

February 1959

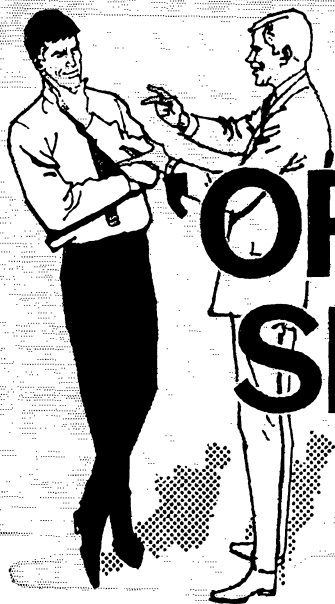
75 Cents

QST

Devoted entirely to

amateur radio

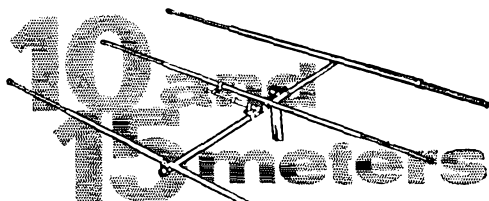
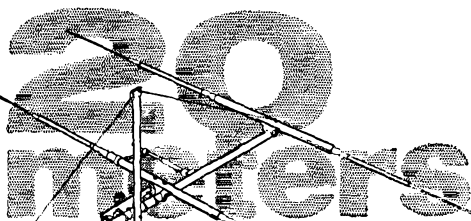




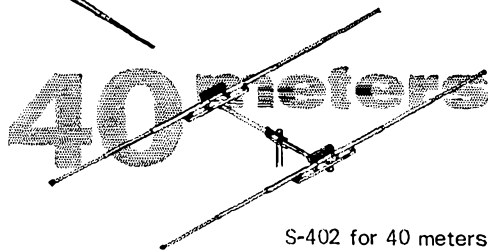
When hams
discuss
**OPTIMUM
SPACING'**
in single
band beams . . .

.....The subject turns to **Mosley**

Amateurs punch through the QRM on 20 meters with Mosley's A-203-C, an optimum spaced 20 meter antenna designed for full power. The outstanding, maximum gain performance excels most four to six element arrays. This clean-line rugged beam incorporates a special type of element design that virtually eliminates element flutter and boom vibration. Wide spaced; gamma matched for 52 ohm line with a boom length of 24 feet and elements of 37 feet. Turning radius is 22 feet. Assembled weight -- 40 lbs.



A-310-C for 10 meters
A-315-C for 15 meters
Full sized, full power, full spaced 3-element arrays. 100% rustproof all stainless steel hardware; low SWR over entire bandwidth; Max. Gain; Gamma matched for 52 ohm line.



S-402 for 40 meters
Top signal and unexcelled forward gain - a 2-element optimum spaced beam. 100% weatherproof. Low SWR. Heavy duty construction. Link coupling results in excellent match over full bandwidth.

For detailed specifications and performance data, write Dept 157A.

Mosley Electronics, Inc. 4610 N. Lindbergh Blvd., Bridgeton, Mo. 63042



10 reasons to buy Hallicrafters' new SR-400 Cyclone

FEATURE	Hallicrafters SR-400	Collins* KWM-2	Drake* TR-4
Power Input	SSB=400 watts CW=360 watts	SSB=175 watts CW=160 watts	SSB=300 watts CW=260 watts
Accessory "dual receive" VFO available	Yes	No	No
Noise Blanker	Yes	\$135.00 Accessory	No
Receiver Incremental Tuning	Yes	No	No
Built-in notch Filter	Yes	No	No
Sharp CW Filter	Yes 200 cycles	No	No
Sensitivity	.3 uv for 10 db S/N	.5 uv for 10 db S/N	.5 uv for 10 db S/N
1 kHz dial readout	Yes	Yes	No
Carrier Suppression	60 db	50 db	50 db
Unit Price	\$799.95	\$1,150.00	\$599.95

*Data from published specifications.

Now: can you think of one reason why you shouldn't?

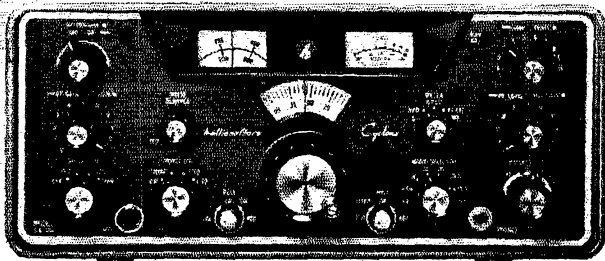
Superb sensitivity, 400 watts RF, 200 cycle CW selectivity, receiver incremental tuning, 1 kHz readout, amplified automatic level control, exclusive notch filter! There's even the HA-20 dual receive VFO for sensational, award winning DX operation. No matter what specifications or features you choose as a standard of comparison, the exciting new SR-400 fixed/mobile transceiver is unsurpassed. Unsurpassed feature for feature. Unsurpassed for rugged dependable performance in all environments. Unsurpassed in value and versatility. Prove it to yourself. Write for complete specifications in a four page brochure. See your Hallicrafters' distributor today.



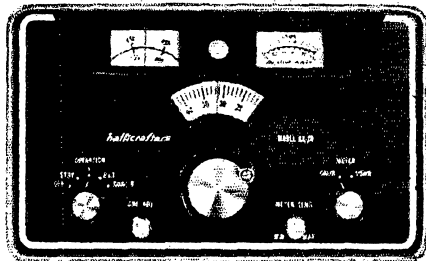
hallicrafters

600 Hicks Road
Rolling Meadows, Illinois 60008
A Subsidiary of Northrop Corporation

SR-400 Cyclone Transceiver



HA-20 VFO



Export: International Dept. Canada: Gould Sales Co.



EVER WONDER IF YOU'RE WANDERING?

With a Collins 32S-3 Transmitter, you'll know you're locked on frequency. That's because the 32S-3 has Collins' stable PTO, plus crystal-controlled beat frequency and HF conversion oscillators.

Don't be a drifter. See your Collins distributor.



COMMUNICATION / COMPUTATION / CONTROL

STAFF

JOHN HUNTOON, W1WQ
Editor

E. LAIRD CAMPBELL, W1CUT
Managing Editor

GEORGE GRAMMER, W1DF
Technical Editor

DONALD H. MIX, W1TS
DOUG DE MAW, W1CER
WALTER F. LANGE, W1YDS
ROBERT E. ANDERSON, K1TVF*
Assistant Technical Editors

EDWARD P. TILTON, W1HDQ
V.H.F. Editor

LEWIS G. McCOY, W1ICP
Beginner and Novice

ROD NEWKIRK, W9BRD
WILLIAM SMITH, W8HIP
LOUISE MOREAU, W8BBO
JOHN TROSTER, W6ISQ
Contributing Editors

ROBERT J. RINALDI, W1CNY
Advertising Manager

EDGAR D. COLLINS
Advertising Assistant

I. A. MOSKEY, W1MY
Circulation Manager

CARL E. SMITH, W1ETU
Assistant Circulation Manager

*On military leave of absence

OFFICES

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

Subscription rate \$7.50 per year post-paid, U.S. funds, in Canada and U.S.; \$8 elsewhere. ARRL Membership, including QST, available only to individuals with a bona fide interest in amateur radio: \$6.50 per year, U.S. funds, in Canada and U.S.; \$7 elsewhere. Single copies, 75 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. Copyright 1969 by the American Radio Relay League, Inc. Title registered at U.S. Patent Office. International copyright secured. All rights reserved. *Quedan reservados todos los derechos.* Printed in U.S.A.

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



OUR COVER
Some darkroom trickery provided this view of W6FFC's a.f.s.k. RTTY unit described on page 11.

QST

FEBRUARY 1969

VOLUME LIII NUMBER 2

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

—CONTENTS—

TECHNICAL —

A.F.S.K. for RTTY.....*Irvin M. Hoff, W6FFC* 11

The W8 High Radio Frequency Short Beam
David L. Walsh, W8HRF 16

A Simple Oscilloscope Calibrator
Clifford C. Buttschardt, Jr., W6HDO 18

T-Notch Filter for the HBR....*Jay F. Helms, W6HHT* 20

Bridge Break.....*Mark Pearson, W0ZJY* 28

A Transmitting Converter for 50 MHz.
H. Gordon Douglas, W8PMK 31

Gimmicks and Gadgets:
A C.W. Clipper-Filter Using FETs
R. W. Fish, W2OWF 35

Automatic Letter Spacing for ICKEY
Frank Van Cleef, W1WCG 38

A Novel Antenna For 80 and 40 Meters
Neil E. Handel, W1IR 40

More Twoer Changes.....*Doug DeMaw, W1CER* 41

Technical Correspondence..... 44

Recent Equipment
Allied A-2515 Receiver..... 49

BEGINNER AND NOVICE —

Limited-Space Antennas and Methods of Coupling
Lewis G. McCoy, W1ICP 24

OPERATING

Hassles..... 56

GENERAL —

225 Miles on 2300 MHz..... 53

Mailing the Club Bulletin....*Hugh Cassidy, WA6AUD* 55

The ARRL Museum of Amateur Radio..... 60

ARRL QSL Bureau..... 37

ARPSC..... 56

Coming Conventions..... 54

Correspondence From Members 68

Feedback.....48, 72, 88

Hamfest Calendar..... 54

Happenings of the Month..... 62

Hints & Kinks..... 46

How's DX?..... 78

IARU News..... 66

Index to Advertisers..... 142

"It Seems to Us....."..... 9

League Lines..... 10

Operating News..... 84

Silent Keys..... 98

Station Activities..... 89

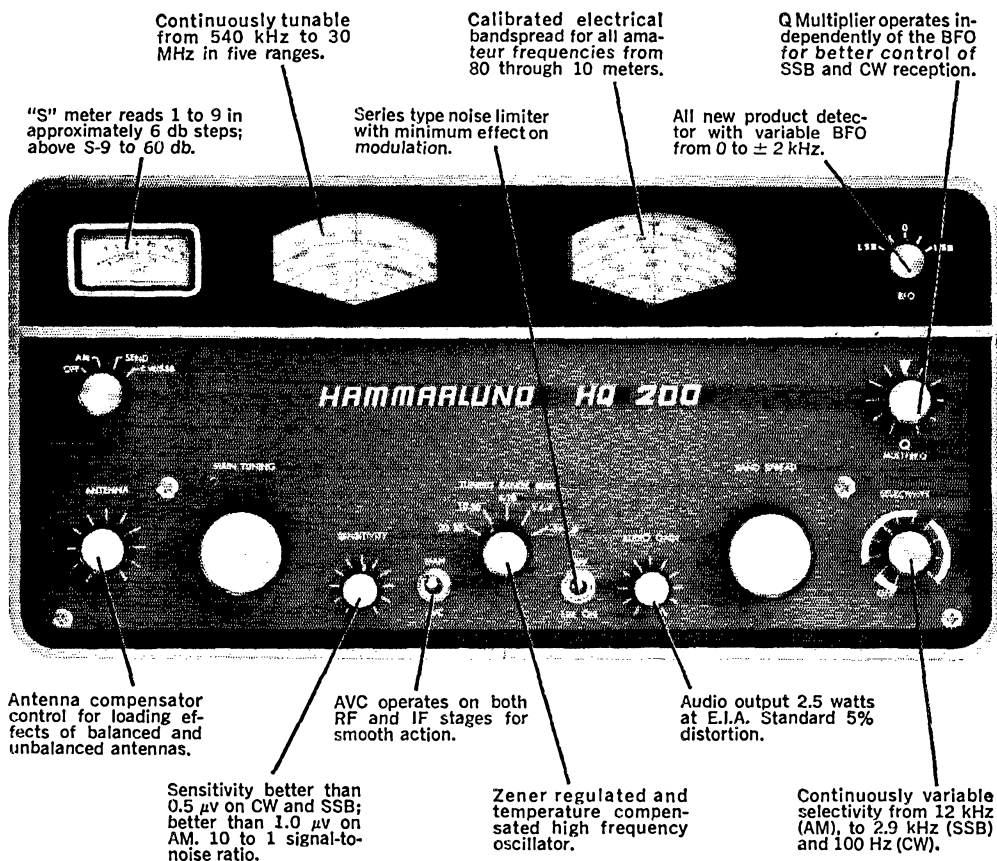
World Above 80 Mc..... 74

YL News & Views..... 70

25 Years Ago in QST..... 39

Take a good first look at the new HQ-200 general coverage receiver.

At only \$229.50, you won't need a second look.

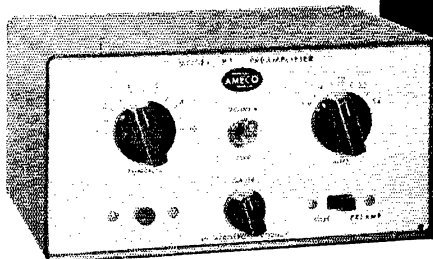


Write for the HQ-200 catalog sheet and a CQ magazine review of the outstanding HQ-215 Solid State Communications Receiver.



The **HAMMARLUND**
Manufacturing Company Incorporated

A subsidiary of Electronic Assistance Corporation
73-88 Hammarlund Drive, Mars Hill, North Carolina 28754



PRESENTING THE ALL NEW
AMECO PT
 ALL BAND TRANSCEIVER
 PREAMPLIFIER

- 6 THRU 160 METERS
- FEEDS 2nd RECEIVER

Model PT, with built-in power supply, transfer relay, connecting cables, wired and tested. Amateur Net \$49.95

- A frame grid pentode provides low noise figure with ability to handle strong signals, greatly improving the sensitivity of the receiver section of a transceiver.
- A unique built-in transfer circuit enables the PT to by-pass itself while the transceiver is transmitting. The PT also feeds the antenna input of a 2nd receiver as well as muting it.

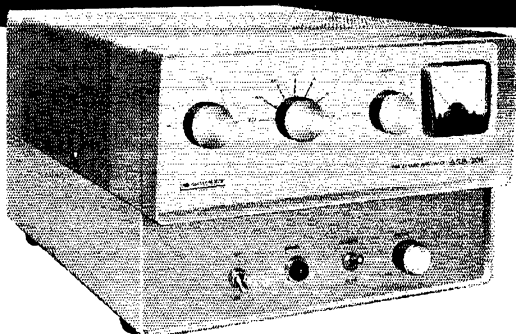
AMECO

DIVISION OF AEROTRON, INC. ▪ P. O. BOX 6527 ▪ RALEIGH, N. C. 27608



GSB 201 MK III
 10-80 METER LINEAR AMPLIFIER

...THE WORK HORSE



Exceptionally compact—only 8½" high, 12⅝" wide and 17" deep—the GSB 201 lends itself readily to table top mounting.

- Four (not two) type 572B tubes for a full 2000 watt P.E.P. SSB input.
- Full wave solid state power supply.
- Universal rear of cabinet circuitry may be connected for transceiver or receiver-transmitter use without internal modification.
- Plus many, many more features.

AMATEUR NET \$375.00

Also available: GSB 201 MK II — employs four type 811A economical triodes for 1500 watt P.E.P. input.

AMATEUR NET \$325.00

See your favorite distributor
 — Write for brochure

GONSET® ANOTHER DIVISION OF AEROTRON, INCORPORATED
 P. O. Box 6527 / Raleigh, North Carolina 27608

Section Communications Managers of the ARRL Communications Department

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

ATLANTIC DIVISION			
Delaware	K3NYG	John L. Penrod	RFD 1
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4607 Convent Lane
Maryland-D. C.	K3LFD	John Munholland	306 Holland Rd.,
Southern New Jersey	W2ZI	Edward G. Raser	19 Blackwood Drive
Western New York	K2KTK	Richard M. Pitzeruse	303 Woodland Rd.
Western Pennsylvania	W3GJY	John F. Wojtkiewicz	1400 Chaplin St.
CENTRAL DIVISION			
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.
Indiana	W9BUQ	William C. Johnson	2838 Hillside Ave.
Wisconsin	K9GSC	Kenneth A. Ebnetter	822 Wauna Trail
DAKOTA DIVISION			
Minnesota	W0TCK	Herman R. Kopschke, Jr.	RFD 2
North Dakota	W0DM1	Harold L. Sheets	21 Euclid Ave.
South Dakota	K0TXW	Seward P. Holt	Box 58
DELTA DIVISION			
Arkansas*	W4S1S	Robert D. Shoeler	409 West Cedar
Louisiana	W5PM	J. Allen Swanson, Jr.	RFD 1, Box 354-E
Mississippi*	W4SKEY	Clifton C. Comfort	310 E. Washington St.
Tennessee	K4R2T	Harry A. Phillips	5200 Oak Meadow Ave.
GREAT LAKES DIVISION			
Kentucky	W4OYI	George S. Wilson, III	2113 Old Cabin Road
Michigan	W8FX	Ralph P. Thetreau	27209 W. Six Mile Road
Ohio	W8ETU	Richard A. Egbert	6479 Red Fox Road
HUDSON DIVISION			
Eastern New York	K2S1N	Graham G. Berry	50 Parrot Ave.
N. Y. C. & Long Island	K2FD3	Rene S. Johnson	258 Cypress St.
Northern New Jersey	W2ZZ	Louis J. Amoroso	180 Pleasant Ave.
MIDWEST DIVISION			
Iowa	K0MHX	Wayne L. Johnson	Rural Route #1
Kansas	K0BXX	Robert M. Summers	3045 North 72nd
Missouri	W9GS	Alfred E. Schwaneke	Route 1, Box 169
Nebraska	K0OAL	V. A. Cashon	334 Pine St., Box 488
NEW ENGLAND DIVISION			
Connecticut	W1GVT	John J. McNassor	218 Berlin Ave.
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.
Maine	K1BYG	Herbert A. Davis	RFD 1
New Hampshire	W1SWX	Robert Mitchell	Box 137-A, RFD
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.
Vermont	K1M1N	E. Reginald Murray	3 Hillcrest Drive
Western Massachusetts	W1STR	Norman P. Forest	36 Valley Rd.
NORTHWESTERN DIVISION			
Alaska	KL7AEQ	Albert F. Weber	Box 735
Idaho	W7ZNN	Donald A. Crisp	3408-8th St. F
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave.
Oregon	K7WWR/WA7KTV	Dale T. Justice	1369 N. E. Sunrise Lane
Washington	W7BQ	William R. Watson	1005 E. 1st Ave.
PACIFIC DIVISION			
East Bay	K6LRN	Richard Wilson	629 Blue Ridge Dr.
Hawaii	KH6BZF	Lee R. Wical	45-601 Luuku Rd.
Nevada	W7FBV	Leonard M. Norman	652 Utah St.
Sacramento Valley	W6AJYT	John E. Mink, III	6220 Rio Bonito Drive
San Francisco	W6AUD	Furg Cassidy	7 Coleman Drive
San Joaquin Valley	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.
Santa Clara Valley	W6NVO	Edward T. Turner	2837 Fernwood Ave.
ROANOKE DIVISION			
North Carolina	W4BNU	Barnett S. Dodd	420 West Franklin St.
South Carolina	W4PED	Charles N. Wright	711 Merriweather Drive
Virginia	W4SEJ	H. J. Hopkins	8600 Hammett Ave.
West Virginia	W8JM	Donald B. Morris	1136 Morningstar Lane
ROCKY MOUNTAIN DIVISION			
Colorado	K0FDH	Richard Hoppe	Star Route
New Mexico	W5WZK	Kenneth D. Mills	Rt. 1, Box 654 F
Utah	W7QWH	Thomas H. Miller	3184 South 3360 East
Wyoming	W7QQL	Wayne M. Moore	142 South Montana Ave.
SOUTHEASTERN DIVISION			
Alabama	W4WLG	Donald W. Bonner	2208 Rodgers Dr.
Canal Zone	KZ5OB	Russell E. Oberholzer	P.O. Box 107
Eastern Florida*	W4ANEV	W. G. Blasingame	716 Magnolia St.
Georgia	W4RZL	Howard E. Schorher	Box 1902
West Indies	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073
Western Florida	W4RKH	Frank M. Butler, Jr.	323 Elliott Rd., S.E.
SOUTHWESTERN DIVISION			
Arizona	W7CAF	Gary M. Hamman	2813 E. Campbell Ave.
Los Angeles	K8UMV	Donald R. Etheredge	12040 Redbank St.
Orange	W6DEY	Ray R. Maxson	1434 South Olive St.
San Diego	W6GMM	James E. Emerson, Jr.	661 Foyle Way
Santa Barbara	W6OKN	Cecil D. Hinson	1933 Coventry Court
WEST GULF DIVISION			
Northern Texas	W5LR	L. E. Harrison	1314 Holly Glen Drive
Oklahoma	W5PML	Cecil C. Cash	1802 Smith Ave.
Southern Texas	W5AIR	G. D. Jerry Sears	5634 Eskridge St.
CANADIAN DIVISION			
Alberta*	VE6FK	Don Sutherland	444-25th Ave., N.E.
British Columbia	VE7FB	H. E. Savage	4553 West 12th Ave.
Manitoba	VE4JT	John Thomas Stacey	19 Cottonwood Cres.
Maritime	VE1NR	William J. Gillis	Shediac Road, RR 6
Ontario	VE3BUX	Roy A. White	6 Northwood Crescent
Quebec	VE2OJ	Jim Ibej	1755 Brookdale Ave.
Saskatchewan	VE5HP	Gordon C. Pearce	1903 Connaught St.
Townsend 19734			Philadelphia 19114
Severna Park, Md. 21146			Indianapolis 46218
Whiteburta Gardens			Portage 53901
Trenton 08628			
Syracuse 13219			
Conway 15027			
Springfield 62703			
Indianapolis 46218			
Portage 53901			
Janesville 56048			
Grand Forks 58201			
Clear Lake 57226			
Brinkley 72021			
Covington 70433			
Kosciusko 39090			
Memphis 38128			
Owensboro 42301			
Detroit 48240			
Reynoldsburg 43068			
New Rochelle 10801			
Massachusetts Park, L. I. 11762			
Bergenfield 07621			
Kellerton 50133			
Kansas City 66109			
Rolla 65401			
Chadron 69337			
Southington 06489			
Braintree 02185			
Franklin 04634			
Chester 03038			
Pawtucket 02860			
Montpelier 05601			
Springfield 01119			
College 99735			
Lewiston 82501			
Anacosta 87911			
Hillsboro 97123			
Ellensburg 98926			
Martinez 94553			
Kanoodle 98744			
Boulder City 89005			
Carlsbad 95608			
San Rafael 94901			
Fresno 93702			
San Mateo 94403			
Salisbury 28144			
North Augusta 29841			
Norfolk 23503			
Fairmont 26554			
Idaho Springs 80452			
Albuquerque 87102			
Salt Lake City 84109			
Casper 82601			
Huntsville 35811			
Margarita			
Neptune Beach 32050			
Columbus 31902			
Caparra Heights			
San Juan, P R 00922			
Fort Walton Beach 32548			
Phoenix 85016			
Sun Valley 91352			
Santa Ana 92707			
San Diego 02117			
Thousand Oaks 91360			
Dallas 75232			
Lawton 73501			
Houston 77023			
Calgary, Alta.			
Vancouver 8, B. C.			
Brandon			
Moncton, N. B.			
Belleville			
Dorval, P. Q.			
Regina			

