Foundation auspices, have scored more than 30,000 QSOs as KG6SZ, KC6SZ, KG6SZ/KC6, W6KG/KG6, KX6SZ, VR1Z, GD5ACH/W6KG, GD5ACI/WB6QEP, GC5ACH/W6KG, GC5ACI/WB6QEP and ZB2AX. (Photo by M. Kelly via G2DC)

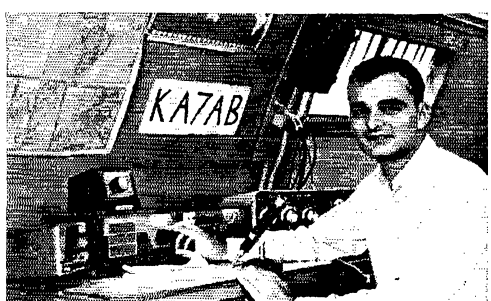
Good long-haulin'! . . . . . "The Chinese (Taiwan) government has prohibited amateur operation by foreign nationals," *notifies* K7KPM on the scene. "This includes Americans, so BV1US-stations are now nonexistent." Temporarily, we hope . . . . . W0MICX's summer transworld tour included reciprocal operation as EP2BF/W0MICX plus visits with EP3AM, JA1s CO YL and other prominent Asian amateurs . . . . . WA6SBO/ says Kabul's YA1JG is hard to hear on 20 sideband due to antenna difficulties . . . . . W3LE ran into ex-JT1s AA and YL at the Czech embassy in Washington. They're OK1s KW and KX back home . . . . . ARRL's W1YYM credits UA9OH with naming his new son in the ham tradition: Maxim . . . . . Oriental addenda via aforementioned clubs and groups: MP4TBO may be back from his U.K. furlough by now. . . . FEARL hears that YLs run about one in ten among Russia's 15,000 amateurs. . . . JAs now can run up to 500 watts of c.w. on 1907.5–1912.5 kc., an extension of their old 160-meter spot frequency allocation.

AFRICA — W6NMC, one of amateur radio's original DXpeditionary wanderers, joins the trek to Africa. WA8GGN finds Myron warming up as 9L1NM/TR8 with intentions of hitting more rare regions out that way . . . . . CR6CK tells K8OQL he hunts North Americans on 14,001 kc. at 2030-2330 GMT . . . . . 9X5SA's KWM-2 and dipole pep up the low c.w. edge of 20 around 2000 GMT. His antenna is only ten feet high but that 9X5 prefix means an automatic 45 db. of usable gain . . . . . K6CYG says WB6CIY collected 1827 QSOs as CT3AR in July, followed by 1421 contacts as 3A0DX . . . . . ZD8SKI haunts 21,375 kc. or so at 2000-2400 GMT but WA5KGW says Ski's work schedule makes for irregular on-the-air days . . . . . CR6s GO and GQ feel that VK2ADY/VKØ (W9WNV) paid insufficient attention to Africa's DXers from Heard. Sure is hard to satisfy everybody . . . . . Ex-5A3TX visited W3HNK in July and now signs W3-YLU/4 at Langley AFB . . . . . African oddments courtesy the clubs press: G5AAM/WA6ZIQ may hit the Azores and/or Madeira shortly. . . . W4BPD hints at an early Indian Ocean encore, *CR7GF* and *VQ9HB* likewise. *VQ9s* BC and TC intend more island-hoppin' thereabouts, too.

OCEANIA notes via VK9JK (K3SSA): "Plenty of New Guinea activity on 20 s.s.b. by VK9s AG BW GN GW JK MK and NT. VK9LF uses straight a.m. and VK9TG may be back early next year. Some 40-meter activity Sunday mornings but I'm busy at that time. There soon should be more New Guinea stations active. VK9s BM and BN will help DJ dispense Papua QSOs. VK9s DR and XI continue very active on Christmas isle, VK9RH is heard occasionally from Norfolk island but Cocos-Keeling and Nauru are quiet." . . . . . W0GTA, in Indonesia, was licensed as W0GTA/8F4 for European QSOs in August, a healthy DX sign, indeed . . . . . W3LE understands that FW8RC will leave Wallis by late January . . . . . KB6s CY and CZ keep Canton comin'. The former likes c.w. while the latter fires s.s.b. on 20, 15 and 10 meters. KB6CZ also gives 21-Mc. Novices a c.w. treat at 0300-0430 GMT now and then . . . . . 9M8RS reports, "Little activity from Sarawak in general but I'm frequently available at 1200-1400 GMT on 14,040-14,060-kc. c.w. or 14,180-14,220-kc. single-sideband with an SB-400 driving homebrew grounded-grid 813s, an 888A receiver and ground-plane." VE3DU tells W1BDI of Hq. that London (Ont.) A.R.C.'s summer auction resulted in an HR-160 being shipped to 9M8RY of Kuching. Ex-9M8EB helped carry the ball on this play . . . . . ZL2AON says W/Ks still roll into New Zealand on 75-meter sideband. Watch for George's replies at 0500-0800 GMT off the low edge . . . . . K3SWW/KG6, noting much improved 14-Mc. conditions Statesward, still seeks Vt. and Wyo. on s.s.b. and/or c.w. . . . . U.S. Sixes really thunder into Macquarie island, according to VKØMI. High-pressure VKØ-hunters hold down Col's own DXCC total but that's the price of being rare . . . . . WA8GGN finds ex-KR6MM about to turn on W3HEO/Ø in Ft. Leavenworth . . . . . Don't forget NZART's gala VK/ZL-Oceania DX Test on the first two week ends of this mouth as detailed last *QST*.

EUROPE — Italian hams, apparently seized with DXpeditionary fevers, swarm all over the Adriatic. ID1IDA, for example, was operated by the Radio Club of Ravenna atop an offshore oil tower in late June for 1200 QSOs on 3.5 through 432 Mc., c.w., a.m. and s.s.b. . . . . Regarding our June reciprocity salute, G3TYL/W9 points out that GM8XX/W2 couldn't work GM8XX under present British rules because the licensee has to be at the home station when it's on the air. (Quick, Jeeves, think of something.) [Okay, Boss — Mrs. McTavish becomes GM8XYL. — *Jeeves*] . . . . . Mr. V. Terehov, 14B, Apt. 25, Enthusiasts St., Chelyabinsk 22, U.S.S.R., desires correspondence with a fellow radio engineer on our side of the curtain. You'll have to read Russian, though, at least to start with . . . . . October 22nd–23rd will be Wales Activity Week End, according to GW3DZJ and K1YZW. GW sidewinders are to congregate on 14,120, 14,230, 21,390, 21,420 and 28,550 kc., QSLs guaranteed . . . . . Reminder: There's the International OK DX Contest slated for the 13th of next month, a c.w.-only affair, specs due in November *QST* . . . . . WB2JWB says DM2CZL, QRT for completion of army service, is eager to get back to his newly homebrewed triband s.s.b. transceiver. Sig formerly signed DM4YPL . . . . . G3s POI SHZ and colleagues lugged a large layout to the Channels for DXpeditionary work as GC3s POI/p and SHZ/p in August and September. QSOs from 1.8 through 1296 Mc. were planned, according to WA2YBR . . . . . WA2HIU says a Warren county contact would give *IT1AGA* Worked All New Jersey credentials. Gius scans 7- through 28-Mc. c.w. ranges at 1300-1600 and 2200-0200 GMT . . . . . PA6AA was an August outing installation fostered by Holland's VERON . . . . . Check with I1PEG for data on a Carta Morgana certification sponsored by Reggio (Calabria) I1s.

HEREABOUTS — Ks 2LRE 3GAT 5OZL, WAs 2NPV and 4KJR help keep the Voice of Adak, KL7AIZ, loud and clear in the foggy Aleutians. Club prez K2LRE writes, "KL7AIZ has been club station of the U.S. Naval Communication Station since 1951. Amateur radio is extremely important to morale up here where there is no civilian population and plenty of bad weather." KL7AIZ's prime activity, of course, is traffic work on 20 phone . . . . . Old "How's" hand W8QXQ makes a DX comeback after a nine-year layoff split between college and Navy duties . . . . . Our Gripe of the Month comes from WA8GGN who suggests fifty jabs of the Wouff Hong for the DXer who calls stations or CQs 20 or 30 times, signs his own call twice or thrice, listens for a few seconds, then starts all over. Yeesh! . . . . . K9WDY hears it's awfully easy to slip into the CQ-DX habit so he's offering a ten-buck reward to anyone who ever catches him at it. That *should* do it . . . . . WA6SLU, while refueling with K6s TBW and YZJ at a local Chinese-style eatery, dug this tip



KA7AB, in this year's ARRL DX Test, turned in the second highest phone score among Yanks in Japan. You'll find John equally adept at c.w., especially favoring 20 and 15 meters. (Photo via W1YYM)

out of his fortune cookie: "A message from a distance is soon to be received." George wonders if this clinches his VS5JC QSL. [For you, Boss, it would be a pinkie from Grand Island. — *Jeeves*]. (You're terribly yakky this month, Jeeves.) . . . . . W9NN bounces back from vacation travels eager to swell his 40-meter countries total, now a substantial 231 . . . . . There's an almost unused NCX-5, NCL-2000 and Telrex beam at Camp Tuto, near Greenland's Thule AFB, ready to go as OX5BA. K4HAV dropped in and ran off a flock of 14-Mc. c.w. and s.s.b. QSOs in mid-July, receiving many "First OX!" comments . . . . . *Now localisms*, more or less, via the club grapevine: W9WNV and K1IMP rocked St. Peter and Paul as PYØXA in August with other rare stops in store. Don's Heard appearance in July as VK2ADY/VKØ chopped up the NCDXC meeting in San Bruno. Took only seconds to read the minutes. . . . VP8s AM and HY, So. Georgia, and IQ, Falklands, keep the 20-c.w. gang gasping. . . . W4MVB, in Florida DX Club's *DX Report*, re-emphasizes that DXpeditioners should be sure that their operating permission comes from proper authorities (see p. 9, June '66 *QST*). . . . Ex-CO2QH now signs WB4DLA. . . . W8ZCQ resumes duties as DX columnist aboard Columbus A.R.A.'s *CARAscope*. . . . Watch for Northern California DX Club's W6TI radiating DX bulletins on 14,002 kc. at 1600 GMT Sundays, 0100 Mondays, W6RGG as emcee. NCDXC's top DX hounds in order: W6s AM GPB CYV KEV LDD HOC BSY, K6VVA, W6s UJ and WX; on phone it's W6s AM LCF, K6s VVA ERV, W6s BSY UMI WX VUW, K6s OHJ and DXM. QST

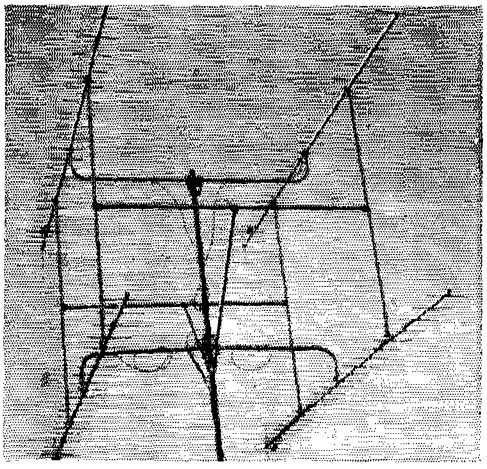
The World Above 50 Mc.

CONDUCTED BY SAM HARRIS,* W1FZJ

VK3ATN–K6MYC Moonbounce

RAY, VK3ATN, reports the August moonbounce skeds with K6MYC were almost a duplicate of the July efforts. Signals from K6MYC were slightly down on the average although the peaks were somewhat higher. No reception by K6MYC so far. In an effort to facilitate finding his signals, VK3ATN will in the future answer on the frequency where he hears signals. For example, if (when) he hears K6MYC he will zero beat the frequency he is receiving the signals on. This will, of course, be Mike's original frequency plus the doppler shift. (With the moon rising and only 4 degrees above the horizon, the doppler shift would be around 400 cycles at VK3ATN's end of the path.)

VK3ATN's signals as received by K6MYC will be coming from a "leaving" moon and will be shifted down in frequency. This narrows the searching area down to less than a 200 cycle slice just above the original transmitting frequency, which is available for calibration purposes. Hopefully this technique will produce results during the September 7 to 11 schedules and future tests.



This 96-element array on 432.6 Mc. is operated by EI2W at his QTH, Sandyford Co., Dublin. Harry also operates on two meters and holds the present European record on this band with a 1387-mile QSO with the University of Belgrade amateur radio station, YU1EXY. EI2W worked 37 States during the 1957–58 openings on 50 Mc.

Overseas V.H.F.

It has been a good month for us in that we have received a number of reports from DX stations concerning their rigs and activities. Hiroshi Kato, JA4AKL writes: "I am running very small transmitter on 50 Mc. because of TVI. The final is a 6BA6 running 2.5 watts with output about 1 watt. Antenna is 8-meters high folded dipole. We experience *E* skip around 1100 to 1200 JST, 1700 to 1800 JST and 2300 JST. When Sporadic-E layer conditions are good we can work many distant stations in JA. JA1s and JA0s are about 600 kilometers from Kuse Town and I worked 24 of them during June. In 1962 I worked JA8RY (1200 kilometers) with this same rig on a.m." Many thanks OM for the fine report.

JA4AKL also tells us that many mobile stations are active on 51-Mc. f.m. and 144.48-Mc. f.m. both frequencies being JA net frequencies. JA4YAM, a club station is operating 435-Mc. TV and is Japan's first amateur-TV station. V.h.f. records in Japan stand as follows:

50 Mc. JA6FR to PY3BW 1958-3-23 19810 kilometers

144 Mc. JA2QY/2 to JA5YAW/5 1962-9-2 463 kilometers

435 Mc. JA1DGF to JA1FEE 1966-5-8 52 kilometers

A report from SV1AB in Greece relates that he began meteor-scatter work on 144 Mc. in August of 1965 running 120 watts in and a 13-element Yagi. Contacts were made with OK2WCG, HG2RD, DM2BEL, UP2ON and UA1DZ (2520 km.). In January 1966 he raised power to 650 watts and has since worked OE6AP and SP2RO. Future projects are 432-Mc. moonbounce, with a 16-foot dish, polar mount and a pair of 4X250Bs which he hopes to have on the air by the end of the summer.

ZB2VHF writes that he is operating 144 Mc. from the top of Gibraltar (1400 feet above sea level!) using a Heath HW20, 10 watts into a J-beam 8 × 8 slot. He is definitely on the air on Tuesday and Friday evenings from 2000 to 2300Z and other evenings when v.h.f. conditions are good. Frequency is 144.091 Mc. on a.m. or c.w. When not in QSO the beam will be north and the auto keyer will be on c.w. calling "CQ de ZB2VHF", transmitting the 2nd, 4th and 6th ten-minute intervals after the hour and listening the 1st, 3rd and 5th ten-minute intervals. Skeds are welcome. Al is also licensed to work 50 and 70 Mc. To date stations worked on 144 Mc. from ZB2VHF include three in Spain, one in Portugal and six in Morocco. A final note from Al sez that he is listening on 14.1 Mc. for ZB2AP calls and hopes to make v.h.f. skeds via that band.

Word received from HG2RD tells us that he has worked 18 countries in Europe on 144 Mc. and would like to work some American stations via moonbounce. Transmitter runs 1.5-kw. input; receiver is a parametric amplifier and 417A converter and antenna is an 11-element quad Yagi. Anyone interested in 144-Mc. moonbounce skeds with Andy should write Andrew Koroknay, P.O. Box 147, Veszprem, Hungary.

From Brazil, PY2CSS writes that he is an engineering student and operates 50.1 Mc. with 50 watts and a 4-element Yagi. "The 432-Mc. antenna is

* P.O. Box 1738, Arecibo, Puerto Rico 00613

2 × 16 elements with reflector, receptor uses 3-6AM4RF, 6C4 — intermediate frequencies, and two 6J6 oscillators." Ricardo also runs 400 watts input on 144 Mc. and is interested in moonbounce work.

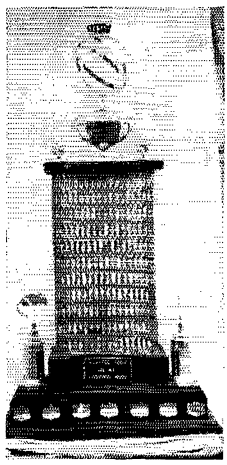
The following is from a letter written by KL7FAV to W5WAX: "The gear here on 50 Mc. consists of a homebrew transmitter, circa 1956 ARRL *Handbook*, modified to pi output. This uses 2-5763s and a 6146 in the final, running 630 volts and 210 ma. The receiver consists of an RME VF-152-A converter into a 7 Mc. ARC 5. The beam is 6 elements about 24 feet long and it sure works. It is only 15 feet high and is right down in the big trees. I'm the only one in Ketchikan on six meters and stick to c.w. on that band. I operate on 146.76-Mc. f.m. most of the time."

Syracuse V.H.F. Roundup

Don't miss it! For chills, thrills and excitement you just can't miss the v.h.f. "Do" of the year at Syracuse, New York on October 8. The chills appear when you start talking about those large antennas you are going to build out in the snow this winter. The thrills make their appearance when you discover the things that have happened and those yet to come on the v.h.f. bands, as recounted by W1HDQ, W2IMU and W3SDZ. The excitement shows up just as soon as the first two v.h.f.ers make their appearance on the scene.

Ontario 420-Mc. Trophy

To stimulate interest in 420-Mc. work in the Province of Ontario, VE3MR has provided a handsome trophy to be awarded to the high-scoring 420-Mc. operator in Ontario, in each of the three ARRL v.h.f. contests. Rules governing the competition are as follows:



The Ontario 420-Mc. Trophy

It is open to any Ontario licensed amateur. There is no power limit except that prescribed in the amateur license. Only two-way contacts in the 420-Mc. band will count (no cross-band). Work must be by a single operator (no multiple-operator category). Logs listing contacts made in the 420-Mc. band (and these contacts only) should be sent to Martin Rosenthal, VE3MR, Electro Sonic Ltd., 543 Yonge Street, Toronto 5, Ontario, and must be postmarked no later than two weeks following the conclusion of the particular contest involved. The winner will receive the trophy, with his call engraved on it, as soon as possible after the contest, and will be allowed to keep it until one week prior to the next contest, when it must be returned to the donor.

OES Note of the Month

K5IQL's OES reports for June, July and August supplemented by two interim "letter reports" spin a tale of 144-Mc. tropo, *Es* and m.s. activity of considerable interest as follows: "First I caught some *Es* on 144 Mc. on June 21st. Around 2130 GMT the m.u.f. was getting high and f.m. radio stations in New Jersey were coming in on 100 Mc. I called CQ from time to time and around 2200 I heard an a.m. station in QSO. He signed with what I understood as 'WA2EXK this is K2MWN.' At 2221 I heard W3RUE but did not get the call. After a QRZ by both of us I got through to him that I was K5IQL. He came back with: 'Is that New Mexico?'. (Seems all of the boys still associate the call sign with rare DX!) When I told him I was in Oklahoma he replied that he needed that one also. Reports were Q3 to Q4 with peaks to S7 or 8. After several minutes of short transmissions and listening, I lost him completely. At 2230 W8KAY was heard 5-7-9 calling CQ WSW. After about 30 seconds of short calls he came back to me on phone with a report of Q3 to 4 with peaks around 7 or 8. QSB on this contact was less pronounced but he faded down and out at about 2235 GMT.

"About 10 days earlier the conditions were as good or better to the Carolinas but no amateur signals were heard. These contacts on the 21st were of a surprisingly short distance considering that 100-Mc. skip was in from New Jersey. No doubt that signals from New England would have been much more solid. It was not surprising that the first station heard was the K2.

"I enjoyed a trip to California and the V.H.F. Conference at Santa Barbara. The antenna measuring party had few surprises. There was but one commercially-built array there, and it was brought mainly for the purpose of checking the matching system." The Ed Tilton Yagi proved to be the hottest single item! One by Don Roberts, W6PUZ, measured about 12.5 db. gain. Another by W6BUR was somewhat less, due, I believe, to an improperly made balun."

144 Mc. and Up

K1YON, K6HIJ and WA9HUV are all enthusiastic members of the 1220-Mc. band and each one doubles on another of the v.h.f. bands. Ted, K1YON, works continuously on attempts to extend his range on 1220 Mc. and doubles on 220 Mc. with an 11-element Yagi at 60 feet. Contacts with WB2CNK on 220 have produced good results. Dick, K6HIJ, has designed a new solid-state converter for 1296 Mc. and fabrication of the cavities has been started. Second band for Dick is 144 Mc. where a net has been organized on 145.54 Mc. in hopes of encouraging v.h.f. activity. WA9HUV, Norm, reports lots of activity on 1296 in his area, and recently increased his own output power to three watts and added a 7768 preamp with intentions of replacing the preamp (come winter) with a paramp. A 7-foot dish at 50 feet is the present project at WA9HUV with hopes running high for contacts with Toledo and Sandusky on 1296 Mc. 432 Mc. is the other band operated by Norm and he sez the opening of July 17 was noteworthy for him because of his contact via s.s.b. with K2LGJ. VE3AIB, VE3EZC and VE3DSE were also worked at that time.

Recently we received a copy of just one page from the log of W2RHQ (Syracuse, N.Y.) for 432-Mc. operation. It makes interesting reading. 17 stations were worked and not one of them in the U.S.A., all being either VE2 or VE3 with the nearest station more than 75 miles and the farthest about 225 miles. Charlie runs 25 watts output n.b.f.m. and c.w. to a 64-element collinear and is using a 6AM4 converter. Frequency is 431.998 and he'd like skeds south from Syracuse.

"Fantastic opening on 432 to Virginia and northern New Jersey on July 7!," so sez K4SUM in Alexandria, Virginia. Joe heard the following stations with stronger than Q5 S9 reports: W2BLV, W3CGV, WA2EMB, WB2EGZ, W3MMV and WB2IOE. In his own area W3RE, W4UBY, W3NG, W4API and K4SUM were active during this opening. July 24 and 25 also proved good on 432 Mc. when Joe worked W1AJR in Rhode Island via a.m.

Encouraging results reported by K7ICW re his skeds with California stations on 432 Mc. On July 10 signals were heard from W6DQJ (400 watts into a 16-element collinear 25 feet high). Signals were 10 db. below the noise level but call signs were definitely identified. On the 17th, signals from K7ICW (20 watts to a 44-element quad Yagi) were heard by K6HAA who was using a 32-element collinear on the ground at a 5800-foot elevation.

On the 31st, W6QUK (25 watts) was heard by K7ICW. OES report from W8CVQ also mentions good conditions on 432 Mc. on July 10 when good signals were heard from 125 to 200 miles. Walt also sez that extended tropo signals were heard on 144 Mc. during July particularly on July 10 and 13.

Up in Minnesota, WØTCK has raised his 32-element extended colinear up to 60 feet for 432 Mc. and is beamed on South Dakota with high hopes for a contact with WØBJV. From recent reports we understand that the number of converts to amateur TV is still slowly growing. Among the new addicts are WB2RVE, W6ORS, WØYMG and WAØDEA.

Regular skeds are held between K8ZES and K8TKC on 220 Mc. on Monday, Thursday and Saturday nights at 2130 EST. K8TKC in Detroit runs 2½ watts out from a converted 522 and his signals are always readable in Galion. All comers are welcome to call in on this sked. W9OVL tells us that there are about 75 stations in the Chicago area with 220-Mc. equipment. Signals are monitored on Monday, Wednesday and Friday nights at 8:00 P.M. EST. Ben also sez that phone DX east to Cleveland and Cincinnati and west to Omaha and Kansas City has been worked in openings.

The Perseids meteor shower, Aug. 10–14, maintained its reputation as the top shower of the year for 2-meter DX men. Contacts reported to date are listed below, with heard reports identified as such. Where an asterisk is shown a new state for the reporting operator was involved.

W1AZK, Chichester, N.H. — WAØFDY, St. Paul,* and WØLER, Minneapolis, Minn.; WØNXF, Lincoln, Neb.;* W9MAL, Peoria, Ill. Heard W5RCI, WØBFB, W5UGO.

K1BKK, Barre, Vt. — W4WNH, Germantown, Ky.; W4AWS, Orlando, and W4CKB, Lake Placid, Fla.; W9WDD, East Alton, Ill.

W1JSM, Waltham, Mass. — WØLER, W9IFA, Carrolton, Ill.

W4CKB, Lake Placid, Fla. — W1MEH, Easton, Conn.; W8QOH, Cincinnati, Ohio;* K9UIF, Hobart,* and W9BRN, Liberty Center, Indiana; K1BKK, Barre, Vt.;* W4ZCM, Rock Hill, S.C.; W2AZL, Holmdel, N.J.*

K5TQP, Tijeras, N. Mex. — W6GDO, Rio Linda, and K6HAA, Redlands, Cal.; WØEOZ, Jamestown, N. Dak.;* WØNXF. Heard WØBFB, W4TLV, W5UGO

WØNXF, Lincoln, Neb. — W1AZK, K2HLA, Cutchogue, L.I.; W6GDO, W4WNH, WØWYZ, Denver, and WØEYE, Boulder, Colo. (tropo); W2AZL, K5TQP.

K1ABR, Cranston, R.I. — W4NOS, Cary, N.C.

WB2FXB, White Plains, N.Y. — W4WNH,* W4AWS,* W9MAL,* K9UIF,* and WØBFB, Mitchellville, Iowa.*

W4FJ, Richmond, Va. — WØLER.*

K4IXC, Melbourne, Fla. — WAØFDY,* WØEMS. Omaha, Neb.;* and K1WHT, K1WHS and K1HTV, all Connecticut.*

We hear from Marty, K1OYB, that he has moved to a new QTH near San Francisco, California, and that Joe, K1MTJ (also of Maine), is now working in New Jersey. This means that for those who need Maine on 144 Mc. it might turn out to be difficult. However, Marty suggests that if anyone would like to make m.s. skeds with Maine they can let him know, through his callbook address, and he might be able to have K1RQE or others run his rig during his absence.

Good conditions on 144 Mc. seem to have been the thing during July. K1FJM noted same on a number of occasions during the month with July 22, 23 and 24 bringing in excellent signals from the entire area of 2 land and a few from 3 land. Pete worked W3BSV on the 22nd making his state total now 10. WB2QMP and WN2UVB brought their states worked up to 9 during July and Gene (WN2UVB) worked all nine during July with 5 watts and 11 elements up at 30 feet. K2HLA and K4SUM both report exceptionally good conditions on 144 Mc. on July 23 and 24 from Maine to South Carolina. Dick worked W4VHH (South Carolina) for a new state. Practically all 144-Mc. OES reports for the month of July noted very good conditions throughout the month with exceptionally good conditions on several occasions. WA2ZPD, W8FZ, W8PT, W9FBC, and WA9JFM picked July 17 as being the best night on 144 Mc. with many states and call areas being heard and worked. W8PT gave us the only report of aurora during July having heard it on the 7th and 8th. Jack had visitors, was unable to get on the air. On twelve different evenings during the month of July W9FBC noted good conditions on 144 during which he worked Illinois, Michigan, Indiana, Wisconsin, Ohio, and Minnesota, and heard New York and Kentucky. "A pretty good month", sez Maury. The band broke loose for WA9JFM on July 18 when stations in New York, Ohio, Pennsylvania and Kentucky were getting into Wisconsin loud and clear. Culmination of activity that evening ended with a contact between WA9JFM and WØNXF in Nebraska.

K7NII also caught Nebraska (WØNXF) for a new state on two meters on July 28 during the Aquarids meteor shower. "The nights of July 14 and 15 could have produced some nice contacts on two meters if anyone had been around"; so sez WAØHMZ who heard only one station in St. Louis.

From California, WB6KAP brings his states worked total up to 8. On July 27 Vic had a 144-Mc. contact with K6QKL/a.m. enroute to Honolulu, a distance of 1440 miles. It's an interesting long-haul contact but aeronautical mobile contacts are not admissible for distance or states-worked claims. The contact between WØENC and WB6KAP last August is still the only known 144-Mc. contact between California and South Dakota.

Although W9GJJ has been on two meters for only a short time he has already had his taste of hearing DX on that band. Jack sez that Michigan, Indiana and Illinois are heard regularly at his QTH in Milwaukee but he was surprised to find that WØDQI is also heard regularly. On July 18 Missouri, Iowa and Minnesota were heard and on the 19th New York State was "in" for more than an hour according to Jack's report. He is using a "Sidewinder" and 8 elements at 12 feet so hasn't worked too much, but it probably won't be long now.

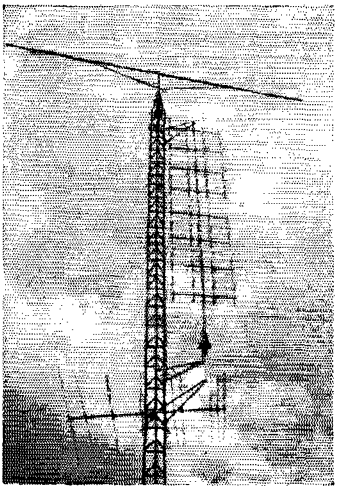
KØEMO upped his states worked during July and is now in the "box" with 15 states worked on 144 Mc. Gene runs 60-watts s.s.b. and c.w. to 17 elements up at 40 feet. K5IQL writes us that every night at 0315 GMT K5WXZ calls CQ NE for five minutes on 144 Mc. At 0320 GMT W8QOH calls CQ SW for three minutes. On August 3 Frank (K5IQL) received W8QOH solid 5-3-9 for more than two minutes with the signal very steady except for a few loud pings.

50 Mc.

Another report of trans-Pacific contact on 50 Mc. has been received. WA8NBN tells us that on June 6 of this year he worked K6ODV/KH6 in Honolulu at 50.23 Mc. Rod was using a TX 62 with 60 watts and an NC300, with a six-element beam at 60 feet. The KH6 was using a home-brew 4-1000 at a kw. and 6 elements and an SP600. Reports were 5/9 in Ohio and 30 over 9 in Hawaii. On that same date, Rod worked a number of stations in California and on June 25 worked CO2GS.

Comments concerning the six-meter band have certainly been varied and give us a glimpse as to just how changeable the band is in different areas. "July could have been a lot better," from WB2PYZ who caught four openings. "Six-meter band very quiet this past month," from K3LLR with two openings. "Six meters showed a decrease in the number of sporadic-*E* openings but an increase of good groundwave," from WA3BKP. "Some band openings on six meters," from WA8KRH. Next in line is Tennessee and K4KYL who caught six openings during which 11 states were heard or worked. On the other hand K8AQA sez: "Skip conditions occurred throughout the entire month with five call areas heard." "During the month of July sporadic *E* was very good once again with the band open every day throughout the month," WA8FTA. (Both of these 8s are in Michigan.) "This time of year six-meter openings are too numerous to mention," from KØJWN. Out in California WB6IZF noted ten days of sporadic *E* with nine states heard including such fair ones as Montana, Utah, New Mexico and Idaho.

K7ICW reports: "Six meters was open for E_s for a total of 18 days during July and on six of these days it was open for double hop. KP4BCN was heard ragchewing with another KP4 on the 9th. Heard VP7DD on three separate openings on the 9th working California. Only one opening noted to the first call area on the 13th when I worked K1PBD." WA8JYR (W. Va.) and W8CVQ (Michigan) agree that "Six meters has continued to be open almost every day." Pete (WA8JYR) sez that by the 4th of July he had already heard all call areas that month; and Walt (W8CVQ) sez that for him the openings were chiefly to the east and gulf coast states and the near mountain states to the west. Other reports received from California, Illinois, Louisiana, Michigan, Nebraska and Pennsylvania reveal that many OES stations observed from one to four openings during the month of July.



The antennas in use by Rex, W5RCI. On top is the 144-Mc. 23½-foot long Yagi. Stretched out below is the new 128-element collinear 432-Mc. antenna.

It looks as though the place to have been during July 1966 might have been Cicero, Illinois. That is the QTH of WA9FIH and he noted 21 days of Sporadic *E* during July and either heard or worked 27 States plus VE2, VE3 and VP7.

Ed Tilton, W1HDQ, reports that six meters was open several times during the first ten days of August, "winding up what surely must be one of the best E_s seasons on record. Openings have often been of long duration with areas affected being geographically very large. Seems to have been an unusual amount of double hop reported also." W1HOY/KP4 has ringed July 21 in red to mark her first contact with VP7DD, after several years of trying from Medfield, Mass. with no luck.

An interesting report received from VE2AIO: "The six metre E_s openings are on the wane here, although I got back on the band on June 12, the nine-day cycle with peak openings on consecutive 27 days has been running true to form. There have been many more of the type of openings this year where the 800 to 1200 mile QRM is low and even spotty but double hop is evident. On July 13 there was a path possibility into the northern part of South America from here, but no signals, since Illinois and Minnesota were better copy at times on a due south-beam heading. That is about at right angles to the great circle heading. However, no 4- or 5-land signals were heard during this period."

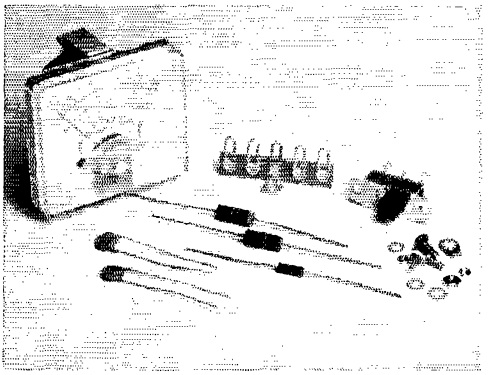
"It would seem that the curse of practical jokers or pirates has appeared on six. On July 25 at 2312 GMT an a.m. phone appeared at 50.013 calling CQ and signing DU1MY, beam here at 280 true, signal about 4 by 4. Called him to no avail. He moved up into the American phone band later and built up to S9. Eventually he worked a W3 and stated the QTH as Manila P.I. He faded out at about 0020 GMT. Now I have had my share of pirates on the lower bands but can't help but wonder about this one. It may be wishful thinking, but he did not have the same general QSB pattern as the Illinois signals heard via one hop *Es* at the time." Signing DU1MY on 5.388 Mc. Anyone else hear or work him? The W3 was W3BWU, Pittsburgh, who logged the station. He was suspicious of the nature of the station also.

• New Apparatus

Omega Multirange Panel-Meter Kit

THE Omega MX-10 is a multirange panel-meter kit specifically designed for amateur transmitter applications. MX-10 consists of a 0-1 milliammeter, a d.p.d.t. slide switch, a 5-contact terminal strip, three resistors, two disk-ceramic bypass capacitors, assorted hardware and an instruction sheet. Meter sensitivity is 1000 ohms per volt and the internal resistance of the meter is 1500 ohms. A 1-megohm multiplier resistor, included in the kit, provides a 0- to 1000-volt range for measuring plate or screen voltage. Scales of 0 to 200 ma. and 0 to 500 ma. are made available, respectively, by 7.5-ohm and 3-ohm shunt resistors. The d.p.d.t. switch, contained in the MX-10, limits operation of the meter to two of the three ranges mentioned above. The instruction sheet lists multiplier and shunt resistors for additional current and voltage ranges; of course, for this purpose more resistors and a multiposition switch must be obtained. Details are given in the instruction sheet for installing the meter and several sample circuits are shown.

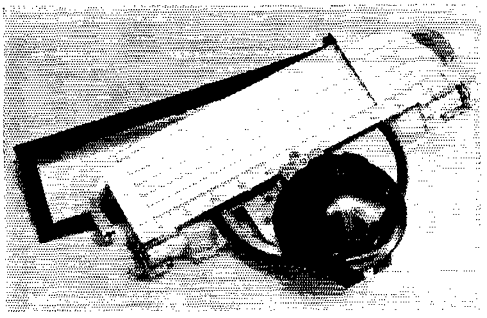
The meter must be mounted on a nonmagnetic panel or chassis; a 2½-inch hole is required. No screw



holes are necessary as the meter is held in place with a U-shaped bracket. Three scales are painted on the meter face: a 0- to 1000-volt range in black and 0- to 200-ma and 0- to 500-ma. ranges in blue. Meter accuracy is plus and minus 5 per cent of full scale.

Meter kit MX-10 is in the $10.00 price class and is available from Omega Electronics Company, 10463 Roselle Street, San Diego, California 92121.

— *W1YDS*



Millen No-String Illuminated Slide-Rule Dial

THE James Millen No. 10037 dial assembly shown in the photograph incorporates many innovations in dial construction. Instead of moving the pointer with a string, which is the usual practice, the pointer is driven by a flexible but non-elastic molded gear-driven rack constrained within a multislot extruded aluminum channel. This method of construction, along with an anti-parallax shaped pointer, permits the dial to be accurately read and reset. The rack is driven by a plastic gear which is molded around the outer edge of a friction drive mechanism. Zero backlash is achieved between the gear and the rack by employing a very slightly different pitch on the driving gear than on the driven rack. This is made possible because of the flexibility of the teeth on the molded rack. Teflon bearings are used throughout the unit, eliminating the need for any lubrication. Zero-set is accomplished by moving the plastic dial face to the left or the right by the adjustment of a screw head that has an off-center shaft.

The drive mechanism has an 11 to 1 reduction ratio; it takes 5½ turns of the 2¾-inch black tuning knob to turn the ¼-inch diameter output shaft 180 degrees. Tuning is rather stiff, but this can be an advantage. Once the dial is set, it stays put. Little care is necessary in selecting a free-turning capacitor to be used with the dial, as the tuning mechanism is capable of handling almost any torque requirement likely to be encountered.

The dial face has five scales; one scale is marked from 0 to 100 and the other four are blank. 6½ inches of pointer travel cover the calibrated dial area. Six 6-32 tapped holes as well as six No. 25 holes are provided on the back plate of the dial mechanism for mounting whatever is to be driven by the dial. Five 6-32 tapped holes are available on the front of the assembly for attaching the dial to a panel; however, only three holes need be employed for secure mounting, the user having his choice. Behind-the-panel space measuring 8¾ × 6 × 1⅝ inches is necessary for the installation. Three No. 25 holes must be drilled in the panel to mate with the dial mounting holes, along with a ⅜-inch hole to clear the tuning shaft and a 2⅛ inch by 7⅛ inch cutout to expose the dial face. A black bezel with a clear plastic window is furnished to fill the cutout. The escutcheon is held in place by bending its 7 flexible tabs over the edge of the hole. Outside dimensions of the bezel are 8 by 2⅝ inches.

Two lampholders with mating translucent pilot lights are included with the dial as well as drilling templates and instructions for mounting the mechanism. Also provided are a flexible coupling for the output shaft and three 6-32 mounting screws. The model 10037 dial is in the $11.00 price class and it is available from the James Millen Manufacturing Company, Inc., 150 Exchange Street, Malden, Massachusetts 02148.

— *W1YDS*

YL news and views

CONDUCTED BY JEAN PEACOR,* K1IJV

"The Lady That's Known as Lou"

ON many occasions you have read news of Louise Ramsey Moreau, WB6BBO-W3WRE on *QST*'s pages. Her outstanding contributions to the amateur radio world have been many. It is indeed a pleasure to now introduce Louise to all as the new YL Editor for *QST*.

August 1953 was the memorable month in which Louise and her OM, Bill, WB6BBL/W3WRC first became licensed as Novices in Philadelphia. Amateur radio was to be Bill's hobby at the start, but Lou soon joined him in learning code for she had suddenly discovered that all the women heard on their receivers were not "just wives," but licensed operators. Lou joined Bill in studying, and both passed the exams.

Traffic hounds everywhere know of Lou's capabilities in this field. As W3WRE she was active on the Western Penn. Net, 3rd Region Net, Eastern Area Net, and Transcontinental Corps. She also served the area as Emergency Coordinator for Cambria County, later as Section Emergency Coordinator (AREC) West. Penn. Section, and as State Net Control for Penn. State c.w. RACES Net.

Since moving to California in 1962, Lou has been active on the Southern Calif. Net (SCN), Pacific Area Net, 8 Ball Traffic Net (v.h.f.), Salvation Army Disaster Communications Net, and has served as manager of the 6th Region Net since 1963.

Lou's official appointments include Official Relay Station, Official Phone Station, Route Manager, National Traffic System Manager. She was awarded ARRL's Public Service Award for her assistance during the Alaskan Earthquake emergency, is an A-1 Operator, and has earned the Traffic Bronze Medallion (it's rare when the BPL listing does not include her call).

Her antique collection of telegraph keys and equipment is also well known as she now has over one hundred keys in the collection. The earliest dates back to 1850.

For the past three years, Lou has been working with W4MLE on the about to be published *The Radio Amateur's Operating Manual* (see Sept. 1966 *QST*, page 10). She has also contributed several articles to *QST* in the past, and received Honorable Mention for her ARRL Golden Anniversary Essay Contest article.

Lou was a member of the Conemaugh Valley Amateur Radio Club in Johnstown, Penn., and is presently affiliated with ARRL, YLRL, LA-YLRC, Ramona Radio Club, Grand Chapter Morse Telegraph Club, Antique Wireless Association, De Forest Pioneers and is a graduate of the University of Pittsburgh. Her OM, Bill, WB6BBL is now employed at California's Institute of Technology's Jet Propulsion Laboratory.

QST's new YL Editor—Louise Ramsey Moreau, WB6BBO/W3WRE.

The new YL Editor's first column will appear in the November issue. May it prove as rewarding an experience to her as it has been for me. I'm sure all amateurs join me in wishing her the greatest success.

Mary Lou Stockstill—WN6SSZ

Impossible? Nothing is! The amazing story of Mary Lou Stockstill, WN6SSZ, of Canoga Park, California well bears out this theory. With physical handicaps quite similar to those of Helen Keller to conquer, Mary Lou, handicapped by the loss of both sight and hearing, has recently taken and passed the FCC Novice examination. She is the first such woman to achieve this distinction.

While attending Earlham College in Richmond, Indiana, Mary Lou won the admiration of a young University of Indiana engineering student, Charles Stockstill, and they were married in November 1954. Born in Marion, Indiana, Mary Lou lost her sight at the age of ten as a result of a combination of childhood diseases. When she was considered well enough, she entered the Indiana School for the Blind where she studied both piano and organ. While a student in high school, she earned the Kiwanis award for the best all around student in the senior class.

Charles and Mary Lou now have two pre-teenaged daughters. A year after the birth of their second child, Mary Lou discovered that she was losing her sense of hearing. Doctor after doctor advised her that not much could be done about a nerve type loss of hearing. In 1961, the Stockstills left Indiana and headed west for a new start in California. Charles went to work for the Rocketdyne Company in Canoga Park, and Mary Lou attended the Braille Institute of America, Inc. at Los Angeles for weekly classes in knitting and mosaic tile.

* YL Editor, *QST*. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena Calif. 91001

Mary Lou Stockstill, WN6SSZ *(Photo courtesy of Braille Institute of America)*

Mary Lou's interest in amateur radio came about quite by accident. During a demonstration of a device known as the "Tactile Speech Indicator" tested in September 1965 in a project which was sponsored by the San Fernando Valley State College, she learned the value of signals by code. In a Leadership Training Program in the Area of the Deaf, Dr. Ray L. Jones, Project Director, and Mr. Hugh L. Moore, an Electronics Specialist for the Los Angeles City Schools tested the device with three highly intelligent deaf-blind men. Results indicated that persons handicapped by the loss of sight and hearing were able to communicate by telephone by use of "yes" and "no" signals. It was also discovered that one familiar with the Morse Code was able to carry on quite a conversation. Realizing that the Braille Institute also sponsored a class in amateur radio, Mary Lou decided to enter a third class of instruction.

Although unable to make intelligence out of any type of conversation involving the spoken word, mother nature has provided Mary Lou with the ability to hear high-pitched tones which fall in a narrow region above and below the frequency of one thousand cycles. The normal frequency of tones emitted by the human voice ranges from just below three hundred cycles to the upper limits of around three thousand. Therefore, the spoken word is just a jumble of sounds, but radio signals from amateur or commercial radio stations using the International Code for transmission of messages can be picked up by Mary Lou. In turn, she, by use of the telegraph key for communication, may now spend many happy hours chatting with friends via the air waves.

In addition to radio code, there are several ways that others may communicate with Mary Lou. She reads Braille and uses either a standard typewriter or Braille to correspond with friends. Another method is to take her finger and using it as one would use a pen or pencil, print letters across the palm of one's hand as though printing one letter on top of the previous one. Radio operators can tap out messages in code on her arm or wrist.

Ray Meyers, W6MLZ, recently featured Mary Lou during his weekly radio program, "Calling CQ," over station KPFK-FM. He also kindly sent the information which has made it possible to tell radio amateurs everywhere the amazing story of Mary Lou Stockstill. Ray sponsors an organization open to sightless amateur radio operators the world over called the International Handicapped Net. This net provides a common meeting place for the members. Further details will gladly be furnished by contacting Ray Meyers, W6MLZ.

Arizona's Flora Straud

Happiness is building a piece of ham gear, seeing no smoke during the smoke test, and having everything work perfectly as per instructions. The end result is not only a better informed ham, but a happy one. Flora Straud, K7TFA, will attest to that.

Flora's OM Ken, K7TEZ, has been active in amateur radio for many years. Ken was first licensed as 3BUX in 1921. Flora's interest to also become licensed was quickly nurtured, and has resulted in another outstanding XYL amateur.

It isn't often that an XYL builds her own complete station. The equipment shown in Flora's shack (see photo) is the product of her capabilities. In addition, she also built her receiver as well as various testing equipment. Her latest undertaking is the building of a Heathkit electronic keyer.

Flora is active mostly on 80, 40, and 20 meters, both on c.w. and phone. To QSO her would be more than just contacting an Arizona XYL, which in itself is a rarity. You would also be talking with a "real" ham.

YL Club News

YLRC of Los Angeles recently installed the following new officers for the coming year: Pres., WA6ISY; V. Pres., WA6LWE; Rec. Sec., WA6ZTW; Cor. Sec., W6JCA; Treas., WA6UBU.

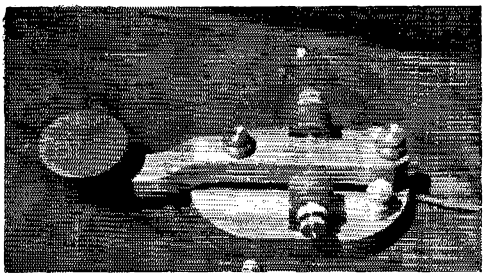
The San Diego YLRC announces their new officers as follows: Pres., WA6SKT; V. Pres., K6VRH; Treas., WA6CQS; Rec. Sec., WA6ATB; Cor. Sec., K6YIT; Cert. Custodian, WA6ATB.

Flora Straud, K7TFA

The Ontario Trilliums, VE3TOT, announce another first for their newly formed club in being the first Canadian YL group to participate in Field Day activities. Theirs is also the only report received from any YL group who may have participated. Transmitters were set up in the Caledon Hills area where they operated c.w. on 40 and 20 meters; phone on 2 meters. This being their first year, they operated to gain experience. Jean Evans, VE3DGG, and Doris Cody, VE3BBO, were their Field Day Coordinators. QST

It is with deep regret that *QST* announces the departure of Jean Peacor, K1IJV, from the *QST* staff of contributing editors. Fairness to the demands of a growing family makes it impractical for her to continue as YL Editor. The column has grown and prospered under Jean's capable hands and we will miss her informative, delightful, humorous, column "leads." Readers and Hq. staff say "well done," Jean. "Good luck and 73!"

Strays



When the president of the Satellite ARC calls the meeting to order it isn't with the customary gavel. That large key in the photograph (the knob is three inches in diameter!) is connected to an audio oscillator that does the job of getting everyone's attention. The key is the creation of Ed Cary, W6DYQ, and it measures five-inches wide by twelve-inches long. It would be a real attention-getter in any shack.

Got the habit of thinking of 28 Mc. as a "dead" band, good only for local work? If so, it's time to shake off that illusion and take a look at "10." CRPL predictions for October show that the band is expected to be open for long-distance communication for a large part of the daylight hours, much of the time with almost ideal ionospheric conditions for intercontinental work.

—•••—

Hams in the St. Louis area, do you know a fellow radio amateur who you think is deserving of the "Amateur of the Year Award"? If you do, nominate him for the award which will be presented at the St. Louis ARC Fourth Annual Amateur of the Year Award Meeting that will be held in St. Louis, November 11, at the C.D. Control Center, Route 340, Chesterfield, Missouri, at 8:00 P.M. Guest speaker will be Sumner Foster, ARRL Midwest Director. Mail your nomination to Horace K. Hudson, 9431 Crestwood Manor Dr., St. Louis, Mo. 63126. All hams in the St. Louis area are invited to the meeting and to participate in the nominations.

Stolen Equipment

The following equipment was stolen from my car on July 27: Swan 175 Transceiver, serial No. 111212, Webster Top-Sider antenna with 75-meter coil, and a Clegg microphone. Judith Epstein, K8TWW, 12908 Talbot Lane, Huntington Woods, Michigan.