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

The FM-2400C provides an accurate standard frequency signal for testing and adjustment of mobile transmitters and receivers at predetermined frequencies between 25 and 500 MHz. Up to 24 crystals may be inserted into the meter. The frequencies can be those of the radio frequency channels of operation, and/or of the intermediate frequencies of the receivers between 5 MHz and 40 MHz. Frequency stability (standard) $\pm .001\%$ from 32° to 122°F. Frequency stability with built-in thermometer, calibrated crystals and temperature corrected charts, .00025%

from +25°F to +125°F. (.000125% special 450 MHz crystals available)

FM 2400C (Meter Only).....\$445.00

RF Crystals

Hi Band.....\$24.00 ea.

Lo Band..... 15.00 ea.

IF Crystals 8.00 ea.

Write for free catalog.



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



Now With Solid State Circuitry & Rechargeable Batteries

ICM FM-2400C
frequency meter...

- Completely Portable
- Tests Predetermined Frequencies
25 MHz - 500 MHz

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, W8TSN, 1952-1962
HERBERT HOOVER, JR. W6ZH, 1962-1966

Officers

President ROBERT W. DENNISTON,* WØDX
Box 73, Newton, Iowa 50208

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

Vice-Presidents ROEMER O. BEST, W5QKF
P. LANIER ANDERSON, JR., W4MWH

Secretary JOHN HUNTOON, W1LVQ

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

Honorary Vice-President FRANCIS E. HANDY, W1BDI

General Manager JOHN HUNTOON,* W1LVQ

Communications Manager GEORGE HART, W1NJM

Technical Director GEORGE GRAMMER, W1DF

Assistant General Manager RICHARD L. BALDWIN, W1KE

Assistant Secretaries PERRY F. WILLIAMS, W1UED
WM. I. DUNKERLEY, JR, WA2INB ROBERT M. MYERS, W1FBY
225 Main St., Newington, Connecticut 06111

General Counsel ROBERT M. BOOTH, JR., W3PS/K4PS
1150 Connecticut Avenue, N. W., Washington, D. C. 20036

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

DIRECTORS

Canada

NOEL B. EATON* VE3CJ
Box 660, Waterdown, Ontario
Vice-Director: Collin C. Dumbrie VE2BK
116 Oak Ridge Drive, Bale d'Urfe, Quebec

Atlantic Division

GILBERT L. CROSSLEY W3YA
734 West Foster Avenue, State College, Pa. 16801
Vice Director: Harry A. McConaghy W3EPC
8708 Fenway Dr. Potomac, Bethesda, Md. 20034

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
Box 226A R.R. 1, South St. Paul, Minn. 55075
Vice Director: John M. Maus WØMBD
Oakdale Addition, St. Cloud, Minn. 56301

Delta Division

PHILIP P. SPENCER W5LDH/W5LXX
575 Amethyst St., New Orleans, La. 70124
Vice Director: Max Arnold W4WHN
612 Hogan Road, Nashville, Tenn. 37220

Great Lakes Division

ALBAN A. MICHEL W8WC
359 Bonham Rd., Cincinnati, Ohio 45215
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 Zuk 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: Ralph V. Anderson KØNL
528 Montana Ave., Holton, Kansas 66436

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: David O. Bennett W7QLE
Box 455, St. Helens, Ore. 97051

Pacific Division

J. A. DOC GMELIN W6ZLJ
10835 Willowbrook Way, Cupertino, Calif. 95014
Vice-Director: G. Donald Eberlein W6YHM
P. O. Box 475, Palo Alto, Calif. 94302

Roanoke Division

VICTOR C. CLARK W4KFC
12927 Popes Head Road, Clifton, Va. 22024
Vice-Director: L. Phil Wicker W4ACY
4821 Hill Top Road, Greensboro, N. C. 27407

Rocky Mountain Division

CARL L. SMITH* WØBWJ
1070 Locust St., Denver, Colo. 80220
Vice-Director: Thomas G. Banks W5HJ
6500 Mossman, N.E., Albuquerque, N. M. 87110

Southeastern Division

CHARLES J. BOLVIN W4LVV
2210 S.W. 27th Lane, Miami, Fla. 33133
Vice-Director: Albert L. Hamel K4SJI
320 N.E. 25th Street, Pompano Beach, Fla. 33064

Southwestern Division

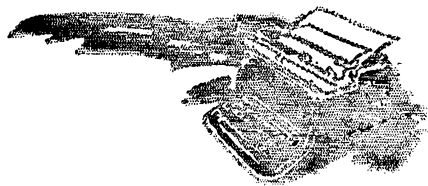
JOHN R. GRIGGS W6KW
11422 Zelzah Ave., Granada Hills, Calif. 91344
Vice-Director: Arnold Dahlman W8UEI
14940 Hartland St., Van Nuys, Calif. 91405

West Gulf Division

ROY L. ALBRIGHT W5EYB
107 Rosemary, San Antonio, Texas 78209
Vice-Director: Lester L. Harbin W5BNG
4515 Calmont, Fort Worth, Texas 76107

* Member Executive Committee

"It Seems to Us..."



CONVERSATION DISCIPLINE

A LETTER in Correspondence this month chastises "unprincipled idiots" who break in on another QSO to warn against a developing conversation on politics (or sex, or religion). While the breaking in may not have been accomplished in a courteous (or even legal) manner, the complaint revolves less around procedure than the basic right to unrestricted choice in the substance of communication.

The main peeve, well expressed, is with humdrum QSOs. Few are inclined to argue that point. We all like a guy at the other end who indeed is "alive, alert and aware." But if we want to discuss the rights and wrongs of happenings at the United Nations, why Christianity is better (or worse) than Buddhism, or some clinical details, let us do so in his (or our) living room. Or in a bar. *Not* on the air.

It is your right to speak as you wish in the privacy of your home, or in a group of selected people with like tastes (or lack thereof). But does this right extend to transmitting such conversations on the air, where they can be heard by others who find them offensive, or heard by people who will misunderstand the conversations because of different cultural backgrounds?

In some minds it is downright unAmerican to question full freedom of speech. Doing so will label us also as against motherhood, liberty, and the pursuit of happiness. But absolute freedom of speech can be as bad or worse than no freedom at all, and failure to question a radical application of its principles can lead to complete chaos and disintegration.

We have already seen some examples in the sentencing of several amateurs for obscenity. We cannot avoid our responsibility with the let-George-do-it excuse that FCC has rules prohibiting such language. The case should never have come to court (and thus public attention) if we indeed had been keeping our own house in order and nipped this in the bud — *before* it got out of hand. If we do not challenge questionable activities ourselves, and official enforcement becomes inadequate, FCC will eventually be obliged to ask which of the bases and purposes in the amateur rules is being served through such conversations.

The unwritten rule on politics also has some stark realities, particularly if we are discussing international politics on a band with any DX possibilities. Government officials will certainly have a dim view of the value of amateur radio if even a small percentage of our conversations deal with criticism of other nations' ideals, ethics, policies and attitudes. Freedom of speech does not include the right to offend a substantial segment of the population, domestic or world. Such discussions could adversely affect a vote at an international allocations conference, which would be rather a high price to pay for "freedom of speech."

Many of us feel capable of using our own good judgment in keeping conversations on "restricted" subjects within acceptable bounds. The difficulty here is that one cannot be at all certain that acceptable conversation in one circle has the same status everywhere. For example, there is no real measure of agreement today on what constitutes obscenity. The best thing to do is steer completely clear of sticky subjects.

Amateur radio is a privilege to be earned — not an inherent right. With privilege goes responsibility. The guy who insists on his right to absolute freedom of speech, and thus his "right" to say almost anything he pleases on the air no matter how offensive to others, may care little about the potential loss of his own license. The real point is he risks *your* status, and mine, by raising the basic question of whether amateur radio is really in the public interest.

And so we say hooray for all "unprincipled idiots" who, by reminding us of the unwritten law, help keep us away from heated discussions on politics, sex and religion. QST

ARE YOU LICENSED?

- When joining the League or renewing your membership. It is important that you show if you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

League Lines . . .

Some 30 nominees for each of the new advisory committees were of such outstanding calibre that ARRL Prexy WØDX felt obliged to expand the planned membership. Even then he had a hard time making the final selections: VHF Repeaters -- WØCXW (Chairman), VE3ADO, W2ODC, W4GCE, W5VPQ, W6GDO, W6MEP, W7FHZ, W9BUB. Contests -- W6CUF (Temporary Chairman), VE2NV, W1AX, K2CPR, W3GRF, W4BRB, W8DB, W9RQM, WAØSDC. More next month.

FCC allowed new tariffs filed by AT&T (with concurrence from other major companies) to go into effect January 1, covering connections of customer-furnished accessories. In our case this means phone patches finally become respectable! Where direct electrical (as compared with acoustic) connection is to be made, the phone company provides a different instrument plus a "voice coupler" to insure correct operation. (There is currently a battle, scheduled for a later hearing, on whether the customer can furnish his own protective unit.) But there is a price -- a one-time installation charge and a monthly rental fee. Though in some states utility commissions have delayed approval of new tariffs, it is likely that by now your local company has details as well as the interface equipment on hand.

While no formal announcement has been made, alien amateurs authorized to operate here under reciprocal agreements are not affected by the "incentive licensing" restrictions of band segments and modes. The variety of classes of license in other countries makes it wholly impractical to set up a comparison or parallel list with our own.

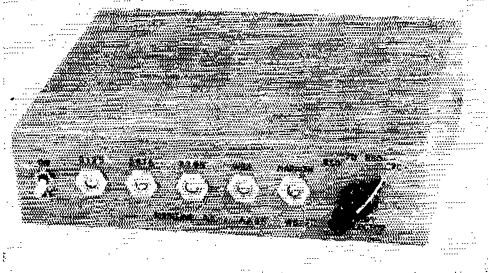
A million bucks worth of TVI -- that's what a Sarasota neighbor of W4GJO is suing for! "Grid" has a clean bill from the TVI committee and FCC; he's defending the suit with vigor, plus liaison with ARRL's attorney. No one knows better than we that one can be sued for most anything, rightly or wrongly, and that it takes a bit of time for justice to triumph.

Clever fellows, these Novices -- during the January VHF shindig we found several on 2-meter c.w. with A-2 produced by an oscillator in front of the mike. Fine, but watch the background noise! Coughs, dishes rattling, phones ringing -- all constitute telephony which is not permitted. If you can't feed the audio tone directly to the mike input, put the oscillator and mike in a soundproof box to eliminate room noise and casual conversations.

Thanks to more than 100 of you who made suggestions for a new heading covering the letters-to-the-editor department. The job of picking a winner is now in progress. Supporters of retaining the simple "Correspondence" showed surprising strength!

FCC rules now require an application for modification of your license to be filed before you operate from a new location, and within four months of your move. This applies whether or not you are operating at a new QTH. Fines and revocations have been visited on non-compliers. Keep your address up-to-date on FCC files.

Watch for the bright yellow cover of the new Handbook, this year again substantially revised by W1CER. Get yours early -- before the printing is sold out as occurred last year.



The chassis for W6FFC's audio frequency-shift keyer is 6 by 8 by 2 inches, and is covered with adhesive shelf paper (similar to the author's frequency standard described in November 1968 QST). The standard 850 and 170 shifts are available, as well as adjustable "wide" and "narrow" shifts.

A.F.S.K. for RTTY

Introducing the "Mainline AK-1"

BY IRVIN M. HOFF,* W6FFC

THE initials "a.f.s.k." stand for *audio frequency shift keying*.

On the v.h.f. bands, where either a.m. or f.m. transmitters are used for RTTY purposes, audio tones are fed into the microphone input to transmit the RTTY signal. The "mark" tone, usually 2125 Hz., is changed from 2125 to 2975 for "space" as the keyboard contacts open and close, thus transmitting a frequency-shifted audio signal. The receiver at the other end feeds these audio tones into a *demodulator* (sometimes called a "TU" or "converter") which changes the tones into d.c. pulses that operate the Teleprinter.

On the bands between 3.5 and 30 MHz., the audio tones from a good a.f.s.k. unit could be fed to the audio input of a top-notch s.s.b. transmitter, a method that was discussed in some detail by the author in an earlier article.¹ However, that article was written in 1965, and it is possible that the reader may not have access to it, so some of the pertinent details will be covered again.

If you use a.f.s.k. on a single-sideband transmitter several problems *can* exist. It is the *extent* to which they exist that is important. You may have the carrier at, say, 14,090.000 kHz. The mark tone will be 2125 Hz., so you will have one sideband (the desired one) at 14,087.875 kHz., 2125 Hz. lower than the carrier, and another at 14,092.125, 2125 Hz. higher than the carrier. With a good s.s.b. transmitter the carrier will be well suppressed and the unwanted sideband at 14,092.125 *should* be completely out of the picture. Carrier suppression and unwanted sideband suppression become very important if you want to operate a.f.s.k. into an s.s.b. transmitter.

Unless you have at least 60 db. of carrier and sideband suppression, a.f.s.k. is best left to others. The FCC is very strong on this point:

"Amateur licensees contemplating the use of audio tones via s.s.b. suppressed carrier transmitters for the generation of A1 and/or F1 emissions are cautioned that any radiation of the carrier or suppressed sideband frequencies at an intensity sufficient to cause interference in receiving equipment of good engineering design constitutes spurious radiation in violation of Section 97.73". [Docket 15267, Released 7 July 1964]

Experience shows that the better s.s.b. transmitters do well enough on suppression to avoid any problems. As an active RTTY enthusiast, I can truthfully say that I have never noticed any interference from stations using a.f.s.k. on s.s.b. units, although the possibility, of course, exists.

What Kinds of S.S.B. Transmitters Are "OK" for A.F.S.K.?

This is a difficult question to answer. In general, s.s.b. transmitters using mechanical filters have excellent sideband suppression, particularly when the tones of 2125 and 2975 are used (a small change in the carrier-oscillator frequency is needed in many s.s.b. transmitters to transmit the 2975 tone; more on this later).

Perhaps most transmitters using mechanical filters or crystal lattice filters would be acceptable when teamed with an appropriate a.f.s.k. unit. The phasing type of s.s.b. transmitter would most likely give marginal results unless perfectly adjusted for carrier and sideband suppression. Phasing rigs seldom hold these critical adjustments over long periods of time.

Unless you have a transceiver, f.s.k. (carrier shift as opposed to audio shift with suppressed carrier) is usually a better approach to getting

* 12130 Foothill Lane, Los Altos Hills, Calif. 94022.

¹ Hoff, "Audio Frequency-Shift Keying for RTTY," QST, June, 1965.

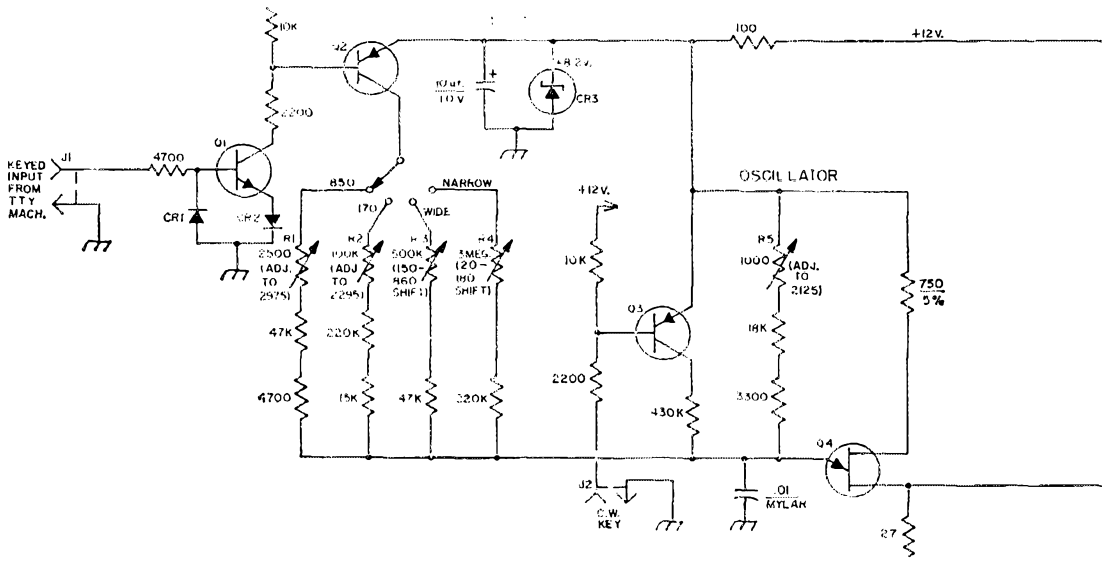


Fig. 1—Circuit of the AK-1 audio frequency-shift keyer. Capacitors with polarity shown are electrolytic; others are paper except as indicated. Fixed resistors are 1/2-watt composition.

on the 3-30-MHz. RTTY bands. Putting a small keyer near the v.f.o., p.t.o. or l.m.o. (depending upon what the manufacturer calls his tuning arrangements) and then connecting it to the cathode pin on the oscillator tube usually results in excellent RTTY transmission. No changes are actually made in the transmitter, thus you are not "digging into it" at all, nor will the resale value be adversely affected since you can remove the keyer(s) in a few moments. F.s.k. has been covered quite adequately in past issues² so it will not be discussed further.

What About Transceivers?

A transceiver on RTTY usually is a nuisance. It is much better to have a separate receiver and transmitter. Even a remote v.f.o. for a transceiver offers a lot of advantages. Since there have been many requests for information on the use of s.s.b. transceivers on RTTY, though, some comments are in order. First, few transceivers will transmit or receive the standard tones of 2125 and 2975 adequately. Second, it is not at all convenient to use f.s.k. on most transceivers.

With respect to a.f.s.k., don't use it at all on RTTY unless the transceiver has a crystal-lattice or mechanical-filter sideband system. If anything other than these two, contact the manufacturer to see whether he feels the sideband and carrier suppression are adequate for use with a.f.s.k. — if he does, you have at least a partial "out" should you hear from the FCC later!

² Hoff, "Transmitting Radioteletype," *QST*, May, 1965.

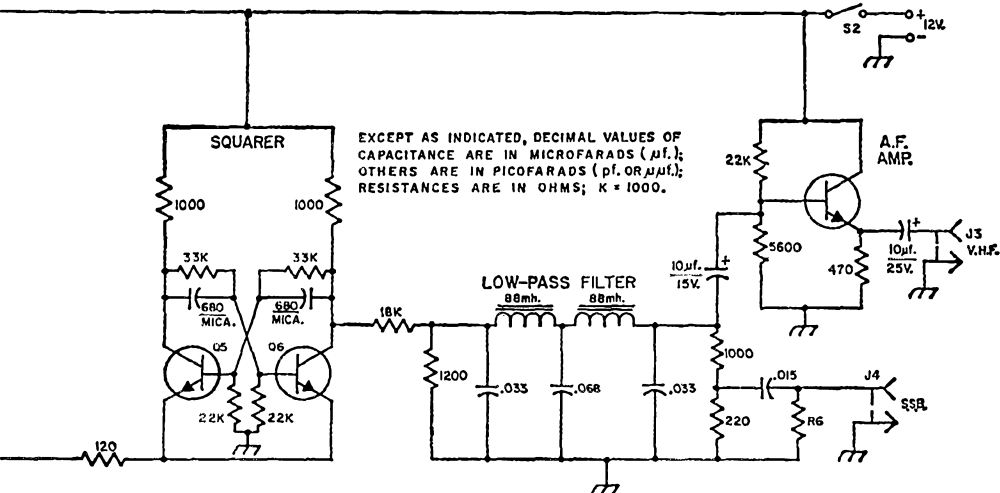
If you feel that the transceiver meets the minimum requirements, then we recommend you do build an adequate a.f.s.k. unit.

Audio Tones

The only reason for using tones other than 2125 and 2975 is the relatively narrow bandwidth of the s.s.b. unit, whether a transmitter, receiver or transceiver. At first glance, you might think you had to use a combination such as 1275 mark and 2125 space, because many s.s.b. receivers and transmitters have audio bandwidths of only 300-2400 Hz. The truth is that in practically any of these transmitters a slight modification will let the 2975-Hz. tone through with no problem at the same time, it usually improves both the carrier suppression and the unwanted sideband suppression considerably.

Most s.s.b. units have a crystal-controlled carrier oscillator or b.f.o. By substituting a crystal approximately 1 kHz. farther from the filter passband you immediately change the audio passband from 300-2400 to 1300-3400 Hz. Find the "lower-sideband" crystal, and order another that is one kHz. lower. For instance, in the Collins S-line transmitters and receivers the lower-sideband crystal is 453.650 kHz. A 452.650 crystal will give you 1300-3400 Hz. audio. A similar calculation on any s.s.b. unit with a crystal-controlled b.f.o. will give adequate results.

This makes it quite simple to use the "normal" tones of 2125 and 2975 Hz. You run into too many problems in trying to use 1275 and 2125: harmonics, keying transients, filter construction, filter balance, and so on. Although tones of 1275



CR₁, CR₂—Silicon; type not critical (1N4816 used).
 CR₃—8.2-volt Zener, 1 watt (1N4738).
 J₁—J₄, incl.—Phono jacks.
 Q₁, Q₅, Q₆, Q₇—Silicon, n-p-n; Motorola MPS-3394 or equivalent.
 Q₂, Q₃—Silicon, p-n-p; Motorola MPS-3702 or equivalent.

Q₄—Unijunction; 2N4871 or equivalent.
 R₁, R₂, R₅—Linear taper.
 R₆—For output level setting; see text.
 S₁—Rotary, 1 section, 1 pole, 4 positions used.
 S₂—S.p.s.t. toggle.

and 2125 may appear to be the easy way out, this is not true at all.

Some receivers and transmitters have a place for an optional filter for RTTY or c.w., in which case they often also have provision for an extra b.f.o. crystal. In many cases you can put the new crystal in that unused vacant spot. If no such spot is available your problem is still somewhat simple. Get a small toggle switch (Switchcraft makes them to fit into a 1/4-inch diameter hole) and mount it in the chassis as close to the lower-sideband crystal as is convenient. The switch should be a single-pole, double-throw type for most transmitters. Hook one side of the lower sideband crystal to one side of the switch and one side of the new RTTY crystal to the other side of the switch. The switch arm, of course, goes to the point where the lower-sideband crystal originally was connected. The other side of the new crystal hooks to the common side of the original sideband crystal.

You now have the option of using either RTTY or s.s.b. when in the lower-sideband position. If the transceiver is habitually used on 20 meters where upper sideband is customary, the chances are the switch can be left in the RTTY position without inconveniencing the owner at all.

If separate receivers and transmitters are used in transceive you will find it necessary to get new b.f.o. crystals for both the transmitter and the receiver. Then they will both achieve similar audio passbands when locked together.

Oscillator Transients and Harmonics

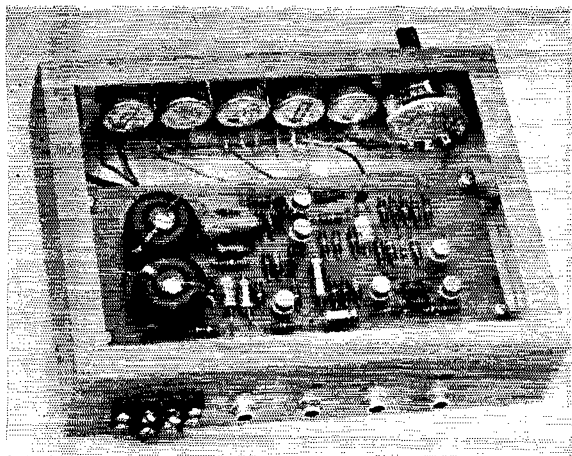
In our a.f.s.k. article in June 1965 *QST*, a unit designed by K3NIO was included. The AK-1

is basically the same thing, but with refinements that add to its versatility, such as narrow-shift c.w. identification and the addition of outputs for both v.h.f. and s.s.b. transmitters. The biggest change is the elimination of the need for separate positive and negative 12-volt power supplies.

All other a.f.s.k. circuits which I have seen published in the past ten years used LC oscillators, usually with one 88-mh. toroid with a 0.033-μf. capacitor across it for 2975 Hz. and an additional 0.03 or 0.033 μf. to go to 2125 for mark. Since adding capacitance to an LC circuit lowers the audio frequency, and since the mark tone is used as the reference, you can see the problem in trying to achieve any shift other than 850 with this type of circuit. It is also a problem to get narrow-shift c.w. identification that will come out "right side up." The greatest problem, though, arises from rapidly changing the frequency of a resonant LC circuit: the inductor generates a back e.m.f. which creates a "spike" on the waveform. The spike created by the 88-mh. toroid in a typical a.f.s.k. unit can cause momentary overdrive of the transmitter, causing distortion and spurious radiations.³

Also, these oscillators have strong harmonics,

³ The effect that the author is discussing here is similar to the spikes that occur on c.w. keying waveforms as a result of, among other things, poor regulation in the power supply. When these spikes are eliminated, however, there remains the bandwidth attributable to the rate at which the keyed character is started and stopped. Unless some provision is made to shape the keying waveform, by slowing up the transition from off to on (and vice versa) in amplitude keying, or from one frequency to the other (in frequency keying) there can be key clicks that occupy more than the necessary keying bandwidth. — Editor.



External connections are on the rear chassis wall. Aside from these and the controls lined up on the front wall, all components are mounted on a $5\frac{1}{2} \times 3$ -inch etched board supported by brackets from the side walls of the chassis. The audio low-pass filter is at the left in this view. The unijunction oscillator and the keying circuits occupy the right-hand section of the board.

particularly the even harmonics, while few, if any, simple a.f.s.k. units use any type of low-pass filter to eliminate them. Although the transmitter itself will probably pass only the 2125 tone, the harmonics at 4250, 6375, and so on can adversely affect the audio and sideband stages. Furthermore, to get from 1275 to 2125 with an LC oscillator (many are thoroughly convinced they "have to" use those tones), you just about have to double the size of the additional capacitor. What does this do to the back e.m.f. created by the inductor? Increases it somewhat, of course, as it now resists even more making this greater change in resonant frequency. Thus the problems with 2125 and 2975 Hz., using an LC oscillator, are aggravated with 1275 and 2125. And what about the harmonics? Now we have 1275, 2550, 3825, 5100, 6375, etc., etc. That 2550 tone, in particular, very likely will go right on through the transmitter, perhaps affecting copy at the other end. Still need to be convinced that a simple LC oscillator using 1275 and 2125 doesn't create more problems than it solves?

The fact that the typical a.f.s.k. circuit is simple and inexpensive is hardly justification for putting a mediocre system on a relatively expensive piece of equipment, when for only a few dollars more you could have additional benefits and do it right at the same time.

Requirements for Good A.F.S.K.

A few requirements are "musts" if you are talking about a decent a.f.s.k. unit, and some other features are in the "nice-to-have" category.

In the "must" department, we would want:

1) No keying transients on going from mark to space.

2) Negligible harmonic content to create distortion in the transmitter.

3) Proper output level for the transmitter to be used.

In the "nice-to-have" department, we could add several things, but let's try these.

1) 170 shift as well as 850 shift

2) Perhaps one or two positions for other shifts to experiment with.

3) Narrow-shift c.w. identification.

4) Output to match either carbon or high-impedance mike inputs.

5) An input that will readily adapt to numerous different arrangements to suit the user.

In addition to such operating features, it would be advantageous to make the unit solid-state, for low power consumption and small size, as well as to allow use of an easily-duplicated printed circuit board.

Thus was the Mainline AK-1 a.f.s.k. unit "born."

The Mainline AK-1

The heart of the AK-1, Fig. 1, is a unijunction transistor pulse generator. The circuit is essentially an RC oscillator, so decreasing R will increase the frequency. You can easily change to any shift you like merely by adding resistance in parallel (or by switching in different resistors) while keeping the mark frequency the same.

The pulse generator runs at 4250 pulses per second for the mark frequency. These pulses are fed into a flip-flop which changes state for each pulse, thus not only dividing by two to get 2125 cycles per second, but also providing symmetrical square waves from the short pulses.

Square waves theoretically have only odd-harmonic content, so the harmonics generated by this system are 2125, 6375, 10,625, 14,875, and so on. The flip-flop is followed by a 5-pole Butterworth low-pass filter that cuts off a little above 3000 Hz. This filter effectively removes all harmonics, changing the square wave into a sine wave.

The output of the low-pass filter goes directly to the s.s.b. mike input, which always operates at a very low signal-voltage level. It also goes to an emitter-follower stage that will supply

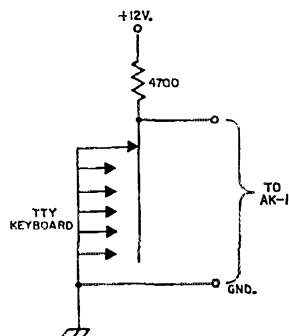


Fig. 2—Teletype machine keyboard connections.

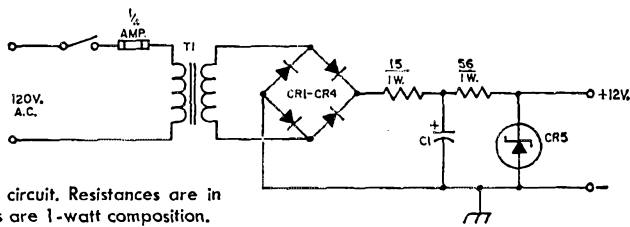


Fig. 3—Power-supply circuit. Resistances are in ohms; resistors are 1-watt composition.

C₁—Electrolytic, 1000 μ f. or more, 15-25 volts.
CR₁—CR₄, incl.—Silicon, 200 ma., 50 p.i.v.
CR₅—Zener; 12 volts, 1 watt.

T₁—Any transformer having 12- to 12.6-volt secondary, 100 ma. or more.

a relatively hefty 0.5 volt (peak audio) to a low impedance, for v.h.f. transmitters using carbon microphones.

Since there is no inductor in the oscillator section, keying transients are minimized when the signal is changed from mark to space. Observations with a Tektronix 531 scope bear this out.

The input circuit of the AK-1 will operate from any system that gives a positive voltage for space. It is immaterial whether there is no voltage or a negative voltage for mark. This system adapts to most systems already in use for driving an f.s.k. unit in the transmitter. It adapts immediately to the Mainline TT/L⁴ or TT/L-2⁵ units. Most other demodulators do not include an f.s.k. driving system, and in such case the operator probably has devised one — such as a "shift pot" system — himself. The AK-1 may also be driven directly from the keyboard as shown in Fig. 2.

Only when receiving on lower sideband do the audio tones come out properly. Consequently, when transmitting in the lower-sideband position, the tones are transmitted normally, and mark will remain "stationary" regardless of what shift is in use. Plan to do all your transmitting and all your listening in the lower-sideband position for normal operation.

Some transmitters will not pass 2975 as well as they pass 2125 Hz. (we are not talking about the units that won't pass 2975 at all — supposedly the owner has now changed the b.f.o. crystal so that 2975 will be passed); that is, 2975 may not be passed at the same level as 2125. For instance, the audio circuits in the author's HT-32A attenuate the space tone of 2975 some 3 db. To compensate for this audio roll-off, a simple high-boost circuit consisting of a 0.015- μ f. capacitor and a resistor, R₆, was added. If your transmitter has less output on space than on mark, try various values of resistors at this point. In my case, it took about 4700 ohms. You may not need any resistor at all.

The shift for c.w. identification at present is set for about 110 Hz. (FCC requires at least 100 Hz. for narrow-shift c.w. for this purpose.) The nice thing about this arrangement on the AK-1 is that the c.w. identification shift is always

the same regardless of the shift selected by the switch. Take the "side-arm" off the key so it will not short out and cause the shift to change inadvertently.

Constructing the Unit

There is tremendous flexibility in the choice of most of the parts. The unijunction transistor (Motorola 2N4871) was selected as its price is only 96 cents, but many others may be used. Q₁, Q₅, Q₆ and Q₇ can be literally any n-p-n type of silicon transistor (do not use germanium transistors). The pots can be the Centralab "Fastach II front" units, as these are modest in cost and various types of short shafts may be obtained. The author used flush screwdriver shafts. You may prefer a short shaft that can be turned with the fingers. The output connectors on the rear are inexpensive phono jacks that mount in a one-quarter-inch hole.

The use of a printed-circuit board greatly simplifies the construction of any project and this is no exception. The board designed by the author measures about 3 by 5½ inches.⁶

For ease of adjustment, the pots for 2125, 2295 and 2975 were selected to give about 60–70 Hz. total variation at the frequencies specified. As a result, you may need to hand-pick the resistors in series with the pots to enable them to operate in mid-range. The values shown on the schematic are those used in the author's unit. The 500K and 3-megohm pots should have right-hand log taper to give linear variations between various shifts you may want to use. If you wish, you can leave out the positions on the switch you do not feel you need, thus saving some money on the pots and resistors. If you never have any use at all for narrow shift, you can dispense with the switch entirely, and the 2295 pot plus the other two. Their associated resistors can also be left off. You can easily enough add any or all of those things later if you wish. The board is merely "programmed" to include all the variations you should ever require.

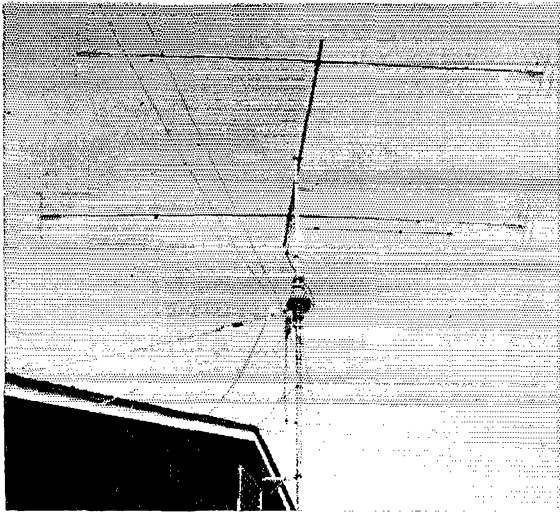
One additional comment: Bypass each connector leaving the chassis with a 0.01- or 0.005- μ f.

(Continued on page 48)

⁴ Hoff, "The Mainline TT/L F.S.K. Demodulator," *QST*, August, 1965.

⁵ Petersen, "The Mainline TT/L-2 Demodulator," *RTTY Journal*, September, 1967.

⁶ The board and parts may be obtained through Truman Boerkoel, K8JUG, (AK-1 Kit), Newark Industrial Electronics Corp., 2114 South Division, Grand Rapids, Michigan 49507. For 88-mh. toroids, check the classified ads at the rear of this magazine.



The W8HRF compact loaded beam installed on a pipe mast.

The W8 High Radio Frequency Short Beam

Compact End-Loaded Two-Element Yagi for 20

BY DAVID L. WALSH,* W8HRF

END loading of a short dipole antenna has an advantage over center loading, since it increases the radiation resistance relative to the loss resistance in the system.¹ Losses are further reduced, because the loading-coil resistance (the principal loss resistance in a loaded dipole element) is moved to a point of lower current on the current-distribution pattern. In the case of a short Yagi antenna, end loading also has the mechanical advantage that "plumber's delight" construction can be used, since it is unnecessary to open up the centers of the elements and insulate them from the boom for the insertion of a coil.

The 14-MHz. antenna shown in the photographs is a modification of a Hy-Lite 10-meter Yagi, but similar antennas may be easily built from scratch, of course. The maximum overall element length is approximately 14 feet.

Loading Coils

Each of the end-loading assemblies consists of a coil and a capacitive hat, and the general arrangement is shown in the sketch of Fig. 1. The coils are wound with No. 8 aluminum wire (clothesline or TV ground wire). Fifteen turns in each coil are needed for the driven element, and eleven turns for the director. The turns are wound on a 2 $\frac{5}{8}$ -inch form. When the coil is removed from the form, the diameter will spring out to about 3 inches. The ends of the coil should

be bent out and formed into loops to be fastened down with No. 8 machine screws.

Although it may not be an absolute necessity, a support at the center of the coil is highly desirable. Such a support can be made from a 3 $\frac{1}{4}$ -inch length of $\frac{1}{4}$ -inch Plexiglas strip 1 inch wide. Drill a hole at the center of the strip large enough to slide easily over the end of the element (approximately $\frac{3}{8}$ inch). Notch both ends of the strip to fit the wire of the coil. Preheat the kitchen oven to 250 degrees, and warm the Plexiglas until it softens (about 5 minutes). Using gloves or potholders, slide the softened strip over the end of the element, and twist the strip into a "butterfly." While holding it in shape, cool it under water. File off the corners of the strip so

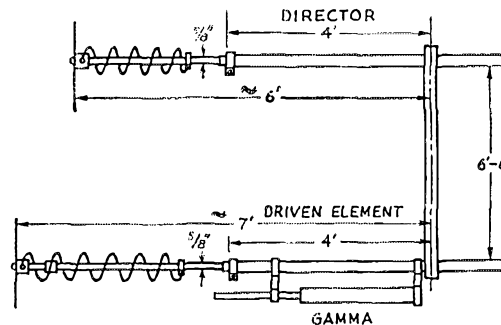
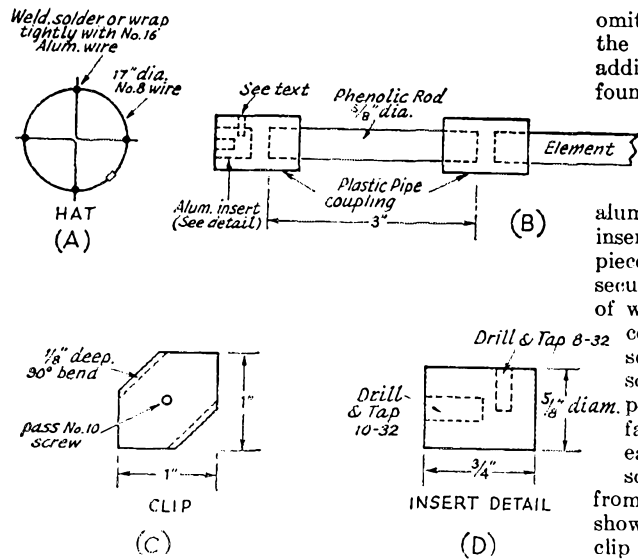


Fig. 1—Essential dimensions of the end-loaded short Yagi antenna.

*1335 Manfield Drive, Columbus, Ohio 43227.

¹Dome, "Increased Radiating Efficiency for Short Antennas," *QST*, September, 1934.



omitted, the aluminum insert being driven into the coupling at the end of the element. (The additional insulation on the driven element was found to be necessary to avoid arcing.)