—•••—

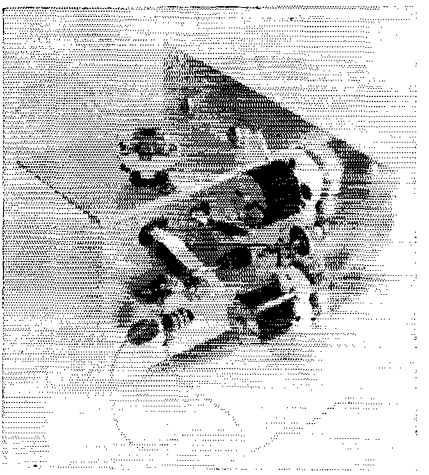
I would like to get in touch with . . .

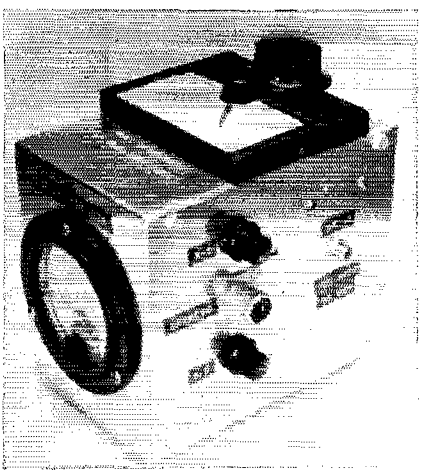
. . . anyone in any country with old ham-call license plates. F. Allan Herridge, G3IDG, 96 George Street, Basingstoke, Hampshire, England.

. . . Alcoholics Anonymous hams interested in schedules on 20 meters. W7FNE, 506 13th Avenue East, Seattle, Wash.

. . . any stations in the following states who work 160 meters, especially c.w.: New Hampshire, Louisiana, Delaware, and Idaho. WØDIB, 313 Elm Ave., Mitchellville, Iowa 50169.

. . . those interested in forming a chess net. W8GGQ, 35668 Fernwood Dr., Wayne, Mich. 48184.



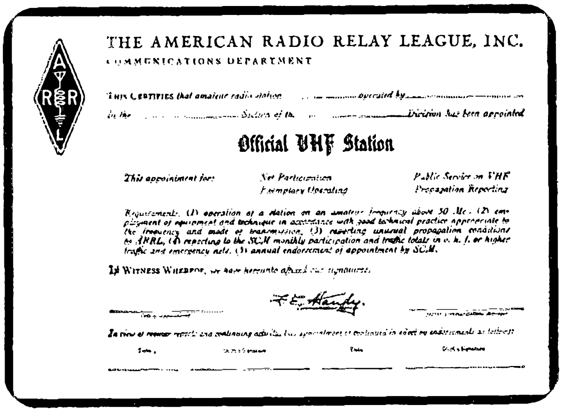


The photos shown above of the modified *Handbook* impedance bridge, described by K4ZZV in "Technical Correspondence" in September QST, unfortunately were received after the issue had been buttoned up and so could not be run along with the letter. They show how the two extra variable capacitors are fitted into the assembly in previously-unused space on the panel wall. K4ZZV also writes that although the construction of his bridge follows the Handbook layout (chapter on measurements) the circuit he uses is the one originally given in the August 1955 article. This uses a balanced signal source, permitting one side of the standard resistor to be grounded. In turn, this allows both rotors of his added reactance-compensating capacitors to be grounded, which simplifies things electrically and mechanically.

Operating News

F. E. HANDY, W1BDI, Communications Mgr.
LILLIAN M. SALTER, W1ZJE, Administrative Aide
GEORGE HART, W1NJM, National Emergency Coordinator
ROBERT L. WHITE, W1WPO, DXCC Awards
ELLEN WHITE, W1YYM, Asst. Communications Mgr.
GERALD PINARD, Club Training Aids
PETER CHAMALIAN, W1BGD, Communications Asst.

OES Becomes OVS. Effective with the publication of this announcement in *QST*, the SCM-post in the ARRL field organization known as Official Experimental Station becomes the League's *Official VHF Station* (OVS) Appointment. Some 600 dedicated and devoted v.h.f. operators, many of them constantly reporting items on their test projects and operating records for their SCM's reports in *QST* and "The World Above 50 Mc." will receive (currently)


THE AMERICAN RADIO RELAY LEAGUE, INC.
COMMUNICATIONS DEPARTMENT

THIS CERTIFIES that amateur radio station ________ operated by ________
in the ________ Section of the ________ Division has been appointed

Official VHF Station

This appointment for: Net Participation, Exemplary Operating, Public Service on VHF, Propagation Reporting

Requirements: (1) operation of a station on an amateur frequency above 50 Mc., (2) employment of equipment and technique in accordance with good technical practice appropriate to the frequency and mode of transmission, (3) reporting unusual propagation conditions to ARRL, (4) reporting to the SCM monthly participation and traffic totals in v. h. f. or higher traffic and emergency nets, (5) annual endorsement of appointment by SCM.

In Witness Whereof, we have hereunto affixed our signatures.

F. E. Handy

New ARRL Certificates for VHF Workers

the handsome blue-bordered certificates, such as here shown. Many of this group participate in emergency and public service v.h.f. nets, and assist SCMs, PAMs, and Emergency Coordinators by their preparedness for any call in handling important communications in their areas in case disaster strikes. We're delighted to recognize their performance with these new certificates.

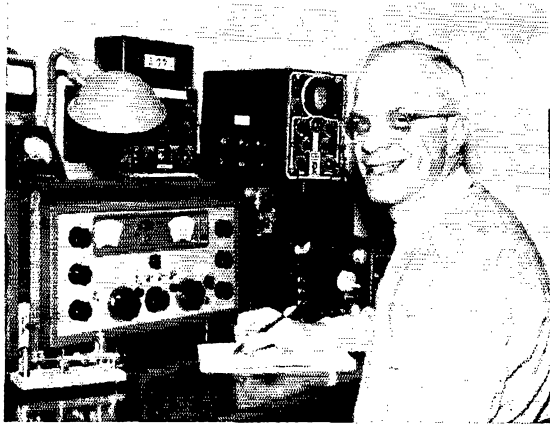
There's no substantive change in the several *appointment objectives* that will continue to be set forth in ARRL literature and which appear on the certificate. There's just the change in designation to OVS. The new name will broaden the understanding and appeal of the certification to additional numbers of amateurs — which may include all, the Technician, General Class, Novice, Extra Class, Advanced licensees and Canadian counterparts. For appointment the big thing to have is the strong consistent v.h.f. interest and activity in line with any or all the objectives or purposes identified with this ARRL-VHF recognition.

Official VHF Station Provisions. The Rules and Regulations of the Communications Department concerning Station and Observer Appointments have been amended or changed only as much as necessary to effectuate the name change and clarify the description. The following language replaces in its entirety that part of par. 17 about the "Official Experimental Station." The new text follows:

> *Official VHF Station* (OVS) appointees shall be appointed by SCMs from among those members active in developing successful communications systems and equipment applications and collecting propagation data in any or all amateur frequency bands above 50 Mc. RTTY operators using a.f.s.k., make-and-break, etc., are eligible. Participation in nets that provide communications facilities for the public and fellow amateurs is a way to earn and maintain OVS appointment, such to be available only to members operating stations above 50 Mc.
>
> (a) Applicants shall indicate the operational and experimental projects and groups in the field of their v.h.f. interest. (b) Appointees shall report monthly, their contacts, observations and progress on the specific

33rd ARRL Sweepstakes—Nov. 12-14 (phone), 19-21 (c.w.)
All W/VE Amateurs Invited To Participate

The highlight of Fall activity, the 33rd ARRL Sweepstakes, will soon be here. As is our usual custom, this early announcement is for the benefit of those amateurs in remote ARRL sections who may not receive their November issues in time for the test. The contest period will run a full 30 hours from 2100 GMT Saturday night until 0300 GMT Monday morning on each of the weekends. Only 24 hours of participation will be permitted, however. Time-out periods may not be taken in less than half-hour increments. This will permit a *maximum* of twelve off periods of a half hour apiece or six off-periods of one hour, etc. See the rules in November 1965 *QST* concerning the message exchange which will be worth a stock 1000 points. Convenient reporting forms are now ready for your request. Write early to the ARRL Communications Department, 225 Main St., Newington, Conn. 06111.



San Francisco OO W6GQA has a record of well over 50 consecutive FMTs behind him. Al has been active since 1932 (previously W9KDD) and holds Extra Class as well as commercial class tickets. In addition to his OO activity, he is an active Intruder Watcher.

> problems and communications justifying this appointment recognition. (c) Stabilized signals, non-radiating receivers and the like, shall be used as appropriate to the frequency and mode of emission in accord with the general progress of development in the designated bands. (d) When handling traffic on v.h.f., standard ARRL procedure and message form will be followed, and contacts with the nationally integrated NTS maintained, as feasible.

As the publication *Operating an Amateur Radio Station* comes up for reprinting the corresponding text on page 9 will cover the new broader title. Plans to give more forceful portrayal of our objectives by renaming this post were mentioned earlier (Mar. '63 *QST*) and we're glad now to follow through with the new certificate issue.

OVS Applications Welcomed. It's of top interest that Section Communications Managers (address page 6, *QST*) are now issuing new certificates to these six hundred appointees. With the expansion of amateur interest in all phases of work in the v.h.f.s, SCMs will welcome applications for Official VHF Station Appointment from any truly active v.h.f. member operator, not now holding the appointment, who subscribes to these objectives. Whether you are a Tech., Novice, Extra Class or hold an in-between grade amateur ticket you can be part of the v.h.f. operating picture! We'll be proud to add your station, if active on v.h.f.'s (in two- or six-meter bands or higher frequency bands) to the roster of accredited workers. You may specialize in v.h.f. links as part of the Public Service Corps (AREC EC-RO groups) or be eligible because of your v.h.f. experimentation and propagation reporting, or as one who reports his v.h.f. netting, under EC, VHF-PAM or other auspices.

Look into this won't you, by asking ARRL Hq. (or your SCM) for OVS application forms. Those appointed will rate this special recognition for their efforts . . . and they will receive advance v.h.f. information from time to time, in addition to our quarterly CD Bulletins.

"Licensing Classes" and Clubs. This is that time of year when almost every club gets back into high gear, decides on its program and activity scheduling for the next few months and struts its stuff. Last month in this space we stressed to amateurs in general, and prospective amateurs especially, *Join a Club*. We repeat this. We want to mention some of the things a club may do that make joining it worthwhile. Most successful clubs have working committees that come up with programs , talks, dinners and get togethers, auctions, transmitter hunts, etc. There's the Field Day and planning to be started. Each club, we think, should suggest to SCMs the calls of those in its membership capable of holding down Official Station posts, and men suited to any ARRL leadership post in which there is inactivity or a vacancy. But most of all, as a service to its members, and to bring new activities to the club, every club needs to schedule, recurrently, some Code and Theory Classes.

As one example of what we mean, the *Mariana Amateur Radio Club* (Torrence, Calif.) last season made application for the use of public classroom facilities from the local education authority (district offices). The club was given two rooms for four nights a week (Mon. thru Thurs. 7-to-10 P.M.) and was able to offer specialized amateur radio study in public quarters under the *Adult Education Program*. Several clubs reported using this same approach. We hope this AEP pattern will be more widely followed all around the nation this year. If you can report a minimum number to enroll and help find an instructor this approach is good. It's worth asking about. A club's own senior members can often help instruct or recommend knowledgeable instructors for such a course where necessary.

Clubs do *not* have to set up groups in precisely this way, of course, advantageous as the plan is where it can be followed. A great many clubs just follow the ARRL outline, and put on Q-A and lectures and serious study sessions on their own home grounds. But more than a one-time class really is needed. We believe clubs need *recurrent* classes best to serve their own interest and the desires of their club members. *All prospective*[1] *amateurs* will please note that wherever there's a club, it is in the best position to help *you* as an individual through its planned program. This is especially true in the field of discussions of technique, guided instruction, operating enterprises and in promoting the fraternal aspects.

Use Those SEC Addresses. Our annual listing of the addresses of all the ARRL Section Emergency Coordinators appears in this issue of *QST*. This is the month ECs and SECs should

[1] Prospective amateurs also are invited to drop a line to ARRL for the Reference Guide (CD-7) which summarizes a lot of information on getting started. Also we'll send the W1AW over-the-air code practice schedule and a compilation of other stations' practice periods (CD-139) free on request.

make drives to secure new Amateur Radio Emergency Corps (AREC) members. All continuing members should ask their EC or SEC having jurisdiction to re-register them and update their station and personal information. The SEC can furnish the address of *your* EC if needed and provide forms for your AREC registration. In large communities or counties having no EC yet appointed to carry out local-amateur leadership, clubs or any amateur should recommend suitable candidates to the SCM or SEC, so that such leadership appointments can be made.

Wanted: Code Practice Schedules: Periodically we revise our lithographed sheet (CD-139) listings of amateur code practice transmissions. This provides information on a group of amateur CP stations and gives also some press, weather, and MARS schedules that cover stated speed ranges. We welcome additional listings and solicit latest information on the days, times, frequency and code speed range and your station call, and address. This can be sent us in a letter or on our CD-62 form. Such schedules are set up and printed for wide distribution, so we feel that a schedule should run for a minimum of six months or longer to make the listing worthwhile. Our Training Aids section will be glad to send any information helpful for the conduct of a code practice routine (CD-130 and CD-158) on request. — *F.E.H.*

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.

A convenient GMT conversion card is available, free of charge, from the ARRL communications Department, 225 Main St., Newington, Conn. 06111.

DX CENTURY CLUB AWARDS

From July 1 through July 31, 1966, DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

WB6OOP....305	W7TLG....139	K8ELF....109	YU3DQ....105	DL3WC....102	K6CAA....100
W0JRI....232	SM4CLU....135	ZS6AUX....109	OK1PT....104	K8EHU....102	K7QXG....100
JA1CIB....231	WA8MICR....134	JA1ITX....108	WA2VWI....104	OK1IJ....102	OE3HOW....100
W7UZA....225	K5SSZ....129	WA8HFN....108	WA9HBA....104	OK1JD....102	SM6CKS....100
DJ5AA....222	WA6OIU....125	JA1BYL....107	K7QMK....103	W1DYT....102	W1AGP....100
W8DGP....217	W4ZFE....113	JA8AJM....107	K7STK....103	W4RJL....102	WB2QJI....100
K3MVP....182	4X4QA....112	W3IOP....107	OE3SJW....103	WB6EED....102	WA4LDC....100
KG6AAY....169	K1OBT....111	PY1FH....106	WA1EJN....103	JA6PN....101	YO3UA....100
EI8H....162	K1UTC....111	OD5EL....105	W6ETR....103	W9OPD....101	YO8DD....100
JA1ZZ....160		OZ8JD....105		K1AFC....100	

Radiotelephone

YV5BPJ....269	WA2RIB....161	HI8XMT....119	K4GRD....109	HPAI....104	K8YRN....101
W8ARH....265	K1BPJ....146	F9IE....118	WA8HFN....108	K7YDO....104	WB2FWE....101
W2NUT....259	ZD6PBD....136	5A4TQ....116	F3SA....106	W8WAH....104	WB2NIC....101
JA3UI....186	G3PBD....134	W8DGP....114	XE1XS....106	WB2HZG....103	W6FHM/DU1
K3MVP....182	11JT....124	ZS6BIN....111	WA8OUM....105	XE1YG....103	100
W7UZA....165	W6UJ....120	JA1CIB....110	DJ3GY....104	W3GVD....102	W6ORC....100
11RCD....161				W9UX....102	W9OFO....100

Endorsements

Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but show only that the participant has reached the endorsement group indicated.

330	W5VSQ	LA5YE	W1GDQ	W3MSR	K4GRD	**180**	W1HNI	OZ4FF	WB2OAE	JA2XI
G4MJ	W8YCP	W2FXE	W1WQC	W3PVZ	K9TVO	K5STL	WA4FDR	PY2BJH	W6SUD	K4OA
320	**280**	W5UVR	W2PXR	W4JDM	OH2VZ	K8DTZ	W5EGS	SM6CAW	WA8JCD	KA2RJ
G3HDA	K4TWK	W8ARH		W6EUF	VE6AAV			VE3FKL	WA9LZA	VE3CZC
W8PHZ	KP4YT	ZL3IS	**220**	W7WLL	W5DNL	**160**	**140**	VP7NA	WØNCK	WB2LJF
W8ZCQ	VE7CE		DJ1QP	W8RCM	W5LJT	LA8LG	DJ9SB	W2GKW		WA4TLI
		240	DJ5IM		W7MH	OH3QC	K2YTC	W2TKG	**120**	W6BNK
300	**260**	K5GOT	LA5Q	**200**	ZL1AMO	SM6AEK	K9WDY	WB2JYN	HBOL	WA8JCD
W2GKZ	K7CHT	ON5ZO	PY2BGL	JA1CRR		SM7CXH	OK2BCI			WA9KQS

Radiotelephone

280	**240**	W2FXE	**220**	**200**	W1KID	**180**	**140**	XE2WH	K3RSW
G3HDA	K1UDP	W2GHK	DJ5AA	K7CHT	W1WKO	WA5LOB	HP1JC	YV3KV	OE8KI
W8EVZ	K5GOT	W5JWM	VE2ANK	KØRDO	W3PN		VE3DYR		PY2BGL
	SM5CZY	W6WX	WA5KBK	SP7HX	W9DNE	**160**	WA2CGD	**120**	W6SUD
260	W1WQC			W1BPY	ZL3OY	VE6AAV	WA5IEV	UGAS	WA6OIU
LA5YE						W5EGS		UKG	W9PUY

JULY CD PARTIES

Highlights? Perhaps the biggest one was the terrible state of the bands on the Sunday of the c.w. weekend! Those who waited for a grand-slam appearance on 80 late that night experienced a rude shock! Yet, and in spite of band conditions, the following list illustrates good pickings for the sharp-eared and patient amongst the CD gang. This month we're adding a new figure to the following list, the time of operation (to the nearest hour). For instance, seeing a W4KFC-100-K in 5 hours, well, you just know c.w. conditions were punk. Phone conditions, on the other hand, appeared good. K2EIU/5 topped *both* modes for another sterling performance with a phone score of close to 82-K, not far from his January 1966 record performance. A number of familiar c.w. CD regulars showed up on phone this time heralding a great party, perhaps, in October.

The following are high-claimed scores, numbers of QSOs, sections and operating times, with final corrected results to appear in the *October CD Bulletin*.

— *W1YYM*

C.W.

K2EIU/5	224,360-625-71-19
W1BGD	214,540-624-68-15
W9EWC (W9AQW, opr.)	208,440-579-62-15
K4BAI	206,040-599-68-18
K8MFO/8	202,869-581-69-19
WA8CFJ	191,820-559-69-20
K1WJD	188,430-564-66-13
K9DHN	186,300-535-69-20
K4BVD	177,800-501-70-17
K5OCX	174,720-510-64-19
W8LT (WA8AJZ, opr.)	174,535-514-67-14
W4YGY	165,330-494-66-20
W3EIS	161,840-470-68-19
WØTDR	161,525-450-71-17
K4RIN/5	160,130-474-67-17
K1YKT	155,295-487-63-15
W6TYM	152,950-432-70-20
K4SXD	150,765-431-69-19
W1ARR/3	144,210-430-66-10
W1AW (WA1FPS, opr.)	143,325-437-65-19
KZ5FX	136,945-442-61-18
W6WX	136,345-400-67-17
W3MSR	133,440-410-64-10
K7RAJ	131,655-393-67-17
W1FJJ	125,440-386-64-12
K4RAD/2	119,680-369-64-19
W8FAW	117,650-356-65-12
W9QQQ	110,825-334-65-10
W4MLE	109,440-336-64-10
K4IXG	108,580-351-61-15
K2SSX	108,270-394-54-18
K8HGT/9	107,575-326-65-18
K4ITV	104,725-350-59-16
W1DYE	103,840-347-59-10
WA9EBT	102,480-331-61-17
W1ECH	101,760-311-64- 6
W4KFC	101,760-311-64- 5
W6RW (4 oprs.)	283,645-792-71-19
W9YT (K9s LBQ, ZMS)	183,940-534-68-20
K3HKK (6 oprs.)	107,840-337-64-15

PHONE

K2EIU/5	81,750-285-56-19
WB2KTO	45,770-199-46-19
W9DOB	41,650-170-49-18
W1AW (WA1CYT, opr.)	39,935-158-49-10
W1FJJ	36,520-160-44- 9
K4BVD	29,400-133-42- 9
W1SWX	29,110-135-41- 9
K2SSX	23,595-136-33-11
W8LT (WA8AJZ opr.)	21,090-104-38- 4
KØYIP	21,090-104-38-11
W6DGH	21,060-101-39-10
K4TTN	20,085-103-39- 9
K9IVG	19,600- 96-40- 9
W1BGD/1	19,270- 87-41- 3
WB2DXL	18,900-101-36- 8
W9NPC	18,430- 91-38- 7
K9DHN	17,170- 96-34- 6
KØGSV	16,720- 83-38- 8
W2ZVW	16,450- 87-35- 4
W3EIS	14,025- 79-33- 5
WA9AUM	13,050- 81-30- 4
K1DAP	12,705- 77-33- 8
WA5FII	12,070- 67-34- 6
W1YYM	11,315- 66-31- 4
K4IXG	10,725- 60-33- 5
W9EGQ	10,720- 60-32- 3
W3KJJ	10,695- 63-31- 4
W8PVC	10,695- 62-31- 6
KØJPI	10,500- 65-30- 4
WAØJKT	10,220- 73-28-15
KZ5FX	10,200- 61-30- 4
K3QDD	10,125- 69-27- 3
W9YT (K9s LBQ LMS)	71,225-252-55-20

A.R.R.L. ACTIVITIES CALENDAR

(Dates are shown in GMT)

Oct. 7: CP Qualifying Run — W6OWP
Oct. 8–9: Simulated Emergency Test
Oct. 15: CP Qualifying Run — W1AW
Oct. 15–17: CD Party (phone)
Oct. 22–24: CD Party (c.w.)
Nov. 3: CP Qualifying Run — W6OWP
Nov. 12–14: Sweepstakes Contest (phone)
Nov. 15: CP Qualifying Run — W1AW
Nov. 19–21: Sweepstakes Contest (c.w.)

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of *QST* issue in which more details appear.

Oct. 1–2: WADM Contest (p. 93, last issue).

Oct. 1–2, 8–9: VK/ZL Test, NZART (p. 92, last issue).

Oct. 1–3: Massachusetts QSO Party, M.I.T. Radio Society (p. 120, last issue).

Oct. 15–16: California QSO Party (p. 146, this issue).

Oct. 15–16, 29–30: VU2/4S7 DX Contest, ARSI (p. 102, this issue).

Oct. 19–20, Nov. 2–3: YL/AP, YLRL (p. 88, last issue).

Oct. 22–24: Sixth World-Wide RTTY Sweepstakes, RTTY Inc. (p. 98, this issue).

Oct. 29–31: Connecticut QSO Party, Candlewood Amateur Radio Assn. (p. 124, this issue).

Oct. 29–31: Maryland-D.C. QSO Party (p. 118, this issue).

Oct. 29–31: West Virginia QSO Party, Kanawha Radio Club (p. 138, this issue).

Nov. 5–7: Delaware QSO Party, Delaware Amateur Radio Club (p. 117, this issue).

Nov. 13: International OK DX Contest, CCRC (next issue).

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the..... .....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— *F. E. Handy, Communications Manager*

Section	Closing Date	SCM	Present Term Ends
Maritime	Oct. 10, 1966	D. E. Weeks	June 11, 1966
Santa Barbara	Oct. 10, 1966	Cecil D. Hinson	Aug. 10, 1966
Maryland-D.C.	Oct. 10, 1966	Bruce Boyd	Dec. 10, 1966
Southern Texas	Oct. 10, 1966	G. D. Jerry Sears	Dec. 10, 1966
Delaware	Oct. 10, 1966	Roy A. Belair	Dec. 10, 1966
Mississippi	Oct. 10, 1966	S. H. Hairston	Dec. 15, 1966
Alabama	Oct. 10, 1966	William S. Crafts	Dec. 26, 1966
Alaska	Nov. 10, 1966	K. E. Koestler	Apr. 10, 1964
Colorado	Dec. 9, 1966	D. Ray Crumpton	Feb. 14, 1967
Sacramento Valley	Dec. 9, 1966	John F. Minke, III.	Feb. 25, 1967
Eastern Florida	Dec. 9, 1966	Albert L. Hamel	Feb. 25, 1967
Orange	Dec. 9, 1966	Roy R. Maxson	Mar. 1, 1967
North Dakota	Jan. 10, 1967	Harold L. Sheets	Mar. 8, 1967
Missouri	Jan. 10, 1967	A. E. Schwaneke	Mar. 11, 1967
Maine	Jan. 10, 1967	Herbert A. Davis	Mar. 12, 1967
Minnesota	Jan. 10, 1967	H. R. Kopischke, Jr.	Mar. 15, 1967

Brass Pounders League Box on page 162

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Montana	Joseph A. D'Arcy, W7TYN	Sept. 9, 1966
Santa Clara Valley	Jean A. Gmelin, W6ZRJ	Oct. 15, 1966

In the Arizona Section of the Southwestern Division, Mr. Floyd C. Colyar, W7FKK, and Mr. Bill L. Young, W7RVY, were nominated. Mr. Colyar received 175 votes and Mr. Young received 125 votes. Mr. Colyar's term of office began July 14, 1966.

In the Ontario Section of the Canadian Division, Mr. Richard W. Roberts, VE3NG, and Mr. Bert Titmarsh, VE3FPJ, were nominated. Mr. Roberts received 447 votes and Mr. Titmarsh received 252 votes. Mr. Roberts' term of office began Aug. 20, 1966.

In the San Joaquin Valley Section of the Pacific Division, Mr. Ralph Saroyan, W6JPU, and Mr. Stanley R. Babcock, WB6IVA, were nominated. Mr. Saroyan received 126 votes and Mr. Babcock received 113 votes. Mr. Saroyan's term of office began Aug. 20, 1966.

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 Oct. 15 at 0130 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Oct. 7 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given in 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, 0130 GMT Oct. 15 becomes 2130 EDST Oct. 14.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 2330 and 0130 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5 7½ 10 13 20 and 25 w.p.m. on Sun. Mon. Wed. Fri. from 0130 to 0235; 15 20 25 30 35 w.p.m. on Tues. Thurs. Sat. from 0130 to 0220; 10 13 and 15 w.p.m. daily from 2330 to 2400 GMT. [All days are in GMT.]

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. The 0130 to 0220 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* and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130 to 0220 GMT practice on those dates.

Date	Subject of Practice Text from August *QST*
Oct. 3:	*It Seems to Us*, p. 9
Oct. 11:	*The TR-2 Transceiver*, p. 11
Oct. 14:	*A Simple Two-Tone Test Generator*, p. 26
Oct. 20:	*Emergency Preparedness In Non-Metropolitan Areas*, p. 49
Date	Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Oct. 26:	*Image Frequencies*, p. 53
Oct. 31:	*Double Conversion*, p. 54

W1AW SCHEDULE, OCTOBER 1966

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EDST, Saturday 7 P.M.–2:30 A.M. EDST and Sunday 3 P.M.–10:30 P.M. EDST. 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.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0020-0100[4]	.....	.....	3.555[6]	14.1	14.1	7.08[6]	14.1
0100	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0105-0130[4]	.....	145.6	3.945	145.6	50.7	1.82	21.41
0130	**Code Practice Daily[1] 15–35 w.p.m. TThSat., 5–25 w.p.m. MWFSun.**						
0230-0300[4]	.....	.....	3.555	7.08	1.805	7.08	3.555
0300	RTTY-OBS[3]	.....	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]
0310-0330[4]	.....	.....	3.625	14.095	3.625	14.095	3.625
0330	Phone-OBS[2]	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0335-0400[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0400	CW-OBS[1]	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0420-0500[4]	.....	.....	3.555[6]	7.08	3.945	7.08[6]	3.555
1700-1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900-2000	.....	14.28	7.255	14.28	7.255	14.28	.....
2000-2100	.....	14.1	14.28	14.095	21/28[5]	7.08	.....
2200-2300	.....	21/28[5]	21.075[6]	14.1	7.255	14.28	.....
2330	**Code Practice Daily 10, 13 and 15 w.p.m.**						

[1] CW. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.045 and 14.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[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 Mc.
[6] W1AW will listen in the Novice segments for Novices on band indicated before looking for other contacts.

Maintenance Staff: W1s QIS WPR NPG. *Times/days in GMT. General operating frequencies are approximate.

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

ATLANTIC DIVISION

DELAWARE—SCM, Roy A. Belair, W3IYE—SEC: K3NYG. RM: W3EEB.

Net	*Freq.*	*Local Time*	*Day*
DEPN	3905 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

New appointment: WA3CRU as ORS. Renewals: W3-EEB as RM and ORS. WA3DYG has a new Swan 350. WA3CRU is on s.s.b. with 90 watts and has a new homebrew 2-meter transmitter. W3EEB vacationed in Vermont without a ham rig along! WA3DUM's dad is a new Tech. Class licensee with WA3OUH as his call. K3NYG is preparing for the Oct. 8 and 9 SET. The First State Amateur Radio Club won the K3GKF Field Day trophy for the second straight year. Traffic: W3EEB 78, WA3DUM 6, WA3DYG 4, K3NYG 3, W3-IYE 1.

DELAWARE QSO PARTY

November 5-7

The Delaware Amateur Radio Club of Wilmington announces its 11th Delaware QSO Party and invites all amateurs to participate. Delaware hams are urged to work as many out-of-state stations as possible, so that those interested can earn credit toward WAS and the W-DEL certificate. Here are the details:

(1) Time: 30-hour period from 2300 GMT Nov. 5 to 0500 GMT Nov. 7.

(2) No time limit and no power restrictions.

(3) Scoring: *Delaware stations:* 1 point per contact and multiply total by the number of states, Canadian provinces and foreign countries worked during the contest period. *Outside stations:* 5 points for each Delaware station worked and multiply total by the number of counties in Delaware worked during the contest period.

(4) Credit for contacts with the same station on othe band will be given.

(5) A certificate will be awarded to the highest-scoring station in each state, Canadian Province and foreign country (with 3 or more contacts) and to the highest-scoring station in each Delaware county. In addition, a W-DEL certificate will be sent to any station working all 3 Delaware counties. Party logs showing required data will be accepted in lieu of QSLs.

(6) *Suggested freqs:* A.m. 3825, 7225, 14,225, 21,325, 29,000 kc. C.w.: 3525, 7025, 14,025 21,025, 28,025 kc. S.s.b.: 3975, 7275, 14,325 21,425, 28,650 kc. V.h.f. 50, 50.4 and 144 Mc.

(7) General call: "CD DEL." Delaware c.w. stations should identify themselves by signing *de (call) DEL K.* Phones say, "Delaware calling."

(8) Contact information required: Delaware stations send number of QSO, RS(T) and county (New Castle, Kent or Sussex). All others send number of QSO, RS(T) report, and state, province, or county.

(9) Logs and scores must be postmarked not later than Dec. 5, 1966, and should be sent to the Delaware Amateur Radio Club, c/o J. E. McCarley, K3NMY, P.O. Box 201, Newark, Delaware. Applications for the W-DEL certificate should also be addressed there.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: K3YVG, K3MVO, W3CBH, W3EML. PAMs: W3FGQ, W3SAO. EPA C.W. Net meets on 3610 kc. at 2330Z nightly, had QNI of 223 and QTC 161. The PTTN Training Net meets nightly on 3610 kc. at 2230Z, had QNI 284 and QTC 174. E. Pa. E.P. & T. Phone Net meets nightly on 3917 kc. at 2200Z, had QNI 651 and QTC 164. We welcome W3CBH as a new RM and manager of the Pennsylvania Training and Traffic Net. K3YVG replaces W3EML as E. Pa. net manager and asks your indulgence and assistance in getting EPA back in shape. K3MHD is stationed at Great Lakes Naval Training Center. WN3FSU, a blind operator, acquired his ticket via the assistance of K3-NOX, Milton ARC. K3FLT, offers a nice certificate for working club members. For details contact WA3BBI. W3FGQ passes *local traffic via 2 and 6 meters* and is working on a 220- and 432-Mc. setup. K3YVG was QNT because of burned antenna coils in the hearing-aid. W3CUL was guest speaker at the Philmont ARC, Franklin Institute in Philadelphia. Vacationeers: W3-MPX *and family camping out*; WA3CFU had a trip through W7- and WO-Land. WA3FWT/8 reports low 6-meter activity in the Lansing, Mich., area. W3AEQ is becoming active again. The Pottstown ARA has been activated and club officers are K3NUM, pres.; W3ZVY, secy.; K3AOH, treas. The first Novice trained by the club is WN3GES. New Gear Dept: WA3BSV a t.r. switch for traffic work. K3KCN is on s.s.b. with a 20A. K3LZS added a Valiant. K3PWM added a Model 19 and 14 RTTY gear. K3FSV erected an 80-meter vertical. WA3AJT added an SR-160. W3BIP added a 60-ft. tower. WA3DBC added a new jr. operator (no call yet). Your editor erected a 40-ft. mast painted red, white and blue—the tallest barber pole in the state. The Simulated Emergency Test is coming off Oct. 8-9. This year we will stress harder on local and county level traffic-handling. All ECs are urged to get their nets operating. Traffic: W3CUL 3680, W3EML 726, W3VR 627, K3MVO 331, K3MYS 268, K3PIE 141, K3FSV 140, WA3ATQ 128, K3YVG 118, W3FGQ 114, W3ZRQ 108, W3AIZ 103, WA3AJT 94, W3FAF 89, K3ZSK 60, W3VAP 56, K3TNL 54, K3WAJ 52, W3AEQ 47, WA3AFI 39, W3KJJ 39, W3-AXA 38, WA3CTP 35, K3MDG 32, WA3BYH 29, W3ELI 26, W3MPX 25, WA3CKA 22, WA3BLZ 21, W3RV 19, W3CBH 18, WA3CCC 17, K3WEU 17, WA3CFU 15, K3PIE 12, W3OY 9, WA3BBI 5, W3BUR 5, K3HKW 5, K3NZD 4, W3BKF 3, K3PWM 3, K3KTH 2, K3NOX 1.

MARYLAND—DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, W3-PRC, W3UE, W3ZNW. PAMs: W3JZY, K3LFD.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*Ave.*
MDD	3643	0000Z	Daily	31	260	8.4
MEPN	3820	2200Z	M-W-F	20	25	1.2
MEPN	3820	1700Z	S-S			
MDDS	3643	0130Z	Daily	31	33	1.1

New QTHs: W3QCW, Silver Spring, to England; W2-NIY to Silver Spring; W3TMZ to an apartment; W3-QA to an apartment; WA3BNL to an antenna farm in St. Mary's County; W3CFK to a new home in Hagerstown in Oct.; WA3AOX to Florida. *New Gear*: K3LFD is on s.s.b. with an HW-12. WN3EOP has a new HT-40 and SX-140 combination. K3LLR has his station ready for winter operating on all bands. *New tickets*: WA3-EEQ has a new Extra Class ticket and WN3ELA is working on a General. *Operating*: K3QDD found the recent CD Party a new low. K3GZK had receiver and antenna troubles nipping at his traffic total. K3OAE spent most of July in Ft. Lauderdale on a business trip but managed to pass some traffic too. W3WTW is organizing AREC nets. W3MSR is active on 2 meters again. *Silent Keys*: We are saddened to report the passing of W3FVK and W3OLK. *Special*: If this report seems a little more brief than usual, blame it on moving day at W3QA. Traffic: (July) WA3CKF 147, K3JYZ 128, WA3BTA 101, W3TN 100, K3LFD 68, K3OAE 68, K3UXY 61, WA3CVM 35, WA3EEQ 32, W3PRC 30, K3OFG 28, K3WUW 24, K3ODD 23, WA3CEK 19, K3-GZK 19, W3WTW 17, WA3BNL 16, W3EOV 14, W3MCG 13, W3ZNW 12, W3CQS 9, WN3EOP 2, K3NCM 2, WA3DWF 1, K3LLR 1. (June) K3JYZ 80, K3LFD 53, K3OAE 39, W3PRC 34, WA3CVM 24, W3QCW 18.

MARYLAND-D.C. QSO PARTY

October 29-31

All amateurs are invited to participate in the first MD-DC QSO Party, information forwarded by the MD-DC, SCM, W3QA.

Rules: 1) The party begins at 2300 GMT October 29 and ends at 0100 GMT October 31. 2) A station may be contacted only once on each band and mode (i.e. c.w.-phone-RTTY). Separate logs must be submitted for each mode. 3) Exchange: MD-D.C. stations send QSO number, RS(T), city and county. (Independent cities such as Baltimore and Washington only send city, no county) All others send QSO number, RS(T), city and ARRL section or country as applicable. 4) Scoring: MD-D.C. stations score one point for each number sent and one for each received, multiplied by each different city contacted, multiplied by each different ARRL section or country. All others score one point for each number sent and one point for each number received, multiplied by each different MD-D.C. city, multiplied by each different Maryland county. 5) Certificates will be awarded the highest scoring station in each ARRL section and country. 6) A readable copy of the log showing contest station call and location, QSO numbers sent and received, times, date, stations contacted, RS(T) sent and received, city, county and/or ARRL section or country should be mailed to C. E. Andersen K3JYZ, 14601 Claude Lane, Silver Spring, Maryland, 20904 (postmarked before Nov. 21, 1966). Each entry must include a signed statement that the operator has observed all the regulations of his country and that the decisions of the contest committee will be accepted as final. No logs will be returned. Enclose an s.a.s.e. if the contest summary is desired. 7) Suggested frequencies: 3575 3875 7075 7275 14,075 14,275 21,075 21,325; 50.1 and 145.1 Novices 3735 7175 and 21,110.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—SEC: W2BZJ. RM: WA2BLV. PAM: W2ZI. SEC W2BZJ reports a total of 13 AREC members in the section. W2LVW is the new EC for Gloucester Co. Walt is looking for appointees in Cape May, Atlantic, Burlington, Camden and Cumberland Counties. NJN reports 31 sessions and 268 traffic total. The N.J. Emergency Phone & Tfc. Net reports 31 sessions, QNI 723, 250 traffic. WB2MNM is a new NJPN member. W2ZQ is now using the 6100 B & W rig on the Sunday net skeds. Field Day messages were received from K2AA and W2MBC. WA2KIP and WA2UPC copied the Armed Forces Day message correctly. WN2UVB is a new station in Moorestown. W2ORS resigned from the League. WA2UPC made BPL for the 3rd time in succession. He also received his TCC certificate and is NCS on 2RN Thurs. WB2YCI is a new station in Cape May and recently joined NJN. W2ZI is having trouble with the local 10-kw. BC station which just moved near him on 1300 kc. (3rd harmonic of 3900, the Jersey Phone Net freq!) OO reports were received from K4RAD/2 and W2ELF. A v.h.f. activity report was received from WB2RVE. W2YPZ has a new antenna away up in his high trees. W2BZJ is back on NJN with a new rig. K2ARY reports transmitting all Official Bulletins, as does WB2SBD, both newly appointed. WB2JFS is a new station in Cologne, N.J. (Atl. Co.). W2EWR has a new SB-100. WA2KIP is in Navy MARS. NJN's June report shows 30 sessions and 239 traffic. WA2BLV's XYL is in the hospital. WA2DVU has a new linear amplifier. Traffic: (July) WA2UPC 505, WA2KIP 128, W2ZI 42, W2EWR 15, W2BZJ 14, WB2SBD 12, W2ORS 4, W2YPZ 4, (June) W2YPZ 24, WA2BLV 13, WA2DVU 11, K2SHE 10, K2CPR 6, K2JJC 5.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. Sun. at 1000 and 2400 GMT on Mon. WB2KTB was appointed OBS. K2KNV was endorsed as OO and ORS. The Syracuse V.H.F. Roundup will be held Oct. 8 at Three Rivers Inn. Speakers will be W3SDZ. W2IMU and WIHDQ. Don't miss it. WB2NGH will be maritime mobile aboard the USS *Truckee*. Gary is in the Navy and would like the Buffalo gang to look out for him. New officers of Penn-York Hamfest Assn. are WA2TPS, pres.; K2JST, vice-pres.; Arlene Lightfoot, secy.; WA2LWF, treas. The Western New York F.M. Picnic was held at the QTH of K2ISO at Eagle, N.Y. All those on 146.94 were invited. W2RUF is starting a training net on c.w. for all interested AREC members. Traffic-handling procedures will be stressed. Watch for further announcements. One of our real old-timers and a fine fellow, K2EE, disposed of all his ham gear and moved into an apartment. The RAGS will have a bigger and better exhibit at the N.Y. State Exposition including Ham TV, traffic, etc. WB2RHJ will go s.s.b. with a Globe 300A and SB-10. WB2FPG is an EE Sophomore at Worcester Tech. The Chemung County AREC assisted the Elmira Soaring Society for the Eastern Open Soaring competition. Stations were set up to take altitude sightings. Participants were K2DNN, WA2s FJJ, HFL, TCZ, YPY and WB2s ABK and HSR. WB2CFG got married. GRAM speakers for the coming season include W2SAW, W2ZIA, K2HUK, W2PZI, W2ICE, W2AKU and K2LCT. Most of the information for this column is gleaned from club bulletins and newsletters. If you or your group would like to be represented here please send information to K2HUK, Warner Gulf Road, Holland, N.Y., 14080. Traffic: W2SEI 276, W2RUF 163, K2SSX 125, WB2GAL 124, WA2UFI 82, W2GVH 74, W2FEB 73, K2DNN 72, WB2RHJ 60, K2JBX 48, WB2SIA 39, WB2TAG 31, K2IMI 25, K2MQN 21, W2RQF 20, W2MTA 17, WB2OMY 17, K2OFV 16, W2FCG 14, W2UYE 13, K1RFX/2 11, WB2JDM 10, W2HYM 6, WB2NZA 4, WB2OYE 4, W2PNW 4, WB2ERK 3, WB2FPG 3, W2PVI 3, WA2GLA 2, WB2NNA 1.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—Asst. SCM: Robert E. Gawryla, W3NEM. RMs: W3KUN, W3MFB, K3SOH, W3UHN, PAM (V.H.F.): K3VPI. Traffic nets: WPA, 0000 GMT and KSSN, 2330 GMT on 3585 kc. K3SOH, RM and KSSN Net Manager, advises that KSSN reactivates Oct. 3 at 2330 GMT. This column records with regret the passing of K3KLW. The Breezeshooters new slate of officers is K3UTG, pres.; K3OTY, treas.; WA3AHP, checker; W3WGS, K3EED and W3TZW, wind gaugers. K3CFA visited ARRL Hq. and W1AW while on vacation. WA3DJI completed a new v.f.o. for 6 and 2 and a new 2-meter portable beam with a built-in s.w.r. bridge. K3HJQ is having fun with a new Twoer in his auto. W3QBU has moved to Cleveland. WN3GFJ attends the Capitol Institute of Technology in Washington, D.C. K3UIK had a "ball" working 2-meter portable while on vacation. If you are interested in AREC work contact the SEC, K3KMO at State College. WA6PNS/3 returned to his California QTH. K3NOU took upon herself a husband. WB6BVB visited the Connellsville area. K3PLQ has completed his hitch in the Army. W3TTV received a recognition award in communications from the Governor of Rhode Island. W3JW is in Mexico signing XEØJW while on vacation. WA3DGI reports that he operated Field Day in June but forgot to send in his log. K3FFJ installed a new SR-160 in his auto for mobile work. WA3FGC is a newcomer to the Cumberland Valley area. This is my last section write-up. I again want to thank all individual hams and clubs which supported me while I was SCM for the section. It indeed was a plensure to serve one and all. New appointees: W3LOD, EC for Venango County; K3HRK, Nittany ARC station as ORS. Endorsements: K3PYS, W3OEO, W3SMV, W3KNQ as ORSs; W3KUN as RM; W3RSB and W3WFR as OPSs. K3PYS has resumed his schooling at Carnegie Tech. W3RTB enjoys sideband activity on 14 Mc. W3RBF has installed a new tower and beam. Now's the time to do it—check the expiration date on your "ticket." Traffic: (July) W3NEM 160, W3KUN 93, W3BLZ 63, K3PYS 61, W3LOS 49, WA3AKB 27, K3SMB 24, WA3AKH 21, W3GJY 21, W3LOD 16, W3RUL 13, WA3EPQ 7, W3ELZ 6, K3TEZ 5, W3YA 5, WA3DGI 2, K2SOH 2, W3UHN 2. (June) K3PYS 62, K3SOH 21, K2SMB 10, W3KNQ 5.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM. PAMs: W9VWJ, WA9CCP and W9KLB (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Traffic*
IEN	3940	1400Z	Sun.	No Report
ILN	3760	0000Z	Daily	217
NCPN	3915	1300Z	Mon.-Sat.	208
NCPN	3915	1800Z	Mon.-Sat.	289
Ill. PON	3925	1700	Mon.-Fri.	312
Ill. PON	50.28	Temporarily discontinued		
Ill. PON	145.5	2000	M-W-F	118

The Shawnee Area Radio Association held its Annual Picnic at DuQuoin Aug. 7. K9PPX has been appointed as OO. W9TOY has a new TX-62. The Ninth Regional

Net traffic count for July was 474. K9QPJ recently acquired an XYL and his QTH is Elmwood Park. K9MDO, WA9NJB, W9RSV and WA9NIP were elected officers of the Worth Township Amateur Radio Club. The Midwest Amateur Radio Club, Inc., is now affiliated with ARRL. Amateur Radio Clubs are asked to write to League Headquarters for information regarding HamQUEST 67. This program will be initiated soon after Labor Day to increase club membership. K9IDQ has a home-brew 4-1000 rig on the air and the first contact was HCL. This column's sympathy is extended to the family and friends of W9LKL, who has joined the ranks of Silent Keys. WA9EXP worked at WJJD A.M. and F.M. during the summer vacation. K9DEV has built a new linear. WA9QXT is now a General Class licensee. K9TVN, Donita Price, the daughter of K9PDT and K9TRP, and WAØBIR, *Dennis Shaw*, were married during the month of July. WA9CCP has a Model 19 RTTY on all bands. W9LNQ reports that the winds damaged his antenna setup but everything is back in FB shape. WA9NFS reports that lightning struck his station and the only damage was a burnt-out new Heathkit keyer. WA9MRB has joined the ranks of s.s.b. operators by acquiring a SBE SB-34 transceiver. WA9GUM requests that all amateurs interested in traffic please check in nightly in the ILN at OOOOZ. WA9MLX has returned from vacation operating in the Rocky Mountain and Grand Teton National Parks. WA9CCP is the only BPL certificate recipient this month. WA9NFS was a late entry for May BPL awards. Traffic: (July) WA9CCP 729, W9SMD 430, WA9GUM 304, W9ELL 238, K9CYZ 230, WA9NFS 223, W9JXV 183, W9EVJ 168, K9AVQ 117, W9NXG 80, WA9KPW 77, WA9PDI 73, W9AXR 65, K9BTE 53, K9WMP 49, W9HOT 47, WA9SEO 35, W9SKR 16, W9IDY 15, K9AUD 12, W9LNQ 10, W9PRN 10, W9HJM 8, K9HSK 6, WA9RGS 6, WA9AJF 5, WA9FIH 4, W9UHD 3, K9RAS 2, W9SXL 1. (June) W9UHD 30, W9KJ 26, WA9EXP 2.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: K9WET.