Capacitive Hats

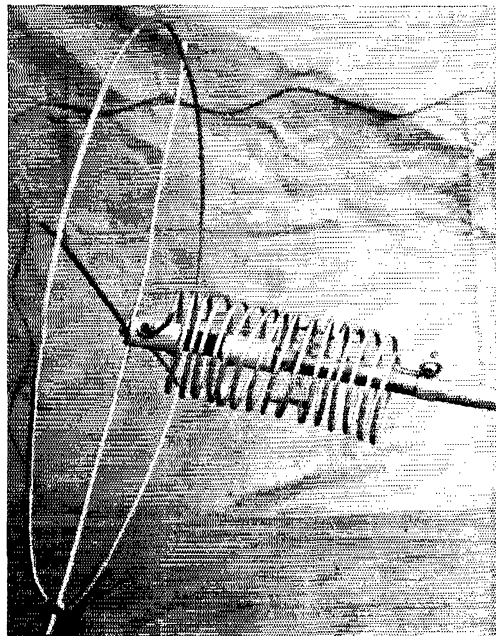
The capacitive hats are made as shown in Fig. 2A. A 17-inch ring is formed of No. 8 aluminum wire. The ends are held together by inserting them into opposite ends of a short piece of $\frac{3}{16}$ -inch aluminum tubing which is secured by crimping. Spokes of the same type of wire are formed as shown. The gap at the center should be just sufficient to allow a 10-32 screw to pass. The spokes may be welded or soldered onto the ring, or fastened by wrapping with small-size aluminum wire. A hat is fastened to the aluminum insert at each end of each element by means of a 10-32 machine screw, a lockwasher, and a clamp fashioned from a small piece of $\frac{1}{16}$ -inch aluminum strip, as shown in Fig. 2C. The two bent-down ears of the clip should be inserted in the Vs formed by the spokes, and the screw tightened securely.

Matching Section

The gamma matching section was patterned after the tubular-capacitor design described by W2VS in all recent editions of *The ARRL Antenna Book*. Not having access to tubing of the required diameter, I used heat-shrinkable tubing as the dielectric.* This tubing has a

(Continued on page 48)

* Shrinkable tubing can be obtained in small lots from Burstein-Applebee, 3199 Mercier St., Kansas City, Mo. 64111.



The end-loading capacitive hat and coil assembly.

Fig. 2—Sketches showing details of the coil-mounting insulator, and capacitive hats.

that they will not interfere with adjacent turns. The completed strip is placed across the center turn of the coil, and slid along the antenna element as the coil is mounted. The hole in the strip should be reasonably loose so that the strip will slide easily along the element as the coil is adjusted.

Insulating Sections

The coils are mounted across insulating sections at the ends of the elements. Those at the ends of the driven element are made as shown in Fig. 2B. A 3-inch length of $\frac{5}{8}$ -inch phenolic rod is fastened to each end of the element by means of a coupling for $\frac{1}{2}$ -inch plastic pipe (obtainable at hardware stores and plumbing shops). The coupling is forced onto the end of the element by hammering with a mallet, and then the phenolic rod is hammered into the coupling. A second coupling is hammered onto the end of the phenolic rod, and the aluminum insert shown in the detail of Fig. 2D is forced into the coupling until it is flush with the end of the coupling. (If necessary, file the end of the insert down to bring it flush.) The 8-32 hole in the insert should not be drilled and tapped until the insert is in position in the coupling. Then the hole should be drilled through the coupling and into the insert. Use a bottom tap to thread the hole. For additional strength, the seams of the assembly may be doped with epoxy.

The 8-32 screw fitting the threaded hole is used as one terminal of the loading coil. The terminal for the other end of the coil is an adjustable strap clamp around the $\frac{5}{8}$ -inch portion of the antenna element.

In the case of the director element, the phenolic-rod section and the second coupling are

A Simple Oscilloscope Calibrator

BY CLIFFORD C. BUTTSCHARDT, JR.,* W6HDO

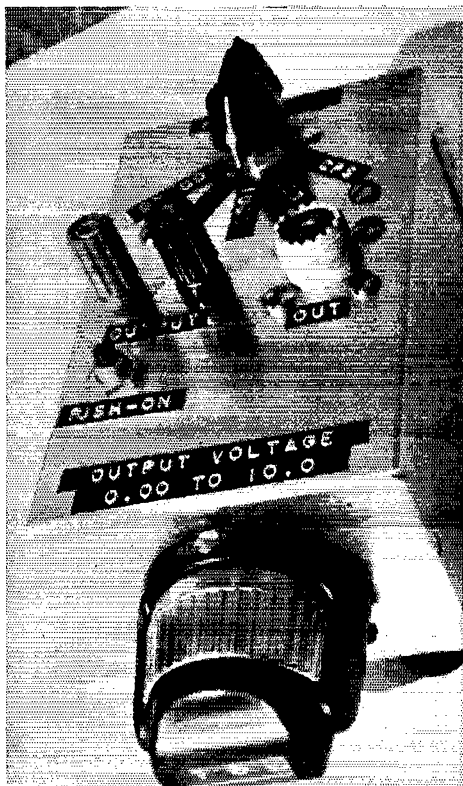
Most amateurs do not have access to oscilloscopes with calibrated time base and voltage presentations. The experimentally-inclined amateur occasionally needs this information to a reasonably accurate degree. Most free-running oscilloscope sweep circuits can be adjusted to give fairly linear presentations by advancing the horizontal gain such that only a small portion of the total sweep is presented. Furthermore, the sweep-frequency control can be independently adjusted to approximate a calibrated sweep time per scale division.

The unit shown schematically in Fig. 1 generates square waves of 0.15 microsecond rise time and 0.1 μ s. fall time. This makes calibration of the sweep presentation very easy. Five different frequencies are generated utilizing time periods most often required by the inexpensive oscilloscope, ranging from 10 Hz. to 100 kHz. in decade steps. Frequency stability is controlled entirely by the resistance and capacitance time constant of the circuit. Voltage calibration is accomplished through the use of batteries and a calibrated surplus ten-turn potentiometer. Voltage stability depends on the condition of the self-contained batteries which can be checked with an ordinary d.c. voltmeter.

Theory Of Operation

The free-running multivibrator shown in Fig. 1 is used to generate different frequency pulses. Normally such a circuit has a collector voltage output waveform which is somewhat like a distorted square wave because of the manner in which the timing capacitor and resistor charge. It is desirable that the collector voltage waveform be as square as possible. Let us look at the portion

*275 Chiquita Avenue, Mountain View, California 94040.



Completed unit shown with calibration dial in the foreground. Two output jacks have been included as a matter of convenience. Tape labels have been added to "dress up" the unit.

TABLE I

Capacitor and frequency selection. All capacitors are 15 volt or greater.

Capacitor	μ f.	Type	Calculated Frequency	Measured Frequency
C ₁ , C ₆	10	tantalum	10 Hz.	9.7 Hz.
C ₂ , C ₇	1	tantalum	100 Hz.	98 Hz.
C ₃ , C ₈	0.1	tantalum or Mylar	1 kHz.	0.95 kHz.
C ₄ , C ₉	0.01	Mylar	10 kHz.	9.82 kHz.
C ₅ , C ₁₀	0.001	silver mica	100 kHz.	96.73 kHz.

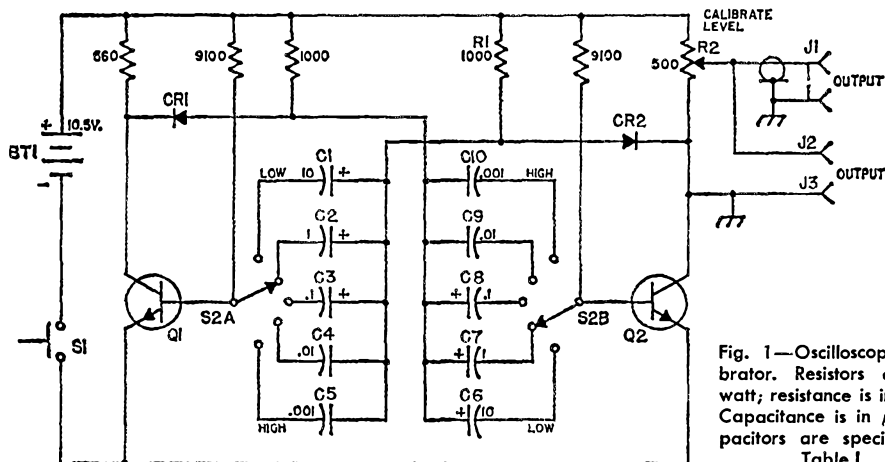


Fig. 1—Oscilloscope calibrator. Resistors are $\frac{1}{2}$ watt; resistance is in ohms. Capacitance is in μ f. Capacitors are specified in Table I.

BT1—7, 1.5-volt penlite cells in series.
CR1, CR2—1N270 used, 1N34 applicable.

J1—Coaxial receptacle, SO-239.

J2, J3—Six-way binding post.

Q1, Q2—2N3641 used, 2N5187, 2N5183, 2N706,

2N697 applicable.

R1—See text.

R2—500-ohm, 10-turn, linear, wirewound control.

S1—S.p.s.t., pushbutton, momentary contact.

S2—2-pole, 5-position, nonshorting rotary.

of the multivibrator circuit associated with Q_1 . S_2 is in the position shown in Fig. 1. The timing capacitor C_2 is charged through resistor R_1 instead of the normal collector load resistor R_2 . After C_2 has been charged through R_1 , CR_2 prevents further charging current from passing through R_2 . The collector voltage waveform is very nearly square since the collector nearly represents a fully saturated or a fully open transistor. The output squareness of the waveform is limited only by the switching speed of the transistors Q_1 , Q_2 and diodes CR_1 , CR_2 , and by the inductance of the wirewound potentiometer R_2 . The collector voltage waveform is rich enough in harmonics so that it can be heard on a broadcast receiver. This is, incidentally, a possible way to check the frequency of oscillation after the construction has been completed.

The maximum voltage output is 10 volts. For the transistors specified, a $\frac{1}{2}$ -volt drop from collector to emitter is typical. The voltage drop across the Q_2 is assumed constant as the transistor's operation is quite stable at room temperature. Seven ordinary penlite cells yield about 10.5 volts d.c., which allows 10 volts to be placed across R_2 .

Additional Thoughts

Nothing is particularly critical about the construction of the unit. Any metal box that will hold all the components should be quite satisfactory. R_2 and its accompanying calibration dial were obtained on the surplus market to help reduce the cost of the project. Similar capacitors should be used on each side of the multivibrator as a capacitance dissimilarity will cause the on-time to differ from the off-time. Most of the components are simply fastened to tie points as they are needed and are convenient.

The calibrator has been most satisfactory in

every respect. It has found additional uses in that the performance of a number of audio amplifiers has been analyzed by using the unit as an ordinary square-wave generator. The attack time of a compressing audio preamplifier has been set up by using the 10-Hz. position as a keyed signal. Additional uses are apparent. A homemade frequency counter was giving difficulty and its fault was determined by pulsing the device with this calibrator. Primarily however, the calibrator has proven to be most valuable in determining the frequency and amplitude of low-level oscilloscope signals.

QST

Back Copies and Photographs

Back copies of *QST* referred to in *QST* issues are available when in print from our Circulation Department. Please send cash, money order or check — 75¢ for each copy — with your order; we cannot bill small orders nor can we ship c.o.d.

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

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

T-Notch Filter for the HBR

Selective Rejection of Unwanted Heterodynes

BY JAY F. HELMS,* W6HHT

The advantages of the notch filter are well known. Here is how one can be added to the 100-kHz. intermediate-frequency amplifier of the HBR receivers, with specific layout details for the HBR-13C described in August 1965 QST.

THE QST series of articles on Ted Crosby's HBR receivers have long been of great interest to me. My recent need for a receiver which was an improvement over the average commercial product prompted me to try my hand at the project. In developing this unit from its original form¹ there were found operating conditions when even the excellent selectivity of the HBR-13 left something to be desired. Specifically, it was felt that it would be most desirable to attenuate those strong interfering signals in the i.f. passband which break up the desired signal. A tunable T-notch filter has been incorporated in the design to accomplish this purpose. This article describes the T-notch filter and gives details as to how it may be incorporated in an existing HBR-13C.

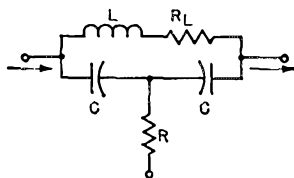


Fig. 1—Ideal bridged-T network. R_L is the resistance of the coil L at the operating frequency.

Circuit Theory

The T-notch filter has as its heart the three-terminal bridged-T network shown in its pure or theoretical form by Fig. 1. R_L is the resistive component of a reactance formed by the inductance L . (The value of R_L is not the same as the d.c. resistance of the inductance.) Values for components L , R_L , C and R can be chosen so the network has zero transfer impedance at some resonant rejection or notch frequency, f_o . Such

a network can be theoretically designed to have any desired amount of attenuation at a single frequency. Because of shielding problems, stray capacitance, and unbalance of circuit elements a maximum attenuation of 50 to 60 db. is generally realized. The resonant notch frequency, f_o , can be calculated by the equation

$$2\pi f_o = \sqrt{\frac{2}{LC}}$$

At this frequency a series of equations may be developed which permit calculating all other network parameters for maximum attenuation:

$$R = \frac{L}{2CR_L}$$

$$R_L = \frac{1}{R(2\pi f_o C)^2}$$

If the inductance, L , has a very high Q then the network impedance at the notch frequency, f_o , will be approximately equal to four times the value of the total resistive leg, R .

The construction and subsequent use of a practical circuit is simplified if this network is modified as shown in Fig. 2. The variable capacitor, C_1 , permits tuning the network over a small frequency range. This in turn allows one to position the rejection notch over an undesired signal which falls anywhere in the receiver's passband. When not in use the variable capacitor is set at either maximum or minimum capacitance, thereby placing the rejection notch well outside the passband. So positioned, the network has little or no effect on normal receiver sensitivity or selectivity. Although from a strictly theoretical standpoint the filter is designed for one rejection frequency only, it is quite practical to tune the circuit a few kilocycles either side of this frequency to cover the entire i.f. passband. Experiments in the laboratory indicate that the equations given for the network in Fig. 1 apply equally well, for all practical purposes, to the compromise network of Fig. 2. In calculating com-

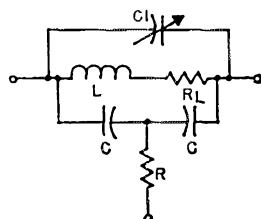


Fig. 2—Adjustable-frequency bridged-T network. C_1 permits tuning the rejection frequency over a small range.

* Pacific Telephone Telegraph Co., Special Service Engineering, 450 Mission St., Room 201, San Francisco, Calif. 94105.

¹ See Crosby, "HBR Developments," QST, August, 1965, or a description of the HBR-13C.

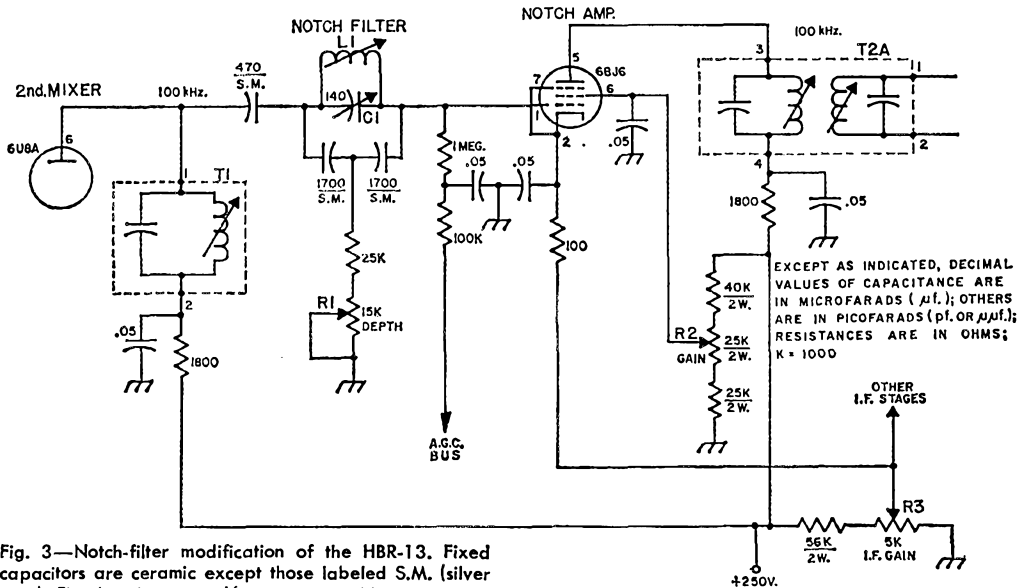


Fig. 3—Notch-filter modification of the HBR-13C. Fixed capacitors are ceramic except those labeled S.M. (silver mica). Fixed resistors are 1/2-watt composition except as indicated.

- C₁—140-pf. midget variable (Hammarlund APC-140B).
- L₁—App. 3 mh., adjustable (Miller 9004, 2.1-8 mh.).
- R₁—Linear control, wire-wound.
- R₂—Linear control, 2-watt.

R₃—I.f. gain control in original circuit.

- T₁—One circuit of 100-kc. I.f. transformer (Miller 1709).
- T_{2A}—100-kc. i.f. transformer (Miller 1709) in original HBR-13C circuit, previously connected to plate circuit of 6U8A second mixer.

ponent parameters for the compromise network the total capacitance is set equal to the sum of the two fixed capacitors ($=C/2$) plus half the maximum capacitance of the variable, C_1 . This is done because the notch circuit will be subsequently aligned at the i.f. mid-band frequency when the variable is positioned precisely at half-mesh, in order to permit tuning the rejection notch from one side of the passband to the other.

This compromise bridged-T network has been incorporated in the HBR through an additional amplifier stage following the second mixer, as shown in Fig. 3. This additional stage provides a means for correctly matching the network to the main i.f. amplifier as well as providing enough gain to overcome the losses in the network. The overall gain of the added stage plus the bridged-T network is controlled by varying the screen potential of the added 6BJ6. Component values shown are those used by K4FX (ex-WA4ZNI) in his HBR-13C. I have made several substitutions of R , C and L components in my HBR, each time achieving identical rejection-notch characteristics. The equations which have been given will permit the experimentally-minded amateur to calculate his own component values (providing of course that he remembers to remain dimensionally correct by using farads, henrys, cycles per second, and ohms!). Values for R , C , and L actually measured in a properly aligned network should compare within 10 percent to calculated values obtained by solution of the equations.

A high- Q inductance is an absolute necessity for this circuit. The J. W. Miller 9004 which is specified has a measured Q in excess of 80 at an inductance of 2.74 mh. and a frequency of 100 kHz. In addition, its slug-tuned feature provides a means for aligning the network to the precise i.f. mid-band frequency. The original mixer plate is tuned through one section of a J. W. Miller 1709 transformer and capacitively coupled to the network. This circuit arrangement proved its superiority to resistance-coupled schemes which were also tried.

No provision has been made for adjusting notch depth from the front panel. Alignment of the network for optimum rejection would not be possible if the resistive leg were operationally varied. Actual use of the network indicates there is really no such thing as "too much rejection," so the resistive leg of the network, once adjusted for optimum network balance (i.e., maximum rejection) during the alignment process, is thereafter not touched. The network when properly aligned should give not less than 45 db. of rejection to an undesired signal falling within the i.f. passband of an average HBR receiver.

Mechanical Details

A chassis layout for adding this stage to an HBR-13C has been developed by K4FX and is given in Fig. 4. Test point J_3 must be moved to the rear chassis apron to make room for the 15K network pot and the added 1709 transformer.

The Hammarlund APC-B is mounted beneath the chassis directly below T_{2A} and T_{2B} on the

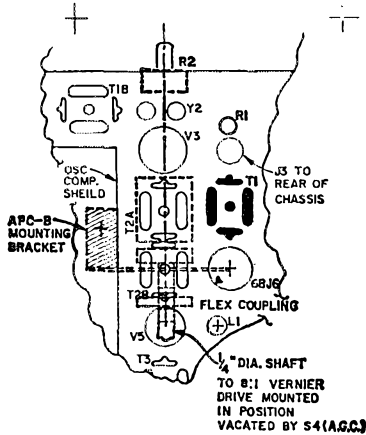


Fig. 4—Layout of notch-filter components in the HBR-13C chassis plan as shown on page 15, October 1965 QST. Original components are shown light, added components above the chassis are heavy; variable-capacitor mounting and drive, underneath the chassis, are dotted.

bracket illustrated in Fig. 5. Installation of threaded studs $3\frac{3}{4}$ -inches long between the vertical face of the mounting bracket and the rear chassis apron is needed to give extra stability to the entire assembly. An 8:1 vernier drive will be required for driving the capacitor; Lafayette Radio catalog 99HG031 is recommended. This vernier drive unit is mounted in the position vacated by S_4 (the a.g.c. switch), which in turn has been moved to the right of C_{12} (b.f.o. pitch). The notch will tune through the i.f. passband with 30 degrees or less of shaft rotation, so a high vernier-drive ratio is required for operating ease.

Precise alignment of the capacitor shaft and the vernier drive assembly is quite important. A little care and patience in getting the drive shafts correctly aligned will pay handsome operating dividends. A Millen 3900 insulated flexible coupling between the capacitor shaft and the vernier unit shaft will be helpful in compen-

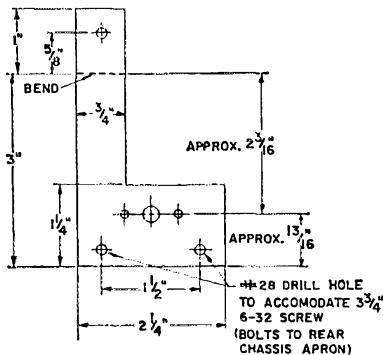


Fig. 5—Mounting bracket for the variable capacitor. Dimension X should place the capacitor shaft at the same distance from the chassis as the shaft of the original a.g.c. control. Both rotor and stator of the APC-B must be insulated from the mounting.

sating for small errors in mechanical alignment. Note in particular that the rotor and stator of the capacitor are both above chassis ground; mounting arrangements must provide for this.

I. F. Alignment

Before aligning the bridged-T network itself it will be necessary to realign the entire i.f. amplifier because of the added 6BJ6 stage. It is imperative that you use a 100-kHz. signal source for this purpose, as well as for subsequent network alignment. In order to receive full benefit from the excellent i.f. response of the HBR-13C and from the T-notch circuit you should beg, borrow or buy a 100-kHz. frequency standard; the *Handbook* design will give excellent results.

Short L_1 with a jumper and set the 6BJ6 screen pot to provide 75 volts of screen potential. Con-

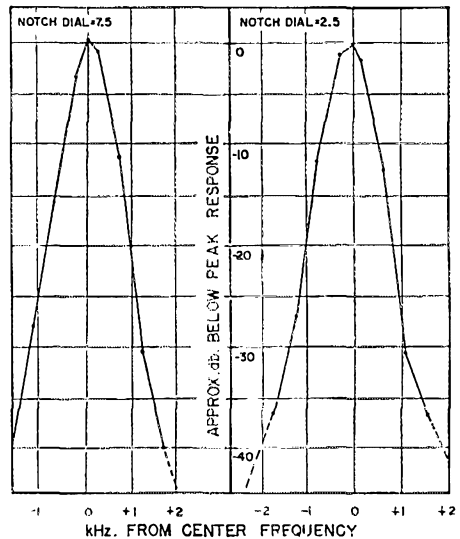


Fig. 6—I.f. selectivity curves with the notch-filter variable capacitor set near the extremes of its range, below the i.f. passband at the right; above the passband at the left. Aside from a slight effect on symmetry, the passband is unaffected by the notch.

nect the 100-kHz. signal to the grid (pin 7) of the 6U8A second mixer; disable the second oscillator by pulling the 1710-kHz. crystal. Turn the a.g.c. on and advance both i.f. and mixer gain to the point required for a half-scale S-meter reading.

Now, slowly and carefully tune the slugs in i.f. transformers T_4 , T_3 , T_{2B} , T_{2A} , (the numbers refer to Fig. 1, page 18, August 1965 QST) and the new 1709 unit, in that order, for maximum S-meter reading. Remember that only one-half of the new 1709 transformer is used, and that only one of its two slugs will make any appreciable difference in your S-meter reading. Reduce the i.f. gain to keep a midscale meter reading throughout this process.

Network Alignment

Having aligned the i.f. amplifier as precisely as possible, remove the jumper from L_1 and turn off the a.g.c. Leave the 100-kHz. signal source connected as before to the grid of the second mixer. Connect a v.t.v.m. to the phones jack, turn the b.f.o. on, adjust the pitch for a 700- to 1000-cycle audio note. Set the v.t.v.m. to its lowest a.c. range (1.5 to 3 volts), open the audio gain fully, and then advance the i.f. and mixer gains just enough to achieve a midscale deflection of the v.t.v.m.

The object in aligning the bridged-T network is to measure the amount of 100-kHz. signal passing through the notch circuit and balance the network for maximum attenuation. Set C_1 to its half-mesh position; then, using a nonmetallic alignment tool, tune L_1 through resonance as evidenced by a sharp dip in the v.t.v.m. reading. Adjust the 25K pot for a minimum v.t.v.m. reading. There is much interaction between the slug in L_1 and the pot, so a large number of very small incremental adjustments will be required.

As balance is approached it will be found that the slightest pressure of the alignment tool on either the slug or the pot will make a marked change in the v.t.v.m. reading. At this point use patience and care; the degree of unwanted signal rejection which can be obtained from this circuit is a direct function of how precise the network balance condition can be made. In some cases it may be easier to use separate alignment tools for the inductance and the potentiometer, turning both of them slowly and simultaneously for a minimum v.t.v.m. signal. Close to balance, it will be necessary to slowly advance the i.f. gain to get sufficient v.t.v.m. signal for accurately sensing the exact point of maximum rejection. Be very careful not to overdrive the i.f. stages,

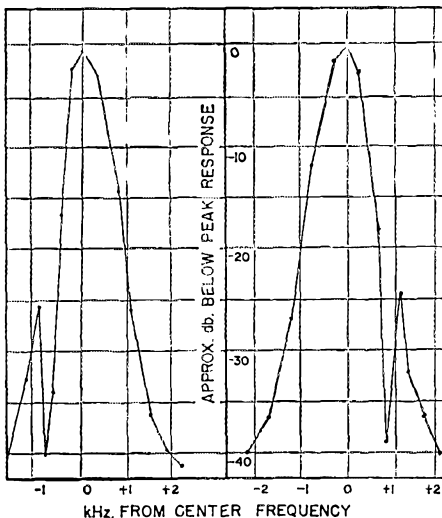


Fig. 7—Typical selectivity curves with the notch set approximately 800 Hz. below (left) and above (right) the frequency of peak response.

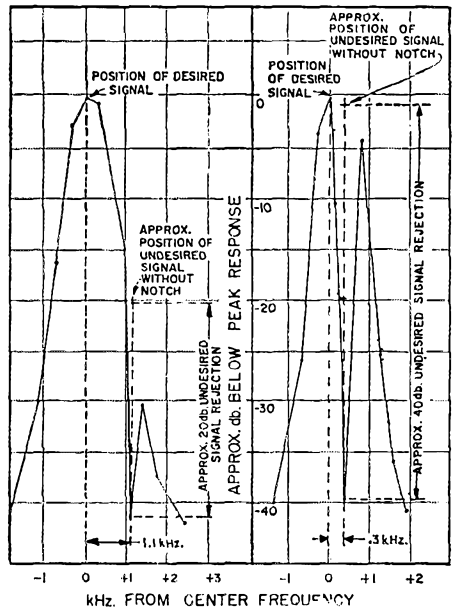


Fig. 8—The effect of frequency separation between desired and undesired signals is shown by these laboratory measurements for signals separated by 1100 and 300 Hz. In both cases the undesired signal is suppressed approximately 40 db. below the peak response.

as this will result in misalignment of the notch circuit. In a correctly-aligned network it should be possible to see a slight upward kick of the v.t.v.m. as the signal source is keyed, evidencing the fact that the rejection notch reaches down very closely to the noise threshold of the receiver.

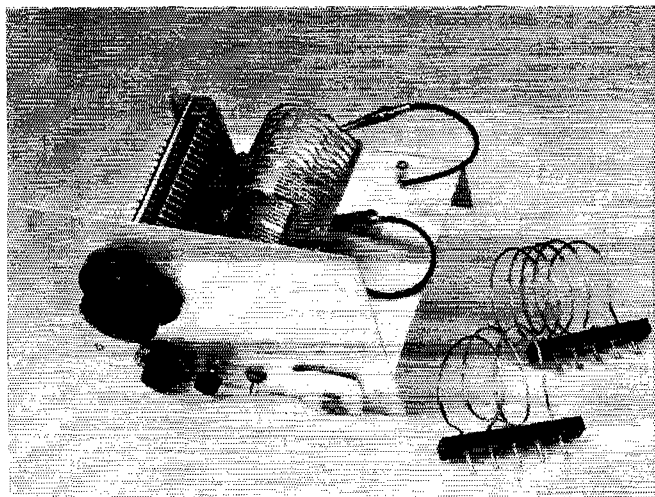
Unfortunately, since this circuit had to be fitted into available chassis space it was not possible to follow shielding and layout precautions that otherwise would have been taken. For example, there is some slight signal leakage around the added 6BJ6 stage and into the grid of the first i.f. amplifier. On-the-air use of the receiver has shown no operational difficulties from this undesirable condition, however. For those who may still be contemplating the construction of an HBR I would strongly advise modifying the normal HBR-13C chassis layout so the entire notch circuit can be installed in a shielded enclosure placed directly in line with the i.f. amplifier proper, in preference to the side-saddle mounting used here.

Circuit Performance

Some fairly extensive tests have indicated that changes to the 6BJ6 screen potential vary not only the stage gain but also the overall i.f. passband, although the notch depth does not seem to be affected. Higher screen voltages favor a narrower passband while lower voltages favor a better signal-to-noise ratio. It is for this reason that the voltage divider for the 6BJ6 screen

(Continued on page 83)

● Beginner and Novice



The completed transmatch with the 80/40-meter coil plugged in. At the rear is the 20-meter coil and the 10/15-meter unit is to the front. In regular operation, the antenna would be attached to the stand-off insulator at the top rear of the chassis. The clip lead visible below the coil is the one attached to the jack bar.

Limited-Space Antennas and Methods Of Coupling

BY LEWIS G. McCOY,* WIICP

ONE very popular type of antenna, probably because of its simplicity, is a wire of either a predetermined or random length, fed at one end. It is common procedure among amateurs these days to refer to such an antenna as a "long wire." Actually, this term is usually incorrect because, by definition, a long-wire antenna is a wire that is several wavelengths long at the operating frequency. However, no matter what you call it, the end-fed wire can be a very simple antenna to put up and use, if certain steps are taken.

Transmitter Loads

Nearly all transmitters described these days are designed to work into 50- to 70-ohm loads, with little thought given to any load that departs very far from these figures. If the load is something different than the above figure it may be impossible to get the amplifier in a transmitter to load up. In order for the final amplifier stage to operate at its best efficiency the load (the antenna system) must be within the design range of the amplifier.

An end-fed wire may present a load of 50 to 70 ohms, but if it does it will be a case of pure luck on the part of the user -- and what's more important, that load won't stay the same across a band. In other words, the antenna will present a 50- to 70-ohm load for only a very limited fre-

quency range. Once we QSY the load may change to where it is no longer within the tuning range of the amplifier. Our problem boils down to having the transmitter *always* see a load 50- to 70-ohms, regardless of the band or frequency in use. This in turn means we must make the antenna system look like a 50- to 70-ohm load, no matter which band we use it on.

The Transmatch, An Adjustable R.F. Transformer

Let's make one point clear about end-fed wires, or any antenna, for that matter: there is no way of predicting what the feed-point impedance (load) will be before making and installing the antenna. We can come close, but there are many factors that get into the act to determine what

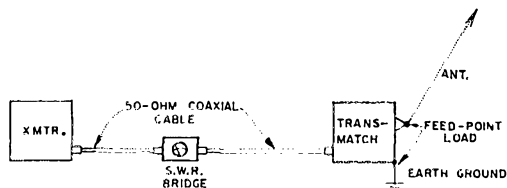
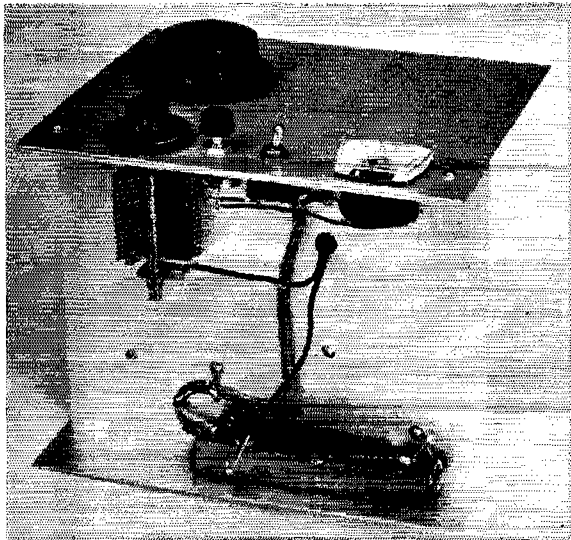


Fig. 1—This block diagram shows the set up for using a transmatch. Not shown is an antenna relay which normally would be inserted in the coaxial line. If a low-pass filter is used, it should be the last item in the line before the transmatch.

* Novice Editor.



This shot shows the wiring below deck. At the rear of the chassis is the Varimatcher section. C2 is at the left front of the chassis.

meters. Depending on which capacitor plate spacing you use for C_1 , the transmatch can be used for Novice powers or up to the legal limit of 1 kw. Actually, the closer-spaced capacitor will handle 200 watts or so. The same type coil stock is used for either power level, high or low.

Also included in the transmatch shown in Fig. 2 and the photographs is an s.w.r. bridge. This is a necessary item in order to know when the transmatch is correctly adjusted. If you already have a Monimatch or reflectometer, the unit described can be eliminated from the transmatch.

With the random-wire antenna we'll be dealing with various loads, depending on the frequency and band in use. Shown in Fig. 3 are the three basic circuit configurations used with the transmatch. The circuit can be changed to conform with type A, B, or C by reversing the plug-in coil in the jack bar or by changing the capacitor C_1 from the output side of the L configuration, as in B, to the input side, as in C. The capacitor is changed by means of a clip lead connected to the stator.

Some loads may require the circuit setup of A. In this configuration, a link-coupled parallel-tuned circuit is used, the antenna being tapped onto L_1 .

Construction Details

The chassis used to hold the parts is $2 \times 7 \times 9$ inches and the panel measures 7×9 inches. Any chassis large enough to hold the parts can be used. C_1 and the jack bar for the plug-in coils are mounted on top the chassis, and the Varimatcher reflectometer and C_2 are mounted below the chassis top. The remaining components are mounted on the chassis front.

A 4-inch length of RG-58/U coaxial cable is used for the pickup and conductor sections of the

s.w.r. bridge. Details for making this section are given in Fig. 4. Study these details and the photograph of the bottom view carefully before starting construction. The black outer covering of the coax is removed, leaving the braid and inner conductor with its insulation. The outer braid will be L_3 and the inner conductor L_4 . You'll notice that there is an open area at the center of the coax braid. This is to allow room for the connection of one end of the 50-ohm resistor to the center of the inner part of the coaxial line. Use a probe or pointed instrument to open up the area in the braid and then carefully tin the edges of the opening with solder so as to prevent any of the hair-like wires from shorting to the resistor lead or inner conductor. The ends of the braid can be wrapped with a few turns of solid wire and tinned. The wire ends will provide a support for the connection to the feed-through terminal and the inner pin of J_1 .

The metal trough that houses the bridge section is made from a piece of copper flashing, although tin or aluminum could be used. It is a good idea to drill the holes for J_1 and the feed-

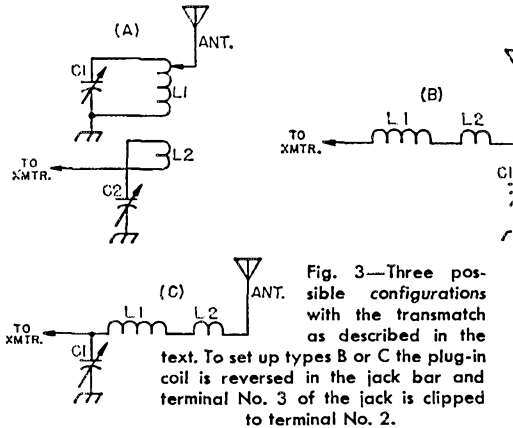


Fig. 3—Three possible configurations with the transmatch as described in the text. To set up types B or C the plug-in coil is reversed in the jack bar and terminal No. 3 of the jack is clipped to terminal No. 2.

through bushing before bending up the trough into a U. Also, when soldering the leads for the diodes, CR_1 and CR_2 , use a heat sink between the body of diode and the point being soldered because too much heat can ruin the diode.

Using The Transmatch

In making the antenna, shoot for a length of at least $\frac{1}{4}$ wavelength at the lowest operating frequency. In other words, if you plan on working 80 meters as the lowest band, then the antenna should be 60 feet long, at least. This doesn't mean that shorter wires won't work — they will, but not nearly as well. A lot of hams will say they can't get up a length of 60 feet. The wire doesn't have to run straight. You can go around corners, up and down, or what have you. The important point is to get up as much wire as possible.

By the same token, many hams think (mistakenly) that they have to have a good earth ground connection in order for their station to work. It's fine if you have one but if you don't,

forget it. If you have access to a water pipe or other earth ground connection make a connection to the rig and the transmatch, but if you can't, don't worry. The antenna will still work.

With the antenna connected and the rig on the desired frequency, feed enough power through the system to get at least a half-scale reading on the Varimatcher meter, and have the transmatch set up as in (A). Tap the antenna onto the first turn of the coil L_1 at the "hot" end, or end opposite the ground. Incidentally, always turn the rig off when making any adjustments on the transmatch. There may not be any d.c. voltages present but some very, very high r.f. voltages can be developed on the transmatch coils and can cause a nasty r.f. burn.

With the antenna tapped on near the hot end of L_1 , switch S_1 to read reflected power and adjust C_1 and C_2 for a dip or minimum reading. If you cannot get the reflected reading down to zero, or close to it, turn off the power and move the antenna tap closer to the ground end of the coil. You'll eventually find a tap point that will give a reading of zero in the reflected position versus full scale in the forward position of S_1 . If you find that the tap point on L_1 is very close, say within 25 percent, to the ground end, you may want to try configuration B or C.

In either of these configurations, start at the antenna end of the coil and, using another short clip lead, short out turns or portions of turns as you move the antenna tap towards the transmitter end of the circuit. In other words, the antenna is always on the end of the coil, but you may have some of the coil shorted out in order to get a match as indicated by M_1 .

Once you get a match for any given band, make a chart of the taps and so forth so you can return to the setup when you change bands.

The main reason for using configurations B and C is that if the antenna is tapped near ground on L_1 in configuration A, extremely high r.f. volt-

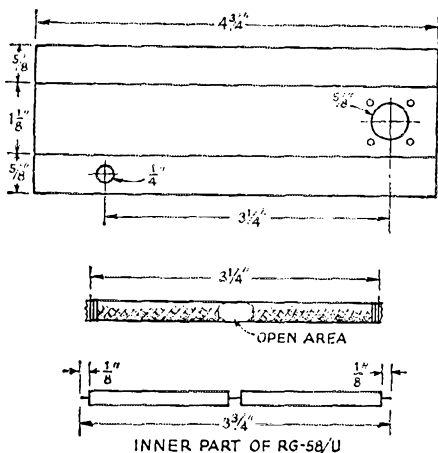


Fig. 4—Constructional details of the Varimatcher bridge section. The braided portion of the coax is L_3 and the inner portion is L_4 .

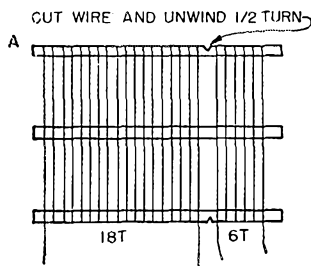


Fig. 5—The 80/40-meter coil. To use the coil on 40 meters, short out 10 turns, counting from the "A" end of the coil. Shorting clips should be copper and the shorting leads should be insulated. Coil stock is No. 14 wire, 8 turns per inch, 2 1/2 inches in diameter (Air Dux 2008T, B&W 3905-1, or Polycoids 1775).

The 20-meter coil consists of 4 turns of No. 12 solid wire, 2 1/2 inches in diameter, with the turns spaced so that L_1 is 1 1/2 inches long. L_2 is one turn of No. 12, same diameter as L_1 , spaced 1/2 inch from the end of L_1 .

The 15/10-meter L_1 coil is 2 turns of No. 12 solid wire, 2 1/2 inches in diameter, turns spaced to cover 1 1/2 inches. L_2 is a single turn, same diameter as L_1 , spaced 1/2 inch from L_1 .