Net	*Freq.*	*Time*	*July tfc.*	*Mgr.*
IFN	3910	1330Z daily, 2300Z M-F	233	K9IVG
ISN	3910	0000Z daily, 2130Z M-S	501	K9CRS
QIN	3656	0000Z daily	179	WA9BWY

K9GLL, PAM of Hoosier v.h.f. nets, reports July traffic of 87. K9EFY, mgr. of PON, reports July traffic of 74 and WA9IZR, mgr. of RFN, reports July traffic of 62. W9QLW, RM of 9RN, reports Indiana was represented 100% in July. QIN Honor Roll: K9HYV 29, K9VHY 22, W9HRY 19, W9QLW 17, K9RLW 17, K9WWJ 16, W9ZYK 15. WA9ROA, Earlham College ARC, has been quite active snagging DX with a vertical antenna and 60 watts c.w. W9DNQ was awarded the 1966 Outstanding Amateur Award for Indiana for his work with the Indiana State School for the Blind. Congratulations, Bob. W9HRY, is the new RM for QIN. WA9NDN moved to Louisiana Sept. 1. W9LRT is vacationing in W. Va. Congratulations to WA9EZP on receiving the A-1 Operator Award. WA9QAH and W9AGJ are both enjoying new s.s.b. equipment. Congratulations to WA9OVO on receiving his Gen. Class license. Good luck to all those leaving for school this month. We will miss you. *Amateur radio exists because of the service it renders.* A BPL certificate went to K9IVG. Traffic: (July) K9IVG 774, W9QLW 332, W9ZYK 185, W9HRY 165, K9HYV 165, WA9IZR 145, W9UB 134, WA9BWY 122, W9PIN/9 105, W9MM 86, WA9LGQ 72, K9DHN 71, WA9JHH 69, WA9FDQ 60, K9CRS 58, WA9OYI 57, K9VHY 53, K9FZX/9 45, W9DKR 43, W9SNQ 38, K9RWQ 37, WA1DAG/9 32, W9FWH 31, K9ZLB 28, K9RLW 27, K9EFY 19, W9CC 17, WA9KAG 17, W9YYX 17, W9CLF 16, K9EOH 16, WA9GJZ 15, K9GBR 13, K9JDK 13, WA9BZI 12, WA9CWF 12, W9DOK 12, K9ILK 11, WA9RBQ/9 11, W9DZC 10, K9OXA 10, W9BDP 7, W9RTH 7, WA9BNX 6, WA9NGN 6, WA9AXF 5, K9BSL 5, WA9CHY 4, WA9QAH 4, K9YFT 3, WA9ABI 1. (June) WA9OYI 30, K9RLW 15, W9DZC 3, W9AQW 1.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. PAMs: K9IMR, K9HJS and W9NRP. RM: WA9MIO.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
BEN	3985 kc.	1200Z	Mon.-Sat.	25	147	34	W9NRP
BEN	3985 kc.	1700Z	Daily	31	541	134	K9HJS
WSBN	3985 kc.	2215Z	Daily	31	889	232	K9IMR
WIN	3662 kc	0015Z	Daily	30	268	83	WA9MIO
SWRN	50.4 Mc.	0200Z	Mon.-Sat.				W9CIU

Net certificates went to K9JMP and WA9QNI for WSBN. New appointments: WA9LHJ as EC for Adams County, K9FHI as EC for Dodge County, W9BCH as EC for Winnebago County. Renewed appointments: W9ZB, K9GSC, W9MWQ, W9SIZ, K9GDF and W9CXY as ORSs; K9GSC as OO; WA9LWJ as OPS; K9IMR as PAM; W9FBC as OES; W9LQC and K9KJT as ECs. K9OSC led the OOs with 26 notices in July. WA9QMP and WA9RYO have received their General Class licenses. WA9LWJ is in the service. The Annual WNA Picnic was a huge success with everyone enjoying himself. W9KQB is active in traffic again. The FLARC assisted with the bicycle races in Madison. W9GGN has moved to Stevens Point. K9PKQ was interviewed over radio station WRDB. W9DYG reports that CAN has completed 2 years of 100% representation. W9SUF was NCS for the day in the Old Milwaukee Parade. WA9NDV put his antenna back up 5 minutes after it blew down. A BPL certificate went to WA9GJU for July and WA9MIO for June traffic. Traffic: (July) W9KQB 328, K9IMR 184, WA9NPB 176, WA9GJU 160, W9DYG 136, WA9NDV 104, W9CXY 76, W9CBE 58, W9NRP 48, W9SUF 48, W9AYK 35, K9HJS 31, WA9NVY 28, WA9NFG 26, W9AOW 23, W9MWQ 23, W9RTP 22, WA9QKP 20, W9IFS 15, K9FHI 10, K9GSC 10, W9HQT 4, W9YT 3, K9ZMS 2, WA9EZU 1. (June) WA9MIO 507, WA9QMP 2.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke Jr., WØTCK—SEC: WAØIEF. RMs: WØISJ, WAØEPX. PAMs: KØQBI, WAØJKT, WØHEN, WAØDWM. MSN meets daily on 3595 kc. at 0300Z. MJN meets M-S on 3595 kc. at 0100Z. Noon MSPN meets M-S on 3820 kc. at 1805Z and Sun. at 1500Z. Evening MSPN meets daily on 3820 kc. at 2400Z. MSTN meets M-F on 50.4 Mc. at 0430Z and Sat. at 0200Z. Co. Hunters WX Net meets Sat. on 3820 kc. at 1500Z. PO Net meets Sun. on 3812 kc. at 1830Z. During DST the nets meet one hour earlier by GMT. Same local time. New appointments: WAØIEF as SEC and WAØIAW as OO. Renewals: WØLUP and WAØIAW as ECs; KØFLT and WAØIEF as OPSs. WAØIEF has taken over the SEC duties. ECs: Please note that your reports now go to Gary Hanson, 719 N. 18th Ave. E, Duluth 55812. Let's flood him with reports! Our thanks to WAØRZG, who faithfully served as SEC since 1964. Ace has moved to a new home outside Grand Rapids. It is with deep regret that we report that Richard Power, the son of WØTUS and WØVPO, was killed in action in Viet Nam. The picnics at Grand Rapids, Lake City, New Prague and Mankato were all well attended. Area hams operated from the MSA 1 c.d. trailer at the Dodge and Olmsted Co. Fairs. WØPHD visited the Bureau of Standards and several hams while vacationing in Colorado. The c.w. nets are considering moving to a different frequency. Watch for an announcement after the members vote on this. WAØCEL and WAØIEF both had the misfortune of having SB-34s taken from their cars, while WAØBJY lost his beam to a recent wind storm. WAØKFJ has a new two-element quad for 20, 15 and 10 meters on a 40-ft. tower. WØMFW has a new 80-meter antenna. WAØILX is operating an Eico 753. WAØIDB and XYL WAØIDA are moving to a better hamming location in Winnebago. The Mankato ARC provided communication for the Indian Days Parade at Titonka, Iowa. BPL awards go to WAØIAW and WAØJKT. Traffic: WAØIAW 566, WAØJKT 296, WAØKQU 83, WAØEPX 66, WØISJ 66, WAØMJF 60, WAØKFJ 49, KØZRD 47, WAØDVH 37, WØTCK 33, WAØEDN 30, KØICG 28, KØQBI 22, KØFLT 21, WAØMMV 20, WØUMX 19, WØBUO 13, KØHJC 11, KØIGZ 11, WØATO 10, WØKYG 10, WAØJPR 9, KØSXQ 9, WAØEZQ 7, WØKLG 6, WAØIEF 5, WAØLOH 5, WAØHRM 4, WAØIUJ 4, KØAQT/Ø 3, WAØDFT 3, WØSZJ 3.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. The International Hamfest held at the International Peace Garden July 16 and 17 was a decided success with 100 registered hams and their families, of which about one-half were from VE-Land. WØHUD and VE4EG were elected to co-chair the next one to be held in 1967. KØOVE won the hidden transmitter hunt and won the clock with the help of KØHXL's super-duper sniffer. WØBUO, ARRL Director, and WØDM were there. Congratulations to WØHUD and his many helpers of the Minot Amateur Radio Club who put this successful event on. KØLRO had a service patrol of Boy Scouts there. WØDM had an eyeball QSO with KØGRM, who headquarters in Minot. Murph has a new T-4X and an R-4 with a dipole strung up at the Motel. The Minot Radio Club has a nice paper, the *Ham-Bone*. It has been running some nice 2-meter articles by WØHVA. W5LZU, from down Arkansas way, was a visitor during fair week in Grand Forks. He runs a concession with Midway Shows. He uses a Swan 350 as a portable from the Ford Motor Home. WØKON/Ø has moved to Finley from Hoople. He is active in TEN, CAN and TCC. WØDM has been on with a Ranger while getting the SR-150 religned. WAØOAT moved to Bismarck. Lyle Beebe, an ex-North Dakotan, now WA4-VKE, is Engineer in Charge for the FCC in Norfolk, Va. His XYL, Lillian, is WA4VKG and a c.w. operator. They work 20, 40, 80 c.w. and s.s.b. W7CLN spent a month's vacation in Grand Forks. Traffic: (July) KØITP 79, WØDM 5. (June) WØKON 15.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. New calls from Sioux Falls: WNØPJE and WNØPJF. New calls from Brookings: WAØOMK, WNØOML, WAØOSK, WNØOTZ. KØZTV has successfully been working DX since getting a new receiver. WAØBWF, Rapid City, heeded the call for mobile assistance at the forest fire near Newcastle, Wyo., on July 11. Installing his Swan in the car and travelling 75 miles to the scene in 1½ hours, he was able to give the needed assistance. With K7MGM as net control station and relay stations from Wyoming, Colorado, Nebraska and Idaho the fire was brought under control. Traffic: KØGSY 582, KØVYY 77, WØSCT 63, WAØLLG 20, WØBQS 9, WØIGG 6, KØTNM 3, WAØBZD 2, WAØDNG 2, WØZAL 2, WAØBMG 1, KØJGM 1.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—Asst. SCM: Lyle F. Shaw, W5GZP. SEC: WA5KTX. PAM: WA5GPO. RM: K5TYW. NMs: WA5IIS, K5IPS, WA5HNN, W5MJO. It was my pleasure to attend the Calico Rock meeting at which, I feel, much progress was made in correlating the emergency plan with the state civil defense plan. It was nice to visit with state CD Radio Officer K5YTR and Army MARS state director W5IXC. Several have passed along suggestions and ideas and I am informed that the Fort Smith and Boone County clubs have put some of these ideas into effect such as listing the officers of the club with the local chamber of commerce, erecting highway signs at the city's entrance calling attention to the local amateur club and what frequencies are normally monitored, holding code and instruction classes for novices. Net reports for July:

Net	*Freq.*	*Time*	*Day*	*Sess.*	*QTC*	*QNI*	*Time*
RN	3815 kc.	0001Z	Daily	31	27	648	526 minutes
AFN	3885 kc.	1200Z	Mon.-Sat.	26	29	875	1625 minutes
OZK	3790 kc.	0100Z	Daily	31	28	138	491 minutes
APON	3825 kc.	2130Z	Mon.-Fri.	20	57	279	600 minutes

June report for the Arkansas Single Sideband Razorback Net:

RN	3815 kc.	0001Z	Daily	28	75	544	638 minutes

Traffic: W5NND 202, W5MJO 106, WA5KUD 4, K5AKS 1, K5TYW 1.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: K5KQG. RM: W5CEZ. V.H.F. PAMs: W5CQR, WA5DXA.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
LAN	3615	Daily	0030	31	9.8	171
Delta 75	3900	Sun.	1330	5	16.5	3
LAPON	3870	Sun.	1300			

Please take notice of the change in time of LAN. In addition a late session meets nightly at 0400. Net Mgr. is WA5FNB. The League is putting on a combined ARRL-Club membership drive. WA5JVL is working on antennas. The CENLAARC had a hang-up two-day hamfest in July. Among those present was DL5GG/K5-BGG, from Ramstein, Germany. The Air Command Wing from England AF Base put on a very nice exhibition of its latest gear. W5AXU is in Buena Vista, Colo., and is operating from his trailer around 7230. WA5KQN is back on 80 and 40 with an inverted Vee. W5OAR, whose call was used by the gang from the Ozone Radio Club, worked slightly over 500 contacts. The Lafayette Radio Club now mails its very fine bulletin prior to club meetings. K5UYL is the big DX gun from the Lafayette area. W5BSR, up Washington State way for the summer, keeps weekly skeds with his son at home. W5MXQ reports he is busy with c.d., RACES and the Jefferson Club is planning to hook up with these activities. K5-OKR reports a new TB500 beam is up and she is looking for DX. WA5HGX reports that K5MWG and WA5OXK will be starting in as freshman at LSU this fall. W5IOG soon will be running a kw. WA5EID plans to modify a 74A-4 and with a 15-meter beam going DXing. WA5DXA reports WA5ORV, WA5GQT, WA5-DRK, WA5NNB, WA5DUX, WA5CYO and WA5ORV are active on 6 meters! Elwin, our new V.H.F. PAM, would like to know if anybody has 2-meter f.m. going in S. La. or the GNO area. W5QEG/5 closed down operation at BSA Camp Edgewood. W5KC requests that associate members for LAPON contact Vince, if interested. W5CEZ is recovering nicely from a mild heart attack. WN5PDN, the son of W5CEZ, did a great operating job from BSA camp. WA5KLF and WN5PRM are trying to rebuild the Monroe Radio Club. W5CEW and his XYL have been visiting out Seattle way. The Baton Rouge Radio Club had a station at Sears Roebuck and Co. the week of the Fundora activities in Baton Rouge. W5DUS led the drive to put over this public attention-getter for ham radio. Traffic: (July) W5-QEG/5 121, W5CEZ 119, K5OKR 103, W5KRX 78, W5-MXQ 71, W5MBC 67, WA5FNB 61, WN5PDN 49, WA5-LQZ 16, WA5NYY 13, WA5DRP 10, WA5HGX 7, WA5DXA 6, W5EA 6, K5FYI 6, WA5JVL 6, W5KC 6, WA5KLF 6, WA5EID 2. (June) WA5EID 32.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. Congratulations to the Jackson Club for a fine hamfest. W5OFE and his committees did a fine job and W5MUG as always was a fine MC. WA5JWD is the new net mgr. for the Miss. Sideband Net with K5JCT/W5ODV as assistant. WA5JTB now is mobile for the first time with NCX-5 fixed station handling much overseas and maritime mobile traffic on 20 and 15 meters. Mississippi needs active ECs. WN5PZU is an active Novice in Meridian. W5TAB has a fine 75-meter transceiver for an inexperienced amateur to build. WA5JWD, W5ODV, WA5-INC, K5BWW, K5SSZ and K5RUP are really working to make more use of v.h.f., especially 2 meters, and want other v.h.f. boys to check with them. Sorry to lose K5-VAN. New appointment: WA5OKI as OBS and OPS. The Meridian ARC reactivated the local net Sun. on 3818 kc. at 1300 CST. The Columbia ARC Net meets Tue. at 2000 CST on 3835. Traffic: W5WZ 134, W5JDF 88, WA5OKI 45, W5EMM 19, WA5JWD 15, WA5JTB 7.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: K4RCT. RM: K4UWH. PAMs: WA4EWW, W4PFP.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
ETPN	3980 kc.	M-Fri.	1140Z	21	434	44
TN	3635 kc.	Daily	0100Z 0203Z	62	507	221
TPN	3980 kc.	M.-Sat. Sun.	1245Z 1400Z	31	1247	198
TSSB	3980 kc.	Tue.-Sun.	0030Z	23	1015	76

K4SXD ran his DX to 152/129 before departing for the Army. The traffic nets will miss Ted. W4DIY is a new ORS. W4HHK reports on the July solar noise of 3.8 db. high point and June was 4.0 db. New ECs are W4RMJ for Henry County and K4VZI for Knox. We need others. Contact K4RCT or W4UVP for information. The *Tenn. Ham* deadline is the 20th of the preceding month. W4WHN would appreciate news from every club in state. New officers of the Tenn. Council are W4TYV, chairman; WA4-GJW, secy.- treas.; W4PRY, vice-chairman. Traffic: W4-OGG 264, K4UWH 135, W4SQE 116, W4PQP 100, WA4IBZ 79, K4SXD 49, W4RUW 47, W4WBK 45, WA4YDT 44, W4TZB 40, WA4CUQ 36, WA4YEM 36, WA4CKP 35, W4-UVP 35, WA4DBG 28, W4CXY 26, WA4NUJ 24, W4PFP 17, W4TZJ 17, W4DIJ 16, W4MXF 14, WA4WYP 13, K4-UMW 11, WA4NEC 10, WA4CGK 9, W4TYV 8, WA4EWW 7, K4MQI 7, WA4ZBC 7, W4FLW 6, W4VTS 6, W4SGI 4.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Appointments: WB4AFH as OES, WA4-AUR as EC, K4NHY as OPS and EC. Endorsements: W4CSN as EC.

Net	*Freq.*	*Days*	*EST*	*Sess.*	*QNI*	*QTC*	*Mgr.*
EMKPN	3960	M-F	0630	21	341	57	W4BEJ
MKPN	3960	Daily	0830	31	510	141	WA4KFO
KTN	3960	Daily	1900	31	866	238	WA4AGH
KYN/KSN	3600	Daily	1900/1700	49	315	288	W4BAZ
KPON	3945	Sat.	1300	4	105	23	WA4AVV

WB4AIN is going to school in Louisville. WN4CRY is club president in Danville. W4JUI has the new frequency measuring system going. WA4IBG lost all his antennas in the storm of July 6. The Northeastern Kentucky Emergency Net has been formed under the management of WA4TJS and meets at 1930 EST Fri. on 3942 kc. The Kentuckiana Radio Club came up with some fine publicity on its Field Day activities. K4KZH is on with a Drake 2B. WA4UAZ has a new big signal with an SB-200 amplifier. W4WNH was visited by W4AWS after keeping MS skeds for two years. W4MWX is back in business with a new antenna. Your SCM attended both the Paducah and Henderson Hamfests during July and both clubs are to be congratulated on fine jobs. W4BAZ wants more stations on KYN. Traffic: (July WA4UAZ 272, WA4HJM 225, WA4-AGH 218, W4BAZ 159, K4MAN 146, WA4 TJS 146, WA4-VUE 127, WB4AIN 71, WA4DYL 64, K4NHY 62, W4RCE 62, WA4KFO 58, WA4TPB 58, WA4AUR 33, WA4GMA 33, WA4GHQ 32, K4LOA 26, WA4DXA/4 24, WA4WWQ 22, WA4IBG 20, W4KJP 20, WA4BZS 14, W4CDA 13, W4-KKG 8, WB4ACO 5, W4OYI 5, W4BTA 3. (June) W4BAZ 269, K4HSB 95, W4NBZ 35.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—Asst. SCM: K. E. Stecker, W8SS. SEC: K8GOU. RMs: W8ELW, K8QKY, W8EU, K8KMQ. PAMs: W8CQU, K8-LQA, K8JED, V.H.F. PAMs: W8CVQ, W8YAN. Appointments: W8WVL as ORS; K8CKD and WA8MEE as OPSs; K8PVC as EC, WA8KYO as OBS, WA8EFK as OES. W8CQN as OO, K8LNE BPLs again. Silent Key:

Anna May Hall, W8QPT, Ludington. W8CQB had a bad coronary but is recovering. W8OQH, secy. of the U.P. Evening Net, advises it meets each evening at 2230 on 3920 kc. with c.w., s.s.b. and a.m. check-ins welcome. B/R Men net mgr. is W8ZBT and asst. mgr. is W8TIJ. WN8TYE promises he will not be a Novice for long. The FARL *Bolt* has 6 low-pass filters in its Aug. issue. WA8IFB has moved to Mississippi. WAØEZZ/8 now is at the Coast Guard base at the Soo. WA8KZW is teaching at N.M.U. WA8CVH is in lower Michigan. WA8MNF married Cheryl. WA8MEE is in Akron RCA Computer school for 6 months. WA8SHF has a new TX-62, and WA8QCV bought the SRARS a 75A-3. K8NTI has his new Finco 6&2 beam up. K8TEI is handling MARS traffic from Viet Nam. K8AGO has a new SB-100 transceiver. The CMARC had trouble getting workers for FD. The CMARC 29ers Sunday Net, at 1500 GMT on 29 Mc., is off to a fresh start. Communications for the '66 Michigan State water skiing championship was handled by the CMARC Lansing gang. The Van Buren ARC had its usual fine annual V.H.F. Picnic at Allegan County Park—same day as the U.P. Hamfest. K8CKD is putting time in on RTTY and on Navy MARS. K8KMQ is on QMN, 8RN and EAN. WA8MCQ worked HK3ASJ, his first DX. The airline strike caused difficulty in delivering eyes for the Eye Bank Net. W8FGB made the BPL on deliveries/originations. The second annual N. E. Michigan V.H.F. Hamfest will be held at East Tawas, Oct. 7, 8 and 9. See you at the Muskegon Convention, Oct. 21 and 22. Traffic: (July) K8LNE 536, K8KMQ 294, WA8PIM 134, W8FGB 132, WA8TAN 132, WA8OEE 114, W8EU 108, W8YAN 105, WA8OGR 94, WA8PII 77, K8NJW 75, WA8MCQ 64, WA8LRC 63, W8FX 41, K8HLR 38, K8VDA 38, WA8GTM 37, W8UM 32, WA8BJD 28, K8JED 25, W8FWQ 21, W8NOH/8 19, W8TBP 19, K8ZJU 19, WA8LXY 17, W8REZ 16, K8GOU 16, WA8MVH 14, W8SWF 14, WA8PWF 12, WA8IAQ 11, WA8CZJ 7, W8DSE 6, W8RTN 6, W8AUD 4, WA8KME 3. (June) K8NJW 290, WA8PII 143, WA8MQT 46, K8HLR 36, K8GOU 33, W8UM 20, K8LQA 14, W8WVL 1.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VZ and K8UBK. Attention all Ohio Radio Clubs: Don't forget to mail Sweepstakes entry blank to Miss Karla Hambel, 81 W. Main St., Westerville, Ohio 43081, to be eligible for the Ohio Council Sweepstakes trophy. Also if you have worked 25 Ohio women, send to her for the Ohio Council of Amateur Radio Clubs' the Worked Ohio Ladies Award. She also issues the Worked All Ohio Counties Award. K8BXT sent this news: W8PKC has a new SB-100 transceiver. W8HSP is operating mobile s.s.b. with a TR-3. K8QUC joined the Silent Keys. WA8TZU and WA8TNO are new amateurs in Warren. WA4HFR moved to the Warren area. K8YMU is on 2 meters. K8BXT vacationed ni New England, W8HCL and WA8PTA were in the hospital, WA8ABE has an HRO receiver and W8OEY has a new SB-100. WN8UFV is on 2 meters. K8VYO has a new Swan 350. Toledo's *Ham Shack Gossip* tells us that WA8HWD joined the Silent Keys. K8HWJ joined the Silent Keys, WA8EIQ moved to Iowa and K8PMI is in Viet Nam. Greater Cincinnati ARA's *The Mike & Key* informs us the club heard W8FLN discuss Microwave Systems and K8CNQ is in the Air Force and stationed on Ascension Island with ZD8CN as the call. Tusco RC's *The Beam* says the club held its annual banquet, WN8PAD is now WA8TRG, WN8PJI is now WA8PJI and WN8TVU is a new Novice. Canton ARC's *Feedline* relates that W8FSM and W8INU both joined the Silent Keys, WA8LRM attended the Northeast Ohio V.H.F. Group hamfest, W8FMW and W8GAB took a fishing trip. Mr. Horth explained operation and function of a cable TV system. WA8LAM drove your SCM to the Buckeye Net Picnic meeting at Mt. Vernon with W8BZX, DAE, CHT, LZE, RYP, K8DDG, LGA, LGB, LVC, YSO, WA8CFJ, GYT, LAM, MQE, ORX and PMN attending. They are begging to have stations in Southeastern Ohio to check into either the Ohio Slow Net or Buckeye Net on 3580 kc. at 6:30 EST for OSN and 7 P.M. EST for BN. I have heard the Ohio Single Side Band Net also is looking for these stations on 3972.5 kc. at 1530 and 2345Z. W8BU writes that W8BAH is in Cleveland VA Hospital. Lancaster & Fairfield County ARC's *The Rag Chewer* tells us that K8KNU gave a review of an article on Understanding AVC and WA8HJD was in the hospital for surgery. W8QCU was on active training duty at Ft. Knox. From K8QFW we learn the Steubenville Area ARC held a picnic with K1MRP as visitor. W8LVW is on crutches. W8OYV vacationed in Iowa. W8YAB was in the Denver area and W8DNC was on a camping trip. Columbus ARA's *Carascope* tells us that Mr. Art Goodman spoke on Communications in the Petroleum Industry. W8DWP leads the state in the VE/W Contest and WA8RWU leads the Great Lake Division in the Novice Roundup. Parma RC's *P.R.C. Bulletin* informs us that W8EPP had two colored films shown, Invitation to Ohio produced by Ohio Bell and one about New York State. The V.H.F. High Banders' *The Log* tells us K8MAG graduated with honors from Clarks Technical School and K8DMU graduated from Ohio School for the Blind. K8BAX reports WA8s STW, STX, TRL, TRM, TRP, TSD and TSE are new Technicians and WN8TYF is a new Novice. W8WCW is a new OO. W8UPH and WA8CFJ made the BPL in July. The writer wants to correct a statement he made in Aug. QST, "ex-W8DSX is living in Jamaica." Len writes he still is W8DSX, living in KP4-Land and has his first baby girl. A clipping from *The Blade*, of Toledo, shows a picture of amateurs seated at the Lucas County AREC station in rehearsal for another disaster. They want to be prepared if any emergency should arrive. We need ECs for many Ohio counties. Why don't you select an EC among you and form an AREC.

Net	*Freq.*	*Sess.*	*QTC*	*%*	*Time*
OSSB	3972.5	51	513	10.	1530 & 2345Z
BN	3580	31	282	9.1	0000Z

Traffic: (July) W8UPH 781, WA8CFJ 621, W8IJH 481, WA8PMN 288, W8CHT 256, W8DAE 202, WA8FSX 195, W8BZX 163, K8LGA 118, WA8QES 96, WA8AUZ 86, K8YSO 81, WA8MQE 78, W8RYP 75, K8BYR 72, K8UBK 66, WA8OCG 62, WA8LAM 60, K8DDG 55, W8NAL 49, W8QCU 44, WA8NTA 40, K8DHF 31, WA8BTE 30, W8DQD 29, K8BAX 26, WA8JXM 25, WA8NSL 22, W8LZE 21, W8OE 21, W8GOE 20, WA8NYS 17, W8OUU 16, W8FGD 15, WA8GYT 14, W8HII 14, K8MZT 14, WA8FKD 13, K8LGB 12, W8TV 12, W8LAG 9, K8BNL 8, WA8KPN 7, WA8PLJ 5, W8WEG 5, WA8BND 4, W8GIU 3, K8AKN 1, W8AYR 1, W8CSD 1, WA8DRL 1, K8VWB 1. (June) W8CHT 260, WA8FSK 181, W8OE 32, W8FGD 17.

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 WA2UZK on making the BPL for June traffic. Welcome to WB2YKX and WB2PYZ, who joined the General Class ranks. WB2MOJ, secy. of the Westchester ARA, reports new officers for 1966-67 are K2EEM, pres.; WB2MOI, vice-pres.; WB2MOJ, secy.; K2CIJ, treas. The Westchester Technical Net meets the 1st and 3rd Wed. of each month on 28.690 Mc. at 2000 local time. WB2HZY is a new member of the A-1 Operators Club. Congrats. The *ESS Bulletin* reports that WB2DXL is enlisting in the Navy. WB2UHZ is reporting into both the ESS and NYS Nets. Approximately 15 members and guests attended the ESS Net Picnic at the QTH of W2JMZ on July 9. K2AVP, the RACES group in Westchester Co., operates weekly on four bands with both phone and RTTY. W2ODC operated /VE3 for two weeks while on vacation. All traffic-handlers should obtain Form CD-3 which lists the new ARRL numbered messages. Both W2ANV and WA2VYS were honored by NYS Mgr. W2RUF for attendance over 250 during the year. K2VTW/6 is working for Lockheed in Calif. Dan is on 20-meter s.s.b. Traffic: (July) WB2HZY 169, WA2UZK 118, WA2VYS 75, W2THE 74, K2AVP 65, K2SJN 50, WB2UHZ 42, WA2HGB 27, W2PKY 24, WB2DXL 23, W2URP 20, W2ANV 17, W2BXP 16, WA2WGS 9, WB2QYZ 6. (June) WA2UZK 639, K2AVP 50.

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	K2UFT-RM
VHF Net	145.8 Mc.	2000 TWTh	W2EW-PAM
VHF Net	146.25 Mc.	1900 FSSnM	W2EW-PAM
NYCLIPN	3932 kc.	1600 Daily	WB2DXM-PAM
NLS (Slo)	3630 kc.	1845 Nightly	WB2SLI-RM

NYC-LI AREC nets: *See Dec. 1965 column for skeds.*

The nice new high Zepp has been good to WB2SLI. WB2RBA has a new Drake 2B going like the dickens. WB2DXM is now sporting an Amateur Extra ticket! WB2SRN is the new manager of the Eastern Area Sideband Net on 3815 kc. at 2100 local. W2GKZ is operating a class to upgrade the licenses of members of the Suffolk County RC. WB2PYI, 2nd district chairman of the YLRL-type girls, received a most pleasant visit from VE2KO. Remember last July when we were all lookin' around an' wonderin' where ole K2UBG was at? Well, he was just sashayin' through the bourbon country and ended up in Morehead, Ky., at a motel owned by WA4TJS's daddy. WB4APN/2 picked up a handsome CP-15 last July '66. WB2RQF served as NCS on the V.H.F. Net during W2EW's vacation. Listen, the section traffic nets listed above are always eager to introduce new operators to the joys and pleasures of handling traffic. No prior experience is necessary so, "C'mon and give it a try!" WB2TNY, bicycle/mobile in Brooklyn, worked WB2HVV in Yonkers for a bit of ole DX. Hey, you 10-meter guys in Queens who want to join the AREC will be snapped up rather quickly

by our old reliable-type 10-meter EC, W2IAG. W2BCB has returned to the fold after taking a long rest in the mountains of Westchester. The section is indeed saddened by the passing of one of our pioneers, W2LP/W2CLA. "Doc," as he was known to most old-timers, was licensed back in 1912 and along with guys like W2PF helped organize our current Hudson Division out of what used to be the old Atlantic Division in the early 20s (1924, I think). He was the first Director of the Hudson Division and continued on to many honors, not the least of which was the QCWA 50-Year Award. He will be sorely missed throughout the section and division. WB2AWX, EC for Kings-10, is starting a 15-meter AREC net for those who can't get on 10 meters. It will be on 21.37 Mc. Wed. at 2030 local time. WB2EYS got his draft notice awhile back and by now is cavorting through boot camp, etc. WB2IIA is on a European jaunt. The Hamster Radio Club says it is supporting WA2YQW for Hudson Division Director. The Lake Success Radio Club says it is supporting W2TUK. W2EW reminds us that it's time to dust off the rigs and get into the swing of things now that the seashore and mountain shindigs are over. K2HTX reports that Huntington AREC/RACES is going full blast again Fri. nights. Hey everybody, don't forget the HARC Hudson Division Convention Oct. 15 at Tarrytown, N. Y.! Everybody's going to be there and we'd like to see you-all. Traffic: (July) WA2UWA 485, WB2MHT 271, K2AAS 186, WB2-DXM 179, W2GKZ 132, WB2SLH 105, K2UBG 93, W2EW 92, WB2UEH 82, WB2NGZ 81, WB2TCS 47, WB2AEK 34, WB4APN/2 30, WB2RQF 27, WB2TNY 20, W2EC 12, WB2MBU 8, WA2LJS 6, W2PF 6, WB2NZL 4, WA2QJU 4, WB2UIV 3, WA2PJL 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2-LQP. SEC: K2ZFI.

NJN	3695 kc.	7:00 P.M.	Daily	WB2AEJ-RM
NJ Phone	3900 kc.	6:00 P.M.	Ex. Sun.	W2PEV-PAM
NJ Phone	3900 kc.	9:00 A.M.	Sun.	W2ZI-PAM
NJ 6	51,150 kc.	11:00 P.M.	M-W-Sat.	K2VNL-PAM
NJ 2	146,700 kc.	10:00 P.M.	Tue.-Sat.	K2VNL-PAM

All times shown local prevailing. AREC net data is available from K2ZFI. New appointment: WB2FUW as OBS. WA2UDT took Air Police training at Lackland AFB and should be back in N.J. by now. WB2TFK is using a home-brew five-element 2-meter beam indoors. The Fairlawn ARC meets Fri. nights at the Fairlawn Recreation Building and invites home-brewers to participate in its amateur construction projects. Contact W2TIW for details. The Union County ARA meets at the Washington St. School, Roselle, the 2nd and 4th Fri. of the month, 8 P.M. when they operate their club station, W2HFP. WB2FUW has entered Bucknell U. WA2ASM has completed a cruise aboard the USS *Wrangel* operating MM. The Telephone ARC is on the air with W2FWG, its memorial station. WB2PXO has been pulling NCS duty on NJ 6 & 2. WB2-SJH and WB2SJI aided communications during a forest fire in Hampton. WA2CCF has replanted his antenna farm consisting of 80-10-meter vertical, tri-band team, big wheel and discone. WB2SEZ has a new bug and is picking up on his net operating. Congratulations to W2-JDH on the receipt of his Extra Class license. Walt is working out the bugs from his HQ-129X home-brew modifications. WB2WWH is a new member of the NJN and is active in the Maplewood C.D. as well as an NNJ ragchewers net on 15 meters. WB2UFV has 13 new countries on 20 and 15. W2NVA is an expert on indoor antennas with three for 10, 20 and 40. Frank's next project will be a shortened 160-meter dipole. W2QMT is moving to N. Y. State. WB2FZU has entered military service for four years. WB2GKB is back on the air after an operation. WB2ERM has a new Ranger. All amateurs are welcome in the Bergen Amateur Radio Assn. Net Sun. on 145.8 Mc. at 8 P.M. and 50.4 Mc. at 9 P.M. WA2RIN uses a two-channel tape recorder for logging, one channel for WWV to establish time, the other channel for received and transmitted signals. WB2QMP has 9 states on 2 meters. OO reports for July: W2TPJ-18. Traffic: (July) WB2FUW 502, WB2AEJ 264, WB2OHK 210, K2VNL 206, WB2IYO 42, K2USA 38, WB2BCS 34, WB2QMP 30, W2CVW 24, W2QNL 20, K2-EQP 15, WB2BXK 14, K2JTU 13, WB2KTO 12, WB2QLF 10, K2ZFI 10, WB2LUT 9, WA2TAF 7, WB2VHG 7, WB2-PXO 6, WB2SJH 6, WA2CCF 5, W2DRV 5, W2PEV 5, WB2URD 5, WB2SEZ 4, WA2DEW 3, K2MFX 3, W2-TFM 2, W2JDH 1, (June) WA2ASM/MM 122, WB2QLF 22, WB2TFK 17, WB2IYO 9, WB2KTO 3.

MIDWEST DIVISION

IOWA—Acting SCM, Verlin Rowley, KØBRE—SEC: KØBRE. It is good to see the increase in the number of traffic reports this month. Regardless of whether or not you are interested in the points, this is the only way that ARRL Headquarters has of knowing how much traffic has been handled and using such statistics intelligently for the good of amateur radio. If you handle traffic, let us know via the "traffic report." And please get them in by the 6th of the following month: we have a deadline to make.

75 M	QNI 1360	QTC 169	Sessions 26
Tallcorn	QNI 74	QTC 17	Sessions 21
Tallcorn (June)	QNI 81	QTC 3	Sessions 21
160 M IEN (May)	QNI 620	QTC 7	Sessions 31
160 M IEN (June)	QNI 514	QTC 5	Sessions 30

Traffic: (July) WØLCX 934, WØLGG 730, WØUSL 91, WAØJEG 56, WØLJW 37, WAØDYV 36, WAØKXJ 33, KØBRE 29, WAØDAG 23, WØDRE 20, KØKAQ 18, WAØIYH 17, WAØJUT 16, WØGQ 13, WAØMIH 11, WØ-BKR 10, WØGPL 10, WØNGS 9, WØPTL 9, WAØKWH 7, WNØNVM 4. (June) KØTDO 11. (May) KØTDO 12, WAØKXJ 4.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. RM: WAØJII. PAM: KØJHF. V.H.F. PAM: WØHAJ.

	QNI	*QTC*	*Mgr.*
Kansas EC Net	63	10	WAØCCW
HBN	383	119	WAØBHG
QKS	131	51	WAØJII
KPN	258	51	KØJMF
KSBN	486	109	KØJMF
Kans Wx Net	547	3	KØEMB
Kans PI Net	62	3	WAØHMZ

KØEMB reports 565 AREC members, 35 local Emergency Nets. KØMZZ is working on the 2-meter repeater in Salina. WAØCCW and WAØHMZ still are making skeds on 145.350 Mc. Tue. and Fri. at 2145 CST. WAØHMZ says several good band openings appeared on 6 during July. Lee says he still is looking for Kansas 2-meter stations on the Kansas PI Net, 145.350 Mc. Sat. at 2100 CST. Lee is now running a 4x150A on 2. The Chippawa Ragchewer Net meets Sun. at 8 P.M. CST. WØEKZ is about ready to try 432 Mc. WAØDZI reports 6-meter openings average range around 650 miles. Zone AREC Nets are functioning rather smoothly. Zone 10 QNI 50, Zone 13 QNI 46, Zone 15 low-band phone net QNI 30, c.w. net QNI 4 and 6-meter net QNI 16. The Wheat Belt Radio Club's new officers are WØVDF, pres.; KØMRI, vice-pres.; KØIFI, secy.; KØMXU, treas. WØQNI, Topeka, was awarded the WØFNS Amateur of the Year Trophy at the Kansas Nebraska Radio Club Hamfest Aug. 7. *The Log*, the printed voice of the Flint Hills Amateur Radio Club, celebrated its 12th anniversary. Members of the JARS in K.C. helped out in the Powder Puff Derby July 2 through 5. Traffic: (July) WØOHJ 378, WAØJII 121, WØINH 110, KØGZP 102, KØGII 84, KØEMB 83, WAØLLC 70, KØJMF 61, WAØMLE 57, WØAUX 51, KØBXF 48, KØ-UVH 45, KØMRI 42, WØVRZ 41, KØMZZ 30, WAØCCW 26, WAØEMQ 23, KØLPE 12, WØFDJ 5, WAØHMZ 5. (June) WAØEMQ 3.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—SEC: WØBUL. New appointments: KØIFL as OO; KØTCB as OBS and OPS. Appointments renewed: KØ-DEQ as ORS, KØYIP as OO, WØBUL as OBS, KØJPL as OO and OPS. I am very sorry to report that WØHVW joined the ranks of Silent Keys July 18. Gib was licensed in the early '30s, worked all bands from 6 to 160, was one of the original members of MEN when it first started and was a member of the Ridge Runners Net KØAXU of the N.W. St. Louis ARC, placed first for the SCM Field Day Trophy with 329 contacts in 71 sections on 20 meters for a score of 23,359. WØGWX, of the Lees Summit ARC, was second with 432 contacts in 39 sections on 75 meters for a score of 16,848. The ARC of Jackson County is now an ARRL affiliated club. KØLGZ achieved membership in CHC. WAØJRP is a new call in Elsberry, having moved from Colorado. WNØOSU is publishing a St. Louis Teen Ham newspaper. The following have qualified for MTTN certificates: WAØHQR, WAØJOA, WAØKRL, WAØLCV and KØONK. WA7AMD/Ø, editor of *Tri-State QRM*, has a new Swan 350. OES reports were received from WØJTD and KØJWN. The FCC office in K.C. has moved from the 17th to the 31st floor. July net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	13	172	17	WØBUL
MoSSB	3963	2400Z	M-Sat.	26	345	108	KØTCB
MoPON	3810	2100Z	M-F	20	210	99	WØHVJ
MTTN	3940	2300Z	M-F	22	176	70	WAØELM
MON	3580	0100Z	Daily	31	164	151	WØWYJ
QMO	3580	2200Z	Sun.	5	15	6	WAØFKD
MSN	3715	0300Z	Daily	30	47	—	KØONK
MNN	7063	1800Z	M-Sat.	25	49	10	WØOUD
PHD	50.4	0130Z	Tues. (GMT)	3	45	1	WAØFLL

Traffic: KØONK 1071, KØAEM 279, WAØFKD 169, WØWYJ 168, WØHVJ 73, WAØFMD 50, WØOUD 47,

THE new National 200 transceiver differs rather substantially from its closest competition in that it incorporates crystal-controlled pre-mixing in the front end to allow the use of a single VFO rather than a separate, tunable, VFO for each band.

THE advantages of crystal-controlling the front end of a receiver, transmitter, or transceiver should be well-known by now, and it is somewhat surprising to see the old tunable front end technique still in use by at least one manufacturer of low-cost transceiving equipment. To briefly review the pros and cons . . . brand "X" uses a separate, bandswitched, VFO range for each amateur band, removed in frequency from the signal by the IF — approximately 5 MHz. As a result, on the 10 meter band the VFO is operating at approximately 33 MHz! Stability, of course, greatly suffers because of the difficulty of building a stable oscillator at high frequencies, and is further impaired by two important factors — the introduction of bandswitch contacts into the oscillator circuit, and the necessity of individually temperature compensating each tuning range. In addition, dial calibration must necessarily vary from band to band.

THE National 200, on the other hand, incorporates a single, non-bandswitched VFO which tunes only the 600 KHz range from 8.7 MHz to 9.3 MHz. This VFO is accurately temperature compensated, and is inherently mechanically and electrically more stable because it is not affected by bandswitch variation or contact cleanliness. Of course, because it is used for each of the five bands, the same stability is achieved from band to band and dial calibration is unchanged when changing bands. The output of the '200 VFO is "pre-mixed" with that from one of three stable crystal oscillators to produce a tunable mixer output, which is in turn mixed with the signal frequency to produce the IF frequency of 5.2003 MHz. Crystal oscillators are necessary only for 40, 15, and 10 meter operation — on 80 and 20 meters the VFO mixes directly with the signal frequency to produce the 5.2003 MHz IF. As you can see, this technique permits the use of one VFO for all bands, and makes the task of obtaining good stability much easier from the very beginning. One additional advantage of the VFO-crystal oscillator pre-mixer is that the mixer itself acts as a VFO buffer — thus minimizing extraneous effects on the VFO which might otherwise cause FM problems or keying chirp.

AT only $359, the new National 200 is a lot of five-band transceiver for the money — offering, as it does, SSB, CW and even AM operation with separate AM detection in that mode. Like the top-of-the-line NCX-5, it incorporates a solid state balanced modulator for "set and forget" carrier suppression with automatic pre-set carrier insertion for AM or CW operation. Single knob band-switching is included, of course, with only *Exciter* and *PA Tune-Load* controls to adjust when changing bands. ALC is included to further increase its 200 watt PEP sock on all bands through 10 meters, and an additional operating convenience is front panel choice of either manual or push-to-talk operation.

IT's probable that the power supply for the single or tri-band transceiver (such as the NCX-3) that you trade in on the new '200 will operate the new rig — it was designed to operate from an NCX-A or NCX-D supply without modification. On the other hand, if you own no supply, the National 200 *and* its new AC-200 117–234 V.A.C. supply come to only a few dollars more than the closest competitive transceiver *without* power supply. Why not move up to the five band National 200 right now?

FRANK ROBERTS, W1JVG

National Radio Company, Inc.

WAØELM 46, WØEEE 42, WØGBJ 32, WØTPK 26, KØJPL 25, KØTCB 25, WØRTO 17, WØGQR 15, KØLGZ 14, KØORB 10, WØBUL 9, WAØFLL 8, WAØJLJ 7, KØDEQ 6, WAØCHH 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØJXN. Appointments: KØJPP and KØFVB as ECs; WAØMOB as OPS. Net reports for the month: Nebr. Storm Net, WAØKGD, 1st session, QNI 919, QTC 26; 2nd Session, QNI 581, QTC 35. Dead End Net, WAØMCX, QNI 262, QTC 32. Nebr. Morn. Phone Net, KØUWK, QNI 890, QTC 34. Nebr. AREC Net, WØIRZ, QNI 164, QTC 1. West Nebr. Net, WØNIK, QNI 430, QTC 33. Nebr. C.W. Net (NEB) WAØGHZ, QNI 94, QTC 37. AREC C.W. Net (NACN) WAØEEI, QNI 12, QTC 0. Nebr. Emergency Phone Net, WAØGHZ, QNI 1643, QTC 86. A new Novice net has been formed in the state, according to WAØNUK. It meets at 0200Z daily on 3747 kc. WØFQB displayed and then donated a "Joy Stock" antenna to the Central Nebraska Radio Club at Victoria Springs in July. Governor Morrison attended to award Centennial Certificates and make several amateurs "Admirals" in the Nebraska Navy. Traffic: WAØGHZ 279, WAØNUK 148, WAØLOY 94, WØLOD 69, KØUWK 34, KØIXY 17, WAØBOK 12, WØGGP 12, WØBFV 11, WØFQB 11, WØFBY 10, WAØGVJ 10, KØFJT 8, WAØEEI 7, WØAGK/Ø 6, KØDGW 5, KØHNW 4, WØLJO 4, WØRAM 4, KØKJP 3, WØWKP 3, WAØIBL 2, WAØIXD 2, KØOAL 2, WØFHF 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for July:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	1845	31	259	187
CPN	3880	M-S	1800	31	380	99

CN high QNI: K1TKS and K1OQG. CPN high QNI: WA1EEJ, W1YBH 23; W1GVT 22; K1LFW 20; K1EIC, WA1GBA 19; W1HBH, K1YGS 18; K1OQG 16; WA1DXS 15. Appointee reports were received from W1EBO, W1EQV, W1BGD as OOs; K1YON as OES; K1AFC as OBS. All ECs should report to SEC W1PRT each month. EC reports were received from K1OQG, K1QPM and W1WHR. W1PTR keeps ECs informed via his *Ct-Conn Bulletin* (Prepare In Conn.). Clubs should include at least one Official Observer among their members. These appointments are available to qualified General Class (or higher) licensees. See July *QST* page 99. Application blanks will be sent to all who express an interest to become OO. W1EFW, 1RN Net Mgr. (3605 kc.) publishes a very good *First Regional Net Bulletin* for net members. W1ADW and K1FEM are editors of *CARA Newsletter* for the Candlewood Amateur Radio Assoc. in Danbury—a good example for other clubs to follow. *Conn. Council Newsletter* suggests that club representatives join in QSO on 3830 kc. at 6:30 P.M. local time each Wed. New officers of the Conn. Wireless Assn. are W1NJM, pres.; W1RZJ, vice-pres.; W1TCJ, secy.; K1HTV, treas.; W1BGD, comm. mgr. W1QV, N. E Director, is general chairman for the Tri-City Hamfest in New London Oct. 1. W1NTH is now CN8FV with the USNAF. K1MBA now is in military service. WA1DWF is attending Air Force Electronics School. K1CSY has been checking into the Eye Bank Net daily for over two years and until recently was the only New England outlet! K1OQG was incorrectly listed as K1LQG in the May report. Traffic: (July) W1EFW 317, W1BGD 144, K1LMS 138, K1TKS 136, K1LFW 103, K1OQG 94, K1EIC 92, K1EIR 74, W1BDI 40, K1EYY 37, K1STM 35, W1YBH 26, K1QPN 24, WA1DEM 20, W1QV 18, W1GVT 17, K1NTR 15, WA1FNJ 10, K1YGS 10, W1YBI 7, W1CUH 6, W1OBR 6, W1ZL 4. (July) W1OBR 11, W1BNB 4.

EASTERN MASSACHUSETTS—SCM, Frank Baker, Jr., W1ALP—W1AOG, our SEC, received reports from W1s STX, LVK, K1PNB, K1ERO, new EC for Rowley, is General Class now. K1FJM is a new OES. W1UOP is a new OPS. K1NPS is on his way to Thailand for 3 years. His dad is K1AFF. W1ZSS/1 is from N.J. and Westfield, Mass. K1SBX is on 40-meter c.w. The EM2MN held 26 sessions with 100 QNIs, 151 traffic. W1FSL has his call back. W1YLB won an award for an article in *QST*. W1KSO visited W1LAZ. K1YGW is on 15. W1GA is mobile on 75. K1LZV is on 160 and 75. The EMINN had 49 QNIs, 10 sessions, 16 traffic, reports K1PNB, Ex-W1NXN is waiting for a new call. His brother is WA2ABO. New check-ins to our EMICWN on 3660: WAIs DEK, DGG, DGH, DLT, DOB, ECY, EVD, EVY. W1EAE is back on the air. Heard on 75: WAIs GKZ, EKV, DOB, K1ZJK. Heard on 2: W1BVV, K1YZE. W1DAL has a new antenna for all bands. WN1FHJ is now General Class and has an HQ-110. WA1FFS is moving to Portland, Me. W1ZLX visited W1AW. W1MVO has a new antenna. WA1DWP is on 6. W1PGN has a new QTH. K1OKE is NC for the 6-meter net. The Whitman ARC is now incorporated. New officers are K1YBS, pres.; WA1DDO, vice-pres.; K1UMP, treas.; Mary Hooker, secy. WA1BOQ is on c.w. on 40. W1QZO is a Silent Key. The 6-Meter Crossband Net had 21 sessions, 197 QNIs, 6 traffic. W1AQE won in the Fla. QSO Party. K1KBO is the daily NCS of the "QTC" Traffic Net on 7215 at 1800Z Mon. through Sat. W1JNV has a 310 DXCC sticker and is a member of the Nutwork Net on 14.282. W1UE is on 15 a lot and works F3DX, his brother-in-law. K1KTC is at the U. of Mass. for the summer. W1HKG went to the Calif. Hamfest. W1ALB writes from Indiana. W1HIL is getting out well on 2, working all N.E., N.Y., N.J., Pa., Va. and Que. W1OFY has an HW-12 s.s.b. receiver for 75. W1NF uses two for "Intruder Watch." K1UKT, now General, is on 2 and 6. WA1EOT is DXing on 15. He still needs Utah. K1GPH is having rig troubles. K1MYF worked out in Colorado for the summer. K1PNB overhauled his v.f.o. Needham stations on during the July 4th celebration: W1s STX, PEX. K1s VPJ, VFY, VHZ, EZX, OQQ, MKV, ZKK, OQT, KBB, WA1s GHJ, FEP, FRK. WA1ECY has a new receiver. WA1DEC/DED have a Twoer. WA1DJC is on 20 c.w. WA1DGH is DXing on 20. W1UOP is building a new ground system for the HyTower vertical. W1OJM was on the Cape for the summer. K1EYM has a new QTH. W1ZQM and K1BUF helped out in the July 4th celebration in Burlington. W1SPW is over in Portugal. The Massasoit ARA had a very good Field Day this year. W1BVP was chairman. K1VWJ writes from Greece and is on at SVØWV 1500 GMT to 2300 GMT around 14,250 and 14,300 on s.s.b. New officers of the Chelmsford Club are K1MGP, pres.; K1RZK, vice-pres.; K1TEE, secy.-treas. A new net, the Mass. Bay Net is on 7050 c.w. at 0000 GMT, Mon. through Fri. WA1BYA is NCS, WA1EVY Mgr. W1ACT/1 is handling traffic from the U.S.S. *Mass.* week ends. K1FPV is on s.s.b. K9AQP/1 has a 6146 on 6 and built a converter for 2. K1FJM worked W3BSV in Md. on 2. WA1ACD is on 2. K1FWF worked his first W2 on 2. W1PEX and WAØGSA/1 made the BPL. Appointments endorsed: W1PEX and W1MME as OPSs; W1s THT, DFS, JNV, AYG, BGW and K1CCL as OOs; W1s UE, MME, STX, YYI and KWD as ECs; W1ZLX and K1CTM as ORSs; K1SCJ, W1MME and W1ALP as OBSs. Traffic: (July) W1PEX 1143, K1PNB 134, WAØGSA/1 133, W1EMG 124, W1ZSS 58, K1ESG 56, K1VPJ 53, WA1EAT 46, W1UIR 46, K1CLM 45, W1CTR 38, W1DOM 33, W1OFK 30, W1SIV 30, WA1ECY 27, WA1EVY 26, WA1DLT 25, W1AOG 17, K1ETT 15, WA1DED 14, K1GKA 14, WA1BYA 13, WA1DJC 9, K1FJM 8, WA1EYY 7, WA1DGH 5, WA1DEC 4, K1RCD 4, K1LCQ 3, W1UOP 2, K1YUB 1. (June) W1OJM 58, W1ZLX 27, K1EYM 6, K1LCQ 5, W1BGW 4, K1BUF 4.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1QIG. PAMs: K1WQI, K1ZVN: RM: K1TZH. V.H.F. PAM: K1OYB. Traffic Nets: Sea Gull Net, 1700 to 1800 and 2000 to 2100 on 3940 kc. Mon. through Sat. Pine Tree Net, daily at 1900 on 3596 kc. Earle B. White, W1KNJ, of Belfast, passed away recently. Although he has not been active lately he was active on c.d. and the nets. He will be sadly missed by all who knew him along the way.

CONNECTICUT QSO PARTY

October 29-31

The Candlewood Amateur Radio Association invites hams throughout the world to take part in the 4th Connecticut QSO Party.

Rules: 1) The contest period is from 2100 GMT October 29 to 0300 GMT October 31. 2) The general call is "CQ Conn" on c.w. and "CQ the Connecticut QSO Party" on phone. 3) Exchange number, RS(T), ARRL section, Conn. county or country. 4) Scoring: 5 points per QSO. Out-of-state stations multiply times Conn. counties. Conn. stations multiply times ARRL sections, countries. A station may be worked once per band/mode. 5) Suggested frequencies: 3540 3840 7040 14,040 14,240 21,100 and 144 Mc. (Slow speed operators use 3700 7150 and 21,100 for Conn. QSOs) Awards: Certificates will be sent to the high scorer in each ARRL section and country, also the two highest scorers in each Conn. County. 7) Logs must show dates, times, band, mode numbers, RS(T) and QTH. Note your license class, your address and show your score calculations. Send all logs before December 3rd to Connecticut QSO Party, Candlewood Amateur Radio Assn., Tom O'Hara, W1DDJ, 7 West Wooster Street, Danbury, Connecticut 06810.

You Will Pay Over A $100 More For A Comparable 6-Meter SSB Transceiver And Still Not Receive The Quality, Value, High-Performance Features, And Protection Against Obsolescence Included In the Heath SB-110

• Built-in VOX at no extra cost • Upper & lower sideband or CW operation • Built-in 100 kc crystal calibrator at no extra cost • Oscillator Mode switch for VFO transceive, xtal control transceive, or xtal control transmit — vfo receive (ideal for net operation) • 2.1 kc SSB filter with superior 2 to 1 shape factor • Built-in sidetone for CW operation • The famous Heath LMO (Linear Master Oscillator) that provides tuning linearity with 1 kc dial calibration . . . stability, and calibration accuracy never before found on six • Sophisticated triple conversion circuitry • Low cost companion AC and DC power supplies

Here's The 180-Watt PEP, 170-Watt CW Input Transceiver That Sets The Pace For All Future VHF SSB Transceivers. The Heath SB-110 provides full VOX, PTT, & CW operation on six with the same selectivity, stability, and performance already made famous by the Heath SB-Series equipment on 80-10 meters. Choose the appropriate power supply and go fixed or mobile. Discover for yourself the pleasure of operating the most advanced VHF transceiver in amateur radio . . . the satisfaction of owning a truly high-performance 6 meter rig you have assembled yourself.

Kit SB-110, 23 lbs.....**$320.00**

PARTIAL SB-110 SPECIFICATIONS—RECEIVER SECTION: Sensitivity: 0.1 uv for 10 db signal-plus-noise to noise ratio. **Selectivity:** 2.1 kc @ 6 db down, 5 kc max. @ 60 db down. **Image rejection:** 50 db or better. **IF rejection:** 50 db or better. **Audio output power:** 1 watt. **AGC characteristics:** Audio output level varies less than 12 db for 50 db change of input signal level (0.5 uv to 150 uv). **TRANSMITTER SECTION: DC power input:** SSB, 180 watts PEP; CW, 150 watts. **RF power output:** SSB, 100 watts PEP, CW, 90 watts (50 ohm non-reactive load). **Output impedance:** 50 ohm nominal with not more than 2:1 SWR. **Carrier suppression:** 55 db down from rated output. **Unwanted sideband suppression:** 55 db down from rated output @ 1000 cps & higher. **Distortion products:** 30 db down from rated PEP output. **Hum & noise:** 40 db or better below rated carrier. **Keying characteristics:** VOX operated from keyed tone using grid-block keying. **GENERAL: Frequency coverage:** 49.5 to 54.0 mc in 500 kc segments (50.0 to 52.0 mc with crystals supplied). **Frequency selection:** Built-in LMO or crystal control. **Frequency stability:** Less than 100 cps drift per hour after 20 minutes warmup under normal ambient conditions. Less than 100 cps drift for ±10% supply voltage variations. **Dial Accuracy:** Electrical, within 400 cps on all band segments, after calibration at nearest 100 kc point. Visual, within 200 cps. **Dial backlash:** No more than 50 cps. **Calibration:** Every 100 kc. **Power requirements:** High voltage, +700 v. DC @ 250 ma with 1% max. ripple. Low voltage, +250 v. DC @ 100 ma with .05% max. ripple. Bias voltage, —115 v. DC @ 10 ma with .5% max. ripple. Filament voltage, 12.6 v. AC/DC @ 4.355 amps. **Dimensions:** 14⅛" W x 6⅝" H x 13⅜" D.

Kit HP-13, Mobile Power Supply, 7 lbs.....**$59.95**
Kit HP-23, Fixed Station Power Supply, 19 lbs.....**$89.95**
Kit SBA-100-1, Mobile Mounting Bracket, 6 lbs.....**$14.95**
Kit SB-600, SB Series Speaker, 5 lbs.....**$17.95**
Kit HS-24, Mobile Speaker, 4 lbs.....**$7.00**

FREE CATALOG!

Describes these and over 250 other Heathkits. Save up to 50% by building them yourself. Use coupon and send for your FREE copy!

HEATHKIT®

HEATH COMPANY, Dept. 9-10
Benton Harbor, Michigan 49022

☐ Enclosed is $_____, plus shipping.
Please send model (s)_____
☐ Please send free Heathkit Catalog.

Name_____
(Please Print)
Address_____
City_____State_____Zip_____

Prices & specifications subject to change without notice. AM-167

VE1HJ and family paid a surprise visit to K1DYG. Ralph was one of the original members of the Satellite Data Network. K1DAP has been active in the CD Parties and doing very well. Traffic K1WQI 55, W1GU 43, WA1DOW 17, K1DAP 12.

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 2300Z and Sun. at 1330Z. The VTNH Net meets on 3685 kc. Mon. through Fri. at 2230Z. Endorsement: K1WKP as OES. The Manchester Radio Club is having its Annual Banquet Oct. 22 and WA1DZX will supply information for those interested. K1IIK made DXCC. K1JFQ was Operator of the Month. Congratulations to you, Bea. K1AEG has changed jobs. K1PCY likes apple pie. K1NMU is now active on 2 meters. K1-RNN is a new GSPN member. K1APQ was active in the Phone CD Party. K1GQH is working DX on 10 meters. W2KHE also is W1WHP in New Hampshire. W1CMV is getting married. K1AEG is now on v.h.f.-u.h.f. with his new color TV. K1GTZ is on vacation in our state. Traffic: W1MHX 12, K1PQV 5, W1SWX 3.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. RISPN report: 31 sessions, 410 QNI, 78 traffic. The W1AQ Club of Rumford issued the following WRI certificates: No. 82 to W2LQP, No. 83 to W2NCG, No. 84 to W4HYW and No. 85 to K1ONU. The club made 158 contacts during R.I. Amateur Radio Week. Members of the club bowling team are W1WAC, W1YUT, K1AMG, K1HMO and K1PEL. K1VZP has been elected to club membership. WA1EEJ has been elected asst. net mgr. for the New England Teenage Net. The net meets every Tue., Wed. and Thurs. nights on 3880 kc. at 1900 local time. K1SGX is net mgr. Now that fall activities are about to begin make sure that copy of your special events is sent to the SCM for use in this column. The University of Rhode Island RC, W1KMU, has set up a 6- and 2-meter station. The club has worked Ohio on the 2-meter station and the 6-meter station has an effective radius of 150 miles. This should be a good chance for hams to work Washington County for the WRI certificate. Traffic: (July) W1TXL 298, W1BTV 91, K1TPK 60, K1VYC 35, W1YKQ 29, WA1EEJ 25, K1YEV 17, K1VPK 4. (June) K1VYC 46, K1YVN 15. (May) W1BTV 37.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: K1UZG. July net reports.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2130Z	Dy x S	511	13	W1VMC
Vt. Fone	3855	1300Z	Sun.			W1UCL
VTNH	3685	2230Z	M-F	64	29	K1UZG
VTCD	3990½	1400Z	Sun.	34	12	W1AD
VTSB	3909	2230Z	M-Sat.	590	30	W1CBW
		1230Z	Sun.			

Welcome to new hams WN1GMW, Newport Center, and WN1GMS, North Hero. Congrats to new Generals WA1-ETJ, Burlington, and WA1GOF, Bennington. K1MFP moved back to Montpelier. K1HKI transferred to St. Albans. W1UCL moved to Caledonia County. W1WFZ graduated and left us. K1FSY has an SB-400. Traffic: (July) K1BQB 293, K1MPN 11, W1FRT 9, K1UZG 4. (June) W1FRT 6, K1FSY 2.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1IJV. C.W. RM: K1IJV. Lacking the usual club bulletins during the summer months we are a bit stuck for news (since very few of our West. Mass. members take the time to mail reports of their activities to me.) Sure wish they would! W1EOB has a new Heath SB-400 in the works to go along with his SB-200. WN1GHA, formerly of the East. Mass. section, is now in ours. Welcome. C.W. RM K1IJV reports the following: WMN (3560 kc. nightly at 7 P.M.) handled 57 messages during July with the following in attendance (in order of activity): K1WZY, W1ZPB, W1-DVW, K1IJV, W1BVR, WA1FNX, W1DWA, WA2KZV/1, W1MNG. This net will gladly welcome any West. Mass. c.w. operators any nights they might care to report in. Although the net usually operates at a fairly fast clip, the Net Control will gladly adjust speed to suit your requirements so don't hesitate to report in at any speed. My personal opinion is that every amateur should know how to originate traffic. For emergency work definite forms can cut time. Operators without the know-how usually just gum up the whole works (this applies to both c.w. and phone operation). Also, in my opinion, if you are without the know-how to operate in either a traffic or emergency net, then you are not carrying your share of the responsibility of having an amateur ticket! Ever hear of PICON? (Amateur radio is authorized in the Public Interest Convenience or Necessity). Traffic: K1SSH 42, K1WZY 39, K1IJV 38, W1BVR 35, W1ZPB 25.

NORTHWESTERN DIVISION

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. V.H.F. PAM: K7IOA. New appointments: K7MEA, W7MSB as ECs. The Glacier Park Hamfest was held July 23 and 24 with 236 registered. VE6ASN was the youngest licensed ham at the gathering. A new American Director was elected, K7VPS, of Columbia Falls. The annual Flathead Area Picnic had hams from all over the state in attendance. K7DCI is the secy.-treasurer of this group. At the Montana PON Picnic K7BON was the fish-derby winner, beating out last year's winner K7UON. While on vacation in Q-land W7NPV stopped to visit the facilities of WWV at Colorado Springs. K7UPH has moved to his new QTH in Billings. A recent visitor at the Butte Amateur Radio Club meeting was K7PWY. On July 17 the Havre group held a fine picnic just outside of Havre. K7MYC is on with a new SW-350. K7PWY also is on with a new SW-350. K7TQM is starting a new net on 3881 kc. at 3:00 MST called the Bitter Root Net. The Yellowstone Amateur Radio Club is going to get 51% of the membership members of the ARRL so they can become re-affiliated with the League. Why not check and see if your club is affiliated. If not join the League to help your group obtain this 51%. If you are interested in joining the Navy MARS program check with K7VSS, in Billings. K7LDZ, with the help of K7EGJ, WA7EJQ and KØQLM, moved his own station out to the State Fair in Great Falls to help demonstrate amateur radio to the fair-goers. Traffic: W7FL 7, K7EGJ 5.

OREGON—SCM, Everett H. France, W7AJN—Will be on vacation the first two weeks of August. July activities, etc., will be combined with August reports. See you next month.—Ev.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7UWT. RM: W7OEB. PAM: W7LEC. V.H.F. PAM: W7PGY. NTS nets:

WSN	3535	Daily		QNI 362	QTC 481	Sess. 31
NTN	3970	Daily	1930Z	QNI 977	QTC 563	Sess. 31
WARTS	3970	Ex.-Sun.	0100Z	QNI 848	QTC 217	Sess. 26

The Washington Section Traffic Hamfest held in Yakima July 9-10 had over 350 members and families present; for WARTS, new Net Mgr. K7YFJ, directors, N.E. K7QNW, S.W. WA7BTZ, N.W. secy.-treas. and editor for *Parasite* W7ICW, and recording secy. W7MCW. The Puget Sound Council of Amateur Radio Clubs will hold its Fifth Annual Banquet Oct. 23 at Waller Road Grange Hall, Tacoma. Your SCM had the pleasure of speaking to members of the QCWA Northwest chapter annual meeting in Portland July 24. Our section mourns the passing of W7REZ, Tacoma's most-heard signal. OBS K7CHH/7 now is on sked with the bulletin service from Richland. The Northwest Amateur Radio Communications System held its fourth annual camp-out at Indian Creek July 16-17 with over 70 hams and families taking part. EC W7AJV is working all his extra time on the new ham-shack. WSN shows an increase in traffic with the same membership for the summer months and continues to function smoothly with all NCS and liaison jobs fully staffed. Worked Five BEARS (Boeing Employees Amateur Radio Society) awards now are being issued and can be won during the Washington Section QSO Party. W7FNE now is MM on the SS *Hudson* to Indonesia via Suez. The new QCWA chairman is K7CNE. W7BV again is on 3950 kc. after surgery. KL7CSR and W7BTB maintain daily contact on 14,220 Mc. W7COG and K7PVF now are in Seattle on a Boeing building project. K7CDI is in Moses Lake on a sub-station job. K7QOM now is USN, San Diego. ORS W7JEY is active on WSN and RN7. ORS W7AIB reports summer DX nil, but the Victoria Wireless Club hosted the Clallam County group in August at Victoria. PAM W7LEC states his code practice net now is under way on 3728. W7MCW and W7AMC took in the Okanogan Hamfest. EC/ORS W7GYF visited Sheridan, Wyo., and Portland and picked up QSLs to total 39 DX-wise. OPS W7EVW hopes for better conditions this fall. W7VE is now Bremerton and Kitsap County Official RACES station. Our sympathy to W7-HWD on the loss of his wife.

NWSSN	3700	Ex. Sun.	2000Z	QNI 257	QTC 77	Sess. 26
NWSSB	3945	Daily	No report			

Traffic: (July) W7BA 1629, K7TCY 110, W7HMA 765, W7DZX 432, K7CTP 182, W7PI 146, W7APS 133, W7OEB 129, W7BTB 128, WA7DXI 124, W7KZ 61, W7JEY 51, W7AIB 43, W7HMQ 42, W7GVC 41, W7LEC 41, W7MCW 21, K7VNB 20, W7GYF 18, WA7CXD 9, W7AMC 8, W7-EVW 7, W7AXT 5, WA7EMM 5. (June) WA7DXI 28, W7GVC 27.

5-Band High Power SSB Transceiver

. . . Heathkit® Style . . . Only $459.95

• Featuring the SB-100 & HA-14 • Full kilowatt P.E.P. SSB five band transceiver, 80-10 meters • Fixed or mobile operation with appropriate power supplies listed below • Built-in antenna change-over relays • Built-in SWR meter • Operates PTT & VOX—Upper/Lower sideband • Built-in 100 kc crystal calibrator • Transceiver tuning with Heath LMO—1 kc dial calibration

Here's A SSB Combo That Has It All Over The Competition In Power, Performance, And Versatility . . . Go "barefoot" with the SB-100 for 180 watts upper or lower sideband, or 150 watts CW. If the going gets rough, or you need that extra sock for mobile operation, add the HA-14 with just a flip of a switch. Either way you'll enjoy truly linear tuning with the famous Heath SB-Series LMO . . . plus all the other many convenient operating features of the now-famous Heathkit SB Series.

Order The SB-100 & HA-14 For The Best Value In High Power Transceiver Operation. We invite comparison of the complete SB-100 & HA-14 specs. (See coupon below.) with those of any other make of SSB transceiver or combo. Compare for the ultimate in versatilty and value . . . consider circuit design as related to inherent stability, the use of quality components and fine mechanical construction, full five-band coverage, and resale value. You'll choose the SB-100 & HA-14.

Kit SB-100 .....**$360.00**
Kit HA-14 .....**$99.95**
Kit SBA-100-1, SB-100 Mobile Mtg. Bracket **$14.95**
Kit HP-13, SB-100 Mobile Power Supply....**$59.95**
Kit HP-14, HA-14 Mobile Power Supply.....**$89.95**
Kit HP-23, SB-100 AC Power Supply.....**$39.95**
Kit HP-24, HA-14 AC Power Supply..... ...**$49.95**
HDP-21, Microphone.....**$29.40**

HEATHKIT®

FREE 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!

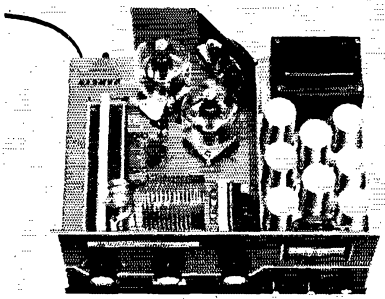
HEATH COMPANY, Dept. 9-10
Benton Harbor, Michigan 49022

☐ Enclosed is $_____, plus shipping.
Please send model(s) _____
☐ Please send free Heathkit Catalog.

Name_____
Address_____
City_____ State_____ Zip_____

Prices & Specifications Subject to change without notice. AM-163

LOOKING FOR MAXIMUM PERFORMANCE PROVEN RELIABILITY SUPERIOR CRAFTSMANSHIP ?

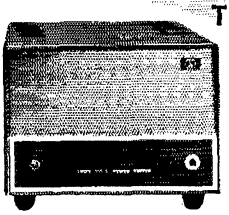


MARK I LINEAR AMPLIFIER

Five band, 2000 watts PEP input. Uses two Eimac 3-400Z or two Amperex 8163 triodes. Has built-in power supply.

PRICE $475

TUBES $68



MATCHING AC SUPPLY

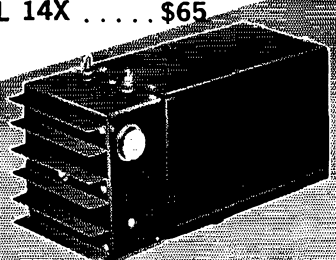
with speaker, phone jack.

MODEL 117-XC $95

MODEL 230-XC for 230 volts $105

DC MODULE Converts AC supply to 12 volts DC for portable or emergency operation.

MODEL 14X $65



12 VOLT DC SUPPLY

For mobile or portable operation. Negative ground standard. Positive ground available on special order.

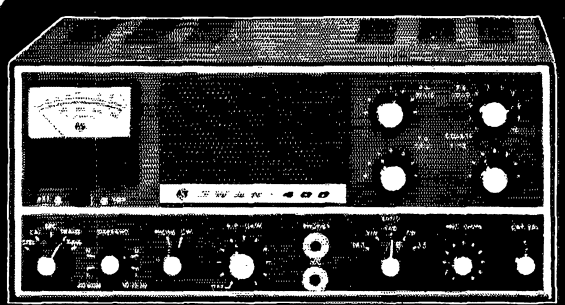
MODEL 14-117 . . $130

SWANTENNA 5 BAND MOBILE ANTENNA

500 watt power rating. 10-15-20-40-75 meters.

MANUAL SWITCHING MODEL 45 . . $65

REMOTE CONTROL MODEL 55 . . $95



MODEL 400 SSB TRANSCEIVER 5 BANDS 400 WATTS

Includes many deluxe features. Designed to use the highly stable, full coverage Model 410 VFO in fixed station, the miniature Model 406 VFO for mobile, or the Model 405 for MARS operation.

$420

PLUG-IN VOX UNIT

for either transceiver

MODEL VX-1 $35

CRYSTAL CALIBRATOR

KIT $19.50

SIDEBAND SELECTOR

KIT $18

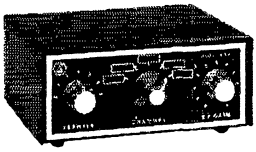
Kits for Model 350 only. Model 400 includes these features.

SWAN SPEAKS YOUR LANGUAGE

ASK THE HAM WHO OWNS ONE

LOOK TO SWAN ELECTRONICS

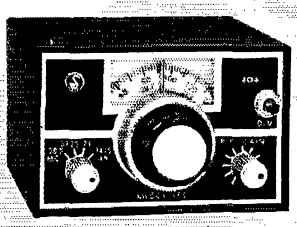
See the Complete Swan Line at Your Dealers Today:



MARS OSCILLATOR

Five crystal controlled channels with vernier frequency control. May be used directly with Model 400 Transceiver or with Model 350 and Model 22 adaptor.

MODEL 405X, *less crystals* **$45**



MOBILE VFO

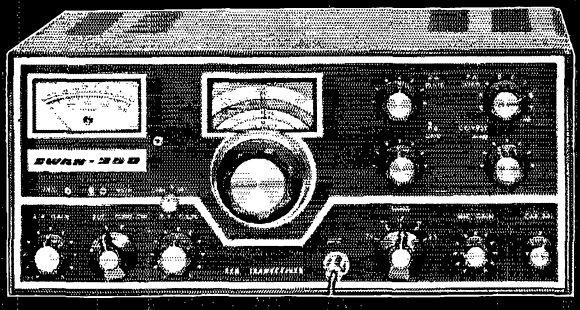
Miniature size. Covers phone bands. Makes it possible to trunk mount the transceiver.

MODEL 406B **$75**

REMOTE CONTROL KIT

For trunk mounting of transceiver.

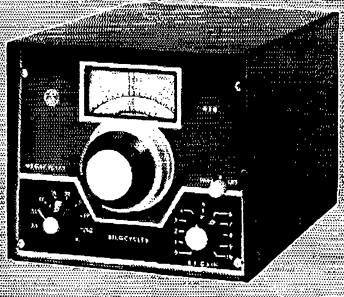
MODEL RC2 . . . . . **$25**



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.

$420



FULL COVERAGE VFO

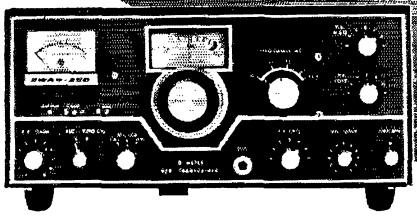
8 ranges, 500 kc each, 5 kc calibration. Matches 350 and 400 transceivers in size and styling.

MODEL 410 . . . . . **$95**

DUAL VFO ADAPTOR

Provides for the addition of second VFO for separate control of transmit and receive frequencies. May be plugged into either 350 or 400 transceiver.

MODEL 22 . . . . **$25**



MODEL 250 6 METER SSB TRANSCEIVER

240 watts PEP. **$325**

SWAN ELECTRONICS CORP.
Oceanside, California

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—SEC: None. ECs: W6TYM and K6TFT. OESs: K6SPP, WA6RRH, W6BYC, W6YKS, WB6SAJ. OPSs: K6TFT, WA6WNG/WB6CRC, WA6QZA, WA6PTU. ORSs: WB6ETY, WA6WNG/WB6CRC, WA6FBS, W6IDY, WB6FHH, W6TYM, W6YKS. OOs: K6LRN, WA6KLL, W6TYM, W6OJW, W6CBF. OBSs: WB6NUI, K6TFT, WB6IBU, WA6VAT, W6JDUB, W6JGW, W6UB, WA6NEL, WA6RRH, WB6ILH. RM: WA6WNG/WB6CRC. V.H.F. PAM: WA6RRH. The East Bay section hit the jackpot in July with BPL certificates going to WA6WNG/WB6CRC, W6IDY and W6UZX. W6IDY is planning a trip to Europe. W6UZX is working on break-in circuitry. W6TYM was in Oregon on his vacation. KOPIV/6 is leaving the Bay area and will be /4 soon. W6CBF is mobile with an SB-34. W6ZF is building a conical monopole for bulletin skeds. Ron transmits news of the Pacific Division and other pertinent data on 3540 and 7080 kc. Drop a card to 1573 Baywood Lane, Napa, Ca., 94558, for more information. W6QJW and several others in the section report the weather has been too hot for hamming. WB6LFJ and K6ONI are new AREC members. WB6NUI is having fun trying to get his 4-1000A linear on the air. K6LRN sold his rig to WB6FHH and is now trying to get the bugs out of an old Viking II. The Hayward Radio Club is helping to prepare for the Greater Bay Area hamfest to be held at the Edgewater Inn at Oakland Oct. 22 and 23. *WN6SSU is a new ham in Hayward and is the XYL of* WB6RPK. WA6JCS accuses WN6SPE of being so busy building gear that his Novice license may expire before he has a chance to operate. To the best of my knowledge I have all AREC records. If it has been over a year since you last filled out an AREC form, you will be getting a new one in the mail to fill out and return to me. I would like to have an up-to-date roster of AREC members to give our new SEC—when and if. All applicants for AREC membership residing in Alameda, Contra Costa, Napa, Solano or Lake counties should mail their AREC forms to 107 Cordova Way, Concord, Ca, 94520. Be sure to include your zip code. There also are plenty of openings for ECs, ORSs, etc. Drop me a line or a radiogram for more information.

NCN	0300Z	Daily	3.635
BAN	0145Z	Tues.-Sat.	146.7

Traffic: WA6WNG/WB6CRC 655, W6IDY 572, W6UZX 401, W6TYM 182, KOPIV/6 126, WA6FBS 26, W6CBF 8, K6LRN 8, W6ZF 8.

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SCM/-SEC: Ernie J. Kurlansky, KH6CCL. PAM: WØPAN/-KH6. RM: Vacant. V.H.F. PAM: KH6EEM. Join a net today.

Net	*Freq. Mc.*	*Time*	*Days*
Friendly	7.290	2030Z	M-F
No Ka Oi	7.290	2230Z	Sat.
50th State	3.895	0500Z	Tue.-Sat.
KH6GG coordinates the following:			
RACES 40	7.225	1930Z	2&4 Sun.
RACES 10	28.700	1930Z	2&4 Sun.
RACES 6	50.252	1930Z	2&4 Sun.
RACES 2	147.000	1930Z	2&4 Sun.

K3DIO/KH6, his XYL and that harmonic, Michelle Elaine, left the islands for work in Delaware. KH6EXI and his gang were all up on the Mainland for the summer. KH6HP recently was cited by his insurance firm for 21 years meritorous service. W6EKJ, his pretty XYL and their family arrived for a Hawaiian vacation aboard the USS *Lurline*. Marty flew over with the Swan 350. KH6-AFS, down Hilo-way, placed 14th in the recent Kona Billfish Tourney. KH6FHQ, the daughter of KH6SN, is the only licensed harmonic at home this summer and at the OM's rig. KH6DJE is working at the USARHAW Signal station. KH6USA, KW6DK assumes the Army MARS Director job at Schofield. WN2YED/KH6 recently *moved here from Rome, N.Y.* KH6DJ *recently spoke at* the Engineering Association of Hawaii luncheon about the more exotic technical aspects of his two 6-month tours in Antartica. KH6ATS, KH6CPW, KH6BQQ and KH6ELW are the chief net control stations behind the Friendly Net. Traffic: (July) KG6AIG 169, KH6BZF 10, WØPAN/KH6 1. (June) KH6EOQ 26.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU, K7SFN, W7SRM, W7YKN and K7WLX were the Field Day operators for the NARA at Gleana Creek. A Worked-All-Nevada-Counties certificate by the NARA is in the making. ON5DS was a guest at W7YKN. K7RKH has a new HB-432 s.s.b. rig running 100 watts. WA7CFS is the EC for Fallon and reports the 3825 s.s.b. net check-ins are increasing with all parts of Nevada being represented. W7YDX and K7USU have new

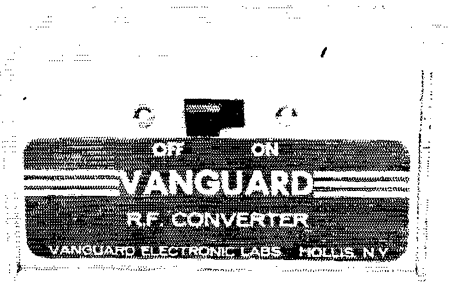
SOLID STATE
FREQUENCY CONVERTERS

WORLD'S LARGEST SELECTION OF STOCK FREQUENCIES

Available in the following frequencies from stock:

	Model	Input mc	Output mc
2M	301-D	144-148	50-54
	301-E1	144-145	.6-1.6
	301-E2	145-146	.6-1.6
	301-F	144-146	28-30
	301-Q	144-148	14-18
	301-R	144-148	7-11
	301-S	143.5-148.5	30-35
6M	301-B1	50-51	.6-1.6
	301-B2	51-52	.6-1.6
	301-C1	50-54	7-11
	301-C2	50-54	14-18
	301-J	50-52	28-30
20M	301-G	13.6-14.6	.6-1.6
CB	301-A1	26.5-27.5	.6-1.6
	301-A2	26.8-27.3	3.5-4.0
40M	301-K	7-8	.6-1.6
CHU WWV	301-L	3.35	1.0
	301-H	5.0	1.0
Int'l. Marine	301-I1	9-10	.6-1.6
	301-I2	15-16	.6-1.6
	301-M	2-3	.6-1.6
Aircraft	301-N1	118-119	.6-1.6
	301-N2	119-120	.6-1.6
	301-N3	120-121	.6-1.6
	301-N4	121-122	.6-1.6
	301-N5	122-123	.6-1.6
	301-N6	123-124	.6-1.6
Fire Police VHF Marine etc.	301-P1	154-155	.6-1.6
	301-P2	155-156	.6-1.6
	301-P3	154-158	7-11
	301-P4	154-158	104-108
	301-P5	156.3-157.3	.6-1.6
Weather	301-W1	162.55	1.0
	301-W2	162.55	10.7
	301-W3	162.55	107.0
CUSTOM MADE	301-X Your choice of any one input and output frequency between .6 and 163 mc.		

(4-6 weeks delivery on custom converters)



ANY CONVERTER NOW ONLY **$16.95** ppd.

except 301-X, $18.95 ppd.

The model 301 uses 3 of the very latest type epitaxial planar UHF transistors for unsurpassed gain and low noise at all frequencies. It can operate from 6 to 18 volts (positive or negative ground) without any significant change in gain or frequency. The circuit consists of a tuned R.F. amplifier, crystal controlled oscillator and a low noise mixer. More than 30 high quality parts carefully assembled and tested. Sensitivity is better than ½ micro-volt for a 6 db signal to noise ratio even at 160 mc.

- **Enclosed in a sturdy 16 gauge, 3⅛" x 2⅝" x 1¾" aluminum case with mounting ears, transfer switch and two SO-239 (UHF) receptacles.**
- **100% made in the U.S.A.**
- **2 year guarantee on all parts *including transistors!***
- **Free 24 hr. SPECIAL DELIVERY anywhere in the U.S.A. if you send a *money order or cashiers* check. With personal checks allow 2 weeks to clear the bank before shipment can be made. No shipments made on Saturdays, Sundays, holidays, and 2 weeks in August.**

OPTIONAL ACCESSORIES:

9 volt battery eliminator with 110 volt cord. Only $2.95 ppd.

R.F. cable adapters in 6", 12" or 18" lengths with PL-259 plug on one end (mates with converter). Other end your choice of Motorola male or female, RCA, BNC or PL-259. Price $1.25 each postpaid cable with 2 plugs.

For prompt shipment please include postal money order or cashier's check. COD's must include 20% deposit. New York City residents add 5% sales tax. New York State residents add 2% sales tax.

VANGUARD LABS

Dept. S
196-23 Jamaica Ave.
Hollis, N.Y. 11423

AMATEUR ELECTRONIC SUPPLY

RECONDITIONED HAM EQUIPMENT

★ 10 Day Free Trial (Lose only Shipping Charges) ★ 30 Day Guarantee ★ Full Credit Within 6 Months on Higher Priced New Equipment ★ Pay as Little as $5.00 Down and Take up to 3 Years to Pay the Balance ★ Order Direct from this Ad!

AMPLIDYNE
621 Xmtr $149
261 VFO 35

B & W
5100 Xmtr $ 89
5100B Xmtr 119
51SB-B SSB Gen 99
L-1000A Lin/Sup 149

CENTRAL ELECT.
10A Exciter $ 49
10B Exciter 69
20A Exciter (table) 89
QT-1 Anti-Trip 9
BC-458 VFO 19
600L Linear 219

CLEGG / SQUIRES-SANDERS
99'er Xcvr $ 99
Thor 6 (RF only) 175
Thor 6 DC Sup. Mod 95
Thor 6 AC Sup. Mod 75
Zeus Xmtr 375
Venus Xmtr 249
Venus AC Supply 75
Apollo Linear 175
SS Booster 49
Interceptor Rec 295
22'er 2m Xcvr 169
SSIR Receiver 475

COLLINS
75A-1 Receiver $139
75A-2 Receiver 219
75A-3 Receiver 269
75A-4 (0-1000) 349
270G Speaker 19
75S-1 Receiver 295
75S-1/Waters Rej. 325
75S-3 Receiver 399
75S-3B Receiver 475
75S-3C Receiver 525
32V-3 Xmtr 199
32S-1 Xmtr 375
32S-3 Xmtr 495
62S-1 VHF Conv 595
312B-4 Console 149
KWS-1 (500-1000) 675
KWM-1 (0-500) 249
351D-1 Mount 25
KWM-2 Xcvr 750
KWM-2 Waters rej. 775
351D-2 Mount 75
MP-1 Mobile Sup 119
399B-1 DX Adaptor 25

R. L. DRAKE
1A Receiver $109
2A Receiver 159
2AC Calibrator 12
2B Receiver 189
2BQ Combo 29
2BS Speaker 9
TR-3 Xcvr 369
AC-3 Supply 65
DC-3 Supply 95
R-4 Receiver 279
R-4A Receiver 299
MS-4 Speaker 12
T-4X Transmitter 299

EICO
720 Transmitter $ 49
722 VFO 34
730 Modulator 39
753 Transceiver 149

ELMAC
AF-67 (AS-IS) $ 20
AF-67 Xmtr 45
AF-68 Xmtr 79
PMR-6 (AS-IS) 20
PMR-6A (AS-IS) 25
PMR-7 Receiver 39
M-1070 AC/DC 39

GLOBE GALAXY/WRL
Scout 65B Xmtr $ 34
Scout 680 Xmtr 35
Scout 680A Xmtr 39
LA-1 Linear 69
Scout Deluxe 49
Hi-Bander 62 99
Chief 90 Xmtr 29
Chief 90A Xmtr 34
Chief Deluxe Xmtr 39
King 500A Xmtr 225
King 500B Xmtr 249
DSB-100 Xmtr 49
HG-303 Xmtr 29
Galaxy 300 Xcvr 149
PSA-300C AC Sup 49
G-300DC 65
Galaxy V Xcvr 299
AC Supply 59
Deluxe Console 69
RX-2 VFO 59
755 VFO 24
755A VFO 29
Rejector 15
UM-1 Modulator 29
VOX-10 5
MM-100 Matcher 7

GONSET
Comm III 6m $149
Comm IV 2m 199
G-28 Xcvr 149
GC-105 2m Xcvr 169
900A (2m) Xcvr 249
902A DC Supply 49
901A AC Supply 49
G-33 Receiver 44
GR-211 Receiver 49
G-43 Receiver 59
GR-212 Receiver 59
G-66B Receiver 49
3-way Supply 19
Thin-Pak 19
G-76 Xcvr 99
G-76 AC Supply 75
G-76 DC Supply 75
G-77 Transmitter 49
G-77A Transmitter 69
GSB-100 Xmtr 169
GSB-101 Linear 169
Super 6 (AS-IS) 10
Super 12 Conv 29

HALLICRAFTERS
Sky Buddy Rec $ 39
S-38B Receiver 24
S-38E Receiver 34
S-40B Receiver 49
S-53 Receiver 44
S-53A Receiver 49
SX-62 Receiver 125
SX-71 Receiver 89
S-76 Receiver 69
S-77A Rec (AS-IS) 25
S-86 Receiver 59
S-95 150Mc Rec 39
SX-96 Receiver 119
SX-99 Receiver 75
SX-100 Receiver 139
SX-101 Mk II Rec 125
SX-101 Mk III Rec 139
SX-101A Rec 199
S-108 Receiver 69
SX-111 Receiver 134
SX-115 Receiver 325
SX-117 Receiver 225
S-120 Receiver 39
SX-140 Receiver 69
CRX-2 150Mc 69
CRX-3 Aircraft 69
R-46 Speaker 8
R-46B Speaker 9
R-48 Speaker 12
HT-17 (AS-IS) 25
HT-30 Xmtr 119
HT-31 Linear 119
HT-32 Xmtr 249
HT-32B Xmtr 349
HT-33 Linear 169
HT-33A (conv to B) 269
HT-37 Xmtr 225
HT-40 Xmtr 49
HT-44 Xcvr 249
P-26 Supply 49
P-150AC Supply 75
P-150DC Supply 75
SR-160 Xcvr 189
HA-5 VFO 45
HA-6 Transverter 89
HA-10 Tuner 15

HAMMARLUND
HQ-100C Rec $109
HQ-110 Receiver 119
HQ-110C Rec 129
HQ-110A Rec 159
HQ-120 Receiver 59
HQ-129X (AS-IS) 25
HQ-140X Rec 99
HQ-145XC Rec 169
HQ-160 Receiver 189
HQ-170 Receiver 169
HQ-170C Rec 179
HQ-170A Rec 239
HQ-170AC Rec 249
HQ-170AC with immunizer 299
HQ-180C Rec 249
SP-600JX-17 Rec 275
HX-50 Xmtr 199

HEATHKIT
HR-20 Receiver $ 89
MT-1 Xmtr 39
MR-1 Receiver 49
DX-20 Xmtr 24
DX-35 Xmtr 29
DX-40 Xmtr 34
DX-60 Xmtr 59
DX-100 Xmtr 85
DX-100B Xmtr 99
TX-1 Transmitter 119
HX-11 Xmtr 29
HW-12 75m Xcvr 99
HW-32 20m Xcvr 89
VF-1 VFO 17
HG-10 VFO 29
HW-10 Ten'er 29
HW-10 6m Xcvr 169
VHF-1 Seneca 159
HP-20 AC Supply 25
MP-1 DC Supply 25
UT-1 AC Supply 19
HO-13 Hamscan 49
HA-14 Mob. Linear 95
HP-14 DC Supply 75
HP-24 AC Supply 50

HUNTER
2000A Linear $325

JOHNSON
Adventurer $ 25
Challenger 59
Viking I 49
Viking II 69
122 VFO 19
Ranger I 89
Ranger II 169
Valiant I 139
Valiant II 239
500 Xmtr 349
Pacemaker 149
Courier Linear 139
275W M'box/SWR 69
Mobile Xmtr (AS-IS) 25
Mobile VFO (AS-IS) 15

KNIGHT
R-55 Receiver $ 39
R-55A Receiver 44
R-100 Receiver 59
R-100A Receiver 69
T-50 Transmitter 24
T-60 Transmitter 34
T-150 Transmitter 59
T-150A Xmtr 69
V-44 VFO 17
X-10 Calibrator 5

LAKESHORE
Phasemaster IIB $149
PP-400GG Linear 99
Signal Splitter 29

LAFAYETTE
HE-30 Receiver $ 39
HE-45 Xcvr 65
HE-45B Xcvr 75
HE-61A VFO 15
HA-90 VFO 29
KT-320 Receiver 49

LOUDENBOOMER
Mk II Linear (RF) $125

NATIONAL
SW-54 Receiver $ 24
NC-57 Receiver 49
NC-60 Receiver 39
NC-98 Receiver 69
NC-105 Receiver 75
NC-109 Receiver 79
NC-125 Receiver 69
NC-155 Receiver 99
NC-173 Receiver 69
NC-183 Receiver 89
NC-183D Receiver 149
NC-188 Receiver 69
NC-270 Receiver 119
NC-300 Receiver 149
NC-303 Receiver 249
VFO-62 34
XCU-300 Calibrator 5
HRO-60 Receiver 225
NTS-1 Speaker 9
NTS-3 Speaker 12
NCX-3 Xcvr 189
NCXA Supply 75
NCXD Supply 75
NCX-5 Xcvr 395
NCL-2000 Linear 425

P&H
LA-400 Linear $ 69
LA-400B Linear 79
LA-400C Linear 89

POLYTRONICS
PC-6 6m Xcvr $175
62B 6&2m Xcvr 225

RME
DB-23 Preselect $ 25
4300 Receiver 69
4302 Speaker 9
4350 Receiver 89
4350A Receiver 99
6900 Receiver 149

SBE
SB-33 Xcvr $175
SB-34 Xcvr 275
SB1-LA Linear 125
SB2-DCP Supply 35
SB3-DCP Supply 75

SINGER
PR-1 Panadaptor $ 99

SONAR
20m Monobander $ 99
AC-10 AC Supply 75
DC-10 DC Supply 75

SWAN
SW-120 Xcvr $119
SW-140 Xcvr 119
SW-175 Xcvr 119
SW-240 Xcvr 189
SW-117AC (for 240) 65
SW-117B AC Sup 50
SW-12 DC Supply 75
SW-350 Xcvr 299
SW-117XC AC Sup 75

TMC
GPR-90 Receiver $225
GPR-90 Speaker 19
GSB-1 Slicer 75

WATERS
Codax Keyer $ 59

To: AMATEUR ELECTRONIC SUPPLY
4828 West Fond du Lac Avenue
Milwaukee, Wisconsin 53216 Q

Ship me the following Reconditioned Equipment:

FIRST CHOICE _____

SECOND CHOICE (IF ANY) _____

THIRD CHOICE (IF ANY) _____

I enclose $_____; I will pay balance (if any)

☐ COD ☐ 1 year ☐ 2 years ☐ 3 years

Name _____

Address _____

City _____

State _____ Zip _____

☐ Send Reconditioned Equipment Bulletin

HELP WANTED!

Shipping Clerks
Electronic Technicians
Counter Salesmen

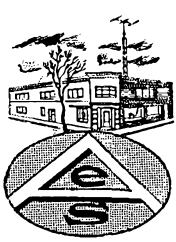
Send picture, resume, and salary requirement...Would consider helping with moving expenses for out-of-town applicant.

SWAN **SWAN**

LOOK at your low Monthly Payment
AFTER JUST $5.00 DOWN

350 10-80m Transceiver	(14.98)	$420.00
400 10-80m Transceiver less VFO	(14.98)	420.00
250 Transceiver for 6 Meters	(11.55)	325.00
Mark I Linear – less tubes	(16.97)	475.00
Two 3-400Z Tubes for above	(2.27)	68.00
405 MARS Oscillator - 5 fixed channels	(1.44)	45.00
406B Miniature Phone Band VFO	(2.52)	75.00
410 Full Coverage VFO	(3.25)	95.00
117XC 117v AC Supply w/cabinet & spkr	(3.25)	95.00
230XC As above, but for 230 volts	(3.61)	105.00
117XB 117v AC Supply only – less cabinet & spkr. (normally used with 400)	(2.52)	75.00
230XB As above, but for 230 volts	(2.88)	85.00
14-117 12v DC Supply w/cable	(4.51)	130.00
14-230 As above, but w/230v Basic sup	(4.87)	140.00
117X Basic AC Supply ONLY	(2.16)	65.00
230X Basic AC Supply ONLY	(2.52)	75.00
14X 12v DC Module & Cable	(2.16)	65.00
14XP As above, but Positive Ground	(2.34)	70.00
Cabinet, Speaker & AC Line Cord		30.00
117v or 230v Line Cord (specify)		5.00
8' Power Supply Cable w/Jones Plug		3.00
VX-1 Plug-in VOX		35.00
SSB-2 Selectable Sideband Kit for 350		18.00
22 Dual VFO Adaptor for 350 & 400		25.00
100kc Calibrator Kit for 350		19.50
500kc Calibrator Kit for 250		19.50
10m Full Coverage Kit for early 350's		15.00
55 Swantenna – Remote Control	(3.25)	95.00
45 Swantenna – Manual	(2.16)	65.00
Deluxe Mobile Mounting Kit		19.50
RC-2 Remote Control Kit		25.00

The payments shown above are for a 36-month time-payment plan with $5.00 down. The minimum total order that may be financed for 12 months is $60.00; for 24 months - $120.00; for 36 months - $180.00. NOW! Our time-payment plan offers a 105-day pay-off option!



AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Avenue
Milwaukee, Wisconsin 53216
Phone (414) 442-4200

MILWAUKEE STORE HOURS: Mon & Fri-9 am to 9 pm; Tues, Wed, Thurs-9 am to 5:30 pm; Sat-9 am to 3 pm

IMPORTANT! – Be sure to send all Mail Orders and Inquiries to our Milwaukee store, whose address is shown above. VISIT – Please do not write the following Branch stores – they are set up to handle walk-in trade only-

CHICAGO, ILLINOIS
6450 Milwaukee Avenue
Phone (312) 763-1030

ORLANDO, FLORIDA
19 Azalea Pk. Shpg. Ctr.
Phone (305) 277-8231

CHICAGO & ORLANDO STORE HOURS: Mon, Wed, Thurs - 12 to 9 pm; Tues & Fri - 12 to 5:30 pm; Sat - 10 am to 4 pm

STOP

Look no further!

The Best Deals (Trade or No Trade) on New Swan Equipment are being made at AMATEUR ELECTRONIC SUPPLY

GET OUR DEAL TODAY!

Use Handy Coupon Below

Terry Sterman, W9DIA
Proprietor

Ray Grenier K9KHW
Mgr. Mail Order Sales

To: **AMATEUR ELECTRONIC SUPPLY**
4828 West Fond du Lac Avenue
Milwaukee, Wisconsin 53216 Q

I am interested in the following new equipment:

_____

I have the following to trade: (what's your deal?)

_____

Ship me the following New Equipment:

_____

I enclose $_____ I will pay balance (if any)

☐ COD ☐ 1 year ☐ 2 years ☐ 3 years

Name _____

Address _____

City _____

State _____ Zip _____

☐ Send Reconditioned Equipment Bulletin

wheels for their mobiles. Section net certificates have been mailed to K7AOA, WA7BHC, WA7CFS, W6DIX/7, WA7ERY, K7QGO and K7SNS. WA7BAV is telephoning relaying messages for GIs in Viet Nam. W7BIF and W7PRM vacationed in Utah. K7RBM has taken up color-photo finishing. W7AAF is doing a lot of flying. W7JU is missing a couple of TV sets, and has traded his sail boat for a two-wheel cycle. Traffic: WA7CFS 31, K7OHX 11, K7RKH 7.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC: WB6BWB. ECs: WB6MXD, K6RHW, W6SMU, WA6TQJ. RM: W6LNZ.