All coils are mounted on Millen type 40305 valves and the socket (jack bar) is a Millen 41305. James Millen Co. will sell direct if you cannot get the components from a distributor. Write to James Millen Co., Malden, Mass., Attn: Wade Caywood.

ages can develop across C_1 , even with Novice powers. We don't recommend playing around with "arcs" from coils but it might be wise to prove to yourself just how much voltage can be developed. With the antenna tapped near the ground end of L_1 , take a pencil and hold it by the wood, not at the eraser end but in the center. With the key closed and the rig loaded up to about 75 watts, touch the lead end of the pencil to the stator of C_1 . You'll quickly see why caution is necessary. Such an arc can make a very nasty and painful burn.

If you want to try using antennas that are very short for the frequency, such as 10 feet long on 80 meters (similar to a mobile whip) certain additional steps may be required to obtain a match with the transmatch. When you make the coil for 80 and 40 meters you'll have some coil stock left over. With very short antennas, this can be used as a "loading" coil. Connect the antenna to one end of the coil and connect the other end to the antenna terminal on the transmatch. Then go through the tune-up procedure. You may have to use a clip lead to short out turns on the coil but you'll find a setup that will permit matching with the transmatch. Again, avoid coming in contact with the series loading coil because very high r.f. voltages can develop in such a setup.

Some beginners may not be aware of it, but a fluorescent lamp or neon bulb will light up when in an r.f. field, if the r.f. voltage is high enough. If you have a fluorescent lamp (a burned out one is OK) the lamp can be laid along the antenna wire where it leaves the transmatch. This makes a good output indicator, showing when power is flowing in the antenna.

QST

Bridge Break

An All-Electronic Break-in System For C.W.

BY MARK PEARSON,* W0ZJY

ADVANTAGES of full break-in operation on c.w., while widely recognized, are apparently available to only a very few. While many seem to feel that traffic handlers are the only ones who benefit from break-in operation, such is not the case. C.w. operation inherently provides many opportunities for break-in interruption. A full break-in system prevents the station receiver from being disabled for considerable periods of time such as occurs when a manual send/receive switch is used or when the transmitter in use has a long vox delay.

With the "Bridge-Break" system to be described, the key is the only send/receive switch used. When the key is down, receiver audio is blocked from reaching the headphones and a side tone is developed for monitoring purposes. When the key is released, receiver audio output is present at the headphones within a few milliseconds. The operation is entirely electronic with no relays to cause problems with dirty contacts or maladjustment. In addition to my performance criterion for the Bridge-Break system, I desired to avoid any change in receiver wiring as well as to eliminate the necessity of a special low-voltage power supply for the transistors. Although the system shown in Fig. 1 was installed in an old Navy TCS transmitter of WWII vintage, there is no reason why the Bridge-Break system could not be used with other transmitters.

Audio Switch

The function of the audio switch is to electronically disconnect the headphones from the receiver's audio output during the times the key is actually making contact. Its effect is to make all the usual receiver noises — loud squeals, thumps, and clicks — during transmission completely inaudible.

Q_1 and Q_2 comprise a switching circuit known as a Schmitt trigger. Its action may be compared to a spring-loaded, snap-action, double-pole, double-throw toggle switch. Positive voltage at the base of Q_2 acts like a force pressing against the toggle of our switch. With the key up, Q_2 is conducting and Q_1 is cut off. The top or anode end of the diode bridge consisting of CR_1 - CR_4 inclusive is connected to a point of positive voltage because Q_1 is drawing no current. The bottom or cathode end of the bridge is connected through R_1 to a considerably less positive point at the collector of Q_2 . This point is at a positive potential of one and one-half volts with respect to ground. With Q_2 conducting all four bridge

diodes, CR_1 - CR_4 , are forward biased and conducting current. In this condition, the bridge allows receiver audio signals to pass from the input to the output side of the bridge and on to the headphones.

When the key is pressed, C_1 discharges through CR_6 with the positive base voltage on Q_2 falling toward zero at a very rapid rate. At some point during this change in Q_2 's base voltage a critical point will be reached below which Q_2 will suddenly cease conducting. This corresponds in our analogy of the toggle switch to removing the pressure against the switch toggle. Because the emitters of Q_1 and Q_2 are connected through a common resistor to ground, a regenerative action takes place that causes Q_1 to quickly conduct. The switching action is extremely fast, in the order of a few microseconds. Since Q_2 's collector is now at a positive voltage, drive is available to Q_1 's base through R_2 which maintains the conduction state of Q_1 . With Q_1 conducting and Q_2 cut off, the anode end of the bridge is near ground and the cathode end of the bridge is at about eleven volts positive. CR_1 - CR_4 are now back biased. The receiver audio appearing on the input side of the bridge has no path to the output side and is not heard in the headphones.

Because of the rapid-switching capability of the diode bridge, a slight delay must be introduced into the circuit. This delay prevents any receiver noises caused by the trailing edge of the transmitter output waveform from being heard in the headphones. R_3 together with C_1 create a slight time delay in the voltage appearing at the base of Q_2 . If the resistance of R_3 is too low, clicks may be heard. A larger value of resistance for R_3 would extend the disabled time of the bridge unduly, delaying the return of receiver audio to an undesirable extent. A little experimenting with the value of R_3 will quickly determine the optimum value for your particular installation.

One other feature of the audio-switch circuit is worthy of note. The bridge circuit tends to limit or clip high-amplitude audio signals to the headphones. This helps to prevent unwelcome surprises when an extremely loud signal is tuned in.

Side-Tone Oscillator

Q_3 is an inexpensive unijunction transistor that functions as a side-tone oscillator to monitor keying. When the key is pressed, a one-kilohertz tone is fed to the headphones at the output side of the diode bridge. The series combination of R_4 and C_2 between the oscillator output and the headphones tends to soften the harshness of

* 8932 Park, Lenexa, Kansas 66051.

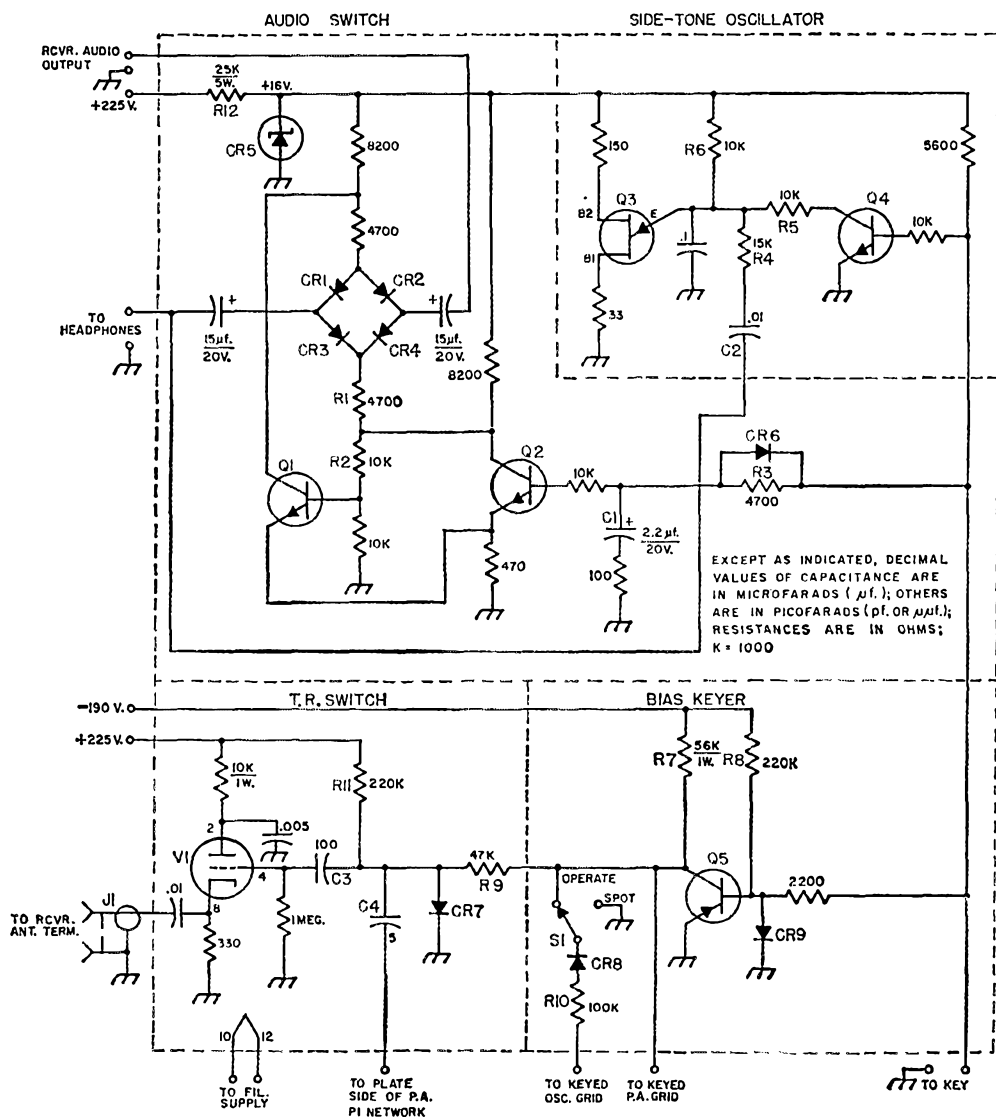


Fig. 1—Schematic diagram of Bridge-Break circuit. Capacitors with a polarity indication are electrolytic. Resistors are $\frac{1}{2}$ watt unless otherwise noted.

CR₁—CR₄, inc.—For text reference.
 CR₁—CR₄, inc.—1N457.
 CR₅—16-volt zener, 1N4745.
 CR₆—1N277.
 CR₇, CR₈—1N4003.
 CR₉—1N457.
 J₁—Coaxial receptacle, BNC type used.

Q₁, Q₂, Q₄—2N2714.
 Q₃—Unijunction transistor, 2N2646.
 Q₅—2N398A.
 R₁—R₁₁, inc.—For text reference.
 S₁—S.p.d.t. applicable, see text.
 V₁—6CW4 for 6.3-volt operation, 13CW4 for 12.6-volt operation.

the saw-tooth wave form providing a more pleasing tone.

With the key up, Q₄ is conducting. Current flowing through R₅ lowers Q₃'s emitter voltage just below the point where oscillations will be maintained. Too large a change in Q₃'s emitter voltage could produce a slight d.c. click. Since the characteristics of unijunction transistors

vary somewhat, some adjustment of the value of R₅ may be in order. First ground the base of Q₄ allowing the unijunction oscillator to run continuously. If the tone obtained is too high or too low for your personal taste, change the value of R₆. A higher value of resistance for R₆ will lower the pitch; a smaller resistor for R₆ will increase the frequency of oscillation. Once the

oscillation frequency has been established, unground the base of Q_4 and install the highest value of resistance for R_5 that causes the oscillation to cease.

Bias Keyer

Q_5 is a high-voltage p-n-p transistor that is capable of switching voltages as high as -105 volts. Under key-up conditions, Q_5 's base-emitter junction is back biased with CR_9 limiting this bias to about $+0.6$ volt. Q_5 draws no collector current in this state. A minus 100 volts is applied to the final amplifier grids and about -50 volts is placed on the oscillator grid. With the voltages and resistances shown, CR_7 in the t.r. circuit is back biased to about -45 volts.

When a t.r. switch is used, it is highly desirable to bias the final amplifier past cut off when not actually transmitting. Unless this is done, the final amplifier may generate diode noise that can mask weaker signals in the receiver. Unless the screen voltage on tetrodes is held constant, biasing the tubes to cut off becomes a rather difficult problem. To eliminate this condition, I connected the screens of the final amplifier in my TCS to a regulated 225 -volt supply which is used to power the exciter section of the transmitter.

The -190 volts applied to the bias keyer circuit is borrowed from a string of voltage-regulator tubes in my power supply. A somewhat higher or lower available negative voltage may be used by adjusting the values of R_7 and R_9 . R_7 and R_9 must be chosen so that under key-up conditions the maximum allowable collector voltage of -105 volts on Q_5 is not exceeded.

When the key is pressed, back bias is removed from Q_5 , and Q_5 is driven into heavy conduction by the base current flowing through R_8 . With Q_5 conducting, blocking bias to the oscillator and final amplifier is removed. The oscillator and final amplifier then operate at their normal grid-leak bias conditions. There is no problem with grid current damaging Q_5 as it is rated at 200 ma. when driven into saturation.

To key the oscillator, a $12A6$ tube in the TCS transmitter, blocking bias is applied to the control grid through CR_8 and R_{10} . The oscillator is turned on to spot the transmitter frequency by switching the cathode of CR_8 to ground with S_1 to remove the blocking bias. The oscillator-selector switch in the TCS was rewired to be used for S_1 . In the TCS, R_{10} and CR_8 are mounted on a small terminal strip near the oscillator with one end of R_{10} being wired directly to the oscillator tube grid connection.

With the $12A6$ buffer operating in the TCS the spotting signal was much too strong. Another section of the TCS oscillator-selector switch is used to remove screen voltage from the $12A6$ during the spotting operation. The $12A6$ buffer is not keyed with bias but is protected from drawing excessive current during key-up conditions by its original 1500 -ohm cathode resistor.

In installations where an existing t.r. switch may be used rather than the built-in unit de-

scribed below, a single $100K$ -ohm resistor from the -190 -volt supply to the collector of Q_5 and another from Q_5 's collector to ground will suffice as a voltage divider for Q_5 .

T. R. Switch

V_1 is operating as a cathode follower. The grid connects to the final-amplifier end of the pi network through C_3 and a special capacitor C_4 which is made from a short piece of RG-58/U. CR_7 is normally back biased as determined by the voltage divider consisting of R_9 and R_{11} . While CR_7 does have some junction capacitance, even though back biased, the capacitive division of the received signal by C_4 and the capacitance of CR_7 seems to be adequately compensated for by the voltage step-up of the pi network and the power gain of V_1 . Output signals from the t.r. switch are fed to the receiver via J_1 .

When the key is closed CR_7 's back bias is removed by the bias-keyer transistor, Q_5 . CR_7 then becomes forward biased by current flowing through R_{11} . This reduces CR_7 's impedance considerably, effectively shorting out the input terminal of the t.r. switch. Power-rectifier diodes like the $1N4003$ used for CR_7 have relatively slow-switching times, and at r.f. act more like a low-impedance lump when forward biased because their rectification efficiency is so low. Other small silicon rectifier diodes with a p.i.v. rating of 200 volts or greater can be used for CR_7 .

Since the transmitter's pi-network tank circuit is between the antenna and the input to the t.r. switch, several advantages are realized. By listening to signals with the receiver and tuning the transmitter plate-tuning capacitor back and forth, final-amplifier tank-circuit resonance can be quickly verified. By peaking received signals in the manner, near the desired operating frequency, the transmitter's output controls will require a minimum of further adjustment. While no TVI has been noted from the t.r. switch, if any harmonics are generated they must find their way to the antenna through the pi network which offers them considerable attenuation.

The t.r. switch has been successfully used on all bands from 160 through 15 meters with no degradation noted on numerous weak signals that have been logged. Rigs using the more popular 6.3 -volt tubes would, of course, substitute a $6CW4$ for V_1 for the $13CW4$ tube used in the author's 12.6 -volt surplus unit.

Power Supply

The positive sixteen volts required for the low-voltage bus is obtained from the transmitter's 225 -volt regulated power supply through R_{12} . This avoids the necessity of a separate low-voltage supply since the current requirement is only about fifteen milliamperes and plenty of well-filtered B+ was available. A sixteen-volt Zener diode, CR_5 , is connected from the plus sixteen-volt bus to ground primarily to protect the semiconductors from excessive voltages. Of course, any other arrangement supplying the

(Continued on page 58)

A Transmitting Converter for 50 MHz.

C.W. or Sideband on Six with Your H.F. Exciter

BY H. GORDON DOUGLAS,* WSPMK

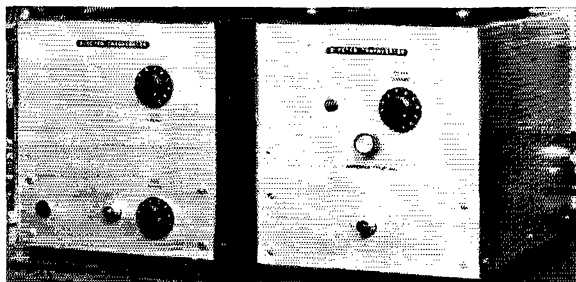
MORE and more v.h.f. enthusiasts are turning to s.s.b. as a means for extending their communications range over that achieved with a.m. Many operators already have an h.f. band s.s.b. transmitter in the station lineup. A practical solution to getting on v.h.f. s.s.b. is to build a transmitting converter and use the h.f. s.s.b. transmitter as the heart of the system. Because a Heath HX-10 s.s.b. transmitter was in use at WSPMK, this approach was taken to get on 6- and 2-meter s.s.b. The equipment described has seen daily use for more than a year. It has provided reliable service, with a minimum amount of normal maintenance. Similar units are shown in the first photograph: one for 50 and one for 144 MHz. The 2-meter model will be described in a subsequent issue.

The Circuit

Referring to Fig. 1, the triode section of V_{1A} is used as an overtone oscillator on 22 MHz. It operates at low power and has good frequency stability. Output from the oscillator is amplified by the remaining half of the 6EAS, which operates at a low power level by virtue of rather high values of series resistance in the plate and screen leads. The values were chosen experimentally to provide only enough 22-MHz. drive to excite the mixer, V_2 . Too much drive results in objectionable intermodulation distortion in the mixer, a common cause of poor signal quality in s.s.b. transmitters. Bandpass coupling is used between the mixer and the driver, V_3 , to help reduce spurious responses from the 12BY7A. S.s.b. or c.w. energy is supplied to the mixer cathode across a 100-ohm resistor which provides cathode bias for V_2 while serving as a load for the s.s.b. exciter, connected to J_1 .

* Box 164, Luther, Michigan 49656.

This transmitting converter provides up to 120 watts p.e.p. input for operation in the 6-meter band. It can take its driving signal from any low-power 28-MHz. c.w. or s.s.b. exciter, and requires less than 5 watts of excitation to develop full input power. Output from the transmitting converter is fed directly into the antenna system, or it can be used to drive a high-power linear amplifier.



Front view of the transmitting converter. The equipment described in this article is seen at the left. Its mate, the 2-meter version at the right, will be covered in a later edition of QST.

The driver stage, V_3 , is operated Class AB and gets its bias from a 120-ohm cathode resistor. It is neutralized by means of C_1 , a 1½-inch length of No. 16 wire. This is soldered to the low side of L_4 , and its free end is brought through a hole in the chassis and placed adjacent to the tube envelope, parallel to its plate. Neutralization is adjusted by moving the wire to or from the tube, as needed, until stability is achieved. A metal shield divides the plate side of the driver from its input tuned circuit, and aids in stabilizing the stage.

Link coupling, L_6 and L_7 , is used between the driver and the grid circuit of the final amplifier. Neutralization is again used (C_4 and C_5) to assure good stability. C_4 and C_5 are 3-inch lengths of stiff wire, cross-connected as indicated in Fig. 1. The stubs are placed adjacent to the 6146B tube envelopes, using the technique described for the driver. Parasitic chokes Z_1 and Z_2 are installed at the plate terminals of V_4 and V_5 as a further measure of assurance against spurious output. All power leads going into the driver-plate/p.a.-grid compartment are decoupled by means of feedthrough capacitors.

Construction Hints

An 8 × 12 × 2½-inch steel chassis is used as a foundation for this equipment. An aluminum chassis could have been used, and it is quite likely that a much smaller chassis would have served, had it been available at the time the project was started.