Net	*Freq.*	*Time*	*Days*	*Mgr.*
Yolo Co. CD	146.94 Mc.	0200Z	Wed.	WA6TQJ
SCEN	146.28 Mc.	0400Z	Wed.	WB6BWB
SVN	146.28 Mc.	0330Z	T-Sun.	WA6YYK
NCN	3635 kc.	0300Z	Daily	WB6HVA
Tri-Co. Emer. Net	3815 kc.	1700Z	?	?

Let's all support President Denniston's Hamquest '67 in doubling membership in both your club and the ARRL. *Let Every Amateur Give United Effort.* SCEN held a "Rabbit" Hunt on July 31 with WB6RVR as the rabbit, or better, a "rat." The "rat" had a t.r. switch on his car switching from a J-antenna to an antenna hoisted up a flag pole to confuse the boys. W6CIS, former Pacific Div. Director, retired from the Cal. Disaster Office with over 38 years of State Service. WN6TOZ, the XYL of ex-WN6QMT, is a new ham in Carmichael. WA6FWU is watching for 6-meter band openings from Soda Springs. The RAMS held a barbecue at W6TEE and WB6PHQ. WN6TOA, of McClellan AFB, is trying to initiate a Novice-Tech. net. WB6MAE moved back to his ranch in Orangevale from Fair Oaks. WB6MXD put up a 40-meter antenna consisting of #12 AWG wire. W6AF is using a 65-watt 7-Mc. rig for Official Bulletins. Traffic: (July) W6LNZ 116, WB6MAE 36, K6IKV 13, WN6TOA 9, W6AF 3, WB6MXD 3. (June) WB6MAE 18, WB6BWB 16.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD —W6KZF has completed over a year without missing a report but would like to get more Form 5s from the ECs. W6CIS, former Pacific Division Director and California State Disaster official, was a visitor at the Aug. meeting of the Humboldt Radio Club. W6HSA finds more DX coming through with eight new countries in July. W6UDL checks into the Mission Trail Net regularly. W6DTV operated portable most of the summer from Old Station, north of Mt. Lassen. WA6MGG is a new OO in the Eureka area. K6SAA returned from the Bastille Day celebration in Papette reporting not much doing on 20 meters from FO8AA. WA6QXV has put an HW-12 on the air. In the July CD Party W6BIP, W6BYS, W6GQA and W6HSA were heard in the c.w. portion and W6CYO and WA6AUD in the phone section. WB6GVI is getting antennas up at his new QTH. W6BIP gave a talk on his experiences at Thule in OX-Land at the July meeting of the San Francisco Radio Club. OO WA6RXM reports clicks and chirps the most frequent problem with c.w. signals. The San Francisco Section Net meets Mon. and Fri. at 1830 local time on 3900 kc. WB6JOX is the present N/C with a powerful s.s.b. signal. WB6AIS continues to gain on the staphlococcus infection which has bothered him since his operation early this year. However, Doc reports 33 countries worked outside North America since returning home from the hospital. WA6ARE is looking for anyone interested in a 2-meter net in Sonoma County. W6WLV was the best man at his 80-year-old father's wedding. K6TWJ continues to be the main source for traffic on the Golden Bear Net. W6SRZ and XYL W6QOJ recently moved to Marin County. WB6IMO continues to turn out the *QSL* paper for the Marin Club, doing a fine job with WA6UTE helping with the art work. W6CYO is working the DX openings to Asia almost every morning and reports the new TH-4 beam working well. W6PTS is erecting a tower and beam at his new Corte Madera QTH. W6BCM, W6DXA, WB6IMO and K6OJO attended the QCWA July picnic in Sonoma County. The Sonoma Radio Club had a film shown on optical lasers at its Aug. meeting. Traffic: (July) W6KVQ 345, W6WLV 72, K6TWJ 55, W6UDL 32, W6BWV 22, WB6DMP 18, WA6AUD 15, WB6OGF 7, WA6ARE 6, WB6JOX 5, WB6GVI 4, WB6KWL 4, K6TZN 4, WB6IMO 3, K6SAA 3, W6DTV 2, K6MBV 2, WA6QXV 1. (June) W6DTV 3.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—W6COB has a new Swan 350 and Moseley tribander beam. K6AXV is moving to Manteca. WB6MUY and XYL WB6SMQ are moving to Berkeley. The Delta Net meets on 50.4 Mc. every Thursday at 2000 local time. The Tulare Co. FD was at Mountain Aire., 6500 feet high. All those who participated in FD reported excellent results. WA6RTI is on 75 with an HW-12. W6-

EIMAC offers new 1 kW PEP tetrode for SSB with highest linearity—at least -40 db in typical operation

EIMAC's new 4CX1500B power tetrode is the most linear tube on the market; intermodulation distortion characteristics under typical operating conditions are at least −40db at all drive power levels from zero to maximum. The new tube is ideal for advanced single sideband transmitters demanding high linearity to avoid channel-to-channel interference. The 4CX1500B is the product of a four-year development study which included optimization of internal tube geometry by computer techniques. Rated maximum plate dissipation of this radial beam tetrode is 1500 watts, and control grid dissipation rating is 1 watt maximum. Because the 4CX1500B has very low grid interception (typically less than 1.5 mA grid current), it is possible to drive the grid positive without adverse effects upon the distortion level; the tube is therefore recommended for Class AB_2 linear amplifier service. For further information, write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.

TYPICAL OPERATION (Frequencies Below 30 MHz)

DC Plate Voltage	2500	2750	2900 volts
DC Screen Voltage	225	225	225 volts
DC Grid Voltage	−34	−34	−34 volts
Zero-Signal DC Plate Current	300	300	300 mA
Single-Tone DC Plate Current	720	755	710 mA
Two-Tone DC Plate Current	530	555	542 mA
Driving Power	1.5	1.5	1.5 watts
Useful Output Power	900	1100	1100 watts
Intermodulation Distortion Products			
3rd Order	−38	−40	−40 db
5th Order	−47	−48	−48 db

EIMAC
Division of Varian
San Carlos, California 94070

We have a new brochure entitled "Single Sideband." Write for your copy.

JUK has a new 71-ft. self-supporting tower. K6BKZ is on 75-40-20 with a KWM-2. WA6HKH is on 75 s.s.b. W6TZN is experimenting on 2100 Mc. with pulse modulation. WB6GIT has modkfied his antenna and is getting out much better. WA6TQL is building a linear amplifier for his S/Line. WA6RLW was heard operating portable from Lake Taho using an SB-34. WB6LMB has been checking into the S.S.B. Net from Mineral King. W6TRP is operating from Camp Nelson with his KWM-2. W6-YGZ reports the loss of a mike and key with oscillator during FD. W6BWK, the Delta Amateur Club station, is operating on 80 meters. WB6HVA has a 75S-3, a 32S-3 and a Henry 2K. WB6OSH is heard operating s.s.b. on 40 meters. W6MSU is putting up a repeater station on 2 meters. W6ADB made the BPL for the first time in years. The Tulare County Radio Club meets the 4th Fri., the Delta Amateur Radio Club the 3rd Fri., the Fresno Amateur Radio Club the 2nd Fri. I want to thank my friends for their support in the SCM election. Traffic: (July) W6ADB 689, WB6PCQ 248, WB6-HVA 103, WA6SCE 45, WB6NCJ 2.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin., W6ZRJ—Asst. SCM: Ed Turner. W6NVO. RM: W6-QMO. Both W6RSY and W6DEF made the BPL for the month of July, Hal on originations plus deliveries. W6-RSY made the BPL with only 19 nights of operation. Congratulations to both. W6QMO, our very fine RM, was in the hospital for over two weeks. She is now recovering and will be back on the air soon if not already. The NPEC of South San Francisco held a picnic in July with 16 members and families attending. WA6PTF was the MC. The club is busy organizing for the fall operating season. The West Valley Radio Club held its Annual Pancake Breakfast in Campbell with over 200 amateurs attending. The usual fine breakfast was served up by WA6YDF and his crew. Pacific Division Director W6HC, your SCM and SEC all attended the event. W6DEF reports that K6MPN and W6JSR are both recuperating from recent heart attacks. Hal now has new antennas for 80 and 20 meters. W6VZT was guest speaker at the SCCARA meeting, speaking on the subject of antenna design. The PAARA took part in the operation of W6OTX at the San Mateo County Fair. The meeting of the Santa Cruz Radio Club featured slides and films of various hams and ham shacks in the area. The club meets the first Fri. of each month at Cabrillo College. The SCARS was busy planning for the operation of a station at the San Mateo County Fair, as was SCCARA for the Santa Clara County Fair to be held two weeks later. Both clubs plan on handling traffic as well as demonstrating amateur radio operation. W6AIT is active on NCN. K6GK reports that there has been much QSB on all nets during the summer months. W6-AUC is active as OO and on several nets. Russ is now secy. of the QCWA area chapter. WB6NXK is operating on 40 meters in the early morning hours and working DX. W6BVB now sports a new 75S-1. Bob works NCN. W6VZE is very active as EC for Burlingame and is making plans for the SET. W6OII is OPS on the Mission Trail. W6ASH is QRL with school work, but manages to check into nets. WB6IZF is now active on WCARS on 40 meters. WA6CVU is now NCS on PAN. Traffic: W6RSY 1316, WA6CVU 496, W6YBV 412, W6-DEF 199, W6AIT 64, W6HC 38, K6GK 33, W6ZRJ 28, W6AUC 18, WB6NXK 18, W6BVB 14, W6VZE 13, W6-OII 11, W6ASH 10, WB6IZF 7.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. The combined NCN/SSBN Picnic was held at Morrow Mountain State Park. Certificates were presented to WA4ANH, W4EVN, K4IEX, W4LWZ, K4TTN and W4UWS for earning the N.C. Service Award, and WB4BGL was presented a net certificate and named "The Rookie of the Year." Albert W. Parker, W4BAW, 1889-1966: North Carolina amateurs are saddened by the passing of one its best-known amateurs. Licensed in 1919 as 4EA, Al received the call W4BAW in 1925 and devoted the next 40 years of his amateur life to public srevice and to other amateurs. He held many station appointments, was EC for Craven County, a charter member of THEN, initiated NCN, received many awards and citations from the Red Cross and civil defense for his public service work during the N.C. hurricanes. Net Traffic: NCN(E) 194, THEN 105, NCN(L) 93, NCSSBN 56. Traffic: W4LEV 1570, WB4BGL 207, W4EVN 153, W4IRE 136, W4LWZ 136, K4BUJ 82, WA4UFQ 59, K4CWZ 46, K4EO 42, W4BNU 26, WA4FJM 21, WA4VNV 21, K4EOF 20, WA4-CFN 19, WA4UQC 14, WA4UVH 12, WA4VTV 12, WA4-NUO 11, WA4ANH 10, K4ZKQ 8, WA4GMB 7, K4SHU 4, WA4KWC 4, W4ACY 2, (June) W4LWZ 141, W4OTE 128, K4GNX 24, (Apr.) W4IRE 172.

BIG-K

1000 watt (p.e.p.) mobile antenna at a mini-power price! Quick-connect high power inductors for 160*-80-40-20-15-10 meters have exceptional figure of merit—"Q"—that measures approximately 230 on 80, rises to 350 on 15 meters. **Webster invites comparison of this sky power antenna** particularly its high efficiency space-wound coils, **suspended**—not molded—inside a protective all-white tenite housing. **Compare** also the precision machined hinged column assembly that releases coil/whip for right-angle laydown—forward or to the rear. Lockup into operating position is equally fast. **Install BIG-K**—give your mobile signal a real sendoff. Two column sizes for bumper and deck mounting with overall lengths, respectively, of 93" and 77". And use the money you save to buy a fine Webster mount.

*160-meter coil 300W p.e.p.

Band-spanner

Want a fully streamlined car antenna that will handle 500W p.e.p.? **Buy Band-spanner** as thousands have over the past sixteen years. One clean-cut antenna—nowhere over 1⅛" in diameter—that delivers big sky power on 80-40-20-15-10 meters plus MARS. Band-change in seconds too just by raising or lowering the top whip (which contacts a section of any of the internally exposed inductor turns) and exact resonance on any in-band frequency. **Band-spanner**—truly streamlined—de-emphasizes the appearance of a fair size antenna on a new car. It has a two-tone fiberglass column and an attractive, epoxy-sealed loading section that blends both with car and surroundings. Two column lengths: Model ABB, 117" overall extended, 63" telescoped and Model ABD, 93" overall extended, and 60" telescoped.

Model THMD, de luxe 3-hole mobile mount.

Model BCM, bumper chain mount. (spring not supplied)

Model SHM, single hole de luxe mobile mount.

Write today for free BIG-K and Band-spanner brochures

RAYTHEON COMPANY

213 East Grand Ave., South San Francisco, Calif. 94080

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SECs: W4WQM, WA4EFP, RM: K4LND. PAM: WA4RUB. Vacations took their toll in July. The SC Slow Net is still trying to hold together. It needs more use by the SCSBN members. The Rock Hill Hamfest is scheduled for the middle of October. WA4ECJ hopes to finalize emergency plans through AREC, current nets and c.d. into one combined effort. W4CE is progressing well from a trip to the hospital. The Greenville V.H.F. Society is planning another mountain trip after the wonderful experience on the mountain-top adventure. WA4LDM received an ORS appointment. W4NTO reports a real need for more OOs. Volunteers are wanted for printing the *SCN News*. K4HDX and K4LNO need the help. There is plenty of 2-meter activity over the state but little reporting. Traffic: WA4LDM 105, K4LNJ 40, W4NTO 35, WA4QKQ 28, K4OCU 15, W4JA 11, WA4ICF 10, W4PED 5.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—PAM: W4OKN. RMs: K4LJK, W4SHJ, WA4EUL. We were again shocked by news of the death of another of the section's prominent and devoted amateurs. In mid-July, Dr. William Grigg, WA4AGB, passed away—suddenly and untimely. Dozens of Richmond amateurs paid tribute at the final rites. We all mourn his passing. Elections for Roanoke Division Director will be held in October. Among the candidates is W4KFC. Study your ballot carefully. Vote for Vic if you can—but by all means, vote. WA4HHH is in New York State studying for a new job while W4WDZ, long absent from the nets, hopes to become active after graduate work at Harvard. W4NLC and WA4DAI, both ECs, are not getting the best of response in forming up local AREC units. W4ZM finally took on a TCC assignment. W4OWE has a fine country location with an antenna farm except for 80 meters where the antenna touches a metal screen door and sparks fly. W4QDY reports the best activity in nets in several years. W4JUJ was the highest W4 in the YL-OM C.W. Party. It took K4ASU several weeks to work 150 countries from the new location without a beam. Traffic: (July) W4RHA 168, W4SZT 165, WA4EUL 154, WA4OHZ 148, W4NLC 98, WA4UMX 98, K4LJK 70, W4ZM 66, WA4YSE 62, W4BWF 58, W4OWE 54, K4KNP 46, K4FSS 45, WA4QOC 43, WA4TNS 43, K4MLC 39, W4QDY 38, WOKN 35, WA4DAI 28, K4ITV 26, W4DVT 22, W4BZE 16, K4LMB 16, W4MK 16, W4KFC 13, W4ZAU 10, W4SHJ 9, W4WG 9, K4ASU 6, K4YEE 6, K4PIK 3, W4JUJ 2, W4KZC 2, W4KX 1, W4PTR 1. (June) WA4YSE 56, W4OKN 16, WA4KVR 12.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RMs: K8TPF, W8LMF. PAMs: K8CHW, W8IYD. Nets meet on 3570, 3890, 3903, 3905 kc. WA8GRE is moving to Florida. The Monongalia Wireless Assn. had a fine exhibit at the County Fair. K8BIT and K8MQB report "trailer life with a mobile, fine."

WEST VIRGINIA QSO PARTY

October 29-31

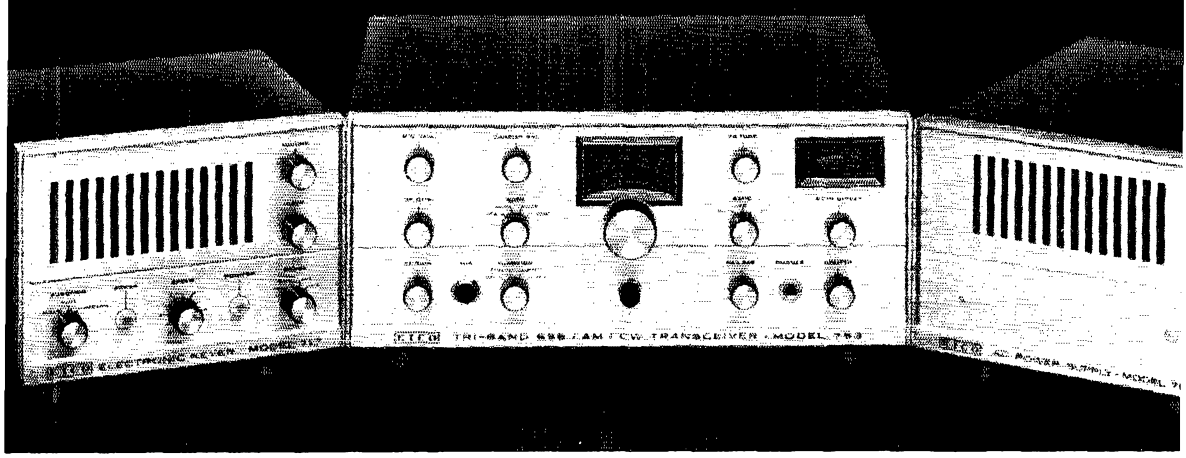
All amateurs are invited to participate in the annual West Virginia QSO Party, sponsored by the Kanawha Radio Club of Charleston, West Virginia. The contest starts 0001 GMT Oct. 29 and ends 0500 GMT Oct. 31. Use all bands, all modes. Each station may be worked twice on each band, once by phone and once by c. w. Complete exchanges consists of QSO number, reports and West Virginia County (or ARRL Section/Country for non-West Virginians). Each completed exchange counts one point. Non-West Virginia stations will try to work as many West Virginia stations as possible. West Virginia stations are not permitted to work stations in their own state for point credit. Suggested frequencies: 3570 3890 3903 7050 7205 14,050 14,300 21,050 21,410, 28,050 28,800 and 50,250 kcs. In scoring, non-West Virginia stations multiply total points by the number of West Virginia counties worked. West Virginia stations multiply total points by number of ARRL Sections/Countries worked. Certificates will go to the highest scoring phone and c.w. stations in West Virginia and in each ARRL Section/Country. Multioperator stations are not eligible. Logs showing usual information in GMT, should be mailed to Wayne Moore, WA8PWM, 1516 Valley Drive, South Charleston, West Virginia 25303. To be eligible logs must be postmarked no later than December 1, 1966.

A 3-band SSB Transceiver Kit for $189.95

An Electronic Keyer Kit for $49.95

A Solid-State AC Power Supply Kit for $79.95

Who gives you ham gear so COMPLETE at prices so low?



Who else but EICO

Pro **all the way, from concept to execution — that's what ham editors say about EICO. Critical customers agree, and like the low price, too. They've made the 753 kit, for example, the industry's hottest seller. And the new 717 Keyer seems headed for the same fate. Highlights of both give you some inkling why:**

The EICO 753 is a complete 3-band transceiver, offering SSB/AM/CW operation with conservatively rated 200 watts PEP on all modes (rated for maximum efficiency rather than maximum possible input power). A new Silicon Solid State VFO provides full coverage of the 80, 40, and 20 meter bands. Assembly is made faster and easier by VFO and IF circuit boards, plus pre-assembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The EICO 753 is at your dealer now, in kit form and factory-wired.

FEATURES: High level dynamic ALC prevents flat-topping even with extreme over-modulation. Automatic carrier level adjustment on CW & AM. Receiver offset tuning (10 kc bandspread) without altering transmit frequency. Front panel selected STANDBY, VOX, or P-T-T operation. Unique ball drive provides both 6:1 rapid band tuning and 30:1 vernier bandspread with single knob. The Model 753 is an outstanding value **factory wired at $299.95**

EICO Model 751 AC Supply/Speaker Console: Provides all necessary operating voltages for Model 753. Incorporates PM Speaker, conservatively rated components and silicon rectifiers for minimum heat and extended trouble-free life. Includes interconnecting plug-in cables. **Kit $79.95 Wired $109.95**

SPECIFICATIONS: Output Voltages: 750 volts DC at 300ma, 250 volts DC at 170ma — 100 volts DC at 5ma, 12.6 volts AC at 4 amps. INPUT VOLTAGE: 117VAC.

EICO Model 752 *Solid State Mobile* Power Supply: (Not Shown). For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload. Output voltages identical to Model 751. Input voltage 11-14 volts DC.
Kit $79.95 Wired $109.95

The ideal accessory for the CW ham— the **fully automatic 717 Electronic Keyer.** It provides self-completing clean-cut dots, dashes, and spaces accurately timed and proportioned from 3 to 65 WPM in four overlapping switch-selected ranges with vernier control of all speeds within each range. Matches EICO 753 in appearance to make it a perfect table-top companion unit.

FEATURES: Output Contacts — 25 volt-ampere dry-reed SPST relay. Built-in adjustable tone and volume oscillator with *a 3 x 5 inch speaker for monitoring.* Can be used as a code practice oscillator.
Kit $49.95 Wired $69.95

For FREE catalog and Amateur Radio brochure write to EICO 131-01 39th Ave., QST-10, Flushing, New York 11352 EICO

W8NTV visited W8RXO, now located in California. The WVN C.W. Net had 21 sessions, 96 stations, 61 messages; the WVN Phone Net, 19 sessions, 435 stations, 107 messages. W8DYJ has added a Heath Linear. WA8-ACQ has a new TR-4. K8ZPR is operating on 29.6 f.m. WA8KCJ is the new EC for Cabell County. W8CHT, 8RN Net mgr., congratulates WVA on the fine showing in the 8RN. New officers of the Black Diamond ARC are K8ZDY, pres.; K8OEN, vice-pres.; W8SSA, secy.-treas. Club members from the East River ARC appeared on WHIS, Bluefield TV station. WA8RHT is a new General. K8UOA is back on the air and W8SSA has a new s.s.b. mobile. K8WNZ will be in KP4-Land for two years and WA8APZ is moving to Buffalo. W8-WHQ, operating 2-kw. p.e.p., creates quite a few queries during contacts. The Thumping Kegers held its annual meeting at its Ham-Picnic in Bluefield. Traffic: WA8-POS 121, WA8GRE 52, W8CKX 43, W8HZA 33, WA8-KCO 19, K8BIT 16, WA8NDY 16, W8GUL 5, K8CHW 4, K8QEW 3, K8RPB 3, K8WNQ 3, K8WWW 3, K8CFT 2, W8IRN 2, WA8RHT 2, K8SOR 2, WA8ALI 1, WA8-BUM 1, WA8CKN 1, W8CNY 1, WA8GGI 1, W8IMY 1, W8JM 1, K8KQX 1, WA8NLI 1, K8OQL 1, WA8PWN 1, WA8QND 1, W8QOB 1, WA8RAS 1, WA8RQB 1, W8-SSA 1, K8TPF 1, K8ZPR 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crumpton, KØTTB—Asst. SCM: A. E. Hankinson, WAØNQL. SEC: WØ-SIN. We regret to report that WØDDM is a Silent Key. Congratulations to Howard and Valerie. KØDCW and KØZSQ, on receiving the 1965 Division PICON Award. Colorado YLs were hosted at a picnic by KØEPE, from Liberal, Kansas, held at Palmer Lake. The Arapahoe Radio Club was formed Aug. 1 composed primarily of Englewood and Littleton AREC members. WAØNQL is pres.; WØMMI, vice-pres.; WØGIL, secy.-treas.; WØFA, activities. The club meets the 1st Mon. of each month at Englewood City Hall. WØKAU, ex-K6KDE, is at Loveland and looking for 2-meter a.f.s.k. contacts. WNØHEP is new in Denver. WØPG reports the V.H.F.-U.H.F. Seminar of Boulder held an antenna-measuring party at the QTH of WØEYE. WØEYE holds regular skeds on 2 with New Mexico and South Dakota using 432. WØHEP remains the mainstay of the OBS in Denver. Bulletins are sent on the 10-meter net Sun. at 0855 MST (28.730). ECs awake, prepare for the SET. Be a fink, send me a card naming your club officers so I can run them down. I welcome traffic reports via the traffic nets. KØSPR is a new EC in Pueblo. KØWGC is the new EC for Delta County. We need volunteers to work in HamQUEST 67. Who's game? Traffic: KØDCW 63, KØSPR 25, WØHEP 12, WØSIN 5, KØZSQ 2.

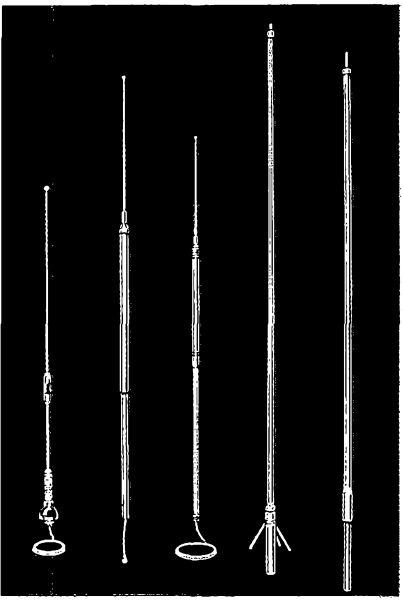
NEW MEXICO—SCM, Bill Farley, WA5FLG—SEC: K5HTT. PAM: WA5MCX. We are sorry to see Tiny and his family leave this area for Texas. W5ROH and his house of hams will be missed. Anyone passing through the Los Alamos area should stop by and get a look at our SEC's operating bench. He says it really helps capture the rare DX. Welcome home to K5ONE, back from his portable operation in the big city. W5WZK had a very unfortunate auto accident and will have to replace the old buggy. If you want to see a real DX antenna go by Roswell and see the beam of W5YFN. It's 35 feet high and six elements. The Olympic Bicycle Races at Albuquerque will be aided in the communications department by the Caravan Club. Have you heard W5ANB with his new s.s.b. gear? WA5FLG has his new f.m. gear on the air and reports good happenings in the 2-meter band. WA5LFX has some new a.m. gear on 2. W5ALL, in Cloudcroft, joined the 2-meter bunch and can work some rare ones with his 9200-ft. antenna. Tourist messages are being handled in Albuquerque by WA5DUH and WA5FJK. These are public service messages which really help to advertise amateur radio. K5-MWV is back from his Colorado DXpdition. Traffic: K5VXJ 56, WA5FLG 32, W5UBW 24, W5DMG 21, K5-ONE 15.

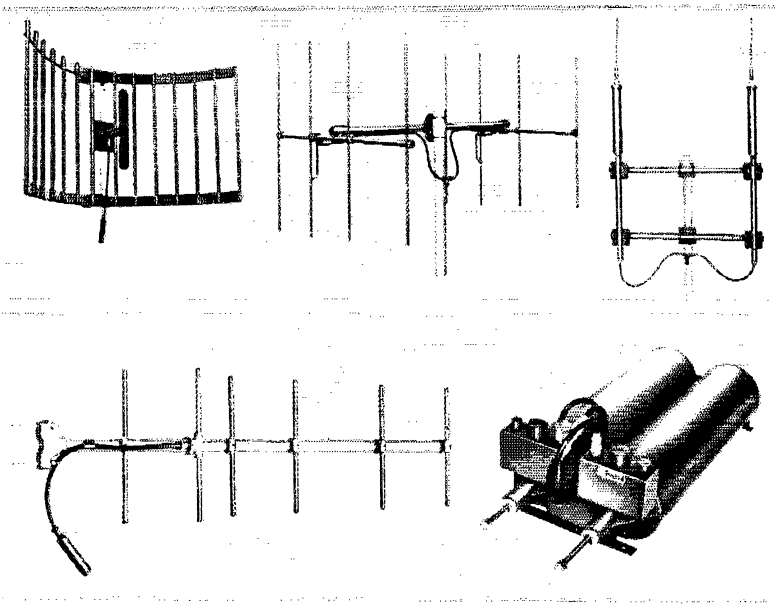
UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7-WKF. RM: W7OCX. Section nets:

BUN	Daily	7272 kc.	1930Z
UARN	Sat.-Sun.	3987.5 kc.	1500Z

As your new SCM, I would like to thank W7MWR/W7-OAD for a job "well done" as Utah SCM. I hope to visit as many Utah clubs as possible in the coming months. New appointments: W7GPN as EC for Weber Co., K7HEN as OES. Volunteers are needed for OBS work, especially on v.h.f. W7OCX reports that TWN moved to 7060 kc. for the summer months. UARN check-ins are picking up after a mid-summer slump. There are now AREC-c.d. nets in Davis, Salt Lake, Utah and Weber Counties on 2 meters. Check with your

If it's used in **Communication** Antenna Systems—it's in this new CPC **Handbook!**





Call or write for your copy today*

Contains complete specifications and technical data on Base Station Antennas, Vehicular Antennas, Coaxial Cable Systems, Duplexers, Mounting Hardware, etc.

The new CPC Antenna Handbook contains a wealth of information of interest to engineers, specifiers and installers of two-way, mobile radio communications. The data is completely indexed for ready reference. All information is based on thorough testing in the laboratory and in the field.

Typical technical data includes: Special Patterns using Standard Antennas, Multiple Corner Arrays, Patterns of Normally Omnidirectional Antennas—side-mounted at various Distances from Several Size Supporting Structures, Horizontal Radiation Patterns of Vehicular Antennas, Additional Attenuation due to Load VSWR, Conversion Chart showing the Relation between DB Loss and Efficiency of Transmission and Reduction of VSWR as a Result of Line Attenuation.

**Please address requests on company letterhead*

Communication Products Company
DIVISION OF
PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

MARLBORO, NEW JERSEY 07746—Telephone (201) 462-1880
LOS ANGELES, CALIFORNIA 90065—Telephone (213) 245-1143

local EC for time and frequency if you would like to participate. Traffic: W7OCX 107.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: W7BHH. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM, K7ZHT, WA7DNZ. Nets: Pony Express, Sun. at 0830 on 3920; YO, Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 3920. K7NQX ran into Murphy's law the first part of Aug.; came upon an accident on the highway and was calling for assistance when the mobile failed. On July 4 the Shy Wy Club furnished communications for the Annual Powder Puff Derby (women's trans-continental air race) with K7YGV as chairman. K7YGW has been appointed deputy base commander of the F. E. Warren Air Base. On Aug. 4 the Cheneene Club hosted Carl Smith, our Division Director, to an open forum meeting. From the comments that have been made it appears that the hamfest was one of the best we have had. Traffic: WA7CLF 30, K7SLM 29, K7ITH 22, W7BHH 14, K7POX 8, K7YPT 6, WA7EDC 3.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gann, W4NML. RM: WA4EXA. PAM: K4WHW. We deeply regret to report K4JSL and K4WNC as Silent Keys. Remember the SET Oct. 8 and 9. Let's keep ole number 1! K4PFM is the new NM AENP. Thanks for a fine job to K4NUW. Nominations for SCM close Oct. 10. I will not be a candidate. July net reports (times in GMT):

Net	*Freq.*	*Time*	*Days*	*Sess.*	*Ave. Tfc.*	*Ave. QNI*
AENB	3575	0100	Daily	30	4.1	5.6
AEND	3725	2400	Daily	28	2.4	7.25
AENH	50.7	0200	Sun./Tue.	9	1.1	18.67
AENM	3965	0030	Daily	31	1.96	35.8
AENO	50.55	0115	T/T/Sat.	13	0.21	14.0
AENP	3.955	1230	Mon.-Sat.	26	1.08	14.3
AENP	3955 (June)		Mon.-Sat.	24	1.5	11.6
AENR	50.52	0115	Wed.-Fri.	8	.25	14.75
AENT	3970	2230	Daily	30	.7	4.8

Sorry that AENP report was omitted last month. K4KJD is home after a second trip to the hospital. Congrats to W4WGI for DXCC & 2XSSB. K4ANB is back in the section with an Extra Class license. New BARC officers are W4GET, WA4MHG, WN4ATY, K4BSK and W4BAI. The HARC is investigating the surplus RTTY distribution plan. Traffic: (July) WØHXB/4 234, WB4BMO 214, WB4APL 130, K4HJX 120, WA4EXA 84, K4AOZ 66, WA4UXC 37, K4BSK 33, K4NUW 30, W4NML 23, WB4ADT 21, K4KJD 15, WA4FYO 14, K4WOP 13, K3WHW 12, WA4EEC 10, WN4BLX 5, WA4HON 5, K4UUC 4, K4NSU 3, WA4WLD 3, W4YRM 3, W4ANB 2, WN4DCR 2, W4DGH 1. (June) K4NUW 80, WA4RES 57, WA4YDQ 18, K4FZQ 1.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5TT—Asst. SCM: Russell E. Oberholtzer, KZ5OB—SEC: KZ5MV. The Canal Zone Amateur Radio Assn. is working on design and rules for a new certificate to be issued by the club; details will be announced when the plans are finalized. New licenses include General Class for KZ5FU and KZ5OP. U.S. Army Security Agency, Southern Command, produced five new novices: KZ5CBN, KZ5DAN, KZ5JRN, KZ5MON, and KZ5RBN. July must have been a restless period on the Atlantic side—KZ5RW, KZ5AD and KZ5SW all moved to a new QTH during the month. KZ5MV was vacationing in Florida, but talking to the gang daily on 15 meters. Traffic: KZ5MV 76, KZ5RW 54, KZ5FN 45, KZ5CD 36, KZ5CT 24.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJH—SEC: W4IYT. RM C.W.: W4LUV. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAMs: W4SDR, W4TUB. V.H.F. PAM: WA4BMC. Cuban c.w. QRM (and phone) on our 3.5-Mc. band can't be avoided. It's legal operation but the wrong time in the skip cycle. Wish there were more c.w. training nets such as the one meeting on 3651 kc. at 7:30 P.M. EST, Mon., Wed. and Fri. at speeds of 10 to 15 w.p.m. The Alachua County Training Net (ACTN) is also in session. Contact WB4CAP for information. Please use the Form 1 with little bits of information; then it will be no chore at all filling this column. Reference traffic reports—average was 65 per month. This month brings 71. We are at present capable of 180 Maximum. Perhaps *you* can tell me how to get more traffic reports. Traffic: (July) WA4SCK 581, W4TUB 541, WA4NEV 430, WB4AIW 387, K4EVY 347, WA4BMC 255, W4FPC 179, W4DFU 159, WA4PDM 158,

ANTENNA BREAKTHROUGH

IN PERFORMANCE, VALUE, QUALITY, PRICE, AVAILABILITY

ALL-BAND VERTICALS

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

"All band vertical?" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

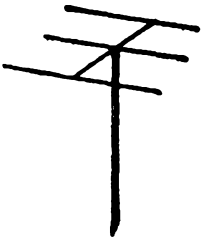
V40 vertical for 40, 20, 15, 10, 6 meters.....$14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters.....$16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters...$18.95

ALSO AVAILABLE AT
AIREX RADIO CORP., NEW YORK CITY
CANADA — ON REQUEST

BEAMS

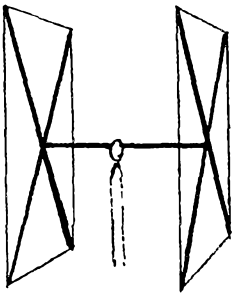


Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 7/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$16	7 El 10	$32*
3 El 20	22*	8 El 10	36*
4 El 20	32*	4 El 6	15
2 El 15	12	5 El 6	20*
3 El 15	16	6 El 6	24*
4 El 15	25*	7 El 6	26*
5 El 15	28*	8 El 6	28*
4 El 10	18	9 El 6	30*
5 El 10	24*	10 El 6	32*
6 El 10	28*		

* 20' boom

QUADS



NEW! NEW! NEW! CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you! Now check these startling prices — note that they are *much lower* than even the bamboo-type:

TWENTY METER CUBICAL QUAD	$25.00
FIFTEEN METER CUBICAL QUAD	24.00
10-15-20 CUBICAL QUAD	35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00

(all use single coax feedline)

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATEY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

W4LUV 118, WA4RQR 115, WA4FGH 90, K4BNE 82, WB4AJV 79, WA4DEL 71, W4EHW 71, K4BY 70, W4AKB 68, W4SDR 68, W4BKC 66, W4FP 66, W4NUH 60, W4AKB 59, WA4PWF 56, WA4CIQ 51, WA4IDH 51, W4VDC 51, W4OGX 50, WA4YIH 41, K4SJH 39, W4GUJ 37, W4NGR 35, K4DAX 34, WA4NBE 34, WB4CAP 33, W4ILE 28, K4KDN 27, W4VPQ 27, K4EBE 22, WA4IVE 22, WA4OHO 22, WA4BGW 21, K4ILB 21, W4TJM 18, W4KRC 17, K4COO 16, K4ENW 16, W4IYT 16, W4SMK 16, W4HFR 14, K4LPS 14, WA4IJH 12, W4MVB 12, W4TQL 12, WN4CBM 9, W4DVO 8, W4LDM 8, K4MTP 8, W4RRB 7, K4IEX/4 6, K4FQP 5, W4LMT 2, WA4WVC 1. (June) WA4WZD 44, WB4AJV 42, WA4HDH 42, K4LPS 17, W4QBY 13, WA4WVC 12, WA4IJH 2. (May) WA4PDM 68.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAMs: K4PKK, WA4JSU, W4KR, WA4WDE. WB4APC now is DL5KS. W4CZN is vacationing in N.C. W4LRR is using stacked big wheels for 2-meter net activity. K4NFP finished the college quarter with an academic A average. W4FQX is on 40 with a doublet and Swan 350. WB4BDG passes on c.w. since he disposed of his kever. WA4HYW was active in the CD Party as well as Minn. and Ind. QSO Parties. WA4UYT will return to Rome. W1IIK/4 now is W4HBS. K4YZE now is all solid state on 2 meters. Jim is air mobile in the new C-182 on a.m. and s.s.b. W4YE has a new TR-4 for mobile and operated in the CD Party. WA4GAY is QRT with receiver problems. Traffic: W4RZL 148, W4FOE 140, W4CZN 126, WB4BDG 119, W4PIM 112, WA4JSU 89, W4HYW 48, K4NFP 46, W4DDY 43, K4FLR 40, WA4WDE 33, WA4UYT 22, WA4LLI 20, K4BVD 19, K4BAI 18, WA4JES 16, W4HBS 14, WA4OVS 8, K4YZE 8, W4FQX 7, W4YE 4, WA4FUN 3, WA4GAY 3, W2TPV/4 3, WA4BVD 2.

WEST INDIES—SCM, Albert R. Crumley, Jr., KP4DV—KP4DJ and KP4AT moved into their new homes, and suddenly found they were only two houses apart! KP4WT is actively engaged in telephone relaying for South American and Dominican Republic students. KP4AXN graduated from college at Mayaguez. KP4AAK is Doctor Guillermos Rios, now practicing in Ponce. KP4BRT moved from Guayanilla to Ponce. KP4AST, the son of KP4ES, obtained his General Class ticket. KP4BQC has scheduled moving to Texas. KP4BJM, Doctor Ollona, is a c.w. DXer. Arecibo is well represented by KP4RE who finally bought a s.s.b. rig., along with KP4RA, who works c.w. and a.m. KV4AA, Dick Spenceley in Saint Thomas, V.I., recently was heard in San Juan at night on 20-meter c.w. "long-skip." The distance is only 75 miles. KP4DV resigned as editor of the PRARC's *Ground Wave*. The bulletin will appear monthly in Spanish, put out by the Board of Directors. Traffic: KP4WT 283.

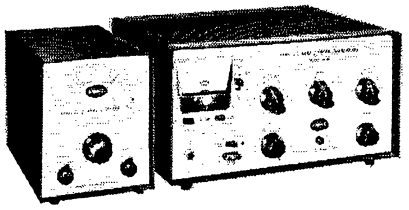
WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: WA4FIJ. RM: W4BVE. Tallahassee: The TARC changed its meeting date to the 1st Wed. of each month. Cypress: W4KCA moved to a new home. Blountstown: K4NML is back on the air, mostly on c.w. Chipley: WA4ZIM. Tech. Class, is active on 2 meters with HW-30 and a sixteen-element beam 40 feet up. W4IKB has submitted the county RACES plan for approval. Panama City: WA4FIJ is the first known U.S. ham with permission to operate portable in Italy. K4LQE is active on 75 meters from St. Joe Beach with an SBE-33. Fort Walton/Eglin AFB: The EARS will serve as a QSL bureau for incoming cards for local hams. QSL to Box 1773, Eglin AFB, Fla., 32542. The EARS also is conducting code and theory classes Mon. and Thurs. 7-9 p.m. WA4EVU and WA4WAX are on 2-meter RTTY, using a.f.s.k. Pensacola: WN4CZG is a new ticket holder. W4DAO had all his ham gear stolen. The Gulf Power Co. honored W4FHQ on his retirement. Traffic: (July) K4VFY 154, WA4KOO 101, K4BSS/4 77, W4BVE 52, W4IKB 43, WA4JIM 11. (June) K4BDF 55. (May) K4BDF 45.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7CAF. RM: K7NHL. The Scottsdale Amateur Radio Club's officers are W7FXT, pres.; K7YAM, vice-pres.; K7OYE, secy.; K7ZQI, treas. W5EZQ/7, going RTTY, has a new Bell teletypewriter and accessory gear. OES K7NII has worked 20 states on 2 meters. An Armed Forces Day certificate was earned by W7FKK on c.w. The 1966 Fort Tuthill Hamfest was enjoyed by 200 amateurs. W7CAF won the 75-meter transmitter hunt and K7GHS located the 6-meter transmitter first. Prize winners at the hamfest were W7KOY, W7WGW, K7PRS, WA7BVU, K7JTT, K7HGZ, K4ROK, WA7DSW, K7SUZ and K7LPB. All those holding appointments are reminded to check the expiration date on their certificates and return them to the SCM for

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 1½ meter transmitter.

Because it uses a transistorized oscillator circuit, 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

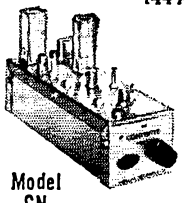
In response to the demand for an inexpensive compact VHF transmitter, Ameco has brought out its new 2 and 6 meter transmitter. It is easy to tune because all circuits up to the final are broadbanded. There is no other transmitter like it on the market!

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

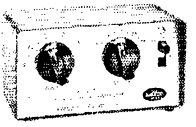
NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE



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**

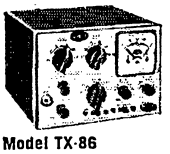
ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS



MODEL PCL, Wired, **$24.95**
MODEL PCLP, with built-in power-supply, wired, **$32.95**

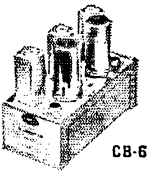
2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "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-10 Ameco equipment at all leading ham distributors.

AMECO EQUIPMENT CORP.
Div. of Aerotron, Inc.
178 HERRICKS RD., MINEOLA, L. I., N. Y. 11501

endorsement if more than a year has elapsed. Your SCM is about to clean out the "deadwood" so please return those certificates if you wish to retain your appointment. If you do not already hold an appointment and are interested, write your SCM. W7SDU has increased his DX totals. Keep those Form 1s coming in. If you need more, contact your SCM. Traffic: K7NHL 140, W7FKK 17.

FIRST CALIFORNIA QSO PARTY

October 15-16

Rules: 1) The contest runs from 2200 GMT Saturday, October 15 until 2200 GMT Sunday, October 16. 2) Use all bands, c.w. and phone. The same stations may be worked and counted for a point on each band mode. 3) California stations score one point for each contact, including contacts with other California stations. All others score one point for each California contact only. 4) California stations multiply total QSO points by the total number of different states, Canadian provinces and foreign countries worked. All others use California counties as the multiplier. 5) California stations send QSO number, RS(T) and county. All others send QSO number, RS(T) and state, province or country. 6) Suggested frequencies are 1910 3550 3725 3900 7075 7175 7220 14075 14300 21075 21125 21300 28075 and 28700 kc. 7) The top 25 entries in California will be awarded certificates. In addition, a certificate will go to the top three scorers from each state and province and the top scorer in each country. The top five Novices will also receive awards. 8) Logs must show dates, times, stations worked, exchanges, bands, mode and total claimed score. They must be postmarked by November 10, 1966 and sent to Mr. Tom Frenaye, WB6KIL, 617 Purdue Drive, Claremont, Calif. 91711. (Enclose an s.a.s.e. for scoring results.)

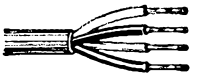
LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: W. R. Calkins, W1KUX/6. RMs: W6BHG, WB6BBO, W6QAE. PAMs: K6MDD, W6MLZ, W6ORS. BPLers for July are K6EPT, W6WPF, WB6BBO, K6MDD, K6IOV, W6MLF and W6TXJ, all contributors to a very nice section total of 11,288. W6GYH still is on vacation in the eastern part of the U.S. otherwise he would be in the BPL listing. SCS voted to combine its net operations with the National Traffic System. K6MDD reports EBN handled 714 pieces of traffic in July. K6IOV is busy with USO traffic relay. W6TXJ was elected asst. net mgr. of EBN. W6QAE put up an 80-meter dipole to replace the vertical for better groundwave. WB6QXY is busy with liaison relay of USO traffic. WA6TYR is vacationing in Eastern Canada. K6IWV reports her OM K6YDJ still is under the doctor's care. WA6WPX is getting teletype equipment in operation. K6ASK listens to SCN. W6BMZ/6's 2-meter transceiver is almost finished. WB6GGL reports working on a new tower and antenna for 2 meters. W6CXC reports that W6SZU and his XYL sailed June 10 on a 4-month freighter trip around Africa and will be M/M on the voyage with a Swan 350. WB6KIL has a new tower. You may be hearing W6AM/VE7. K6KUQ is busy helping newcomers, scheduling several for Novice and Technician Class tests. K6EA, vacationing in Bemidji, Minn., reports WØMFW made 2272 points in the Minnesota QSO Party. WB6RWF is experimenting with 473-million-Mc. communication equipment using amplitude modulation via laser light. WA6WJT reports the West Los Angeles AREC Net inactive for the summer. WA6YKP is putting up a 2-meter antenna and soon will have a 100-watt rig going. W6BTV/6 just moved from Duarte to Rouland Heights, operating h.f. bands only. *Support your section level nets:* The Eight Ball Net (EBN) Mon. through Fri. at 1615Z and Tue. through Sat. at 0230Z on 50,500 kc.; the Southern California Net (SCN) daily at 0300Z on 3600 kc. Traffic: (July) K6EPT 2903, W6WPF 2681, WB6BBO 1037, K6MDD 820, K6IOV 646, W6MLF 634, W6TXJ 504, W6QAE 425, WB6QXY 381, WA6TYR 225, W6BTV 155, WA6WKF 112, WA6KZI 99, WB6BBH 89, W6FD 86, K6IWV 72, WA6WPX 60, K6ASK 52, WB6GXI 51, W6BHG 47, K6LJ 34, W6BMZ/6 28, WB6AEL 27, WA6TWS 23, WB6GGL 18, WB6KGK 14, W6HUJ 10, W6DGH 9, K6CDW 7, W6USY 7, W6CXC 6, WB6KIL 6, W6AM 4, WB6DQX 3, W6QJW 3, K6KUQ 2, WB6MQF 2, W6ORS 2, W6PCP 2, WB6TMC 2. (June) W6BTV/6 14.

ORANGE—SCM, Roy R. Maxson, W6DEY—K6MCA has a new five-element beam for help on Vietnam and other skeds. WB6JFO reports the SoCalSix Net for July had 62 sessions, QNI 709, 410 messages, 210 visitors. The net is now NTS. Leo J. Bennett, pres. of the Mission

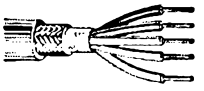
better sent... better received

with Belden wire and cable

...easy to use packaged lengths.

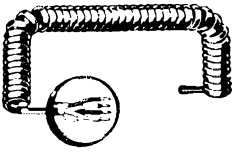


Antenna Rotor Cables
Sturdy, flexible, plastic insulated cable for rotor applications. Color coded. Chrome, vinyl plastic jacket resists sun and aging.



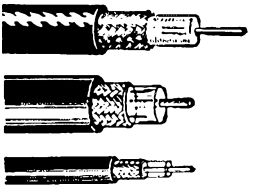
Power Supply Cables
Excellent mechanical and electrical characteristics for long service life. Special jacket offers maximum resistance to abrasion and ozone. Use as power supply cords and interconnecting cables. Ideal for remote control circuits, special press-to-talk microphone circuits, and other applications.

Shielded Hook-Up and Grid Wire
Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available from 24 AWG to 12 AWG.

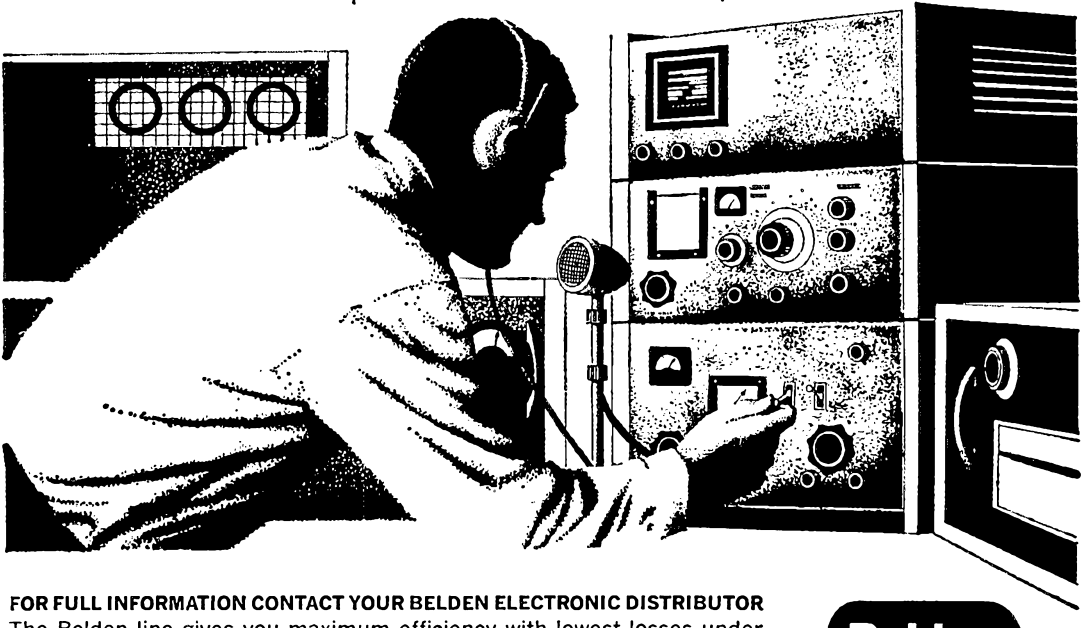


Coiled Microphone Cable
Provides low impedance for mobile microphone applications. Neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.

Ham Transmission Lines—Parallel Type
Uniform quality control provides uniform impedance. Brown polyethylene for best weather resistance and lowest losses.



Ham Transmission Lines—RG/U Type
Designed for lowest losses, longer service life, and maximum dependability. Cables are essentially flat with no peaks in attenuation to reduce signal on either high or low frequencies.



FOR FULL INFORMATION CONTACT YOUR BELDEN ELECTRONIC DISTRIBUTOR

The Belden line gives you maximum efficiency with lowest losses under all conditions of operation. There's a Belden wire or cable to meet every ham transmitting and receiving need. Shown here is only a small portion of this complete line.

8-7-6

Belden

BELDEN MANUFACTURING COMPANY • P. O. BOX 5070-A, CHICAGO, ILLINOIS 60680

Trail Net, furnishes a report as follows: QNI 1139, messages 244, relay 57, cont 218, QST 16. A nice bulletin was received from SCN, thanks to Mgr, K6IME. BPL was made by K6MICA, W6ZJB, WA6OQM and WB6JFO. K6HVC runs a KW Johnson to a folded dipole all bands and to a three-element tri-band beam. W7SMB/6 sent 12 OO notices in June. W6BAM is busy looking through the junk-box for parts to give younger hams. WB6LCO plans higher power. WA6ROF's traffic is down as he has been East on business. WA6UBP, W6TON and XYLs and W6DEY/W6PJU mobiled in a caravan to Washington visiting W7HO, ex-W6PM. Traffic: K6MCA 2000, W6ZJB 1666, WB6JFO 462, WA6OQM 158, K6HVC 146, WA6ROF 140, K6IME 103, WB6ODU 44, W6WRJ 27, WB6LCO 23, WB6NGE 23, KØYVN/6 21, WB6ODW 14, WA6TAG 3.

SAN DIEGO—SCM, Don Stansifer, W6LRU/WA6-VUI—My special thanks again to Asst. SCM W6EWU, who kept me posted during my vacation. WA6NYU joined the Silent Keys. WA6TWF is Net Control for the 10-meter ARPSC on 29.5 Mc. The San Diego V.H.F. Club celebrated its fifth anniversary in August. W6-EWU and XYL motored through the Midwest. W6-VNQ, ORS/OO in Solana Beach, has now replaced WB6-JUH, ORS/RM Imperial Beach, as Pacific Area Net Manager. WB6JUH has gone overseas. The Palomar Radio Club held its Annual Picnic at Live Oak Park in Fallbrook in late July. W6GJC is now in Hawaii. K6ROR again is active after rig troubles. W6YKF and XYL WZ6EVU visited SCM W6LRU/WA6VUI in the High Seirra during the summer, as did WB6GMM. Traffic: (July) K6BPI 17,590, WB6JUH 798, W6VNQ 616, W6EOT 446, W6BGF 202, WB6GMM 20. (June) W6IAB 363.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN—SEC: WB6NDP. RM: W7WST/6. An interesting TVI problem has been reported in Thousand Oaks. The owner of an old TV set is complaining that he can hear his next door neighbor (a 6-meter buff) on channel 1. W6ORW has acquired a model 14 TTY. The Ventura Co. ARC has a club project consisting of the conversion of a quantity of small 2-meter f.m. units. W6DYQ is an active OBS. Look for him each evening at 8 P.M. on 3695 kc. The Satellite ARC was very much pleased to have Lew McCoy, from Hq., address the group. Two new amateurs in Thousand Oaks are WN6SVM and WB6MFF. A report of success and problems during Field Day was received from the Estero ARC via WB6SBH. W6CVU has a new KWM-2. The Simi Valley ARC set up a communications center during the recent Pioneer Days and drew much attention. New appointment: K6GV, Simi Valley EC. Canceled: W6OXJ and WA6KCM (both ORS and OBS). Traffic: W6ORW 7.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. The months of July and August seem to be the worst months to get any news on what is going on in the ham kingdom. Hot weather and vacations take their toll of activities. Because of time needed for editing and printing, this report will not appear until the October issue so if the news you have submitted does not appear in the next issue don't give up, it will come up soon. I receive reports after every FMT and judging from some of the measurements I receive it seems that more hams are qualified for appointment as 1st-class OO than apply for the appointment. Here are a few making measurements with an average error of 6.9 to 24.8 parts per million: W5ARV, W5BKH, W5-CVL, W5DZ, W5MSG, W5NUS, W5OGZ, W5PCW and W5RBL. Most of these amateurs do not use professional equipment for their measurements unless you call the old reliable BC-221 and the 100-kc. oscillator professional. We welcome to the Northern Texas section WA5KHE and WA5KIV. Ken Sr. and Ken Jr. are from Louisiana and will live in Dallas. Ken Sr. holds OPS and V.H.F. PAM appointments and Ken Jr. holds ORS appointment and they will be appointed in this section as soon as paper work is completed. We note from the *Telephone Times* (sent by K5WZT) that Les Harbin, W5BNG (SCM) has just had 40 years with SW Bell. Congrats! Traffic: WA5AGH 143, K2IEU/5 7, W5MSG2.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5DLP. RM: W5-QMJ. PAM-75: WA5BTQ. Our thanks to W5NML for taking on the job as net manager for SSZ. Congratulations to K5RJI and his YF on the arrival of a son, David Curtis, July 16. K5OOV has taken over as editor of the Electron

the ULTIMATE in sophisticated amateur equipment

THE DAVCO DR-30 COMMUNICATIONS RECEIVER

FEATURES:

• Complete ham-band coverage 80-10 meters and portion of 6 meters • Standard-equipment 9.5-10.5 Mc band provides WWV and 31 meter SWL band • Three position selectivity for optimum fidelity and QRM rejection • Crystal-controlled BFO; separate AM and Product detectors; AF and RF gain controls • Full AGC with selectable decay time; S-Meter; illuminated dial • Flywheel tuning drive with high-ratio split gears; direct calibration on all bands • Tunable rejection notch filter; extremely effective noise limiter • Transmitter type VFO; crystal controlled first oscillator; built in crystal calibrator • Low power consumption, permitting 12V battery operation when desired; AC supply available • Full transistorization, diode selectivity switching, plug-in module construction, highest quality components • Rugged, stable extruded aluminum chassis for extreme stability; textured grey metal cabinet; FULLY GUARANTEED.

Compact, high performance, all solid-state receiver for amateur applications featuring FIELD-EFFECT TRANSISTORS

Developed especially for the sophisticated amateur who knows enough to demand the finest. The DAVCO DR-30 is amateur-designed and professionally engineered to provide exceptional performance under extreme environmental conditions and combines advanced design with simplicity of operation. It provides all the latest state-of-the-art techniques in an ultra-compact unit (just 4"h x 7-1/8"w x 6"d). Every DAVCO DR-30 is hand-crafted, inspected on the line during production no less than 60 times and put through rigorous final testing before serial number and warranty are awarded. The DR-30 utilizes Field-Effect Transistors in RF stages to assure greater sensitivity, superior image rejection and unbelievable freedom from cross-modulation or strong-signal overloading. You'll dig out the weak ones with ease, even when the ham down the block is on with his KW. Today's crowded bands demand DAVCO DR-30 performance. Ask the ham who is using one now, check the many plus features included at no extra cost and you'll discover why Davco is the leader in providing amateurs with the most advanced in solid-state electronics.

DAVCO DR-30 RECEIVER $389.50

For further information and illustrated brochure, write:

DAVCO ELECTRONICS, Inc. P.O. Box 2677, 2024 S. Monroe St. • Tallahassee, Fla. 32304

Benders Club paper. The Bartlesville Amateur Radio Club has got five of its members working on 2 meters with the mobile t.m. unit. W5BTZ, W5JRK and W5MKW are all proud owners of TR-4s. W5OXX has his new Galaxy 300 on also. K5OXE has been working 20 and 15 meters with his new Swan 350. W5WAX received confirmation from KL7FAV that they made contact on 6 meters using A-1 emission. K5IQL has worked W3RUE and W8KAY on 2-meter s.s.b. during Sporadic "E" to the northeast. W5PML, net mgr. for OPEN, has been getting good reports with his new NCX-3. We are happy to announce that WA5KZA has taken on the EC job for Pawnee County. Traffic: K5TEY 901, W5QMJ 130, W5FEC 24, W5FKL 19, W5UZX 16, K5LMG 11, W5EHC 6, WA5MDN 6, W5FFW 2, K5OCX 2.

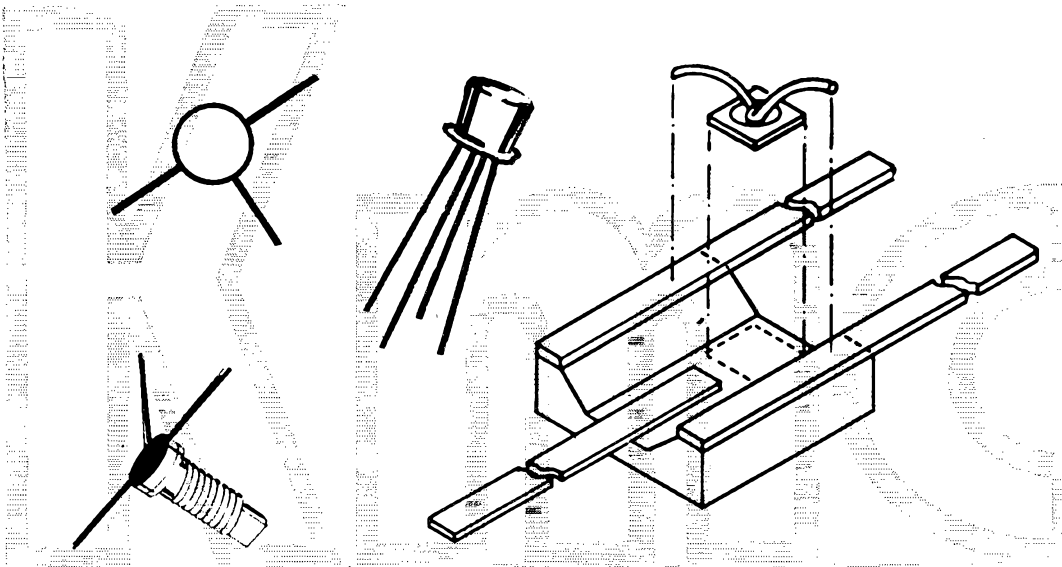
SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5ZPD. RM: K5ANS. WA5BUI, aboard the USS *Cadmus*, sends a nice letter advising that WA5OSA/MM, aboard the USS *Semmes* and WA5BUI will be separated from the Navy and have great plans to push 2 meters when they return to Brenham. K5HZR reports a fine meeting of the Texas V.H.F./F.M. Society was held in Austin July 24. WA5IOO is the proud owner of a new TR-4. EC K5HMF reports new officers of the Brazoria County ARC are K5VIX, pres.; WA5IOO, vice-pres.; WA5MHD, secy.-treas. PAM W5ZPD reports that W5NHB is now s.s.b. with a KWS-1 and WA5MDB with a Swan 350. W5EKP says a week in Kerrville resulted in many pleasant contacts and he was amazed at the extremely low noise level there. WA5AUA and his XYL have been giving the yard a lot of attention which has greatly curtailed amateur operations, as reported in the *W5VS Bulletin* from Corpus Christi. Section Net certificates went to the following stations for their excellent work in the 7290 Traffic Net: K5FPJ, W5HYG, W5KBP, WA5LNV, K5PNC, WA5NAO, W5VW, W5ZIN, WA5BEU and K5RGT. WA5AUZ reports traffic was slow in July. With vacations over and everyone getting back in the swing things should start picking up. There are about 175 on 2 meters in the Houston area. Traffic: WA5AUZ 288, K5HZR 114, W5BGE 111, W5NRJ 23, W5ABQ 14, W5HWY 11, K5HMF 6, W5TFW 2.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM APN: VE6ADS. PAM SSBN: VE6ALQ. ECs: VE6SA, VE6SS, VE6AFJ, VE6HB, VE6XO, VE6XC, VE6AFQ. ORS: VE6BR. OPSs: VE6HM, VE6SS, VE6BA, VE6ADS. OOs: VE6HM, VE6NX, VE6TY, VE6AKV. OBSs: VE6HM, VE6AIF. OES: VE6DB. Our SEC reports that the AREC is preparing for the Oct. Test and the Boy Scout Jamboree; also that he is impressed with our new EC for the south, VE6AFQ. The south should look forward to some fine mock tests. OOs report that infractions are few and far between these days. VE6FS is a proud grandfather. VE6JI is having quite a hard time these days with his XYL in the hospital so long. VE6AO is having a good rest after a long illness. VE6YZ is improving very slowly. Had a short visit from VE8SL who said that he had to get back to the north country. He left his XYL in the Cardston Hospital and she will follow in a month or two. Somebody forgot to send in the traffic count this month. Traffic: VE6FK 69, VE6TG 7.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB —The Okanagan International Hamfest held in the State of Washington was well attended by both sides. VE7XW, VE7AQW and VE7AGF found the hidden transmitters. The 1967 International Hamfest will be hosted by the Penticton ARC and this being Canada's 100th birthday it should be a hamfest to attend. VE7XW's XL-500 was stolen and smashed the same week end. VE7UF has spent some time in the hospital. VE7BLO is in the hospital with a broken leg; fell out of his wheelchair. VE7BGJ has been plagued with transmitters blowing up in his face for his July entertainment. North and West ARC supplied communication for the community parade and then was invited to the president's house for refreshments. VE7AKA had a reason, his tower is now in a vertical position. VE7BQB is busy building gear for the winter activity. VE7AOI had a short stay in the hospital. VE8ER, ex-VE7ER, was in town; also VE2BYU, VE4XA, VE7APH, who is in Montreal and looking for the day to return to B.C. VE7GR is now s.s.b. and a real DX hound. VE7DH, active on 2 and 75, reports nothing exciting happening in the Hub City. BCEN reports a lack of check-ins. Traffic: VE7BHH 250, VE7ASY 84, VE7QQ 22, VE7DH 13, VE7SE 10, VE7AEG 7, VE7BOQ 4, VE7BQB 1.

MANITOBA—SCM, John Thomas Stacey, VE4JT—VE4EP has been transferred to Ottawa and hopes to be



For MILITARY and COMMERCIAL SYSTEMS - the lowest noise silicon transistors available thru 2 KMC

- Low noise VHF - UHF Silicon Transistors
- Tunnel Diodes thru 50 Gc
- MOS/FET Low-noise UHF amplifiers

for further information, write on Company letterhead to:

BILL ASHBY, K2TKN

Kmc semiconductor corporation

PARKER ROAD, LONG VALLEY, NEW JERSEY (201) 876-3811

signing a VE3 call shortly. VE4HI is back in Winnipeg. VE4UJ is sporting an s.s.b. exciter for 6 meters. From all reports the hamfest at the International Peace Gardens was very well attended. We are pleased to report that VE4QD is out of the hospital and back on his favorite band, 75 phone. Your SCM is looking for a PAM (v.h.f.) and could also use an additional QO. If anyone can fill these positions please drop me a line. Station reports are very sparse this month. Each station is urged to forward a monthly activity report. It might be old hat to you but your reports will make this column interesting. Holidays and propagation have taken their toll on the traffic nets. The phone net held 12 sessions with QNI 93 and QTC 3. The c.w. net had 31 sessions with QNI 103 and QTC 68. Both nets solicit your support. Traffic: VE4JT 53, VE4QX 43, VE4EI 39, VE4NE 20, VE4GN 6.

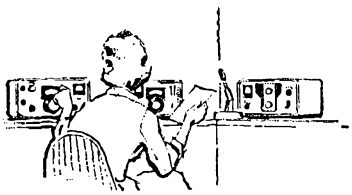
MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCM: A. E. W. Street, VE1EK, and R. P. Thorne, VO1EI. SEC: VE1MJ. The section was saddened to hear of the recent passing of VE1ACL. All join with me in extending deepest sympathy to the family. VE1YU reports the handling of emergency traffic for the RCMP VE1KK/mobile at the scene of a serious accident in northern New Brunswick. New calls for the Bathurst area include VE1ABO and VE1ATX (Beresford). VE1-AFC is moving to the VE2 district (New Richmond). VE3BZB (ex-VE1BK) was a recent visitor to the Halifax area and asks for more VE1 representation on the ECN, 3540 kc. 0040 GMT daily. While on the subject of nets, VE1AAX asks for additional participation in the APN (Atlantic Province), 3653 kc, 2300 GMT daily. VE1s VC, ADH and AMC have been on a DXpedition to FP8. VO1AL is moving to Lewisport. Members of the SONRA recently held a successful Ham-an-anny at Nova Park. Newly-elected officers of the NBARA include VE1FN, pres.; VE1BY, vice-pres.; VE1AGE, treas.; VE1IZ, secy.; VE1AYL, asst. secy.; WA4-TUH/VO1 and WA1EJM/VO1 are departing Newfoundland. Traffic: VE1OM 26, VE1ABS 24, VE1AAX 12.

ONTARIO—SCM, Richard W. Roberts, VE3NG—To all of you who gave me your support in my reelection as SCM, I wish to thank you very, very much. The satisfaction that one receives in knowing that the majority is behind him is very gratifying. I regret to announce that VE3BKB and VE3ART are Silent Keys. VE3HW is active again after three serious operations. VE3NG and Marge, VE3DZA, were in eyeball QSO with W1MPN, SCM of Vermont, when in walked VE3-CDX and VE3ASO. From all reports the S.S.B. Picnic near Guelph held by the Chicken Junct. Net was a huge success. VE3YC, says the Trans-Canada Canoe Races will be reported via AREC next year. VE3CGP has returned from the land of the cod wallopers. VE3FCK was in P.Q. with an HW12/c; likewise VE3NG was portable in W2-W1-VE1-Land. The Sudbury ARC is now in with EMO and is working up a fine winter program. The Scarboro ARC will have a station at the Exhibition Show in Toronto with the call VE3WE. Your SCM requests that you check the date of expiration of your appointments. Otherwise he will be forced to cancel after notification to you. Send your certificate to him. Traffic: (July VE3BII 117, VE3NG 105, VE3DPO 98, VE3ATI 75, VE3CYR 73, VE3DBG 69, VE3GCE 63, VE3DGB 58, VE3HW 46, VE3FGU 36, VE3DVE 28, VE3HW 27, VE3NO 22, VE3AUU 18, VE3TT 16, VE3-AFA 14, VE3BUR 14, VE3DU 13, VE3AWE 7, VE3BTV 7, VE3EBC 5. (June) VE3AVE 40, VE3GCE 40.

QUEBEC—SCM, Jim W. Ibey, VE2OJ—SEC: VE2-ABV, RM: VE2DR. The RAQI Convention at Chicoutimi was a well-managed affair. A preliminary to a trans-Canada canoe race, as part of "EXPO 67", staged from Montreal to N.Y.C. in mid-August, had amateur radio communications from the press boat. Despite vacation time and warm weather OQN and ECN have been well attended. VE2ATL is now in Brossard with a new rig. You can contact the St. Maurice Valley gang on 144.1 Mc. at 2330Z. VE2AOL was the key man at St. Maurice Valley club station VE2MO during Field Day. VE2AJG is very active on 80 meters and VE2AGI/MM tests his operating ability from his yacht. VE2BLM is now heard from St. Remi du Lac-du-Sables. VE2BRT and brother VE2BRD/VE2 have done a fine job translating some operating aids to French. When VE2UQ, a confirmed 160-meter DX man, was asked why he was on 80 his reply was "I'm v.h.f.-ing." VE2BAI, the new EC for Chicoutimi, has a well-equipped v.h.f. setup. VE7APU/VE2, who kept Great Whale on Hudson's Bay on the map for two years, has now departed for VE7-Land with nine acres on a mountain top for an antenna farm. We regret the passing of VE2AVK on July 9. Traffic: VE2RLL 123, VE2DR 104, VE2OJ 70, VE2AGQ 59, VE2EC 35, VE2BRD/2 27, VE3AUU 19, VE2ALE 17, VE2BWL 14, VE2AJD 12, VE2BRT 5, VE2NT 5, VE2BXW 3, VE2AZQ 2, VE2DCJ 1.

QST

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 OCTOBER

51J4	$795	EICO 730	$ 37	RANGER II	$139	HO10 SCOPE	$ 47
75S3	429	EICO 753 AC SUP.	149	KNIGHT VFO	32	HG10VFO	29
75S3B	495	OLSON 6	79	KG221 152-174MC.	32	VF1 VFO	17
32S3	495	SR5	69	MORROW MBR5 CONV	27	UT1 SUPPLY	20
516F2 AC	84	S95 152-174MC	29	HQ100C	117	HP10 DC SUPPLY	22
30L1	419	S120	39	HQ110C	127	DOW TR SWITCH	6
312B4	129	SX71	117	HQ180	259	SWR BRIDGE & MTR	12
SM2 MIKE	24	SX99	79	HC10 CONV	47	100KX XTAL CALL.	9
DRAKE 1A	117	SX111	147	GONSET GR211	47	RF Z ANT. BRIDGE	14
DRAKE 2B	199	SX130	139	SUPER 12 CONV	29	R46B SPEAKER	7
2B SPEAKER	14	SX140	77	MONITONE	19	KNIGHT VTVM	17
DRAKE TR3	389	SR160	219	ELMAC PMR7	47	P&H DD1 SCOPE W/ tone oscillator	47
DRAKE TR4	519	HT40	57	NCX5	399	TRIPLETT 3414	37
DRAKE R4	289	HT44	239	NC155	119	HICKOK 820 VTVM tube,trans ckr.	27
DRAKE R4A	349	PS150-120AC	89	NC300	139	HEATH A111 AMP.	27
SWAN 240	199	PS150-12DC	77	HROSOTIR & COILS	139	FISHER FM90X TNR	69
SWAN 350	349	B&W LPA1 LINEAR	99	HEATH HR10	67	HAMMARLUND SPKRS	7
SBE 34	339	CHALLENGER	57	GR54	37	24 HOUR CLOCK	8
SB2LA LINEAR	209	MOBILE VFO	17	SENECA	169		
CLEGG 99ER	77	TR SWITCH	19	DX60	67		

ALSO IN STOCK EICO NATIONAL HAMMARLUND CDR ROTATORS AND MANY MORE. WRITE FOR COMPLETE LISTINGS & PRICES

10% DOWN WILL START A BUDGET TIME PAYMENT

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.

TELEPHONE

(312)-771-8616

TRIGGER Attn: W9IVJ — Q1066
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)

97.73 — or Bust

(Continued from page 54)

power-supply bleeder resistor. If this resistor has burned out, the power supply will not be sufficiently loaded under key-up conditions, and the difference in B+ voltage between key up and key down may be sufficient to introduce chirp. Unsolder one end of the bleeder and check it with an ohmmeter. If the power-supply filter uses a resistor instead of a choke, unsolder it and check its value.

An additional cause of trouble is crystals that just seem to be "chirpers." Some of them genuinely are, but most chirp only when the transmitter is improperly tuned. Many novice-type transmitters contain only the bare minimum of components and adjustments to put a reasonably clean signal on the air (and some not even that). Failure to tune them properly leads promptly to trouble. *Listen to your signal.*

Many "economy" model ham transmitters do not use voltage regulator tubes to control the oscillator plate and screen voltages, and do not compensate for this deficiency in other ways. The frequency instability deficiency problem is enhanced by the lack of buffer stages. Some of these transmitters chirp when they are new, and will continue to chirp until the oscillator voltages are stabilized. Adding a VR tube is a very easy job, requires very few parts, takes up less than one square inch of chassis space, and makes a dandy little project for the hordes of novices (and OTs) with chirping transmitters on 40 meters. Even allowing for the purchase of a chassis punch to make a socket hole, the total cost of this little project is less than $5. It is highly recommended. See the ARRL *Handbook* (under power supplies) or the Editors and Engineers *Handbook* for the technical details.

Key Clicks

There are two kinds of key clicks. The first, called "r.f. clicks," are caused by the small spark at the key contacts, and are not radiated via the antenna. They are only heard a short distance away, and do not ordinarily cause troubles on the band. If the transmitter and receiver must both operate simultaneously in the same vicinity (as when you are monitoring yourself), this click is easily eliminated by a simple filter.

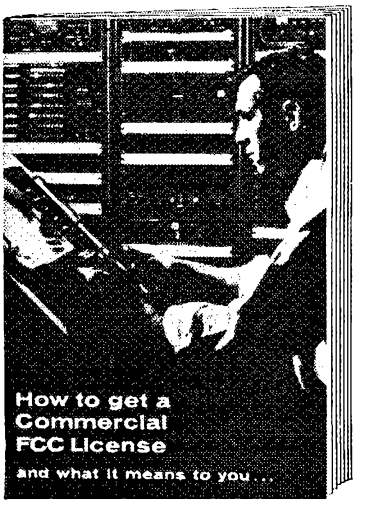
The other kind of key clicks (forbidden by section 97.73) is caused by improper shaping of the c.w. pulse. If the rise and fall times of the pulses are too short, clicks are sent ringing up and down the band causing interference to other stations both in and out of the amateur bands. Since the ARRL *Handbook* contains a complete chapter on the symptoms and cures for this problem (titled "Keying and Break-In") you are referred directly to it. Nuff said.

(Part II of this article will appear in a subsequent issue.) QST

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

Want a high-pay career in Electronics?

This free book may change your life



It tells how to go about getting the key to job success in the growing electronics boom—a Government FCC License

THERE'S A BIG BOOM IN ELECTRONICS. And YOU can be part of it. You don't need a college education or any previous experience in electronics. The free book shown here tells you how.

In the last 15 years, the electronics manufacturing industry alone has grown from $2.7 billion to $17 billion, and is expected to hit $24 billion by 1970.

Thousands of trained men are urgently needed to help design, manufacture, inspect, test, install, operate, and service electronics marvels that are making headlines. If you qualify, it means a secure, steady high-pay job with a real future to it.

Maybe you'd like to become a broadcast engineer... put famous radio disc jockeys and television entertainers "on the air." Or be your own boss servicing some of the more than a *million* two-way mobile radio systems in taxis, trucks, trains, etc. Or work alongside famous scientists developing and testing such electronics miracles as picture-frame TV, desk-top computers, pea-sized hearing aids, rocket guidance and control systems.

Regardless of which you choose, the secret of "getting your foot in the door" is getting a Government FCC (Federal Communications Commission) License. It's government-certified *proof,* respected by employers everywhere, that you have passed a standard Federal exam on the fundamentals of electronics – that you're not just an electronics handyman, but a real "pro." Many jobs legally require it.

Now, because of the importance of getting your FCC License, Cleveland Institute of Electronics has prepared a valuable 24-page book telling you how to go about it.

NEWS FOR VETERANS:

New G. I. Bill may entitle you to Government-paid tuition for CIE courses if you had active duty in the Armed Forces after Jan. 31, 1955. Check box in coupon for complete information.

You will find out why the Commercial FCC License is often called the "passport to success." You'll see how and why the Government issues these licenses. You'll learn how you can get your license . . . and qualify for top opportunities in Electronics.

With this book, you will receive a second free book, "How To Succeed In Electronics." It's the catalog of the Cleveland Institute of Electronics . . . first organization to offer an FCC License Warranty. (CIE will refund all of your tuition if you don't pass the FCC exam . . . on your first try . . . after completing the course designed to prepare you for it.) You will learn why better than 9 out of 10 men with CIE training get their FCC Licenses, even though 2 out of 3 without this training fail.

To receive both books without cost or obligation, just mail the coupon below. If coupon has been removed, write to: Cleveland Institute of Electronics, 1776 East 17th Street, Dept. QT-48, Cleveland, Ohio 44114. Do it now—it may change your whole life.

MAIL COUPON FOR 2 FREE BOOKS

CIE Cleveland Institute of Electronics
1776 East 17th Street, Cleveland, Ohio 44114

Please send me, without cost or obligation, your 24-page book, "How To Get A Commercial FCC License," together with your school catalog, "How To Succeed In Electronics," of license-preparation courses.

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

Occupation _____ Age _____

☐ Veterans check here for GI Bill information.

Accredited Member National Home Study Council
A Leader in Electronics Training ... Since 1934 QT-48

Station Design for DX

(Continued from page 60)

Ward's and neighborhood urban hardware stores generally go only to $\frac{3}{8}$ inch sizes, and are cheaply made. For example, a $\frac{3}{8}$ inch eyebolt, of the kind having a formed, unwelded eye, if used at the top of the vertical plank mentioned above, could easily unwind and drop the load on the ham below at the boat winch. Where does one get better hardware? Try industrial suppliers, such as McMaster-Carr Supply Co., 2828 North Paulina Street, P.O. Box 4355, Chicago, Illinois 60680.

An item not as widely known amongst amateurs as it should be is the screw anchor. This is a long rod with eye at one end and an auger plate at the other, by which it is screwed into the ground. A common size is the Hubbard 7526 or Chance 6346, 66 inches long, $\frac{3}{4}$ inch rod, 6 inch blade, which sells for about $5.00. Fully screwed into good soil, these withstand 4500-pound pull. Many varieties are made: swamp anchors with blades 15 inches in diameter; rock anchors, etc. A well-stocked supplier is Graybar, with warehouses in most U. S. cities. Graybar also has excellent ground-rods — not as cheap as you see in radio stores — but better. Typical sizes are Hubbard 9438, $\frac{5}{8}$ inch in diameter $\times$ 8 feet, or Hubbard 9450, $\frac{3}{4}$ inch $\times$ 10 feet. They even make one (No. 9697) 1 inch in diameter $\times$ 40 feet long. Graybar also stocks clips, clamps, thimbles, arming bolts, eyebolts, shackles, etc.

If the terms used above, and others such as: "gin pole," "tag line," and "come-along" are unfamiliar, some preliminary reading or talking with persons having experience in rigging, is desirable prior to undertaking a major antenna project. Alternatively, there are people who, for a fee, will take the problems off your hands.

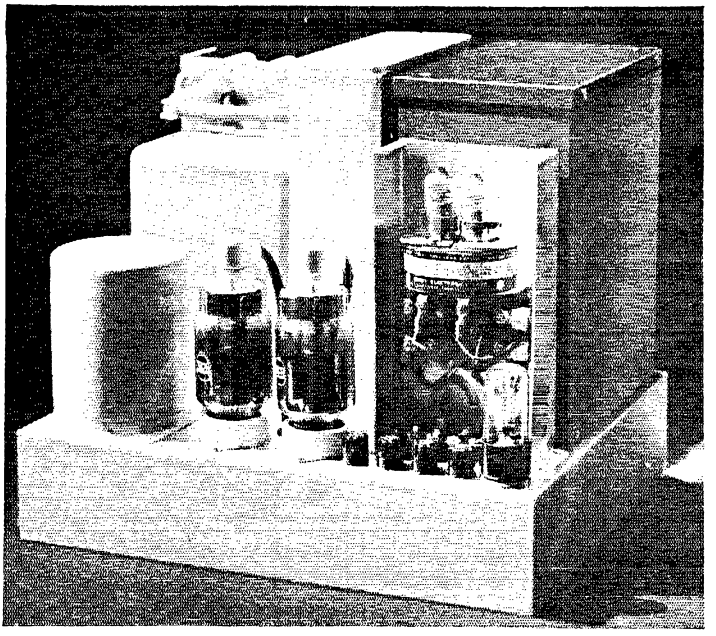
Rescue squads or fire departments which accept public contributions, can be helpful in raising antennas to the top of, say 60, foot towers or poles. A local amateur made a $25.00 contribution (tax deductible?) and found willing and effective cooperation.

Raising a tower with a crane can be dangerous, though it is common procedure commercially. A 130 foot, 24 inch tower was once being raised with a 60-foot crane by wiring the tower base to its concrete foundation, and picking up the tower by attaching the crane hook below the tower center. The base temporary wires failed. The tower base whipped sidewise and killed a rigger instantly.

Locally, the most experienced ham riggers, W3MSK and W3GRF, prefer to assemble towers such as the AB-105 vertically in place by carrying up pieces, bolting them on, climbing up to the next level, etc., using a light gin pole and ground helpers to pull up materials as required.

The reason why self-supported high towers are rare compared to guyed towers, is that they cost several times as much. QST

(The next instalment will appear in an early issue.)



The 2-K linear means HEAVY DUTY

In two short years the 2-K has become synonymous with high quality, heavy duty performance in the amateur radio service.

The 2-K breezes effortlessly at the legal limit in any mode . . . SSB, CW, AM, or FSK. It is 175 compact pounds of pure communication.

The power supply symbolizes the 2-K's all around ruggedness. Notice the high reliability mercury power relay, the brute of a power transformer, the magnificent 20 mfd oil-filter condenser, the 800 milliampere cased filter choke. No other amateur service linear comes within a country mile of using such high cost, high quality components.

Is this power supply the reason the big, clean signals you hear on the air are 2-K signals? It's one! We invite you to discover the others yourself. Write today for complete information. **The 2-K console or desk model $675.00 RF unit only $425.00**

6% FINANCE CHARGE • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models. 15 day trial. 90 day Warranty. 90 day trade back on NEW apparatus. Write for bulletin.

TED HENRY (W6UOU) **BOB HENRY** (WØARA) **WALT HENRY** (W6NRV)

Henry Radio Stores

CALL DIRECT . . . USE AREA CODE

Butler 1, Missouri, 64730	816 679-3127
11240 W. Olympic, Los Angeles, Calif., 90064	213.477-6701
931 N. Euclid, Anaheim, Calif., 92801	714 772-9200
6116 N. 27th Ave., Phoenix, Ariz., 85017	602 AM 4-3895

"Worlds Largest Distributors of Short Wave Receivers"

Silent Keys

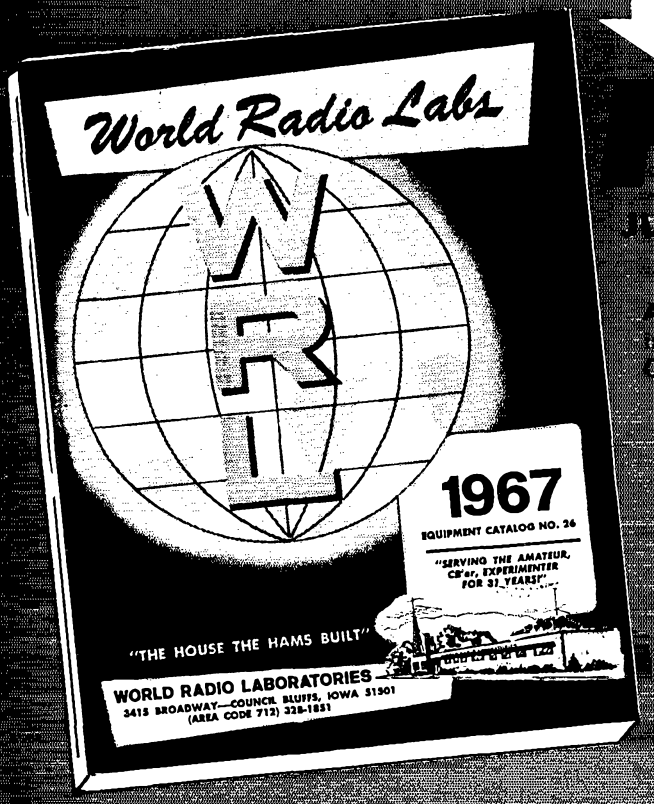
It is with deep regret that we record the passing of these amateurs:

W1AEB, Arthur W. Flint, South Yarmouth, Mass.
W1BBN, Warren W. Anthony, Portsmouth, R. I.
W1CBB, George L. DuBois, Manchester, N. H.
W1QZO, Harry H. Warner, Wollaston, Mass.
W2ATK, Harold L. Van Pelt, Rahway, N. J.
W2CFR, Lardner R. Kerr, Trenton, N. J.
W2GIB, Clarence H. Pennington, Madison, N. J.
W2LP, Lawrence J. Dunn, Garden City, N. Y.
WA2OWN, Kenneth L. Brunneman, Endicott, N. Y.
W2PYS, Frank A. Zugner, Bronx, N. Y.
W2QAV, Wilbur C. Miller, Rochester, N. Y.
W2RUH, Sherman A. Dennis, Elizabeth, N. J.
WA2STD, George Breckheimer, Parish, N. Y.
K3BIB, Robert H. Dunham, New Albany, Pa.
W3FVK, Norman P. Stephan, Hampstead, Md.
W3SGK, Ralph D. Sharp, Glenolden, Pa.
WA4AGB, William F. Grigg, Jr., Richmond, Va.
W4BTV, Gilbert L. Faw, Albemarle, N. C.
W4CVY, Jack Adams, Columbus, Georgia
K4JSL, Ernest M. Veal, Decatur, Alabama
K4MYZ, Harry L. Eisen, North Miami Beach, Fla.
K4PJJ, Walter L. Rives, Fort Lauderdale, Fla.
W4QD, Louis C. Goldich, Atlanta, Georgia
K4QDO, John Sawyer, Spring Hope, N. C.
K4UCL, Sven Hokanson, Tavernier, Fla.
K4WNC, French H. Craddock, Jr., Sylacauga, Ala.
W4YLY, Herman J. Johnson, Lynn Haven, Fla.
K5BAT, John W. Watkins, Manchester, Okla.
W5BZH, Archie L. Compton, Henryetta, Okla.
K5GLB, John B. Trottmann, Oklahoma City, Okla.
W5GYS, Walter D. Baer, Gallup, N. M.
W5SP, William O. Ansley, Abilene, Texas
W5VB, Hallet E. Worthington, Houston, Texas
K5ZKJ, Joseph Franz, Austin, Texas
W6CHN, ex-W7HCS, George E. Minich, Clearlake Highlands, Cal.
WB6CPQ, Warren T. Dodge, Napa, Cal.
W6DYX, Frank J. Ostman, Santa Barbara, Cal.
W6MU, A. Houston Barnett, Beverly Hills, Cal.
W6MYH, Harry M. Baker, Burbank, California
WA6NYU, Wildon J. Seber, San Diego, Cal.
K6ODY, Foster Suits, Long Beach, Cal.
K6OFS, Raymond Rivers, Duarte, Cal.
K6SWB, Milton S. Futterman, Arcadia, Cal.
W6ZRI, Donald Schwab, Kentfield, Cal.
W7HDQ, Claud R. Brand, Salt Lake City, Utah
W7HRU, Walter C. Puryear, Moses Lake, Wash.
W7OUT, Norin O. Holman, Salem, Oregon
W8CQD, Horace C. Dolph, Grand Rapids, Mich.
W8CSQ, Donald M. Jewell, Sebring, Ohio
K8DPO, Charles S. Baker, Port Huron, Mich.
W8FSM, Frank Wagner, Massillon, Ohio
WA8HWD, Frederick N. Gossman, Weston, Ohio
K8HWJ, Douglas J. Scheick, Toledo, Ohio
W8INU, James A. Long, Canton, Ohio
W8NKH, Robert B. Bolden, Sr., Willowick, Ohio
W9DCU, Alva B. VanAlstine, Menomonee Falls, Wisconsin
W9FEH, E. J. Gerard, Kokomo, Indiana
W9LKL, Robert E. Blair, Springfield, Ill.
K9RLG, Emmett Hall, Shipman, Ill.
W9VNW, Rex Maupin Winnetka, Ill.
KØBAT, Edward R. Roser III, Leavenworth, Kan.
WØDDM, Edgar F. Perceival, Hillside, Colorado
WØHVW, Gilbert A. Burr, Pleasant Hill, Mo.
WAØIFR, Carl O. Brunsvold, Fargo, N. D.
WØMXC, Charles M. Bove, Minneapolis, Minn.
WØNDM, Lewis A. Shell, La Junta, Colo.
G2OS, J. M. Ostens, Newcastle-on-Tyne, Northd., England
LU4ABZ, Luis M. Tambussi. Buenos Aires, Argentina
VE1ACL, D. V. Moser, Charlottetown, P.E.I.
VE3ART, Percy G. Ryerse, Port Dover, Ont.
VE3EID, Lawrence Dukes, Sudbury, Ont.

(*Continued on next page*)

Just off the Press!

1967 CATALOG OF BARGAINS—



FREE!

JUST MAIL IN COUPON!

ALL NEW . . . 100 pages of exciting equipment and accessories. Completely illustrated.

- The most complete catalog for Hams and CB'ers ever put together.
- Detailed illustrations. Complete specifications. Save at World Radio Lab's amazing low prices!
- See selected best buys on Radios, Recorders, etc.
- Special purchases for Electronic Builders.
- Buy anything in the catalog on our easy, monthly credit plan.

. . . from WRL — the largest and most personalized Radio Supply House in the World. 35 employed hams to assist you with your amateur needs.

"The House the HAMS Built"

Wm. J. Meyerson
W9CPO
President

CLIP AND MAIL THIS COUPON FOR YOUR COPY

WORLD RADIO LABORATORIES QST-10L
3415 West Broadway
Council Bluffs, Iowa 51501

Gentlemen:
Please rush me my FREE 1967 WRL Catalog.

Name_____

Address_____

City_____ State_____ Zip_____

(*Continued from page 158*)

VK3XD, Richard Dowling, Montmorency, Victoria, Australia
ZS5AM, Allan G. Matthew, Pietermaritzburg, Natal, Republic of South Africa
ZS6WS, Tom Creed, Springs, TVL, South Africa
601MT, Mauro Tessieri, Mogadiscio, Somali Rep.

Because of the need for accuracy in our "Silent Keys" listing, please send all notices to the ARRL and include both name and call of the deceased.

Simulated Emergency Test

(*Continued from page 83*)

extremes is a good compromise between publicity and valid test.

Your cue, if you are an AREC member, is to check with your local EC and find out what's being planned. Check with him even if you aren't an AREC member; it's time you signed up, and he'll be looking for new members.

RACES Role

This will be the first year that RACES will be participating officially as a part of ARPSC; however, RACES has always been a factor in the SET. This first year we are asking all RACES radio officers (ROs) to use the same reporting form as ECs and follow roughly the same procedures. Meanwhile, we are trying to get mailing lists of radio officers from c.d. sources, federal and state. As of the present writing only six states have responded affirmatively (one has "passed" until next year), but we hope to get more lists before the deadline for SET Bulletin mailing.

If you are an amateur active in RACES, *your* cue is to contact your RO about the SET. It may be that he has not heard about it, in which case we would be glad to mail him a copy of the bulletin should he wish to conduct an ARPSC SET taking advantage of the option to do so after the official weekend mentioned above.

NTS Role

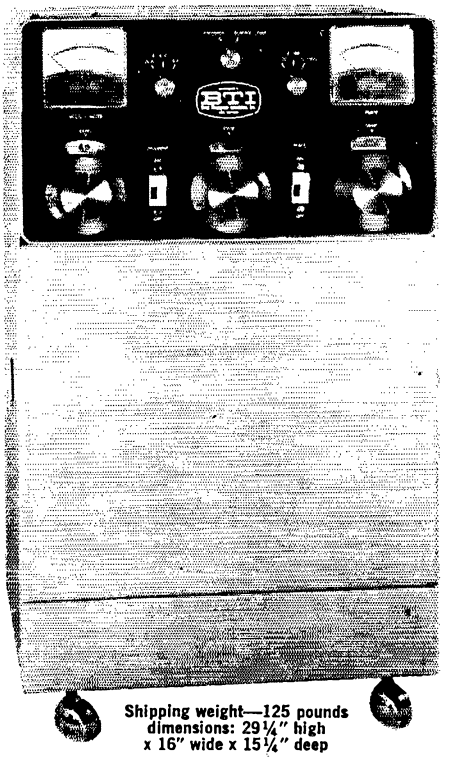
The National Traffic System this year is attempting to set up a standard procedure which will apply in all emergencies in which NTS goes into emergency operation. Further details are given in the NTS subhead in the ARPSC column in this issue. If you are an NTSer, we suggest you read it carefully. Even if you are not an NTSer, you may derive some benefit from having an idea how NTS will operate Oct. 8–9.

Casual Amateur Role

If you are a casual amateur who has nothing against public service but just wants to work somebody, you can be of most help by avoiding those frequencies on which SET work is being conducted. We couldn't begin to give you a list of these frequencies (other than the NCEFs listed below) because there will be a lot of them,

HOW WOULD YOU DESIGN A NEW ADVANCED LINEAR?

THIS IS HOW BTI DID IT . . .



Shipping weight—125 pounds
dimensions: 29¼" high
x 16" wide x 15¼" deep

At least twenty-one important and advanced features built-in the brand new

BTI LINEAR AMPLIFIER

MODEL LK-2000

YOU'RE THE EXPERT—CHECK FOR YOURSELF

■ 1. Designed for maximum legal input all modes. 2000 watts PEP SSB—1000 watts CW-AM-RTTY. ■ 2. Full 1000 watts plate dissipation using Eimac 3-1000Z. ■ 3. New tank circuit design provides greater output on higher frequencies including 10 meters. ■ 4. High Reliability Solid State Power Supply using Computer Grade capacitors for continuous duty. ■ 5. Instant transmit—no warm up—accomplished by BTI Solid State Supply and use of thoriated tungsten filament in 3-1000Z. ■ 6. Longer tube life because of exclusive after off cooling. ■ 7. A.L.C. output provides higher audio level without flat topping. ■ 8. Tuned cathode input for minimum distortion and higher efficiency (50 ohm inp.). ■ 9. Choice of Line Voltages—220V AC @ 10 amps or 115V AC @ 20 amps (Solid State Supply permits efficient 115 VAC operation). ■ 10. Metered relative R. F. watts output to antenna. ■ 11. Built in metering and switching for Dummy Load accessory which when attached provides dummy load for linear or exciter. ■ 12. Meter overload protection. ■ 13. Changeover relay feeds exciter direct to antenna when linear is off. ■ 14. All relays have D.C. coils for hum free operation. ■ 15. Safety switch and shorting bars for personal safety and component protection. ■ 16. High voltage overload circuit breakers. ■ 17. Fused filament and control supplies using lighted fuse indicators. ■ 18. Distinguished console (TVI preventive) design (29" H x 16" W x 14¾" D.) ■ 19. No exposed high voltage in lower console. ■ 20. Precision console casters for easy mobility. ■ 21. Grounded grid, zero-bias linear operation.

BRAD THOMPSON INDUSTRIES, long recognized for innovation in the electronics field, realized the need for a quality linear amplifier which would offer more features with reliable and rugged construction, at a price within practical limits.

Well-engineered, foolproof, simple operation, reasonably priced, fully guaranteed, the B. T. I Linear Amplifier provides the signal impact you've been wanting.

WRITE, WIRE, PHONE:
MISSION HAM SUPPLIES
3316 Main Street
Riverside, California

B. T. I. (Amateur Division)
83-810 Tamarisk Street—P.O. Box CCCC
Indio, California 92201

$795
COMPLETE READY TO GO!

(Continued from page 160)

and we don't know which ones will be used and which won't. We suggest you "play it by ear," and if someone should ask you to move off, to do so graciously. This is asking a lot, but we all have to make some sacrifices in the interest of public service through amateur radio.