A homemade panel, measuring 8 by 10 inches, was cut from ⅛-inch thick aluminum stock and mounted on the front end of the chassis. Another plate of the same dimensions was attached to the

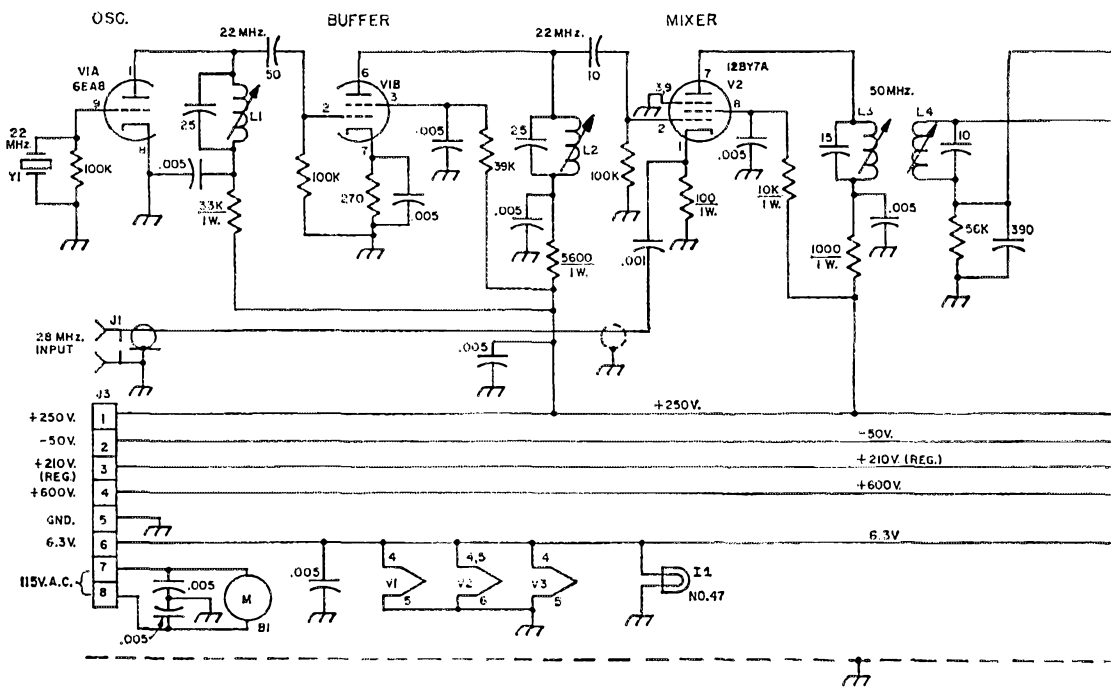


Fig. 1—Schematic of the 6-meter transmitting converter. Fixed-value capacitors are disk ceramic. FT = Feedthrough type. Fixed-value resistors are 1/2-watt composition unless noted differently.

B₁—Medium- or high-speed cooling fan.

C₁, C₄, C₅—Neutralization capacitors (see text).

C₂—20-pf. miniature variable (E.F. Johnson 160-110 suitable).

C₃, C₆—25-pf.-per-section butterfly (E.F. Johnson 167-22 suitable).

C₇—50.-pf. miniature variable (E.F. Johnson 148-4 suitable).

I₁—Panel indicator, No. 47 lamp.

J₁—Phono jack.

J₂—BNC-style chassis connector.

J₃—8-circuit male chassis-mount connector.

rear apron of the chassis for use as a back. Perforated aluminum was then formed as a cover for the assembly. It is attached to the sides of the chassis by means of sheet-metal screws. An aluminum bottom plate is used on the chassis to help confine the r.f. and to prevent accidental contact with the operating voltages of the unit.

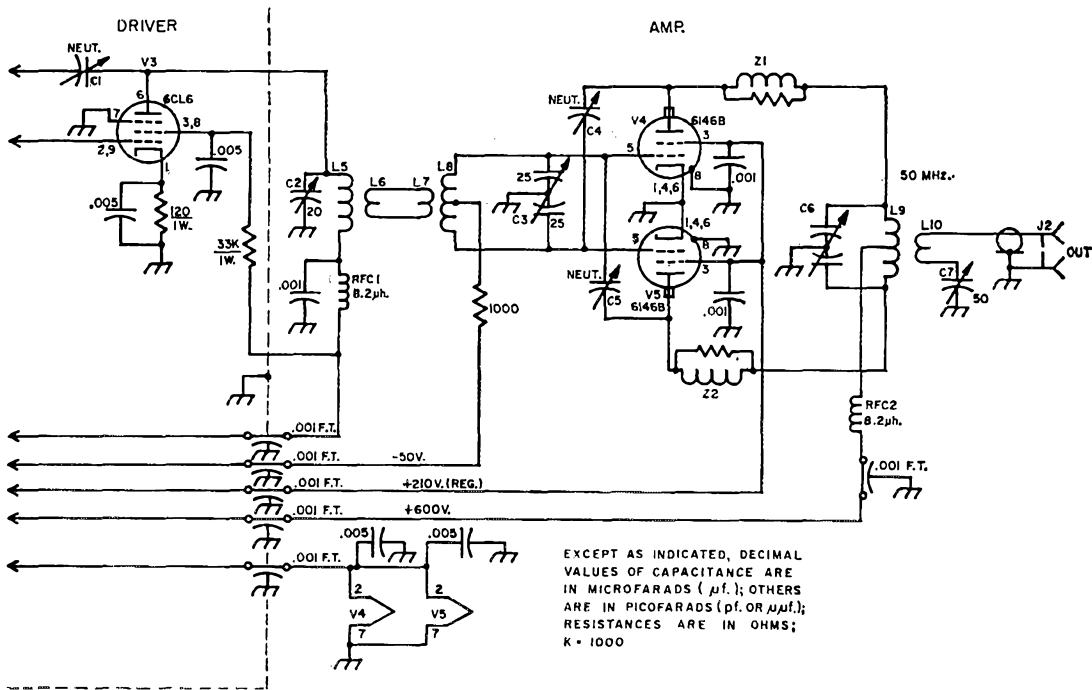
V₁, V₂, and the grid circuit of V₃ are on one side of the bottom of the chassis, and are isolated from the plate circuit of V₃, and the grid circuit of the p.a. stage, by means of a flashing-copper divider. The feedthrough capacitors for power-lead decoupling are mounted on the copper partition.

All resistors and capacitor leads are kept as short as practical, and ground connections are made directly to the chassis. Keep all ground leads short. Dress all power leads along the chassis and away from the r.f. leads of the equipment. The signal-carrying leads should be as short and direct as the builder can make them, keeping the input and output circuits of each stage as well isolated from one another as practical.

The handpass-coupling circuit in the mixer plate uses two 3/8-inch diameter slug-tuned coil

forms, mounted with their centers 1 inch apart. L₅ and L₈ are wound on short pieces of 1/4-inch plastic rod. Air-wound coils can be substituted if the builder wishes. The coils used by the author are doped with TV high-voltage cement so that the turns will stay in place. A suitable length of Miniductor coil stock could also be used at L₅ and L₈. L₈ is supported from the grid pins of the 6146B sockets by its leads.

The plate circuit of the output stage is above the chassis. L₉ is supported by the stator posts of C₆, which is mounted on the front panel. Its rotor terminal is grounded to the chassis by means of 3/8-inch wide copper strap. L₁₀ is supported by a 1-inch high ceramic cone insulator, and by the stator post of C₇. The loading capacitor, C₇, is mounted at right angles to C₆ on a small aluminum L bracket. It is adjusted from outside the case, through one of the holes in the cover. R_{FC}₂ is mounted between the center tap on L₉ and a 0.001-μf. feedthrough capacitor terminal. The latter is used to bring the plate voltage through the chassis. A high-speed cooling fan blows an air stream across the 6146Bs to help assure longer tube life.



- L₁, L₂—1.7- to 2.7- μh . adjustable inductor (J.W. Miller 4503).
- L₃, L₄—0.99- to 1.5- μh . adjustable inductor (J.W. Miller 4403).
- L₅—8 turns No. 16, $\frac{1}{2}$ -inch diam., 2 inches long, center tapped (see text).
- L₆, L₇—2 turns insulated hookup wire; L₆ over B-plus end of L₅, L₇ over center of L₈.
- L₈—10 turns No. 18 enam., center-tapped, $\frac{1}{2}$ -inch diam., $\frac{3}{4}$ -inch long, on ceramic form.

- L₉—8 turns No. 12, $\frac{3}{4}$ -inch diam., 3 inches long, center-tapped.
- L₁₀—2 turns No. 16 enam., $\frac{1}{2}$ -inch diam. Insert in center of L₉ (see photo).
- RFC₁, RFC₂—8.2- μh . r.f. choke (Millen 34300-8.2 or equivalent).
- Y₁—22-MHz. overtone crystal (International Crystal Co.).
- Z₁, Z₂—Parasitic suppressor. 5 turns No. 18 wire over body of 56-ohm, 1-watt carbon resistor.

Tune-Up and Operation

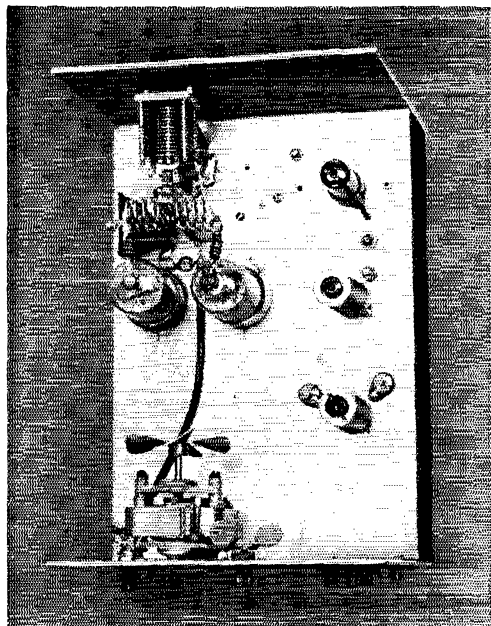
The operating voltages for this unit can be taken from the h.f. s.s.b. rig if desired, or a separate power supply can be built for this purpose. In the writer's installation, the voltages are taken from the HX-10. The HX-10's metering system is used also, permitting monitoring of the plate current for V₄ and V₅, and for reading relative r.f. output from the transmitting converter. Details are not given here since most builders will no doubt prefer to install a 300-ma. d.c. meter in the plate line to the 6146s, making it a permanent part of the assembly. Relative r.f. output can be observed on the station s.w.r. bridge.

Initial adjustments to the equipment should be made with the operating voltages removed from V₃, V₄, and V₅. This will prevent damage to those tubes should instability be present. Start by coupling a wavemeter to L₁ and tuning its slug until the crystal oscillates, as indicated by the wavemeter. Turn the slug of L₁ two or three additional revolutions outward (slug moving out of coil). This will help the oscillator to start readily each time. Next, adjust L₂ for peak re-

sponse, still using the wavemeter.

It will be necessary to reduce the output from the 28-MHz. s.s.b. exciter before conducting the remainder of the tests. This can best be done by adding a toggle switch to the rear apron of the exciter and wiring it in series with the screen supply to the amplifier stage of the exciter. Plenty of drive will be available from most exciters, with screen voltage removed in this way. For h.f. operation, merely restore the screen voltage. Alternatively, the output stage of the exciter can be disabled and link coupling used between the exciter's driver stage and J₁ of the transmitting converter. No more than 5 watts of c.w. or s.s.b. drive will be needed, and quite likely the actual driving power will be on the order of 2 to 3 watts.

The next step is to apply drive at J₁ and adjust L₃ and L₄ for peak output at 50 MHz., still using a wavemeter as an indicator. After this has been done, apply operating voltage to V₃ and tune its output tank for peak indication on the wavemeter, also at 50 MHz. If output on frequencies other than 50 MHz. is evident when using the wavemeter (check from 25 to at least 150 MHz.), check for instability in the driver



Looking at the top side of the chassis, the amplifier section is at the upper left, with the cooling fan below. V_1 , V_2 , and V_3 are in a row along the right side of the chassis.

stage, adjusting C_1 closer to or farther away from the tube envelope for optimum neutralization.

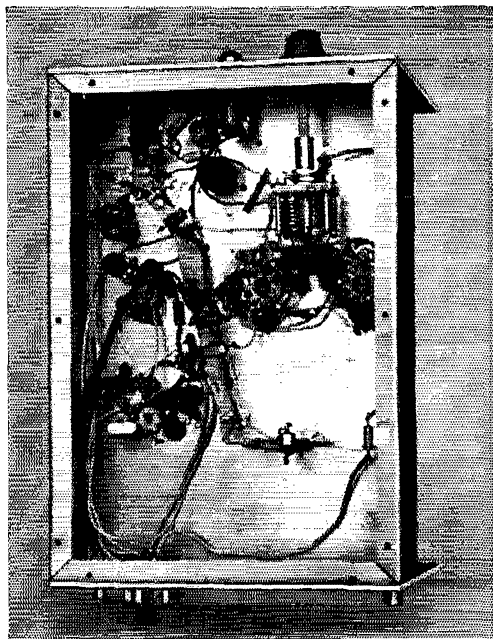
Drive and operating voltages can next be applied to the 6146Bs. A 50-ohm dummy load should be connected to J_2 during this test. A power-output indicator can be installed between J_2 and the dummy to facilitate tuning for maximum r.f. output. Assuming that a plate-current meter is in the 600-volt line to the 6146B plates, apply sufficient carrier from the 28-MHz. exciter to cause a rise in plate current from the resting value — approximately 50 ma. — to approximately 75 ma. Tune C_3 for maximum indicated plate current, then tune C_6 for a dip in plate current, and for maximum output. Next, adjust L_2 , L_3 , L_4 and C_2 for maximum drive to the 6146Bs. As C_6 is tuned through its range there should be no sudden changes in p.a. plate current: just the normal dip, if the amplifier is stable. If instability is noted, adjust C_4 and C_5 (a little at a time) until the amplifier is neutralized. It may be necessary to repeak C_3 after the foregoing adjustments.

C_7 is the loading capacitor. It should be adjusted so that the plate-current dip of the amplifier is rather broad, indicating tight coupling to the load. This condition is mandatory if a high-quality s.s.b. signal is to be had. Once the initial tune-up is completed, the 28-MHz. drive can be increased until the plate current (at dip) is 200 ma., the correct value for 120 watts c.w. input. During s.s.b. operation the plate current should not be allowed to exceed this value. Best

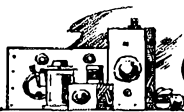
linearity will be obtained only if the s.s.b. drive is held below the point where the 6146Bs begin to draw grid current. For lower-power operation, merely reduce the level of drive from the 28-MHz. exciter. A.m. operation is possible with this equipment, if the 28-MHz. exciter has a.m. capability. During a.m. operation do not let the plate current of the 6146Bs exceed approximately 75 to 100 ma. if the maximum AB_1 ratings are to be observed. Too much plate current will damage the tubes. Provisions should be made externally to cut off the screen voltages from V_3 , V_4 and V_5 during receive. A relay can be used for this purpose.

Results

This equipment has been very effective in working DX on s.s.b. and c.w. For local operation each evening, often in the a.m. mode, the power level is kept down to less than 10 watts input — an aid to TVI reduction which is quite worth while. No TVI other than fundamental overloading has been experienced. This type of TVI can be encountered on the lower TV channels with any 6-meter rig. A 6-meter Transmatch is used between the transmitter and the feed line to help reduce harmonics and other spurious radiation from the antenna. Acknowledgement is given here to WASCOT for his help in designing and testing this equipment. QST

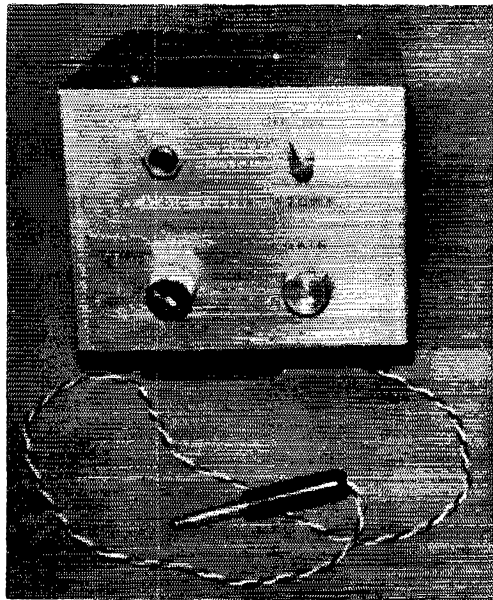


Looking into the bottom of the chassis, V_1 , V_2 , V_3 , and their associated circuits are on the left side of the copper shield which divides the chassis. The plate circuit of the driver, V_3 , upper center, and the grid circuit of the amplifier, right, are on the same side of the partition.



A C.W. Clipper-Filter Using FETs

BY R. W. FISH,* W2OWF



Front view of the clipper-filter. From left to right, J_1 and S_1 are at the top and R_1 and R_2 are at the bottom.

THE photographs and drawings show a c.w. clipper-filter that uses N-channel FETs. Although this device was designed primarily as an experiment in the use of solid-state circuits, it is quite practical, particularly when used with the present-day transceiver that offers only 2500-Hz. selectivity for c.w. work. Having a bandwidth of about 90 Hz. at 10 db. down and approximately 450 Hz. at 40 db. down (see Fig. 2), the gadget does a very nice job even with receivers having 500-Hz. selectivity. There is no ringing or instability evident in the clipper-filter, and the power drain from a self-contained 22½-volt battery is only about 7 ma.

Circuit Details

The circuit is based on time-proven vacuum-tube designs described in *QST* in recent years by Grammer,¹ Campbell² and Albert.³ Referring to Fig. 1, CR_1 and CR_2 are positive and negative series diode limiters. Positive voltage is applied to the anodes of CR_1 and CR_2 , forward biasing the diodes into conduction. Positive pulses above the bias level set by R_1 are clipped by CR_1 , and negative pulses by CR_2 .

Q_1 through Q_4 are audio amplifiers. To avoid possible overload, the source resistors of Q_1 and Q_2 are not bypassed. Additional overload protection is provided by an a.l.c. circuit between the drain lead of Q_4 and the cathode of CR_2 . A

portion of the signal developed across the primary of T_4 is rectified by CR_3 , and the resulting d.c. voltage is used to reverse bias CR_2 .

Between each of the amplifiers is a series resonant circuit (e.g., $L_1C_1C_2$ between Q_1 and Q_2) that peaks at about 950 Hz., and a parallel resonant circuit (e.g., L_1C_1 between Q_1 and Q_2) that presents an audio notch at approximately 1800 Hz.

T_4 matches the collector impedance of Q_4 to high impedance (2000 ohms or more) headphones.

Construction

The c.w. clipper-filter was constructed in a 4 × 5 × 6-inch Miniibox. L_1 , L_2 and L_3 were made from 7-hy. filter chokes by removing the frame and "I" laminations (bar) from each inductor. Because the resulting inductances were not identical, slightly different values of capacitance were used with each choke. The tuned circuits were adjusted before assembly and then checked and repeaked where necessary by slight alteration of capacitor values. Very little repeaking was actually required. As measured the chokes used ranged in value from 1.54 to 1.69 hy., and each inductor had a Q of 14. C_1 , C_3 and C_5 measured from 0.0047 to 0.0069 μ f., and C_2 , C_4 and C_6 measured from 0.012 to 0.018 μ f.

As shown in the photographs, perforated circuit board was used to support the parts. A metal chassis should not be used because it will adversely affect the Q of the chokes, resulting in a loss of gain and selectivity.

* 1 Irving Drive, Rochester, New York 14624.

¹ Grammer, "An Accessory for C.W. Reception," *QST*, July, 1950, p. 11.

² Campbell, "Modernizing the C.W. Clipper-Filter," *QST*, December, 1956, p. 36.

³ Albert, "Greater Selectivity with the C.W. Clipper-Filter," *QST*, September, 1957, p. 24.

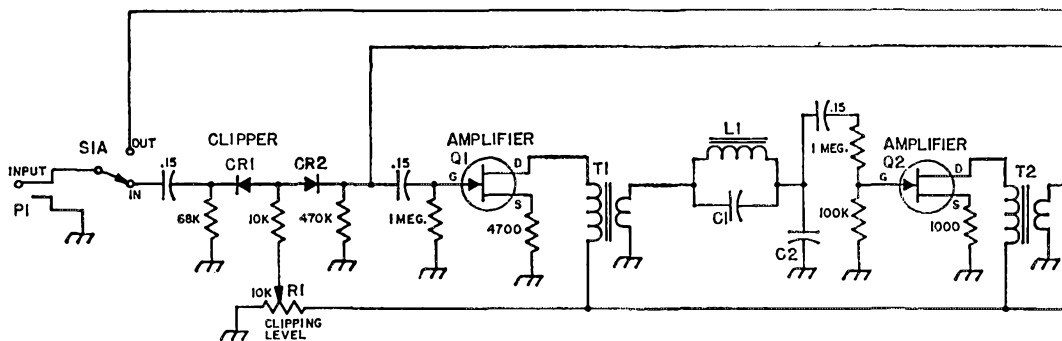
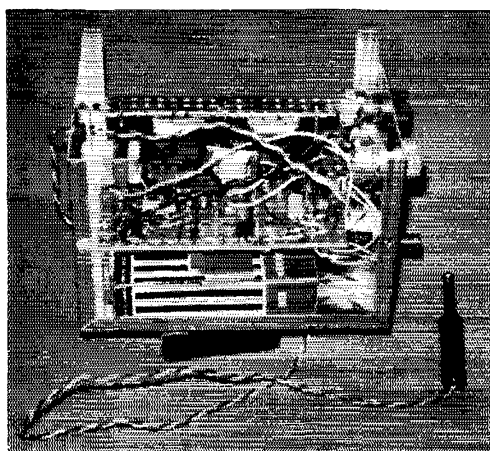
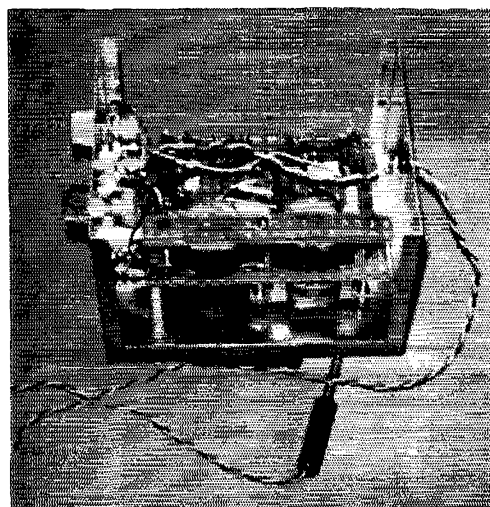


Fig. 1—Schematic diagram of the clipper-filter. Capacitance is in μf . Capacitors marked with polarity are electrolytic; all others are Mylar or silver mica. Resistance is in ohms, $K = 1000$. Resistors are $\frac{1}{2}$ -watt composition.