Even better, why not plan to be a part of it, instead of an innocent bystander? Contact your EC. If you don't know who he is, contact your Section emergency coordinator (SEC), listed on page 160. You'll be glad you did when you feel the satisfaction you get out of public service operating. — *W1NJM.*

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for July Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	198	8696	8411	285	17590
W3CUL	249	1726	1331	374	3680
K6EPT	3	1450	1207	243	2903
W6WPF	69	1306	1268	38	2881
W6ZJB	14	826	809	17	1666
W7BA	5	815	721	88	1629
W4LEV	188	691	584	107	1570
W6RSY	87	626	498	105	1316
W1PEX	91	528	474	50	1143
K7TCY	11	550	510	39	1110
K9ONK	31	522	514	4	1071
WB6BBO	39	514	469	15	1037
W0LCX	4	463	462	5	934
K5TEV	4	523	372	2	901
K6MIDD	20	400	300	100	820
WB6JUH	24	387	355	32	798
W8UPH	21	381	329	50	781
K9IVG	32	435	316	1	774
W7HMA	21	372	370	2	765
W0LGG	13	369	334	14	730
WA9CCP	288	244	192	5	729
W3EML	34	402	283	7	726
W6ADB	5	342	303	39	689
WA6WNG/WB6CRC	37	319	277	22	655
K6IOV	2	371	233	40	646
W6MLF	4	312	303	15	634
W3VR	51	299	271	8	827
WA8CEJ	75	288	244	14	821
W6VNQ	9	309	298	0	616
K9GSY	38	332	272	0	582
WA4SCK	21	300	257	3	581
W6IDY	2	273	255	42	572
WA9IAW	22	272	262	10	566
W4TUB	3	269	266	3	541
K8LNE	9	277	246	4	536
WA2UPC	28	216	208	23	505
W6TXJ	385	67	8	44	504
WB2FUW	39	232	208	23	502
Late Reports:					
K91VG (June)	30	392	257	3	682
WA2UZK (June)	15	313	295	16	639
WA9MIO (June)	18	254	219	16	507

More-Than-One-Operator Stations

K6MCA	88	956	948	8	2000

BPL for 100 or more *originations-plus deliveries*

K4EVY 231	WA4PDM 128	WA3ATQ 106
WA4BMC 226	W8EGB 127	WA0JKT 105
WA4HJM 202	WA9GJU 123	WA0GSA/1 104
W6UZX 171	WA4TJS 116	WB6JFO 102
VE7BHH 161	WA6OQM 116	Late Report:
WA4NEV 155	WB6PCQ 116	WA2ASM/MM
	W6DEF 114	(June) 110

More-Than-One-Operator Stations

Late Report:

W6IAB (June) 271

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: WA3ATQ, WB4AIW, WA4DYL, WA4WWT, WA6OQM, WA8HVR, K9WMP.

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.

NEW FROM ALLIED knight-kit® 6 and 2-Meter Transceiver Kits

Knight-Kit 6-Meter Transceiver Kit

New top-performing Ham rig with many extras. Covers 50-52 mc and 49.980 MARS. Solid-state universal power supply for 12 VDC mobile and 110-130 VAC. Noise-canceling push-to-talk mike. 3-stage transmitter has doubler, tripler and straight-through final. Selective dual-conversion receiver. Illuminated "S" Meter/Output Meter. Complete with all parts, wire, solder, and easy step-by-step instructions. **$139.95**

Knight-Kit 2-Meter Transceiver Kit

Compact and versatile Ham transceiver for General, Technician, or Novice class. Covers 144-148 mc. Built-in solid-state universal power supply. Dual-conversion receiver has spectacular 1.0 micro volt sensitivity. Factory-aligned crystal-controlled RF and mixer subassembly simplifies construction. AVC action prevents blasting. Noise-canceling push-to-talk mike. Complete with all parts, wire, solder and step-by-step instructions. **$144.95**

Read the unique money-back guarantee . . . exclusive in the industry . . . then rush coupon below for full details and Special Introductory Offer on 6 and 2 Meter Transceivers.

VFO KIT. Calibrated for 6 and 2 meters. Features Clapp Oscillator. Takes power from transceiver. B+ switch and indicator light. Complete with all parts, wire, solder, instructions for **$19.95**

KNIGHT-KIT GUARANTEE

Build a Knight-Kit in accordance with our easy-to-follow instructions. When you have completely assembled the kit, you must be satisfied or we will return your money, less transportation charges, under the Allied guarantee of satisfaction. **ALLIED RADIO**

ALLIED RADIO, Knight-Kit., Dept. 13-KK
P. O. Box 4398, Chicago, Ill. 60680

Send me full details and Special Introductory Offer on **Knight-Kit 6 and 2-Meter Transceiver Kits.**

Name_____
PLEASE PRINT
Address_____
City_____ State_____ Zip_____

GBA

(Continued from page 55)

WA6XXX/3 happens to bump into a member of the MDD Net he will never know his buddy sent him regards.

The saddest of all these GBA messages are those to servicemen overseas with the APO number missing in the address. MARS will not accept messages that lack this very necessary number. To omit it is very much the same as omitting the city on a letter. It doesn't matter how many numbers, letter groups, rank, Bn, Div, Reg, there are in the address; if that APO number, or ZIP number is lacking some service man won't get a message from his family.

There isn't a thing the traffic system can do about it. Once a message starts on its way, on the section net, it cannot be stopped until it reaches the terminal station for delivery. The result is, of course, delay. In cases where time element is vital in delivery, it means almost certain cancellation rather than a refile of a text, now stale. But a far graver result is an adverse picture of amateur radio's public service facilities by implying, through carelessness on the originating station's part, an inefficiency that does not exist. This carelessness is really too much eagerness on the part of the originator to be a good friend, and to rush the message off even though the neighbor doesn't "quite remember all the address, but anyhow their name is Johnson and they live in Pasadena, California." Rather than say "Well, call me when you get home, and give me the full address," or, "I can't send this without a complete address any more than the post office or Western Union could," off it goes — and back it comes "GBA."

There is a simple formula to remember for those who really want to hear their neighbor or friend say "The Meyerses got my message, and had a real party for us when we arrived," or Carolyn to know that the gang back home are sharing her big moment, or WA6XXX to enjoy his snapper soup more because his friends wish him well. It is a familiar statement that is used at every club meeting. After the secretary finishes reading the minutes of the last meeting, before they can be accepted as clubs records, the president asks, "Are there any corrections or omissions? If not, the minutes stand approved as read."

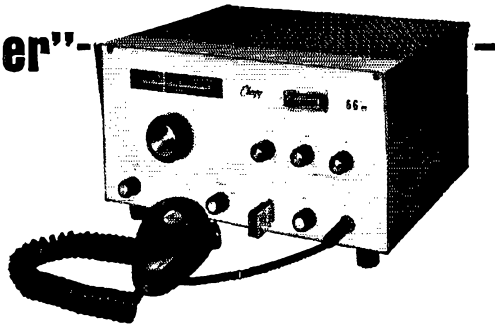
Try it as a yardstick on the next origination, and make that red circle date of "Utopia" come for the traffic fraternity. QST

—•••—

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

this is the new Clegg "66'er"

plenty of power, fixed or mobile operation—all the features you'd want in a top quality, 6-meter transceiver.



Just look at what you get in this compact, high-power, ultra-sensitive successor to the famed 99'er.

SUPERSENSITIVE RECEIVER • Dual conversion design with sharp 8 KC selectivity for freedom from birdies, tweets and spurious signals. • S Meter doubles as tuneup meter for transmitter. • Full 49.9 to 52.1 mc coverage for accurate dial readout—excellent band spread. • Sharp cut-off, adjustable squelch. • Excellent AGC performance. • RF stage provides optimum usable noise figure—freedom from cross modulation and overload. 0.5 uv sensitivity captures weakest signals. • 2 watts audio output with internal speaker. Provision for external speaker. • Effective automatic noise limiter.

POWERFUL TRANSMITTER • High efficiency, 22 watt final amplifier, driven by straight-through amplifier for low-low harmonic output. • Dual self-contained, solid-state power supply for both 115 VAC or 12 VDC operation. • Push-to-talk with provisions to automatically switch Apollo Linear and external VFO. • Broadband, multi-tuned exciter stages for rapid QSY and freedom from spurious outputs—no TVI problems! • High level modulation with speech clipping for top talk power. • Transmitter frequency spotting switch. • Operated with 8.3/12.5/25 mc crystals.
Ideal for MARS, CAP. Wide variety of accessories for CD application. See the Clegg "66'er" today. $249.95. Microphone $10.50. Squires-Sanders, Inc., Martinsville Road, Millington, N. J. 07946.

Squires Sanders

ELECTRONICS TECHNICIAN

Have you an interest in Industrial Electronic Instrumentation? You may be our man. Some experience desired but not essential. Excellent fringe benefits including tuition refund plan.

Call or Write Personnel Director

J. P. STEVENS and CO., INC.
Central Research Laboratory

141 Lanza Ave., Garfield, New Jersey 07026
Tel: (201)-772-7100

An Equal Opportunity Employer

$12.95 W2AU FOUR PURPOSE BALUN $12.95

BALANCE YOUR ANTENNA • STOP YOUR COAX FROM RADIATING • HELP ELIMINATE TVI • IMPROVE YOUR RADIATION PATTERN PLUS F/B RATIO

• Broad-banded 3-32 mc. • Center hang-up hook for inverted Vees • Handles full legal power, 2KW PEP • Built-in lightning arrester • SO239 RF connector for coax transmission feed line eliminates center insulator • Withstands up to 600 lb antenna pull • For use with all type antennas fed with unbalanced coax line • Weighs only 6½ oz. 1½ diam. 6" long • 2 Models: 1:1 matches 50 or 75 ohm unbalanced coax to 50 or 75 antenna load. 4:1 matches 50 or 75 ohm unbalanced coax to 200 or 300 ohm.

• W2AU Super Vinyl jacketed 2 element 10-15-20 meter quad. Complete quad $64.95
• W2AU Super-Fiberglas 2 element 10-15-20 meter quad. Complete quad $99.95

UNADILLA RADIATION PRODUCTS
UNADILLA NEW YORK

★★★★★★★★★★★★

TRIPLE EEE

IN THE
SPACE CITY OF
HOUSTON

Offers all leading brands of New Equipment including Collins, Swan, Drake, Hallicrafters, Galaxy, Hy-Gain, Mosley, etc. Also Real Bargains on Used Equipment. Lease Purchase Plan.

BEST TRADES • LONGEST TERMS

See

STEVE WILSON, WA5JTD • BOB DOUGLAS, W5GEL

Amateur Headquarters For South Texas

ELECTRONIC EQUIPMENT & ENGINEERING CO.

2606 Westheimer • Houston, Tex. 77006
Tel: (713) JA 4-2558

Yagi *vs.* Quad

(*Continued from page 21*)

On the other hand, the Yagi is much stronger structurally and mechanically. The Yagi was comparatively easy to assemble and raise. Constructing and installing a 4-element quad is like trying to handle a crowd of romantic octopuses. During periods of high winds the Yagi seems much more stable and less inclined to shake itself apart or to tear the telephone pole out by the roots.

During the tests I had lightning strike. At the time of the stroke, both antennas were grounded at the station through a Waters Protax coaxial switch.[2] The Yagi, with its grounded boom, suffered no damage. The quad driven element was burned and cut in two and a small amount of damage was done in the station.

In summary, after three months of playing with the two antennas, I have found that neither is overwhelmingly superior to the other. I know I have two good antennas since they both perform well at my location. For the average U.S. contact or during QSOs of 2000–6000 miles, my antennas seem to run about neck and neck. The quad has demonstrated to me an advantage on the long-haul contacts that makes a difference in pile ups; however, this was not true in every instance. I have also learned that the quad must be carefully tuned at the actual site of operation to acquire this advantage.

I still have a lot of playing to do. I am now trying to figure out some easy way of tying the two antennas together and possibly feeding them in phase to see what happens; to date I have come up with no simple system of phasing two antennas 150 feet apart and at the same height. I would welcome any ideas on this score.

I also have a V beam aimed east and west. While I did learn that this antenna outperformed a tribander, I haven't yet gotten around to comparing it with my quad or Yagi on 20 meters. I also want to compare a Yagi "Christmas tree" against a triband quad; this I intend to do during the next few months.

I'm still not sure which antenna I will finally keep. Only when someone notices an ad in the back of *QST* listing an antenna for sale will it become obvious which antenna I have selected as the best for my particular station. However, I'll probably wind up keeping the antenna that succeeds in riding out the Tennessee summer thunderstorm season! QST

[2] Protax switches are not designed to protect equipment from a direct lightning stroke — *Editor.*

Field Effect Transistors

(*Continued from page 19*)

the calibration resistors.

These two circuits were furnished by Don Wollesen and Walter Birks of the Applications Engineering Group at Motorola Semiconductor Products Division.

This article has provided a basic look into the FET and some of its applications. In general, the FET offers much improved noise performance, stability, and cross-modulation resistance over either vacuum tubes or standard transistors (p-n-p, n-p-n). Its many features, such as high input impedance and desirable high-frequency performance, insure its design into a vast number of electronic circuits in the near future. It is probably the most recent radical improvement in device design, and should prove most interesting to amateur radio operators everywhere, allowing them greatly improved freedom in circuit design. QST

Coming Conventions

(*Continued from page 95*)

Amateur Radio Council. An informal get-together is planned Friday at 7 P.M. in the Occidental Hotel, to be followed by a tour of the nearby Grand Haven Musical Fountain (billed as the largest musical electronic fountain in the world).

The Saturday program, to begin at 9 A.M., will include a v.h.f. talk by ARRL Assistant Technical Editor Doug De Maw, W1CER/W8IHHS; special XYL activities; MARS meetings; technical sessions on solid state, lasers, amateur TV, Project Oscar RTTY, mobile antennas and operating techniques: "World Travels of the Ham Operator"; and a swap shop. Of special interest will be an address by ARRL President Robert W. Denniston, WØNWX. Also featured will be the Amateur Radio Public Service Corps, with meetings involving AREC, NTS, RACES and all phases of traffic and net operation. Interested conventioneers are encouraged to bring ice skates, as the Arena will offer skating facilities.

W8ZHO/8 will operate on 3995 kc., as well as on 6 and 2 meters, to handle last minute requests for accommodations or information. Free parking permits will be available.

Registration is $2.00 in advance, $2.25 at the door. For hotel reservations, tickets or more information, write H. E. "Hank" Riekels, WA8GVK, Chairman, P.O. Box 691, Muskegon 49443.

Gimmicks & Gadgets

(*Continued from page 22*)

2½ inches in diameter by 2¼ inches high), using rubber gaskets between the bases of the posts and the lid. The resistive load is soldered to the tips of the binding posts. A relief valve, made from a 4-40 bolt and nut, 2 washers, and a small spring, is installed on the lid to provide a safety outlet in case the load becomes too hot.

The completed assembly is pressed into place on the main body of the can after the container has been filled with transformer oil. Mineral oil was found to be a good substitute. Use only enough oil to completely cover the resistors and the copper disks.

Other values of resistance can be made up for working with different antenna impedances. By using 6 resistors in the configuration shown, the reactance should remain low. — *WICER*

Building Your Own Arrays

(*Continued from page 37*)

York area stations, and W8WEN, Alliance, Ohio, was worked three tries in a row, without a pre-arranged schedule. Such weak-signal tropo scatter work is perhaps the ultimate test of 2-meter antenna effectiveness. You just don't do it with inferior antennas.

The two arrays are mounted as shown in Fig. 1, with the 50-Mc. Yagi about 65 feet above ground and the bottom of the 144-Mc. stack about 6 feet above it. The 50-Mc. beam is fastened to the main vertical support of "1-inch water pipe" running down to the rotator. The 144-Mc. array has a center support of TV masting, held to the water pipe by three U clamps. Either array can be removed without disturbing the other. Both are fed from a single run of coax that terminates in a weather-proofed coaxial switch remotely controlled from the operating position to select the desired array.

The coaxial switch operates on 115 volts a.c., but rather than run this up the folding tower we decided to operate the control line at a lower voltage. A small transformer at the operating position feeds 6.3 volts a.c. into the main run of 4-conductor rotator cable, with pairs of its wires in parallel for low voltage drop. A similar transformer in a plastic refrigerator box up at the antennas converts back to 115 volts for the switch. This makes for a safe system, requiring no special insulating precautions for the control line, where it runs through tree branches or is within reach of passersby. The tower-mounted switch permits maximum return on our investment in low-loss coax for the 125-foot run from station to antennas. QST

Armed Forces Day 1966

(Continued from page 81)

W5IHP, K5JCQ, W5JPC, W5JUM, W5KVM, WA5LMG, W5LNG, K5MBB, K5MCM, W5NBI, K5PIM, W5QFA, W5QJD, W5SAW, K5SDM, K5SVC, K5TPU, K5TUP, W5UJF, W5USA, K5UTE, W5UY, K5VHM, W5VJ, K5VQU, K5WAC, K5WBN, W5YAJ, W5YCQ, W5YIJ, WB6AAL, W6ACN, W6AEE, WA6AGA, WA6AHF, W6AJJ, KH6AO, KG6APD, WB6AQR, WA6AWD, W6AXV, WA6BBG, WA6BBL, KH6BGW, K6BHF, W6BHG, W6BIK, K6BPI, W6BTV, W6CBF, W6BCMN, W6CVV, WB6CWZ, W6DNT, W6DOU, KH6DQW, WB6DRY, K6DYX, WA6ECE, WB6EGH, W6EGZ, K6EPT, W6EV, W6FB, WA6FFW, W6FLW, WB6FRC, WA6FRS, W6GC, K6GKX, W6HTO, W6IAB, W6IWE, W6IWO, WB6JAL, K6JFP, WB6KCH, W6LDG, K6LFM, W6LIP, W6LVQ, WA6LZB, WB6LZX, WB6MHO, W6MJD, K6MLI, K6NCG, W6NRK, WA6NUA, W6OJF, W6PSW, K6PWD, WA6PYE, W6RCR, K6ROR, K6RTS, W6SAW, W6SCQ, W6SCR, WA6SEY, K6SHZ, WN6SIJ, WA6SJM, WA6SJZ, WB6TCL, K6TFT, WA6TQJ, W6TZJ, W6TZK, DL6UK, W6ULX, WA6USU, W6UUO, WA6VGE, WA6VGJ, WA6VGZ, W6VHF, K6VIT, WA6VPG, WA6VVR, K6WBC, W6WLI, W6WPF, W6WXX, W6YLH, WA6YSE, W6YUH, WA6ZCQ, K6ZJS, W7AAI, F7AH, W7AHW, KL7BAJ, W7BEG, WA7BEU, W7BIF, W7CUR, WA7CVI, W7EJD, W7FEN, W7GVG, W7IAN, W7IE, W7JMH, W7LI, W7LMZ, W7LPM, W7MC, W7MCU, W7MEV, K7MLO, K7NHO, W7PAE, W7PBV, W7PHG, K7PHP, K7PLR, W7PQJ, W7PRG, W7PRM, K7PTQ, K7QOM, W7RQQ, W7TYR, W7UKH, K7UXS, K7VJF, W7VKO, K7VTY, W7WHE, K7WQJ, W7YKN, K7YQM, W7ZI, K8ACC, WA8ADL, K8AIZ, K8AQA, W8ARP, K8AVY, W8AYT, W8BEK, WA8BOT, W8BTW, W8BXA, W8CJD, W8CLL, K8CTI, W8DFA, K8DGV, W8ELU, K8EQN, WA8FCN, W8FEU, WA8FYF, K8GJL, W8GKQ, W8GMX, K8GVY, W8HPR, W8HYG, W8IJV, K8JDJ, W8JM, K8JZW, WA8KPN, W8KPT, W8LEX, W8MBB, W8MGA, K8MUZ, K8MYF, WA8NQE, W8OMY, W8ORD, W8PSK, K8RKE, WA8RYG, K8SDQ, WN8SLJ, W8UFN, W8VMP, W8WXM, W8ZEP, K8ZPR, W8ZUA, W8ZYW, W9AFD, W9AZW, K9BRL, W9BUF, W9CAV, W9CBE, W9CHD, K9CYZ, WA9CZS, W9DVJ, WA9EMK, W9EPT, W9EWC, 9EWV, K9GSC, W9GYQ, W9HHX, K9IUG, WA9KEJ, W9KJ, K9MNZ, W9OJY, W9PU, W9QKE, K9QNV, W9QVQ, W9RDJ, W9SUF, K9TKW, W9TQ, W9WKM, W9WUH, W9ZBY, W9ZDI, W9ZFA, W9ZGC, KØAQO, KØBEC, KØBLH, KØCCV, WAØCXY, WØDHA, WAØDYU, WAØEII, WØEUS, KØFAT, KØFLK, WØFWD, KØGVY, WØHFP, WØHHS, KØHPQ, KØHZO, KØIEB, KØIIE, KØIPC, KØIQR, WØITX, WØJAY, WØKIS, WØKUJ, WAØLCK, WØLDO, KØLFI, WAØLUM, KØMDS, WØOGC, KØOJQ, KØORC, WØPHM, WØRSP, WØRWH, WØRX, WØTBL, KØTHG, KØTLQ, KØTNP, WØWHE, WØWWI.

ANDERSON, Robert R.; ARNOLD, Kenneth C.; BEAVER, G. S., RM1, USN; BROTHERMAN, J. O., RM1, USN; CLIFFORD, J. P., RM1, USN; COOK, G. R.; EVANS, Harry H.; FELLER, Albert, Jr.; FREEMAN, C. P., RM1, USN; GEISLER, M.; GOODMAN, D. J.; GROVER, E. J., RMCM, USN; HAJDU, F. L.; HASKELL, S. W.; HERSEY, G. G., RM1, USN; HUGHES, P. M.; HUNTER, J. E., RM1, USN; IVERSON, Ronald K.; LENZ, W. E.; LUSSIER, D. E., RM3, USN; MALME, Glenn, Jr.; MASSEY, Adrian F.; MAYER, R. D.; MENADIER, P. T.; MOORE, William M.; RADKE, L. W.; RM2, USN; RAIN, C. F., RM2, USN; ROBERTS, C. E., Jr.; SHORTWELL, C. M., RM2, USN; STEVENS, Ross W.; VOLT, R. V.; BASE MARS STATION, England Air Force Base, Alexandria, Louisiana. USS CHARLES R. WARE (DD-865); USS FORT MANDAN (LSD-21).

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 non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there no charge for zipcode when you furnish it. **An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all **authorized insertions. No checking-copies can be supplied.**
(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

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.

LOUISVILLE Ham Kenvention, Oct. 15, 1966. Technical forums, exhibits, banquet, Giant indoor Trade-O-Rama (bring your goodies). Ladies Program (Advance Registration only). Details P.O. Box 20094, Louisville, Ky. 40220.

FREE: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings Second Monday of each month at George Washington Hotel, 23rd Street and Lexington Avenue, promptly at 8:00 PM. All are welcome. W2ATT, New York Radio Club.

TRI-STATE Sideband Dinner, Pittsburgh Area. Will be held October 29th at Johnny Garneau's, smorgasbord, Monroeville Penna. 7:00 P.M. C. J. Tirk, W3KTP, Turtle Creek, Penna. 15145.

OLD Old Timers Club now over 650 members with verified 2-way contacts before 1926. Life membership $15.00. Bimonthly "Spark Gap Times" $2.50 annually. Roster free to members. Write Secretary, W5VA. Box 840, Corpus Christi, Texas 78403.

12TH ANNUAL Syracuse V.H.F. Round-up, Dellemort's Country Manor, North Shore of Oneida Lake, Cleveland, N.Y. Oct. 8th. Registration, including dinner, $6.00 advance; $7.00 at the door. Write James Stewart, K2PKK, 268 Hopper Road, Syracuse, N.Y., before Oct. 3rd. Program: see Hamfest Calendar. Starts at 10 A.M.

THE MANCHESTER Radio Club announces October 22nd as the date of their Annual Banquet. All amateurs are welcome. For further information, write to WA1DZX, P.O Box 661, Manchester, N.H. 03105.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, Box 6097, Tulsa, Okla.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA Wayne Nelson, Concord, N.C. 28025.

WANTED: all types of aircraft or ground radios. 17L 618F or S388, 390, GRC, PRC, 51 JRVX, Collins linear amplifier. Type 294; Especially any item made by Collins Radio, ham or commercial. Also large tyre tubes and test equipment in general. For fast cash action contact Ted Dames W2KUW, 308 Hickory, Arlington, N.Y.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts; 617-598-2530 for the gear u want at the price u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Canton, Chicago 6, Ill.

TOPPING All offers for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

TUBES Wanted. All types, highest prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

MANUALS for surplus electronics. List, 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts. BC-610. GRC-2, Antodyne, Bethpage, L.I., N.Y.

QSLS? "America's Finest!"!! Samples 25¢. DeLuxe, 35¢ (refunded). Sakkers, W8DED, Holland, Michigan.

QSLS samples 20¢. QSL Press Box 281, Oak Park, Illinois. 60303.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ For better QSLS! Bringing hams greater returns for over a quarter-century. Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Ill.)

QSLS: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLS: Moyers Printing. 846 Rising Sun, Telford, Penna. Samples, stamped envelope.

QSLS-SMS. Samples 10¢. Malgo Press, Box 373 M.O., Toledo 1, Ohio 43601.

DELUXE QSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1994 N. M-18, Gladwin, Mich.

10¢ Brings free samples. Sims Advertising Service, 32227 Missouri Ave., St. Louis, Mo. 63118.

DON'T Buy QSL cards until you see my free samples. Bolles, W5OWC, Boxx 9363, Austin, Texas.

QSL Specialists. Distinctive Samples, 15¢. DRJ Studios, 2114 N. Lavergne Ave., Chicago, Illinois 60639.

SUPERIOR QSLS, samples 10¢. Hamsco, Box 773, Hobbs, New Mexico.

QSLS, finest, YLRL's, OMs, samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

HUNDRED QSLS, $1.00. Samples, dime. Holland, R #3, Box 649, Duluth, Minn. 55803.

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.

QSLS. 18 samples, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

3-D QSL cards add prestige with spectacularly different glittering colors and raised designs. Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLS 300 for $4.35. Samples 10¢. W9SKR. George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 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-Call decals K2VOB Press, 31 Argyle Terrace, Irvington, N.J.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLS Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

FINE EMBOSSED QSL cards, 21 samples, 25¢ (deductible). Ace Printing Service, 3298 Fulton Road, Cleveland, Ohio 44109.

RUBBER Stamps $1.15 includes tax and postage. Clint's Radio W2UDO, 32 Cumberland Ave., Verona, N.J.

QSLS $2.50 per 100. Free samples and catalog. Garth, Box 51Q, Jutland, N. J.

SMART Ham operators buy their QSL cards from the Ham Wholesale Card Club. Special Customer Dpt., Box 461, Lexington, N.C. 27292.

QSLS—Free samples. Attractive designs. Quick Service. W7IIZ, Press, Box 183, Springfield, Ore.

ORIGINAL EZ-IN double holders display 20 cards each in plastic. 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John K4MNT, Box 198T, Gallatin, Tenn. 37066.

QSLS. Radio Press, Box 17112, San Diego, California 92117.

HUNDRED QSLS. $1.00. Samples, dime. Holland, R 3, Box 649, Duluth 3, Minn.

QSL Cards. Quality printing. Samples 15¢. Sargent Press, 19 Glen Ave., Lynn, Mass.

COLORFUL QSLS. Very artistic—very different: Samples 10¢ or SASE. Colorful QSLS. M. A. Berliner, 833 Crowden Dr., Cincinnati, Ohio 45224.

RUBBER Stamps made-to-order. Write: J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

SINCE 1937. QSLSs by W1LMS. Sheehan Press, 23 West Street, Stoneham, Mass. 02180. Samples 10¢. Catalog, 25¢.

QSLS, 300 for $5.00, 25¢ samples. Jansen, K2HVN, 860 Atlantic St., Lindenhurst, N.Y.

QSLS. Glossy coated, 3 and 4 colors, 100- $2.00. Samples dime. Bob Garra, Lehighton, Penna.

QSL Rubber stamp 3" x 5". $5.00. Other ham stamps, $1.00 up. Set sample impressions 5¢ postage. Wes's W1FP, RFD Amesbury, MA 01913.

SPECIAL K2HVN QSL designs for mobileers and many others. Samples, 25¢. K2HVN QSLs, Atlantic Street, Lindenhurst, New York 11757.

RUBBER Stamps. Name, address, call. 89¢. Jim, WNØPOA, S E 11, Waseca, Minnesota.

RUBBER Stamps. 4 line address $1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

CANADIANS. Eico Model 720 xmtr with Model 730 modulator with cover, both $125.00. Perfect condition. VE1AN, Rothesay N.B., RR #1, Kings Co. Canada.

ATTENTION Canadians! Wanted: Heath Seneca transmitter and/or Shawnee and/or Pawnee transceivers. Douglas Wismer, VE3EHC, 260 Frederick St., Kitchener, Ont. P., Canada

CANADIANS! Will sell HW-12C, A.C. P/S, PTT mike, SWR Bridge, reasonable. E. Crump, VE3OU, 64 Barrie St., Galt, Ont. P., Canada.

BRITISH Racal RA-17C receiver and RA-63 100 Kc. Sideband adaptor-amplifier. Both rack models. North American standards. Cast aluminum chassis, multiple audio outputs. Eight hundred and fifty dollars. U.S. Funds. R. D. Macdonald, VE3ZR, Eighteen Margaret, St. Thomas, Ont. P., Canada.

MONOMATCH-QSO-LETS Sign your call and "handle", make nice gifts for fellow hams. Box of 50 monogrammed matchbooks, $2.50 ppd. 5 boxes, only $10.00. Holland House, Box 924, Severna Park, Maryland 21146.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 37 E. Hoover St., Ann Arbor Michigan. Tel. NOrmandy 8-8262.

TOOOOBES: 6146B, $4.00; 6CW4, $1.40; 417A, $3.95; 6360, $3.45; 6146, $2.55; 5894, $15.50. All new, boxed guaranteed. No pulls, seconds or JAN. Catalog of many other types, free. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

RTTY Gear for sale. List issued monthly. 88 or 44 mhy toroids, five for $1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mancana Blvd., Oakland, Calif. 94610.

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 annd a wealth of technical data included in 92 pages. Price. $3.95 ppd. Two-Way Engineers, Inc., 1100 Tremont St., Roxbury 20, Mass.

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.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salemo, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code 201-471-2020.

NOVICE Crystals 80-40M, $1.05 each. Also other freqs. Free list Nat Stinnette, W4AYU, Umatilla, Fla. 32784.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

CERTIFICATE Hunters: Work five members, get free award. Tu-Boro Radio Club, Inc. W2BMW, 104-19 127 St., Richmond Hill, N.Y. 11419.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each, $10.00 paid prepaid in U.S.A. Send check or m.o. Everett Stidham, Jr., W5JLQ, 722 So. 30th, Muskogee, Okla.

RTTY Channel Filters, octal mounted, 2125/2975 cps, $5.95 pair, 88 mhy toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

SACRIFICE Heath Warrior Linear and 3 bedroom furnished residence on lovely and private ¾ acres near Daytona Beach. Tel. HUntsville (Ala.): 205-536-2524.

COLLINS: 75S-3, $425.00: 32S-3, with 516F2, $575; Hunter Bandit 2000A, $375; Heath Monitor 'scope HO-10, $45.00; Johnson Matchbox, $25.00. Like new. Dr. Perciful, 3326 Noe Way, Louisville, Ky. Tel: 502-452-2116.

COLLINS 30L-1. $330.00. Delivered within 150 miles. K2OGA, Robert J. Miller, 245 Scudder Avenue, Northport, L.I., N.Y.

WANTED: Mode #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics—Howard Co. Box 19. Boston, Mass. 02101 (617-742-0048).

WANTED: Drive unit for Boehme Automatic keying-head, Type 4-E, Series B. State price and condition. H. R. Stewart, Box 57, Point Reyes, Calif. 94956.

SELL: CQ, QST, Handbooks, old IRE Proceedings, any quantity. Buy: Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

CLEGG "22'er" for sale. 3 xtals, halo, all for $200.00 K8IFH, 5334 S. Vassar, Grand Blanc, Michigan.

DRAKE TR-3 w/AC-3 P/S and RV-3 remote VFO, $525.00. Loudenboomer linear KW w/P/S, $300. Hallicrafters HA-1 keyer, bug, 60 ft. E-Z Way tower, rotor, quad. Like new. W2GIM, Kessel, 455 Oakridge Dr., Rochester, N.Y. 14617.

SACRIFICE: KWM-2 mint condition, $659. "Factory installed" noise blanker, $69; mobile supply, $49.00. Mobile Mount, $64; A.C. supply, $65.00; 30L-1, $319.00; Heath HO-10 monitor scope, $54.00; Hy-Gain full size 3-el. 20 M beam, $35.00. Fred Breidbart, 1725 Broadway, Brooklyn, N.Y. Tel. GL5-2222.

SELL: Moving to apartment. 75A4 No. 5557 2 filters, $500.00; Collins 51S-1, used only 3 hours, $1325.00. Clegg Interceptor B with low-band converter, $385.00. 75S-3, 32S-3, 516F2, $890.00. WB2HZP, Irving Haimowitz, 153-18- 58th Ave., Flushing 55, L.I., N.Y. Tel: TU 6-1344 between 9 and 11 P.M.

HEATHKIT SB-300. New, excellent condition. Checked and aligned by the factory, $200. Will ship REA collect. Rev. Joseph Romano, 43 Shelburne St., Burlington, Vt. Tel: 802-862-2845.

HALLICRAFTERS SX-101A, Tecraft six meter converter with power supply, and Webcor Regent Coronet tape-recorder. Will sell together or separately for highest offer. Guaranteed perfect condition. Contact Charles Ormsby, K1PCS, 6 Driftwood Lane, Weston, Mass.

DRAKE TR4, like new, with used AC3 speaker and power supply. First m.o. or certified check for $485.00. Pemberton, W9YJH/4. 2221 Hillside Dr., Henderson, Ky. 42420.

WANTED: For personal collection: QST, May 1916; Learning the Radiotelegraph Code, 3rd edition; How to Become a Radio Amateur, Edition 10 and 12; The Radio Amateur's License Manual, Edition 7, 10, 11, 12, 15 and 16. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

FOR Sale: 32S-3, 516F-2, $600; 30L-1, $350; 312B-5 $250.00; 516E-1, unused, $100. PM-2, $100. 351D-2 mobile mount (KWM-2), $75.00, 75A-4, No. 4098, three filters, $425. James Craig, 172 White Birch Drive, Portsmouth, N.H. 03801.

FOR Sale: Drake 2B and 2BQ, $210.00; Eico 720, $35.00; 14AVS vertical with roof mounting kit, $25.00. Hallicrafters TTO keyer, $25.00. Vibro-Keyer, $10.00. WA8DVX, Brinkman, 619 N. Sugar St., Celina, Ohio 45822.

HQ-170-C, new condition, $175.00. W5RKR, Wondergem, 1009 Dalebrook, Alexandria, Va. Tel: 703-765-7036.

HEATH DX-60, $60.00; HG-10 VFO, $25.00. SX-71 rcvr with Q-multiplier, $50. All in gud condx. Cowan, 2 David Rd., Massapequa, L.I., N.Y.

DRAKE TR-3 and AC-3 power supply for sale. $47.00. WA1-BSE, 66 Osprey Dr., Groton, Conn. 06340.

SALE: HQ-170, perfect condition with manual and original carton. $185.00. W6ZJW, 740 East Sycamore, Willows, Calif.

DX-100B; in excellent condx, grid block keying; with coax ant. relay and spare 6146's, 1625s (two each). All for $110.00. Loren Lafferty, WA6OIP, 5624 Broadway, Sacramento, Calif. 95820.

FOR Sale: QSTs 1934-1966, some earlier issues, COs, 1954-.196 Radio, 1936-1942. Make o"er. Mrs. James E. Hedderman, 2423 Hubbard Rd., Madison, Ohio.

TRAVELING Wave tube: PM type; 1000 to 2000 Mc., new, Microwave Electronics type M2102-F-2; noise figure at 1296 Mc is 8 db; gain is 36.5 db, with complete specs and drawings. Make offer or will consider trade. Finger, KA2RJ/W9VCH, Box 10, APO San Francisco, Calif. 96343.

WANTED: Johnson 240-305-2 SSB adapter. Good condition. Pay top price. Will pay shipping costs. Roy Bechtol, 5609 Seminole Street, College Park, Maryland. Tel: (301)474-5585.

IMRA, International Mission Radio Association (formerly CMRA), is looking for interested and dedicated members. Our work is to provide communications for missionaries with each other and their superiors directly, and with their families by necessary handling; and also to spread good will and love of God to the hearts of all men by charitable and kindly demeanor over the air. Founded by Roman Catholics, it is now open to men and women of all faiths. Dues are $2.00 annually. Please contact Fr. David L. Reddy, O.F.M., K2BUI, 601 McKinley Pkwy., Buffalo, New York 14220, who is Membership Chairman.

MODEL 14 TD and non-typing reperforator with base, covers and sync. motors, junction box, tape reels and mounts. Like new. Package deal: $90.00 or will sell separately, WØDKX, 532 33rd St., West Des Moines, Iowa.

FOR Sale: SX-117 rcvr, $235.00; HT-44 xmtr, $260.00; PS-150-120 power supply, $55.00, or will sell complete for $525.00. All units in new condx with manuals and original cartons. Richard Hennis, 3409 Sevier Drive, North Little Rock, Arkansas.

SELL: Collins KWM-1, 516F-1 AC power supply, MP-1 12-volt power supply, 351D-1 mobile mount and cables, DX adapter, noise blanker, microphone, speakers, Hustler with 10 and 20 meter coils, bumpeer mount. Just aligned by Collins; in excellent condition. $425.00. James Puglise, W3CBJ, 2506 Lindell St., Silver Spring, Maryland 20902.

GONSET 900A 2 mtr. xcvr $245.00; Parks 432-2P preamp, $20.00. 3W 432 Trip-amp $50.00; 1" ferrite 3C3 Toroids, $1.00. Ship at your expense. SASE for ten years' collection of components, accessories. Wanted: Panadaptor SA3-T1000, 10.7 mc. i.f.; Gonset 910A xcvr, 3-el. 6m ant. Handbook. Britt, 7701-F Hillendale Rd., Baltimore, Md. 21234.

FOR Sale: SB-100, SB-200, SB-300. Wanted: Any kit to wire and repair, preferably Heathkit. Most Heathkits in stock. Business ref. on request. Lan Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

FOR Sale: 75A-4/.5 kc—2.1—3.1 filters, $375.00. exclnt condx; HT-46/HA-16 VOX adapter (new), $270.00; SX-146/HA-19 100 Kc. calibrator/ .5 kc filter, $220.00 (new). Hallicrafters equipment is new and carries the standard 90-day warranty. Dick Bellew, W5CGR, 1005 W. 4th St., El Dorado, Arkansas.

A1WA Tape-recorder, $10.00. NRI signal generator, $10.00; Knight R-55A receiver, $45.00; Lafayette 5-watt amplifier, $5.00; E-V 727 microphone, $5.00. Grommes 15-watt amplifier, $10.00. Send to: Tony Cinquini, 6917 Chester Ave., Philadelphia, Penna. 19142.

GOING To college! Must sell: DX-100, relay, key, mike, $100.00. HR-10 receiver. Navy beam filter, $50.00. 66-56 Saunders St., Rego Park, N.Y. 11374.

TR-4, $495.00; AC-4, $83.00; DC-3, $123.00; factory-sealed boxes. Warranty, naturally. Sell separately. Mel Palmer, K4-LGR, P.O. Box 10021, Greensboro, N.C. 27404.

FOR Sale or trade for mobile SSB equipment. 1 B&K TV analyst, Hickok crystal marker calibrator, heterodyne marker adder, sweep generator. James S. Hartzler, Box 214, Smithville, Ohio 44677.

HALLICRAFTERS SX-115, HT-32B, mint condx, best offer over half. Trade for fiberglass boat, motor-trailer, clean, ready to go. John H. Peitler, K4GN, 1731 U.S. #1, Box 12, Juno Beach, Fla. 33403

SELL: 4-400A, $20; exclnt condx DX-60, $40.00. WA7-BNM, Bruce Horn, Box 402, Coos River, Coos Bay, Ore.

PROP Pitch motor, heavy-duty, selsyns, transformer, never used! Surplus. Collins 148C-1 NBFM adapter. Best offers. W1SPQ, 97 Richmond La., West Hartford, Conn.

FOR Sale: 2-element Hy-Gain Beam, only $25.00. Sakkers, W8DED, Box 218. Holland, Michigan

COLLINS Mobil-Mount 351D-2 mobile power supply, MP-1. WA2FBL, tel: Area code 607-MI8-4952.

FOR Sale: RME 6900 ham band receiver, in mint condx. Will ship. $150.00. Louis Ingram, 45 Larry Dr., Decatur, Ill.

600 P.I.V. @ 750 Ma. Tophats, includes by-pass capacitors and resistors, 10 for $3.00. ¼ x 1" ceramic coil forms, slug-tuned, 5 for $1.00. All postpaid U.S.A. Fully guaranteed. East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

FOR Sale: House and ham shack of K6GAJ, all very modest, 3 br. bath home 3 yrs old, fenced patio, etc. With or without misc. ham and CB gear including 30 ft. aluminum tower. Located small, near coastal town of Vista, California. Summers cool 70-80 range. Winters, 35-70. Write F. F. Knapp, P.O. Box 126, or call a.c. 714-724-5830.

4CX250Bs, pair Eimac original sealed cartons. $50.00. Will ship. WA2WQG. Tel: a.c. (716)342-4503.

SELL: SX-101 Mark III, and R-46, $165.00; SB-10 plus power supply, $55.00: Viking II and VFO, $90; Johnson T-R switch 250-59, $18.00; Elmac, PMR-7, AF-67 and M-1070, $135.00. W8QGP, 7948 Nancy Court, Norfolk, Virginia, 23518.

HT-44/ACPS, used one year. Perfect, Original carton. $295.00. Collins 75S-3, perfect, $445.00; Heathkit DX-20, good, $28.00. Going to transceive. Certified checks, will ship prepaid continental U.S.A. Larry Kaplan, 56 Carver Terrace, Yonkers, N.Y. 10710. Tel: (914)SP9-6636.

SELLING Out: Mint HT-41 KW linear, $140.00. RME 6900 receiver, $135.00; BC-221 frequency meter, orig. book. AC supply, $50.00. SASE for list of equipment. W2KJY/4, 2804 Broadview Dr., Huntsville, Alabama 35810.

SELL: 2-Meter Gonset Sidewinder, A.C. power supply, Turner mike, in mint condition. D.C. power, never used. Microwave bridge #262 and #261, $375.00. Al Taylor WB2KTA, 3092 Avenue "X", Brooklyn, N.Y. 11235.

HE-45B 6 mtr. transceiver with new transistor vibrator, and halo antenna with matching transformer, $95.00. complete. W1IDA, Clifford Nelson, Flaggy Meadow Rd., Gorham, Maine 04038.

SELL: DX-60A. exclnt condx. WA3CTP, 200 Lamppost Lane, Camphill, Penna.

COLLINS 75A with SSB mechanical filter and C-E Signal Slicer, $190.00; 32V-3 150W AM-CW transmitter, $180.00. Both are in excellent condition. C. V. Kimball, WA8UNS, 810 W. Jefferson, Ann Arbor, Mich.

PROFESSIONALLY wired SB-100 with AC and DC supplies. Available now. W. F. O'Rourke, 102 E. 23rd, Scottsbluff, Nebraska 69361.

FIRST Come, first served: Drake R-4A receiver, 2 extra xtals for 7.5-8 & 14.5-15 Mc., 4 mos. old, in original carton, $325.00. Mint condition Collins 32V-3, $150.00; Johnson Matchbox, $35.00; Eico 425 'scope, $25.00; Hunter Watt-Meter 200/2000 watts, $45.00; RTTY equipment: Model 26 printer, dark furniture finish table, immaculate! $60.00. H.B. AFS keyer with polar and P.S., $20.00; transistorized W2JAV-TU (Essco) with polar and p.s., $30.00. Sony 105 4-track mono recorder, near new, $100. Sony 123 Tape-mate recorder, $25.00. All gear in superb shape! Mark Holland, K0GXL, 509 Des Moines St., Ankeny, Iowa 50021. Tel: (area code) 515-964-4924.

432 Mc Converter. Convert from 432 Mc to 7-30 Mc. Removed from missile guidance systems. Size 2" x 3" x 3½"; complete with schematic and instructions, less crystal. Unused, $9.95 each. We pay postage on prepaid orders, c.o.ds. remit $2.00 with order. Alpha-Tronics, Dept. B, P.O. Box 31127, Aurora, Colorado.

CE-10B, QTI, VFO, $80; two meter gear: Hy-Gain yagi, Model 28, $10; Tecraft converter, 14 Mc, IF, supply, $20; 500 watt final amplifier, 4CX350F, Class "C" or linear, $50.00. Wanted: HO-13. WA9NKT, Ester, 1235 Hillcrest Lane, Freeport, Illinois 61032.

HQ-140-X rcvr, ready to use. First $45.00. Will pack for safe shipment. If interested, write WA9QXO, 5623 Glendale Rd., Ft. Wayne, Ind.

DRAKE 2B, 2BQ, 2AC, extra crystals. Exclnt, used little. $200.00. WB2AEO. Tel: 212-721-4518.

HEATH HW-20: Pawnee 2 mtr. xcvr built-in, pre-amp, xtals and mike. $180.00 or your best offer. John, WA8TDY, 3528 Craig Dr., Flint, Michigan 7421747.

RANGER II, Hallicrafters SX-110, Johnson 250 w/Matchbox, all new condx. $300.00 takes all. WB2PCY, P.O. Box 1077, Mattituck, L.I., N.Y. Phone 516-629-4704.

SX-101A, match, spkr., latest prod. model. In mint condx, including manual: $210.00 Ralph Formica, WA2EBS, 1300 Greenbriar Lane, N. Bellmore, L.I., N.Y. 11712.

DESPERATELY Need WA2YQW for Hudson Division Director, sponsored by Hamster Radio Club.

WANT: 75A4. Trade, with cash: Leica 35 mm equipment or 16 mm Bell-Howell camera, turret head with three lens. Write Arnold, 304 Pioneer Bank Bldg., Prescott, Arizona 86301.

32S-1, in perfect condition. $350.00. W1ACC.

SELL: HQ-170 A/C, $220.00; SR-160 and DC supply, $220.00; Lettine 242, $40.00; Tecraft CC50, $20.00; 2-meter cascode converter, $10.00; NCXO, $50. All for $525 or swap for Swan 350 and DC and AC supply. Deliver in Connecticut or Massachusetts. W1FBL/1, 47 Nathan Rd., Waltham, Mass.

SELL: Rohn tower, 60 ft. commercial-type galvanized with base and house bracket, new condition, $175.00 (NYC area only); Hewlett-Packard AF oscillator, Model 201C, prop-pitch motor, teletype Panalyzer 455kc IF, high power components. Send SASE. W2GBS/3, 422 Burnt Mills Ave., Silver Spring, Md. 20901.

COLLINS KWS-1 Serial 1214, with relay, set spare finals. $695.00; KWM-1 with AC transistorized DC supplies and mobile tray, $400.00. Gonset II, 2-meter Communicator, $105.00; Drake 1A recvr $105.00 Polytronics 6 transceiver, $195.00. Heath Monitor 'scope HO-10. $45.00. Don Droege, W3CHQ, 523 Coolidge St., New Cumberland, Penna. 17070.

NCL-2000 Brand new, in original carton, $479.50. Save $205.50. Harold Greene, 377 Oldham, Pembroke, Mass.

COLLINS KWM-1 with 516F-1 AC supply and matching speaker, $350.00. 516E-1 12V DC supply (new), $75.00. John Hunt, WA6HXE, 4543 Farmdale, North Hollywood, Calif. 91602.

QUICK Sale! Hallicrafters SX-101, Heath Marauder, $395.00 or $200.00 each. K1ZTZ, 4529515, Lowell, Mass. 339 Riverside, zip 01850.

FOR Sale: Knight T-60 transmitter; brand-new, unused, assembled: $45.00-$50.00. Charles Schwartz, RFD #2, Norfolk Road, Litchfield, Conn. 06759.

WANTED: Atwater-Kent and Amrad Variometers and Variocouplers; Thordarson audio transformers; loose couplers; rheostats; slide tuners; Magnavox electrodynamic speakers; switch points; switch arms. Variable condensers, others. Harold L. Brouse, 2290 Struble Road, Cincinnati, Ohio 45231.

RTTY Gear for sale. Model 19 and 28 parts and service. Price list issued monthly. Mazer Enterprises, 17740 Bay Circle, Founitan Valley, Calif. 92708. Phone: a.c. (714)962-4970.

SELL: HRO Sixty! Excellent condition! Seven coils, xtal calibrator, product detector per April 1966 QST. Make offer. W3DFR, Harris, 828 Bethany Drive, Pittsburgh, Penna. 15216

HEATH HO-10 signal monitor completely wired and in perfect operating condx. Cabinet in A-1 shape. Will ship to first offer over $60.00. Send check or money-order to Pete Chamalian, W1BGD, 111 Buena Vista Road, West Hartford, Conn. 06107. (Shipping Continental U.S. and Canada only).

FOR Sale: New TR-4, RV-4 and AC power supply. All used less than 15 hours. Also 45.4C mike. Quitting ham radio. First check for $600 takes all. WA9OYA, Clarence Jenkins, P.O. Box 145, Francisco, Indiana.

SELL: TECRAFT 6 M transmitter and power supply, $50.00. Tapetone 6 M. converter and power supply, $60.00. James Riel, 55 Main Street, Northboro, Mass. 01532. Tel: 393-6342.

APACHE SB-10 in gud condx. Solid-state rectifiers. 6146-B tubes. For sale or swap for SB-200. Make offer. Leiper Raed, W2IUY, 12 Hyde St., Whitney Point, N.Y.

WANTED: Collins 75S3B or Drake 4-4A Eimac air sockets 4010 and 4CX250B. W6YFE, Garaventa, 4520 Davenport Ave., Oakland 19, Calif.

SELLING Out: SX-101, MK III, exclnt condx, reconditioned, $100. Also new and unused equipment as follows: Matching R48-A Hallicrafters speaker, $10.00: Hallicrafters T-O keyer, HA-1, $50.00; Vibroplex key, $10.00; Knight P2/SWR bridge, $10.00; Knight VTVM KG-620 (factory checked), $15.00; Dow-Key DK-60G2C relay, $8.00; Hy-Gain Lightning arrestor, $10.00; Turner SSB mike, $8.00. Cash. F.o.b. Neenah, Wis. Dr. O. E. Larson, K9LWG, 449 Edgewood Court, Neenah, Wis. Phone 1-414-725-5227.

LAKESHORE Phasemaster II, with matching Central Electronics VFO, 10 thru 160 meters. CW, PM, AM. U/L SSB, 75 W. P.E.P. and HB GG linear, 800 W P.E.P. w/solid-state P/S, built-in, $145.00. Also Drake 2B w/BQ & AC, mint, $215.00 or complete package $345.00 (F.o.b.) or your best offer. WA8QEY, Joe Meixner, 2401 Morningstar Ct., Kettering, Ohio 45420.

SELL: Apache, $150.00; SX-111 w/speaker, $165.00; Bud lopass filter, $12.00; EICO VTVM, $20.00 individually or $300.00 for all. You pay the shipping. QST in binders, 1957 thru 1965, $5.00 per year or $40 total. R. E. Faucett, 2218 Harden Circle, Hendersonville, N.C. 28739.

SELL: Good, clean National(HRO-60) with coils and manuals. Johnson Viking "500" transmitter. Best offer. KINEK, 4 Northboro St., Worcester, Mass.

HT-37: With manual, in mint condx, $225.00. WA2BWT, Richard Gross, 141-12 71 Avenue, Flushing, N.Y. 11367.

TRADE: Collins mechanical filters, 455 Kc. center frequency, 2.1 or 1.5 kc bandwidth for Collins filter 500 cycle bandwidth. Earl Cowden, W8EIA, Rte. #1, Galion, Ohio 44833.

SWAN 240 $150.00. Clegg Venus and 416A supply. $295.00. All in very good condition. Philip Schwebler, W9GCG, 4536 N. 50th St., Milwaukee, Wis. 53218.

WANTED: GSB-100 or similar. W6PZ, 9155 Skyline Blvd. Oakland.

WANTED: Johnson Signal Sentry, CA7 No. 250-28. State price and condition. J. Howe, 92 Lawlor Terrace, Stratford, Conn. 06497.

COLLINS 75S3B, like new condx. $448.00. Paul Rockwell, 5800 Hillburne, Chevy Chase, Md. 20015.

NCL-2000 in sealed carton from National factory. Just serviced and updated: $450.00 firm. Too heavy for me to lift. Dr. C. R. Crosby, RD #1, Chatham, Mass. W1QP.

SELL: Eldico SSB-100F xmtr. $200 and Eldico SSB-1000F 2 KW. linear amp with 2 new spare 4CX300As, $250.00. Excellent condition. Simpson 260 VOM, $20.00. K6SHA, 274 Hiram Ave., Newbury Park, Calif. Fone 4986505.

MOSLEY TA-33, like new, $50.00. Will ship in original carton. F.o.b. my QTH, W5LGD, Bob Ruffer, 4013 Cleveland Place, Metairie, Louisiana.

GONSET 2 Meter Sidewinder AC/DC supply, 500 watt linear amplifier AM and Sideband, mint condition: $930.00 new; $600 firm. WB2SAV, Eisenstein, 3820 Laurel Ave., Brooklyn, N.Y. 11224.

EICO 753, exceptionally good, $160.00. John R. Radzik, K2-RKP, 805 N. Aurora St., Ithaca, N.Y. Phone: AR-34984.

LAFAYETTE HA-350 receiver w/speaker, $115.00: Utica 650A six meter transceiver, w/VFO, mike, $145.00. Both mint condx. "Squalo", $7.00. Certified check. Thurber, 103 Fortuna, Atwater, Calif. 95301.

SB-34 Perfect, sell to highest bidder, or trade for 2 Kw linear. Trade up or down. K9RGH, 9600 S. W. Highway, Oak Lawn, Ill. 60453.

30L1, excellent trade for 75A-4 or crank-up tower 60 ft. or higher. W2IWM, Bob Myers, 1094 Alps Rd., Wayne, N.J.

FOR Sale: Nine month old Swan 350 with xtal calibr., XC-117 A.C. supply, Turner 454-X mike, Heath SWR meter. All manuals. Will ship express collect upon receipt of first certified check for $400.00. John P. Meyett, K9JII, U. S. S. Bridget DE-1024 Fox Division, F.P.O., San Francisco, Calif. 96601.

WRL's Bluebook saves you money! These prices without trades: Thor & AC, $323.10; KWM-1, $224.10; III/6M, $125.95; HT-40, $49.50; SX-99, $85.05; Apache, $116.10; HX-10, $260.10; SR-46, $134.10; HQ-170-C, $188.10; King 500C, $233.10; 2A, $161.10. Ranger I, $89.95. Hundreds more, free list. WRL, Box 919, Council Bluffs, Iowa 51501.

TELETYPES, parts. Fast service. Schmidt, W4NYF.

WANTED: E-Z Way tilt-over ground post mounting kit TORBS40-G. Manning 6417 White Sands Terr., Sarasota, Fla. 33581.

INCENTIVE Licensing? You need Posi-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to the IBM type answer sheets. A very good aid to learning, and a must in preparation for FCC Amateur Exams. General Posi-Check consists of 297 questions and explained answers for only $2.98—Extra Class, 115 questions and diagrams with explained answers. $2.00. 139 questions of the 297 in the General Posi-Check apply directly to Extra Class also. Get both for only $4.50 postpaid. Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa. 50322.

HAMMARLUND HQ-170-AC; excellent with noise-immunizer and matching speaker, $275.00. WA3DEY, 1068 George Road, Meadowbrook, Penna.

FOR Sale: NCX-3 plus Heathkit AC P/S, both in very good condition: $275.00. New, unused Mosley A-315 15-meter beam, $40.00. CDR TR-2 rotator, $15.00. Homebrew kilowatt amplifier and p/s. Needs a little work, but all components in good shape. (Cost me $125.00 new), $60.00. New DOw-Key DK-2-60 DPDT coaxial relay, 110 VAC, $16.00. Some prices open to discussion. Russel Appleyard, WA2MHY, 16 Coolidge St., Larchmont, N.Y. Tel: 914-TE-4-3470.

HERE'S The cheapest way to DXCC, WAZ, WTW. Telrex TM30D wide spaced Triband Beam, new March 1966, Serial 35012; yours for $225.00. Bandit 2000A converted to 2000B. Serial 439 has four new 572B's, $215.00. Heath SB-300 receiver with CW filter, mint condition, $175.00. K4ZJF, Milt de Reyna, 4030 Hallmark Drive, Pensacola, Fla. Phone Area 904-433-6552.

HY-GAIN Thunderbird Tribander, three years old, crated and ready for shipment, in excellent condition; only $45.00 plus shipping. L. G. Dedel, WA2MSY, 61 Summit Ave., Spring Valley, N.Y. 10977.

HAMMARLUND Kilowatt Station: HX-50A with ALC circuit, HQ-170A-VHF, HXL-1. All in excellent condition with manuals, original cartons. Need cash. Best offer takes all three. Also 14AVQ, Globe Scout 65B, Heath VF-1 for any reasonable offers. Fred Lehrer, K2RUR, 601 Lansdowne Way, Norwood, Mass.

FOR Sale: National NC-140 communications receiver, $110.00 (originally $180.00); Lafayette HE-30, $50.00 (originally $75.00), Ameco model PCL preamp w/power supply, $22.00 (originally $33.00). All the above are less than one year old, and are in excellent condx, but I am forced to sell because of apartment move. Steve Gray, WPE8IOB, 22700 Garisson, Apt. 804, Dearborn, Mich. 48124.

DRAKE 2-B, perfect, $190.00. DX-20, $20.00. VFI and P/S, $15.00. Shipping collect. QA8KOX/8, 304 Third St., Morgantown, W. Va.

MOVING, Must sell Master Mobile Matcher, and F/S meter; Gonset Super Six mobile converter; Johnson Challenger. Heath B-1 balun. Best offer per unit. Write: W3CAZ.

SELL Or Trade: Collins 75S-3B, barely used, $500.00: Model 15 printer, good condition, no cover, $50.00. D. M. Burns, 4410 Reading Road, Dayton, Ohio 45420.

SELL: 32S-3, 516F2, 75S-3B, TA36, Ham-M, C. Buchanan, 4812 Lehigh Drive, Springfield, Ohio 45503. Tel: 1-513-399-0708. W8RWZ.

FOR SALE: HT-32, Hallicrafters exciter, $200.00; CE 600L linear, $100.00. Dwight Temple, W2ATM, 163 Weyman Ave., New Rochelle, N.Y. Tel: (914) NE6-2829.

HALLICRAFTERS HT-32A, in excellent condition, $300.00: SX-117, in mint condition, $260.00. Glen Arceneaux, W5GQQ, 817 Short Street, New Orleans, Louisiana 70118.

PORTLAND, Oregon, would like contact with amateur for weekly QSO. Schneider, K6EY, 576 Spruce, San Francisco, Calif. 94118.

RANGER, DB-23, Matchbox, Signal Sentry, 3-el. 10 mtr. beam. All in A-1 condx, one owner gear. $200. Pick-up or will deliver within 50 mile radius. Bert Holtje, W2TQS, 151 Sunset Lane, Tenafly, New Jersey 07670.

FOR Sale: HX-10 Marauder, excellent. No scratches; D-104, filter, SWR bridge and manuals. Pick up deal only, sry. $200 cash. W2EPZ, 80-44 259th St., Floral Park, L.I., N.Y.

BARGAINS: Drake R4 with crystals for complete ten and 160 meters, with matching speaker, $225.00; Eico 720, $40.00; Eico 730, $35.00; Marconi VFO, $10.00; Johnson T-R switch, $15.00. Sorry, will not ship. Will demonstrate. W2VOD, John Moran, 782 Stewart Ave., Bethpage, L.I., N.Y. 11714. Tel: WE-8-7661.

TRANSMITTERS; HW-12, $100.00; Viking II, $75.00; Knight 50W, $25.00; Heath Twoer, $25; all working, some spare tubes, free VFO with Viking, no junk, all clean. Also Quadruplex RC on 11 or 10 meters. W3KNG, 2084 Blair St., Williamsport, Penna. 17701.

NYC Area: HQ-170A with clock and speaker, Gonset GSB-100, D-104, T-R switch, Heath SWR bridge, low-pass filter. Mint condx. $400.00. Charles Schifris, 07726. Tel: MU6-2888 between 9 and 5.

THOR 6, like new, Clegg's best 6 meter AM. Original cartons and instruction book. First $195.00 takes. Ed Shucy, W3BTA, 4913 Keppler Place, Washington, D.C. 20031.

VALIANT Transmitter, D-104 mike, $200.00; National NC-300 and speaker, $200.00; Eico 5-in. scope No. 425, $40.00. Accessories, manuals, in excellent condition. Will take best offer. W2KZL. Tel: 212-MU5-0079.

HR-10 Receiver. Mint condition. $65.00. Tom Benewicz, WA2-OBT, 11 Montrose, Allendale, N. J.

WANT Bogen Booster amplifier Model HO-125. Please state price and condition. K1DVO, 513 Glenbrook Road, Glenbrook, Conn. 06906

TRANSMITTERS-Receivers serviced by radio engineer with lab equipment. Sigma Relays 22RJCC 8000, $8.00 pp. Carter Gen-E-Motors 12V inp, 720 V., outp, 60 .125M, $15.00 plus postage (15 lbs.). J & J Electronics, Box 146 Windham Road, Canterbury, Conn. 06881. Tel: a.c. (203)546-9126.

DX-40 and S-38E recvr, $60.00. M. Gilbreath, WN4BOU, 216 Forman Dr., Attalla, Ala.

SX-140 with added I.F. and speaker. Best offer. Key Dismukes, K4MDF, Box 12, Dahlonega, Georgia 30533.

SELL Or Trade: Stainless G-24 240 inch tower, 5/10/20 foot sections available. Good to 350 feet, $3/ft. Need S/Line receiver or exciter. W4YHD, 6800 Hampshire Road, McLean, Va. 22101.

SELL: ARC-5 transmitter, $15.00; wire recorder, $5.00. William Toth, 8102 Richard, Brecksville, Ohio 44141.

EVERYTHING Goes! No lower prices for equipment and components. Many free items. Send stamped envelope for lists. Clegg Interceptor VHF receiver, perfect, $235.00; RCA AR-88LF quality receiver, 75kc to 30 mc., $80.00. WA6YZG, Traver, 59A Burroughs, China Lake, Calif. 93555.

WANTED: Collins 390A parts, tuning slug for IF (2-3 Mc), small bevel gear for tuning counter, chassis covers, knobs for Mc and Kc. tuning. W3CQ, 7116 Longwood Drive, Bethesda, Maryland 20034.

SELL: Telrex TM30C Tri-band beam. Still in handed shipping crate. Will ship. Paid Telrex $378.00. Asking $250.00. W9FIO, George L. Sensibar, 985 Forest Ave., Glencoe, Illinois. Tel. a.c. (312)835-4138.

MINT Condition: Hallicrafters SX-100, $150.00. Clegg 22'er, $175.00. Jack L. Nichols, P.O. Box 524, Stanton, Nebraska.

WANTED: Clegg 22'er in good, excellent condition, around $185.00. David Austin, 748 Kinderkamack Road, River Edge, New Jersey 07661. Tel: a.c. (201)261-0451.

COLLEGE Bound: Sacrifice, mint condx, SB2-LA linear, $150.00; HO-10 Monitor scope, $50.00. K1YGS, Baldyga, 142 Torrington Heights, Torrington, Conn. 06790.

SELL: Heath Marauder HX-10, $225.00; Heath Shawnee 6M transceiver: HW-10, $125.00. Hallicrafters SX-100 receiver, $125.00. John, WB6MHL, 873 N. Patterson, Santa Barbara, Calif. 93105.

WANTED: NBFM Adaptors for Collins 32V and 75A-2. W7-VS, 419 S.W. Market St., Portland, Oregon

KWM-2 with 516F-2 A.C. supply, six months old, never used! $800. F. S. Eggert, 11833 Wisconsin Ave., Detroit, Mich. 48204.

DX 60. HG-10 VFO, looks, works like brand new. $90.00 Inspection invited. Tel: 516-R06-7097, Mitch, WB2UPB, 3403 First St., Oceanside, N.Y.

QSTS. Complete file, January 1934 to date. First 12 years in Binders, very good condition. Must sell as lot. Make offer. W5POG, George, 2252 North 43rd St., Waco, Texas 76710.

SWAN 350, latest series, still in warranty, including 117XC power supply and 14X 12 volt module and cable. Like new. $475.00. W. Dres, Box 273, Palos Heights, Illinois 60463.

SELL: HQ-129X, $100; T-60, $35.00; HG-10 (VFO), $20.00. WB2SBA, John Whelan, 63 West Main St., Kings Park, N.Y. Tel: 269-9818.

FOR Sale: Lampkin 205A dual range modulation meter. Cost $295. Will sell for $140.00. J. M. Spade, W9PIL, 8024 Cherington Dr., Indianapolis, Indiana.

COLLINS KWM-2 serial number 13398, new December 1965 and used only about 8 hours. Same as brand new condition. Manual, plastic envelope, factory carton, etc. $875.00. Also brand new never used Collins DL-1, $45.00 and Collins SM-1 mike, $25.00. H. Jack Holt, K1VFQ, Woodbury, Conn. Tel: a.c. (203)263-2341.

SALE: Heath MR-1 with spkr, MTOI and station power supply $100. K3OPV, 30 Chapel Hill Road, Huntington Valley, Penna.

WANTED: Mobile single sideband transceiver, W3AXK, phone 215-RE9-1753, John Bolmarcich, W3AXK, 2524 Salmon St., Philadelphia, Penna. 19125.

JOHNSON KW Matchbox, $75.00; small Matchbox, $30.00: Hy-Gain TH-4 Tribander $65.00; Hy-Gain 3-element 10-meter beam, $15.00: New-Tronics 40-75 rotatable dipole, like new, $75.00. Porter Barnes, W9CKF, 2922 Muensterman, Evansville, Ind.

FOR Sale: Johnson SSB Adaptor for Valiant II or Ranger II. New condx. $200.00. Curtis L. Chapman, K1GUV, 123 Fog Plain Road, Waterford, Conn.

SELL: 32V2, $60.00; Valiant I, $100.00: Automatic CW equipment hand perfo, tape transmitter, ink recorder, tape puller, prices on request. Jennings VVC, Kilowatt roller inductor. Deliver 100 miles or ship your cost. K2RM, 1530 Glenwood Dr., Piscataway, N.J. Tel: 968-4003.

MINT Condx DX-60A and HG-10, only $75.00. Pete Zilliox, F.o.b. RD #3, Clarks Summit, Penna. 18411.

SIDEBAND Gear. SX-111 receiver, $150.00; HT-37 transmitter, $200.00; Loudenboomer KW linear, $100.00. Matching power supply, $100. Prices F.o.b. Albuquerque, N.Mex., W5-LGS, 808 San Pedro Dr., S.E. Albuquerque, N.Mex. 87108.

FOR Sale: HT-37, $245.00. Johnson Navigator, $80.00. Both units excellent electrically, mechanically, and in appearance. F.o.b. Tucson, Arizona. K7ZYK, Parish, 5815 Alexander St., Tucson, Ariz.

DRAKE DC-3 supply, like new, $90.00; HT-33B with new final, $425.00: RV-3 VFP, $69.00; TA-33 Triband beam, $69.00: CDR AR-22 rotor w/100 ft. 4-cond. cable, $25.00; HA-1 T-O keyer and Vibro-Keyer, $69.00: Leece-Neville 6026A alternator, complete, $29.00. All with manuals. Bill Jessee, W4-GMN, Box 371, Lebanon, Virginia 24266.

EXCHANGE Student to Argentina must sacrifice recently purchased NCX-5/NCX-A, complete, for $529.00. Shipped prepaid, or best offer. All inquiries answered. Write: Dave, WA1FEP, c/o George Siddall, Box 44, Hyannis, Mass. 02601.

FOR Sale: Hallicrafters transmitter model HT-40, two years old, factory wired, $55.00: Heathkit transmitter Model DX-40, $35.00 and matching model VF-1, VFO $15.00; Vibroplex Original (semi-automatic key) $10.00. R. Paul Humberson, WA7DKZ, 1612 S. Spruce, Casper, Wyoming 82601.

TWOER with DC supply, $50.00; Heath B-1 balun, $5.00; AC-13 stereo headphone control, $5.00. All new. Also two Hy-Gain 40/80 traps, $10.00; two URC-4 transceivers, best offer. WA5ERC, Crisler, 154 Ronald Boulevard, Lafayette, La. 50501.

WANTED: Collins filters No. F-455J21 and F-455J08 or F455-J05 for 75A-4 receiver. Have Hallicrafters SX-99 for sale. $70.00. In excellent condition. Cliff Wyne, 1420 Third St., Spearfish, So. Dak.

CENTRAL Electronics 100-V w/new finals. Used little, except for SS and FD. Mint condx. $375.00. Want: NCL-2000. Tom Bergan, K9DVZ, 1506 Woodmont, South Bend, Ind. Tel: 219-291-4528.

SELL: Hallicrafters HT-32, excellent condition, $200.00; NC-125, $60.00; K5UPX, Charles Bautsch, 5650 Sylmar, Houston 36, Texas. Tel: 713-771-0824.

HW-12, HP-13, HD-20, Turner PTT mic, half-year old. Built by EE. In excint condx. $128.00. Bob Schwartz, B583, Bucknell University, Lewisburg, Penna.

NC-300 with xtal calibrator and speaker; 2nd conversion osc. Xtal controlled with switchable xtals for USB/LSB; coil compartment heater; in excellent condition; $160.00. R. Markel, W2IVS, 1435 Lexington Ave., New York 10028.

FOR Sale: 75S-1 Collins receiver, $285.00; SSB Heath HX-30 6-meter transmitter, AM, USB, LSB, CW, $150.00. Both units in gud condx. WAØFOL, Lintz, 2826 Woodview Ct., Normandy, Mo.

SAVE $500.00! Clegg Zeus, Interceptor B and Allbander, bought new in 1956, mint condx, recently updated by Squires-Sanders. Cost $1375. Prefer one package pick-up deal: $875.00. WA4PSU, George R. White, 3520 Galloway Ave., Memphis, Tenn. 38122. Tel: 901-323-2372 after 6 PM.

FOR Sale: HR-10 with calibrator excellent condition. $65.00 f.o.b. QTH. Art Champagne, Jr., 22 Northview Dr., South Windsor, Conn. 06074.

WILL Buy one each Barker & Williamson 80 HDVL and 49 HDVL coils. State price and condition. Carl, W1IG.

CLEANING House! Meters, transformers, crystals, capacitors, selsyns, etc. Give-away prices. All must go. Please send SASE to R. L. Baldwin, W1IKE, 26 Ridge Road, Simsbury, Conn.

SWAP Hy-Gain PH-4 Tribander for equivalent value 4-element 20-meter beam. Have two (2) LM frequency meters, and will swap one for RF Signal Generator. K1PNS, 24 Rockwood Drive, Waterford, Conn. 06385.

WE'RE Trying to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main, Newington, Conn. 06111.

VIKING Invader, KW Matchbox/SWR/RF ammeter T-R switch, low-pass. Drake 2B/2BQ, HA-1 T-O keyer/Nikey, Heath MM-1 VOM, 4 Eimac 4-1000As. Hy-Gain 5-el. Tribander. All in exclnt condx. Make offer. James R. King, Box 502, Cary Club, Purdue University, West Lafayette, Ind.

FREE Copy of totally new ham publication. Send QSL or postcard today. Nothing like it before! Ham's Market Newspaper, Box 13934, Atlanta 9, Ga.

SACRIFICE. Must sell: SX-111, excellent; Valiant I, F/W, good; Mosley "Fifteen Twenty" 6-element KW beam, excellent. No reasonable offer refused. WA3EMX, 929 High St., Bethlehem, Penna. 18018.

75A-4 serial 4002 with matching speaker and 3 mech. filters. Excellent condition, must sell. Will go to highest bidder. Maj R. R. Blakslee, A Co., Hq Bn, Hq. Marine Corps, Henderson Hall, Arlington, Va. 22204.

WANTED: HRO plug-in coils and clean HRO-50. W2DYU, 360 Marlboro Rd., Englewood, N.J.

GONSET 2-meter Communicator IV, $190.00. Good condition. W6QQB, 1643 Rotary Dr., Los Angeles, Calif. 90026.

SR160, 6146Bs, 240 watts. AC p/s, plate meter. $220.00, local deal. Richard Bain, W8WNZ/9, 1328 Union St., Fort Wayne, Indiana.

SELL Collins 32S-1 noise blanker No. 136A-1. $28.00. W8YBS.

WANTED: Jennings Vacuum variable capacitors for my linear, 5-500 mmfd UCSL 500, 3 Kv, and 20-2000 mmfd, UCSL 2000-2 kv. Wes Minear, WA9FHK, 703 N. Garfield, Lombard, Ill. 60148.

COLLINS KWM-2, 30L-1, 516F-2, 312B-3, 189A-2 for sale. $1,050.00. Exclnt condx. Will ship in original boxes. W5LNK, 1205 Cheyenne, Richardson, Texas 75080.

COLLEGE Expenses require sale of complete 80-10M, AM-SSB-CW station. HT-32A xmtr, $375.00; Heath Mohawk rcvr and spkr, $175.00; HB kilowatt designed along commercial standards, vacuum tuning, less only HVPS. Have $900 in, sacrifice for $200. Master control console, LOC-REM-PTT-VOX operation on 80-2M, has 13 relays, other deluxe components and features including automatic antenna selection, etc. $150.00. All equipment in excellent condition. Package deal: All above plus 3 brand new Dow-Key relays, D-104, cables, Heath FM-3A tuner, preamp., amplifier, $800. First certified check or M.O. takes. Will deliver within 300 miles of Detroit. Phil Hill, WA8IFB, 6920 Cooley Lake Road, Milford, Michigan.

HAMMARLUND HQ-170AC with factory installed noise immunizer. In mint condition. Will ship. $275.00. Robert Zimmer, 94 Brittle Lane, Hicksville, N.Y. 11801.

CRYSTALS Airmailed: SSB, Nets, MARS, Novice, Commercial, etc. Custom finished etch stabilized FT-243, .01%, 3500 to 8600 kilocycles. $1.90. (Five or more same or mixed, $1.70). Ten or more same, $1.35. 1700 to 20,000, $2.50. Overtones supplied above 10,000. Add 75¢ each for HC-6/u miniatures above 2000 kilocycles. Add 50¢ each for .005%. ARRL crystal groups: "IMP", "DCS-500", $9.95. Write for information on kits and types not indicated. Add 5¢ each for postage, 10¢ for airmail. Crystals since 1933. C-W Crystals, Route 2, Box 22-B, Marshfield, Missouri 65706.

FOR Sale: HT-37, $200.00: SX-101 Mark III, $200.00; take both for $350.00. Each in mint condx. Chicago Area only. Jerry, K9RAS, 10728 So Albany, Chicago, Ill. 60655. Phone 445-0315.

GUARANTEED A-1 reconditioned equipment on trial approval at very attractive prices. Terms. Central 100-V; Collins 75S-1, 75S-3, 75S-3B, 32S-3, 30L-1; Drake 2-A, 2-B, R-4, TR-4; Gonset GSB-101; GSB-201, G-50; Hallicrafters SX-111, SX-101A, SX-117, HT-41, HT-32B, HT-37; Hammarlund HQ-110, HQ-170, HQ-180; National NC-190, NC-300, NCX-3, NCX-5, NCL-2000. Much other equipment. Write for lists. Henry Radio Co., Butler, Mo.

HEATHKIT Kilowatt Kompact plus HQ-24 power supply. Absolutely no scratches, works perfectly. Less than 3 weeks old. $135.00 or your best offer. TA-33 Jr, $25.00. Lt. John Palamaro, 3C Hay St., Westover AFB, Mass. 01022. Tel: 593-3844.

75A4-, $369.00; 75A-3, $239.00; 75S-1, $290.00; 75A-1, $135.00; SW-240, $219.00; SX-111, $119.00; SX-110, $99.00; SX-100, $169.00; NC-300, $139.00; 2A, $159.00; 2AQ, $22.50; LSA-3 w/DC, $150.00; HQ-110, $109.00; HT-37, $249.00; new HT-37, $345.00; Viking II, w/VFO, $99.00; Galaxy V, $299.00; AF67's, $35.00. Free list. Howard Radio, Box 1269, Abilene, Texas 79604.

ATLANTA Area! Little used Galaxy V station: AC power supply, vertical antenna, 80 M. coil, GD-104 mike, calibrator, accessory console: $350.00. WB4BKP. Tel: 404-436-6640.

FOR Sale: Complete 2 M station, BC-312 receiver, Tecraft converter, Nuvistor preamplifier, 10 watts phone/c.w. transmitter, 8 element Telrex beam, TR-4 rotator, $120.00. No shipping, sry. Kaftan, 65 E. 52nd St., Brooklyn, N.Y. Tel: HY3-5773.

TWO New 100 mfd., 5,000 VDC Pyranol capacitors. Size: 13" high x 13.5" long x 5¼" wide. Two highest offers accepted. K3MNJ.

NC-240D, BC-348, like new; 40 ft. crank-up mast, beams, meters, crystals, transformers, capacitors. Write for list. W9OBW, 7508 Lawrence, Chicago, Ill. 60656.

WANTED: de Forest tubular audion, Amrad S tube, Margo detector. W2EZM, 431 Oakland Ave., Maple Shade, N.J. 08052.

NCX-3, NCX-A, excellent condition, with instruction books: $295.00. K5QIB, 2408 W. 37th Ave., Pine Bluff, Arkansas 71601.

GENERAL Radio type 1932-A distortion and noise meter. Distortion to 0.1% noise to —80 dbm. Perfect condition. Originally $725, will sacrifice for $300.00. Tom Benewicz, WA2OBT, 11 Montrose, Allendale, N.J.

FOR Sale: SB-34, new, with mike. Hustler antenna 80,40,20 coils, $295.00. K1UDI, 86 Westgate, Wellesley, Mass.

COLLINS Owners: Tired of out of band operation when working DX-split frequency? Avoid bandswitch changing with our new kit that installs in 60 seconds. 75/Line, $21.95; KWM-2, $11.95 postpaid. Front End Conversions and update. 75A-4, $69.95: 75S series, $14.95. 72-hour service. VCZ Sales, Box 15, Ramsey, New Jersey 07446.

NATIONAL NC-303 guaranteed in perfectly new condition, $250.00 or best offer plus shipping. W1KBO, Jowdy, 52 Washington, Stoneham, Mass. 02180.

COLLINS VFO's, 70E-23 for KWS-1, new, $39.00; 70K-1 for KWM-1, new, $29.00; 70E8A for 32-V, new, $29.00; 70H-12 for R390A, new, $49.00; 70E7 for 75A-1, new, $29.00; 70E-18 for R3921 GRC-19, new, $49.00. Richard E. Mann, 430 Wilmot Rd., Deerfield, Ill.

SELL: Drake 2-A receiver, Q-multiplier, speaker, crystal calibrator, like new, $175.00. Joe Kaniuk, 4157 S. Archer, Chicago, Ill. 60632.

SELL: Heath HX-10 Marauder, checked by Heath, with manual. Best offer over $175.00. Hammarlund HQ-180C w/spkr and manual, in mint condx, best offer over $200. WA4PCC, Watzman, 2123 Alameda Ave., Orlando, Fla.

HT-18 Exciter, $28.50; Telrad frequency standard, $22.50, crystal oven, $8.50, tubes, components. Write for details. K2OYN, 449 Hill St., Boonton, New Jersey.

SELL: Hammarlund HQ-100AC with matching speaker, $110.00; Eico-723, factory-wired, $40.00. All in excellent condition. R. Foster, WA9OUE, 639 S. Main, Naperville, Ill.

HEATHKIT HW-22 transceiver, HP23 AC and HP-13, 12V power supplies. Hustler antenna, $240.00. L. Lochner, K9BNP, 353 Marguerite St., Elgin, Ill.

HEATH SB-300 receiver for sale. Have gone homebrew transceive. Excellent condition. Best reasonable offer. K1RPB.

"HOSS-TRADER" Ed Moory says "if you can pay cash and no trade involved," you can purchase the following demonstrator equipment with factory warranty: NCX-5, $479.00; TR-4, $489.00; Swan 350, $349.00; Galaxy V, $339.00; R4-A, $329.95; NCL-2000, $529.00; KWM-2, $895.00; 75S-3B, $499.00; 30L-1, $429.00; SB-34, $329.00; new Ham-M Rotor and dem. Mosley TA-33 beam, $179.00; demo Ham-M rotor, $89.95; T4-X, $329.95. Package deal: New NCX-5 and dem. NCL-2000, reg. price $1370.00. Cash price, $995.00. Package deal: new Swan 350 and dem. Swan Mark I 2000-watt linear, regular price, $963.00, cash price $775.00. Reconditioned gear: HT-37, $219.00; 2-B, $189.00; SX-111, $129.00; SX-101, $139.00. Ed Moory Wholesale Radio, Box 506, DeWitt, Arks. Phone 946-2820.

HW-12 75 meter SSB transceiver, in excellent condition, $80.00; GD-125 "Q" multiplier, $9.00; MI-41 fuel vapor detector, $15.00; all these Heathkit items like new, with manuals. K8BLL, Box 256, Rte. 2, Stevensville, Michigan 49127.

KWS-1, SN238, $695; 75A-4 3 filters vernier knob, SN2917, $400; NCX-3 ac/dc supplies, $325.00; Polycomm 62B, $175.00; Eimac 304TLs, new, $15.00; 2KVA G-E line regulator, $75.00; Ranger I $65.00; T-60, $35.00; 750 and VFO, $35.00. Jack H. Osborne, K6LVD, 5636 Del Monte Ct., Santa Rosa, Calif. 95405.

SQUIRES-SANDERS SS-1R receiver, $995.00; SS 1RS speaker, $35.00; SS18 noise-silencer, $135.00, brand new. First $575.00 takes all. Drake TR-3 SN 12454, RV-3, AC3 like new condition. First $600.00. W8BQH, phone 513-522-6310.

CLEANING House: Brand new Dumont high-band mobile model M-330 carrier squelch, $275.00. Motorola low-band model T51GGV private line, no accessories, $150.00, New surplus I-177B tube tester with adapter, $35.00. Motorola Model T 51GGV carrier squelch, no accessories, $100. Bob Welch, K2BXN, Box 427, Branchville, N. J.

Index of Advertisers

Adirondack Radio Supply 174
Allied Radio Corp. 163, 170
Alltronics-Howard Co. 166
Amateur Electronic Supply 132, 133
Ameco Div of Aerotron, Inc. 145
American Radio Relay League, Inc.
- *QST* 140
- *Advertising Policy* 134
- *Antenna Book* 168
- *Emblems* 160
- *Handbook* 183
- *License Manual* 173
- Membership 175
- Publications 176

Arrow Electronics, Inc. 158

Barry Electronics 148
Belden Manufacturing Co. 147
Bookbinder Publishing Co. 171
British Radio Electronics, Ltd. (Eddystone) 167
Budwig Manufacturing Co. 166, 172
Burstein-Applebee Co. 167

Cleveland Institute of Electronics 155
Collins Radio Co. 3
Communication Products Co. 141
Cubex Co. 173
Cush Craft 164

Dahl Co., Peter W. 170
Dames Co., Theodore E. 172
Davco Electronics, Inc. 149
Dow-Key Co., Inc., The 142

ETCO Electronic Instrument Co. 139
EIMAC a division of varian 135
Electro-Voice, Inc. 171
Electronic Equipment & Engineering Co. 165
Electrophysics Corp. 172
Evans Radio 166
E-Z Mobile Antenna Mount, Inc. 174

Fair Radio Sales 176
Farmerie Corp., The 166
Fichter Electronics 168
Finney Co., The 141
Frederick Electronics Corp. 169
Fugle Labs 158

Gain, Inc. 176
Gentec, Inc. 162
Gift Shop 162
Gotham 143
Grand Central Radio, Inc. 164

Hallicrafters Co., The 1
Ham Kits 169
Harrison Radio 184
Heath Co., The 125, 127
Henry Radio Stores 157
Hotel Beachcomber 162
Hunter Sales, Inc. 176
Hy-Gain Electronics Corp. 5

Instructograph Co., Inc. 173
International Crystal Manufacturing Co., Inc. 7

Jan Crystals 164

Kahn Research Labs., Inc. 167
KMC Semiconductor Corp. 151

Lampkin Labs., Inc. 171
Lattin Radio Labs. 171

Millen Manufacturing Co., Inc., James 182
Miller Co., J. W. 156
Mini-Products, Inc. 154
Mission Ham Supplies 161
Mor-Gain 175
Mulry Sales 150

National Radio Co., Inc. ..... 123, Cov. III
National Radio Institute 152

Omega Electronics Co. 175

Poly Paks 160

Quarter Century Wireless Association, Inc. 169

Radio Publications, Inc. 162
RCA Electronic Components & Devices ..... Cov. IV
Rohn Manufacturing Co. 136

Saleh & Co., Herbert 172
Shure Bros., Inc. 171
Sideband Engineers, Inc. 4
Sierra/Philco 146
Skylane Products 167
Sound History Recording 158
Space Electronics 174
Squires-Sanders, Inc. 165
Stevens & Co., Inc., J. P. 165
Swan Electronics Corp. 128, 129

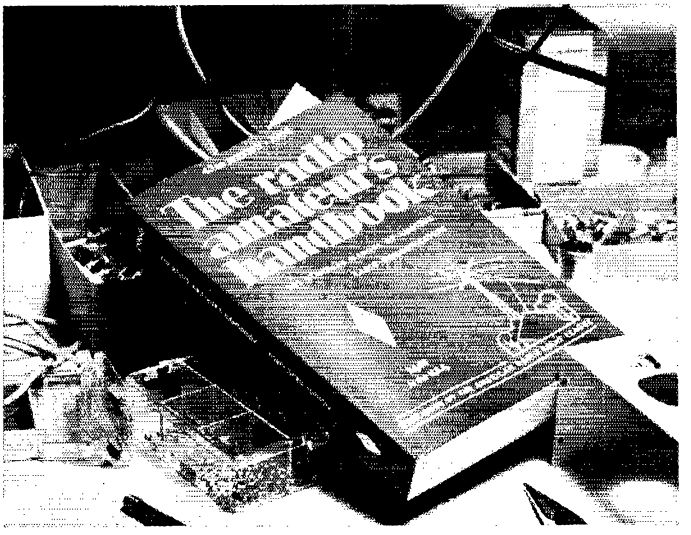
Tetrex Labs 169, 174
Tri-Ex Tower Corp. 138
Trigger Electronics 153

Unadilla Radiation Products 165
United States Fiberglass Co. 156
United Transformer Corp. ..... Cov. II

Van Sickle Radio Supply Co. 168
Vanguard Electronic Labs 130, 131
Vibroplex Co., Inc., The 169

Waters Manufacturing Co. 173
Webster Manufacturing 137
World Radio Labs 159

"TOOLS OF THE TRADE"



When you set out to build a piece of gear, all the tools must be at hand—soldering iron, long-nose pliers, "dikes," screwdrivers, wrenches and so on.

Another "tool" which has been on amateur—and professional—workbenches since 1926 is

THE RADIO AMATEUR'S HANDBOOK

Splattered with solder, dog-eared, the binding broken opposite the tube tables, the HANDBOOK competes with the hacksaw and an old B.C. chassis for space in the work area, never knowing the serenity of a bookshelf.

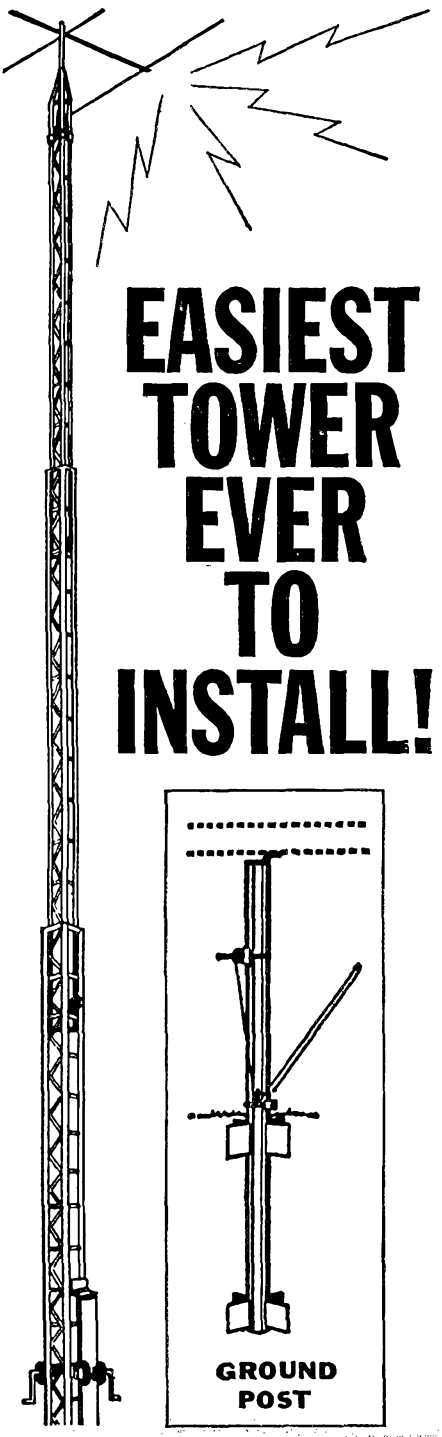
Check *your* copy; is it overdue for retirement in favor of the 1966 Edition? The 1966 Handbook has new information on Zener diodes, Varactors, mesa and planar transistors, silicon-controlled rectifiers. Plus two new receivers, two new transmitting units, a new mechanical-filter s.s.b. rig, three new RTTY units, a new antenna matcher and lots more.

Pick up your copy today at your local radio store, or send a check or money order direct to League headquarters.

$4.00 USA **$4.50 US Possessions and Canada** **$5.50 Elsewhere**

Clothbound Edition $6.50 USA, Possessions and Canada, $7.00 Elsewhere

The AMERICAN RADIO RELAY LEAGUE, Inc.
NEWINGTON, CONN. 06111



NOW! NEW!

★ All towers are now shipped almost completely assembled—for even EASIER installation!

★ All towers now have heavy duty, marine type geared winches—for greater safety and convenience!

EASIEST TOWER EVER TO INSTALL!

- No guy wires needed.
- All models telescope—easily cranked down for safety; eliminates high climbing...protects against windstorm...simplifies antenna installation. (Motorized crank-up available on heavy duty models.)
- Tilt-over mounting can bring beam to ground level.
- No concrete necessary! Wonder Ground Post (illustrated)...exclusive with E-Z WAY...can be used with most free standing installations... its stabilizing fins insure a solid setting under practically all ground conditions. Or, use building mount bracket kit.

HARRISON has the E-Z WAY that's right for your antenna...right for your pocketbook

There's no easier tower to erect than the rugged beauties built by E-Z WAY. Imagine... you don't even need concrete for most installations! And there's no better place to get the E-Z WAY that's best for you than from HARRISON... "Ham Headquarters, USA." Harrison experts give you competent and truly *objective* advice on tower problems. Harrison has the *entire* E-Z WAY line, to meet your needs precisely. Harrison gives you easy terms, guarantees full satisfaction. And...

HARRISON PAYS SHIPPING CHARGES TO YOUR DOOR!

Choose from 26 different models and sizes. Prices range from $54.95 to $1,627.50. One of the best ways to let Harrison's ham specialists help you select the best tower, rotator, antenna, etc., to give you maximum performance at lowest cost, is to get your FREE "Harrison Better Propagation Package." To get your copy, just fill in coupon below and mail today!

Bil Harrison
227 Greenwich St., N. Y., N. Y. 10007

Dear Bil:

Please rush my FREE "Harrison Better Propagation Package" at no obligation to:

NAME:_____ CALL:_____

ADDRESS:_____

_____

HARRISON

"HAM HEADQUARTERS, USA"®

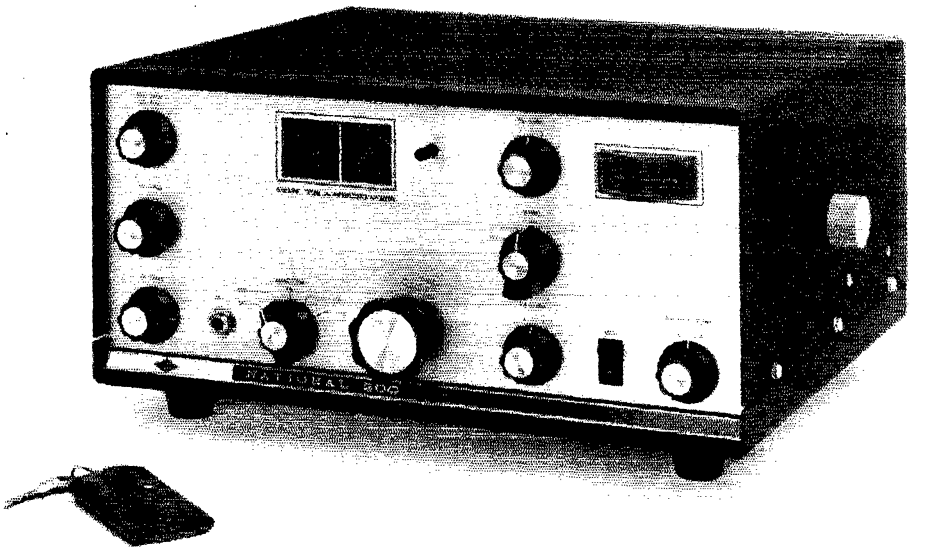
73 *Bil Harrison* W2AVA

Mail orders carefully and promptly filled.

227 Greenwich St., New York, N. Y. 10007
(212) BArclay 7-7922

[Visit Our Long Island Store
139-20 Hillside Avenue, Jamaica]

One for the road,



or... do you need a new rig for fixed-station use? Or a second or even third rig for vacation or even portable operation? Or a replacement for a single or tri-band transceiver? For that matter, the brand-new National 200 five-band transceiver, at only $359, is a natural for *anything* that demands top-notch SSB, CW, and AM performance on the 80 through 10 meter bands with minimal investment. Traditional National Workmanship and our one-year guarantee are yours, in a five-bander priced even lower than a kit rig!

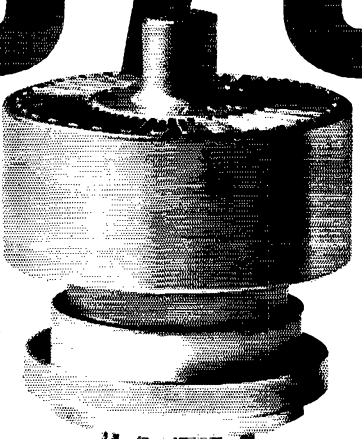
■ Complete coverage of the 80 through 10 meter bands. ■ 200 Watt PEP input on SSB, plus grid-block CW and AM. ■ Separate product and AM detection plus fast-attack slow-release AGC in all modes. ■ Crystal-controlled front end and single VFO gives high stability, plus identical calibration and tuning rate on all bands. ■ Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent channel QRM on receive . . . plus solid-state balanced modulator for "set-and-forget" carrier suppression. ■ Operates from new low-cost AC-200 supply ($75.00) or from NCX-A or mobile power supplies. ■ Extra features like: ALC; 45:1 planetary/split gear tuning drive; automatic carrier insertion in AM and CW modes; universal mobile mount included.

Your dealer has the National 200 in stock right now. See him today for a demonstration.

New National 200, of course.

NATIONAL RADIO COMPANY, INC., *37 Washington St., Melrose, Mass. 02176*

570



RCA-8122 beam power tetrode shown actual size.

watts

output in Class AB_2

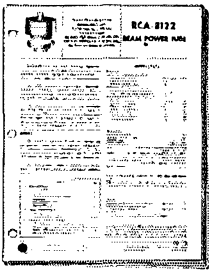
The RCA-8122 has power and reliability that's *hard to beat*—more than 50% greater dissipation capability than older tubes of comparable size. Used in the latest commercial equipment, or in your own project, the RCA-8122 can deliver power and efficiency with as little as 5 watts drive.

This low-cost forced-air-cooled beam power tube is designed with the builder in mind.... Use it with coaxial, strip-line, or conventional lumped tank circuit construction. Get broad-band neutralization on upper frequencies with only a series-tuned capacitor in one cathode lead. Ceramic-and-metal construction and special electrode configuration eliminate mechanically-caused noise and provide extreme sturdiness even at high operating temperatures.

Whether you're planning to buy or build, make sure you take advantage of the latest advances in tube technology with the RCA-8122—made by the people who gave you the 6146. On the amateur bands, it's years ahead!

Full CCS ratings up to 500 MHz. For use as rf power amplifiers; oscillator; regulator; distributed amplifier or linear rf power amplifier in fixed or mobile equipment . . .

• 380 Watts PEP Output at 30 MHz Class AB_1 • 570 Watts PEP Output at 30 MHz Class AB_2 • 300 Watts CW Output at 470 MHz Class C



For complete technical information, write to RCA Commercial Engineering, Harrison, N. J. for a copy of RCA-8122 Data Bulletin (Revised 6-66), and Application Guide ICE-300.

AVAILABLE THROUGH YOUR AUTHORIZED RCA INDUSTRIAL TUBE DISTRIBUTOR

RCA Electronic Components and Devices, Harrison, N.J.

The Most Trusted Name in Electronics