- BT₁—22½-volt battery (Burgess XX15).
- C₁-C₆, inc.—See text.
- CR₁, CR₂, CR₃—Small signal silicon diode (1N914).
- L₁, L₂, L₃—7-hy. 50-ma. filter choke modified as described in text (Knight, Allied 54 F 1408).
- Q₁-Q₄, inc.—N-channel FET, TIS14 used, 2N3819 or MPF102 suitable.



View of the clipper-filter showing the battery and main circuit board.



Side view of the clipper-filter showing L₁, L₂ and L₃ sandwiched between strips of perforated board.

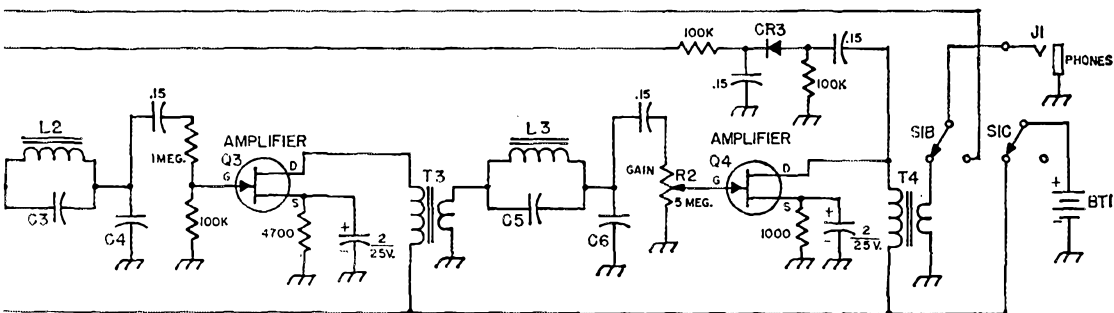
Testing and Use

If suitable test equipment is available for measuring inductance and capacitance, it's no chore to resonate the series-tuned circuit between each stage at 950 Hz. and to resonate the parallel-tuned circuit between each stage at 1800 Hz. However, if the test gear cannot be obtained, it is best to build the clipper-filter using the minimum capacitance value for each range mentioned previously and then add small amounts of capacitance as necessary until the desired band-pass curve is obtained. Proceed as follows:

So that no clipping occurs, set the arm of R_1 at maximum resistance above ground. Connect the output of an audio generator to P_1 and connect an oscilloscope or an a.c. v.t.v.m. across J_1 . Use a 2200-ohm, $\frac{1}{2}$ -watt composition resistor as the output load for T_4 . Vary the frequency of the audio generator from 500 to 2000 Hz. while making a graph of the output voltage. If necessary, change C_1 through C_6 to obtain the desired peak, notch and bandpass. For example, if the peak frequency is too high, increase C_1 , C_3 or C_5 or any combination of these capacitors as necessary. If the notch frequency is too high, increase C_2 , C_4 or C_6 or any combination of these capacitors as necessary. Be careful not to overload the clipper-filter or the gadget will appear to have a very broad bandpass.

To use the clipper-filter, set R_1 as mentioned above. Insert P_1 in the receiver headphone jack, and plug high impedance (2000 ohms or more) headphones in J_1 . Then adjust R_2 so that there is no apparent difference in the strength of a c.w. signal with the unit switched in or out. Finally set R_1 at the desired clipping level.

QST



- R₁—10,000-ohm control, linear taper.
 R₂—5-megohm control, audio taper.
 T₁, T₂, T₃—Output transformer, 2000-ohm primary to 10,000-ohm secondary (Lafayette 99 T 6101).
 T₄—Driver transformer, 10,000-ohm primary to 2000-ohm secondary (Lafayette 99 T 6124).

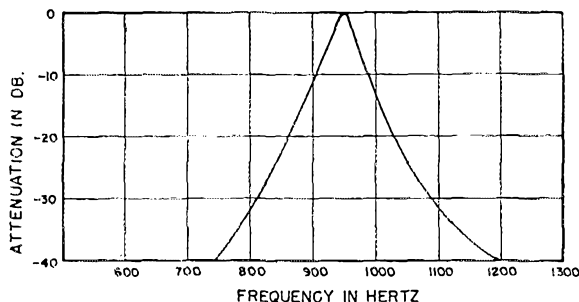


Fig. 2—Selectivity curve of the clipper-filter.

ARRL QSL Bureau

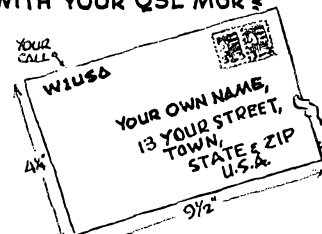
The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4¼ by 9½ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below:

- W1, K1, WA1, WN1—Hamden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108.
 W2, K2, WA2, WB2, WN2—North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.
 W3, K3, WA3, WN3—Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
 W4, K4—H. L. Parrish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.
 WA4, WB4, WN4—J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
 W5, K5, WA5, WN5—Hurley O. Saxon, K5QVH, P.O. Box 9915, El Paso, Texas 79989.
 W6, K6, WA6, WB6, WN6—San Diego DX Club, Box 6029, San Diego, California 92106.
 W7, K7, WA7, WN7—Williamette Valley DX Club, Inc., P.P. Box 555, Portland, Oregon 97207.
 W8, K8, WA8, WN8—Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.
 W9, K9, WA9, WN9—Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.
 W0, K0, WA0, WN0—Alva Smith, W0DMA, 238 East Main St., Caledonia, Minnesota 55921.
 KP1—Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.
 KZ5—Gloria M. Spears, KZ5GS, Box 407, Albova, Canal Zone.
 KH6, WH6—John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.
 KL7, WL7—Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
 VE1—L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

- VE2—John Ravenscroft, VE2NV, 353 Thornerest Ave., Montreal 780, Quebec.
 VE3—R. H. Buck ey, VE3UW, 20 Almont Road, Downview, Ontario.
 VE4—D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
 VE5¹—A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.
 VE6—Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.
 VE7—H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
 VE8—George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
 VO1—Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.
 VO2—Goose Bay Amateur Radio Club, P.O. Box 232 Goose Bay, Labrador.
 SWL—Leroy Waite 39 Hannum St., Ballston Spa, New York 12020.
¹These bureaus prefer 5 × 8 inch or #50 manila envelopes.

IS YOURS ON FILE WITH YOUR QSL MGR?



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

Automatic Letter Spacing for ICKEY

BY FRANK VAN CLEEF,* W1WCG

Here is the modification promised in the original ICKEY article to make the keyer generate perfectly-timed spaces between letters. It prevents starting a letter too soon after the completion of the preceding one.

AFTER using the original ICKEY¹ for several months, I still had the feeling that I had a tendency to run letters together, and after a little experimentation, the problem was solved in the following way.

Tackling the logic first, these facts were determined: If both memories become clear during a character and do not become set during the following code element (one code element is the length of a dot — that is, the interval between two successive pulses from the time base) this condition means the end of a letter. Further, to ensure proper spacing (three code elements) between letters it is only necessary to prevent generation of a new character during the second and the beginning of the third element following the last dot or dash sent. A memory input before this time indicates the continuation of a letter; an input after this time will have at least a three-element space anyway. The circuit in Fig. 1 prevents the memory from starting a new output from the keyer during the times mentioned, but does not prevent the memory from being set.

The circuit uses only two additional parts — one MC724P quad two-input gate and one

* Hillsdale Drive, R.F.D. 1, Rockville, Conn. 06066.

(Note change of address from that given in November QST.)

¹ Van Cleef, "ICKEY — An Integrated-Circuit Keyer with Dot and Dash Memories," QST, November, 1968.

MC790P dual JK flip-flop — both Motorola ICs. The two flip-flops are connected to form a counter circuit which is stepped by pulses from the time base applied to input 2 of COUNT 1. Starting with COUNT 1 reset (Q output low), setting either memory puts a high on an input to MEM SET, causing its output to be low. This low is applied to pin 7 of x and, together with the low on pin 6, causes the output of x to go high, keeping both COUNT 1 and COUNT 2 reset until both memories become reset. Each time both memories become reset, the output of x becomes low and the next pulse from the time base sets COUNT 1. When COUNT 1 is set its Q output becomes high, and this high does two things. At pin 6 of x, it prevents further setting of the memories from affecting the counter until the letter-spacing period is over. At pin 12 of y the high prevents the state of either memory from activating DOT GEN (in Fig. 1, page 29, November 1968 QST) until the letter-spacing period is over. The second time-base pulse to occur, after both memories have become reset, resets COUNT 1 and sets COUNT 2. This action of the counter occurs just after the time-base pulse. When COUNT 1 resets, it removes the high on input 6 of x which, in turn, removes the memory lockout at y and also allows x to reset COUNT 2 and hold both COUNT 1 and COUNT 2 reset until both memories become clear again. Fig. 2 illustrates the conditions on the various leads in the case where the letters "i" and "e" are sent in succession, with the "e" being put into the memory too soon after the "i."

The circuit may be installed in the original ICKEY by making the connections shown in Fig. 1. Be sure to supply plus 3.6 volts and ground to the new ICs as indicated. The power supply

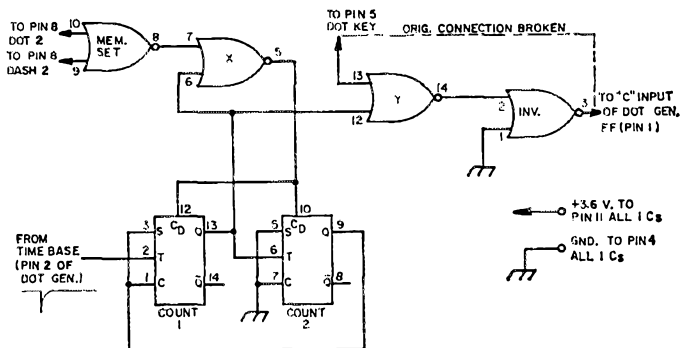


Fig. 1—Circuit diagram of the automatic letter spacing for ICKEY. COUNT 1 and COUNT 2 are contained in a Motorola MC790P dual JK flip-flop; the four gates are sections of an MC724P quad two-input gate. External connections are made to the designated points in the original ICKEY diagram in November QST

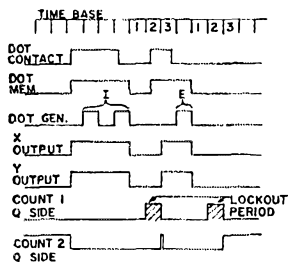


Fig. 2—Timing sequence for the spacing feature, for the case where a second letter ("E") is inserted in the second code element (space) following the completion of an "I."

shown in the November *QST* article is able to handle the additional drain of the new ICs with no strain. Remove the original connection between pin 5 of DOT KEY and pin 1 of DOT GEN and insert the connections to pin 13 of γ and pin 3 of INV as shown.

For those with sharp eyes who spotted six ICs in the original photograph in *QST* instead of the five indicated in the schematic—it's all legal, honest! The MC790P was temporarily out of stock when the keyer was built, so two MC725P single JK flip-flops were substituted. The keyer now has the MC790P installed in it, and the blank space left was used for one of the spacing ICs. QST



February 1944

... Speaking of WERS, K. B. Warner pleads for a continuing interest and activity. Not that the work is slackening off, but he fears that the frequencies used may become easy prey if not used. You should read his description of the shack at which he is chief operator. Really posh, air conditioned and everything. Used to be a ladies powder room for a filling station. He figures there is still the possibility of sneak air attack. Also points out that local disasters can take place at any time.

... Clinton B. DeSoto, W1CBD, has another of his essays, this time on the Army Airways Communications System. Plenty of photos, as usual, of stations in far-flung regions all over the world to help guide our planes on their missions. There is very close liaison between the system and the Air Force Weather Wing. The accuracy and timing of the weather reports might make the difference between the arrival of fifty bombers at destination and disaster.

... Wave propagation on the v.h.f. as influenced by the topography of the intervening terrain is lengthily discussed by Hollis M. French, W1JLK. There is a lot of useful information in this article and, of course, it is just as germane today as it was then. He has a lot of dope supplied by the U.S. Geological Survey, supplemented by his own experiences in this region.

... Sgt. Peter K. Onnigan, W6QUE, describes the equipment and systems used by commercial airlines for both communication and navigation. The well-known A-N system of radio range beacons is thoroughly discussed. Even blind landing devices are taken up.

... A WERS handie talkie of very advanced design is nicely described by Frederick A. Long, ex-W8NE. This equipment is designed for "on the spot" work. Cost? \$1538.77! It must be a dandy, at that. Works over 10-12 miles repeatedly with R9 signals. He breaks down the cost and puts in such items as 40 hours at \$50.00 per hour! Actually the total parts cost \$19.58. Huh!

... Interested in directivity control for low frequencies? B. Penners, W7HLV, applies the basic principles which have been used for years by broad-

casters for giving predetermined horizontal patterns of radiation. All this involves the use of spaced, driven elements. The necessary theory and circuits are given.

... Another true story of "Hams in Combat." How an advance radio station was set up on Georgia Beach, under fire and other difficulties, is well told by Capt. F. C. Beardsley, W4DEN, who was there. ... The experiences abroad with the Civilian Technical Corps are related by J. H. Fulton, W7IKF. While perhaps not as dramatic an experience as Capt. Beardsley's, this is interesting and informative. — W1ANA

Strays



This is Alan Dalton, K1YZK and his seeing-eye dog Ellen. Alan, who was blinded in a 1961 dynamite blast, is active from his own shack and also serves as a Civil Defense operator for South Burlington, Vt.

A Novel Antenna For 80 and 40 Meters

BY NEIL E. HANDEL,* WIIR

If you are like me and you don't want to be limited to operating just a couple of bands or only certain segments of the bands, here's an antenna that may fulfill your needs. In my case, a three-element, three-band beam takes care of the higher frequency bands, 20, 15, and 10 meters. The question was how to operate 80 and 40 meters on both phone and c.w. without cluttering the yard with several antennas. A single dipole works well over the entire 40-meter band but the 80-meter band is much too wide to allow good operation from 3.5 to 4.0 MHz. without either severe compromises or involved tuning arrangements. In addition, all of my equipment is designed for operation with 52-ohm coaxial cable and hence it is convenient to have the low-band antenna use this impedance cable as a feed line.

An antenna system for 80 and 40 meters which has served me well for over a year is shown in Fig. 1. It is a variety of multiband dipole with relay-switched center loading of an 80-meter dipole which permits the resonant frequency of the antenna to be changed from 3.9 MHz. to about 3.5 MHz. The 40-meter dipole is conventional in length. The 80- and 40-meter dipoles are spaced apart about six inches by using wood-dowel rods that have been simmered in paraffin wax for about fifteen minutes for weather-proofing purposes. Each end of the 40-meter antenna attaches to an insulator which is guyed back to the 80-meter antenna by a short piece of wire. Be sure to wrap this guy tightly around the 80-meter antenna wire so that it will not slip. The two wires may be soldered if desired to insure that the connection stays put.

The loading coils L_1 and L_2 can be made from either No. 10 or No. 12 copper wire or any other

Frequency MHz.	S.W.R.	Loading Coils
3.5	1.0	IN
3.6	1.8	IN
3.7	1.9	OUT
3.8	1.25	OUT
3.9	1.05	OUT
4.0	1.75	OUT
7.0	1.2	IN
7.1	1.8	IN
7.2	1.05	OUT
7.3	1.35	OUT

suitable conductor that will be self supporting. L_1 and L_2 can be mounted on a board at the center support for the antenna. L_1 and L_2 are left exposed to the weather. However, the relay K_1 , which is used to short out the loading coils, must be weatherproofed. I accomplished this by placing K_1 inside a plastic food container which is mounted directly to the board used to support L_1 and L_2 . Drill two $\frac{1}{8}$ -inch holes in the side of the food container that will face the ground when the antenna is erected. These holes will serve as drain holes. These containers are available for about 60 cents in any dime store.

Relay K_1 is a double-pole, single-throw relay, preferably with a 115-volt a.c. field coil and contacts that are at least $\frac{1}{8}$ -inch diameter and/or better yet $\frac{1}{4}$ -inch diameter. An antenna-type relay is suitable. The leads from the relay to the loading coils should be at least No. 14 wire and should be kept as short as possible; they should not

(Continued on page 48)

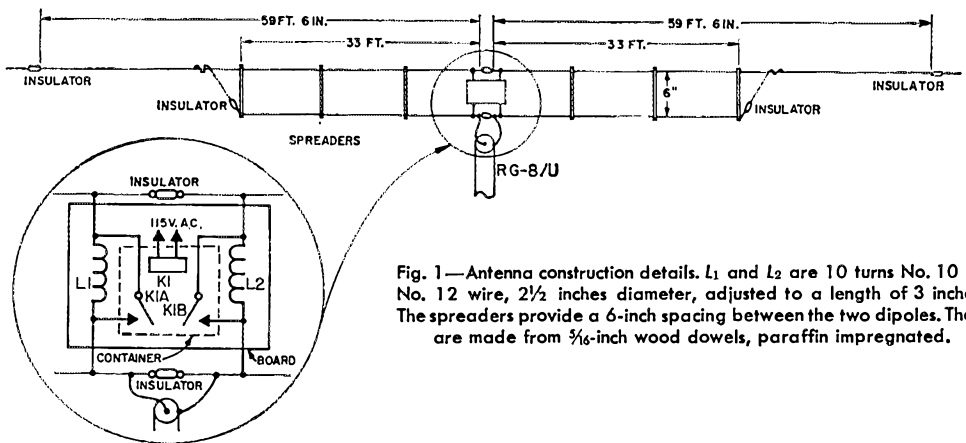


Fig. 1—Antenna construction details. L_1 and L_2 are 10 turns No. 10 or No. 12 wire, $2\frac{1}{2}$ inches diameter, adjusted to a length of 3 inches. The spreaders provide a 6-inch spacing between the two dipoles. They are made from $\frac{3}{16}$ -inch wood dowels, paraffin impregnated.

More Twoer Changes

BY DOUG DEMAW,* WICER

HAMS are continually modifying home-built and commercial equipment for one reason or another. This could be called progress, if the changes are for the better, or inquisitiveness, if the changes are made for experimental reasons. Whatever the motive, some changes do offer greater operating convenience and effectiveness. The changes described here were carried out for the foregoing reasons, and to secure better selectivity from the simple super-regenerative detector that is used in the Twoer. Satisfactory results were obtained, and as a bonus the output from this transmitter increased from approximately 0.8 watt to 1.2 watts, indicating an improvement in efficiency.

Transmitter Changes

Some Heath Twoer and Sixer modifications were described in an earlier issue of *QST*.¹ Before going ahead with the changes shown here, the builder may wish to make some of the modifications described earlier. Actually, these changes are adaptations of those described in the previous article. In this instance the previously-added loading (or coupling) control was accessible through the side of the Twoer by means of a screwdriver. The same was true of the plate tuning capacitor. In the present modification, miniature variable capacitors, C_{16} and C_{17} of Fig. 1B, replace the slotted trimmers and are made accessible from the front panel of the equipment as shown in the photo. C_{16} has its rotor grounded. To prevent accidental short circuiting of the plate B plus to ground, C_{16} is isolated by a 680-pf. silver mica capacitor. This step was considered necessary because of the extremely close plate spacing of C_{16} .

The button bypass, C_{15} , has been relocated near the function switch (see photo) to provide room for C_{16} and C_{17} behind the front panel. A new coil was wound for L_4 , using large-diameter wire in an effort to improve the Q of the coil. The new coil is installed parallel to the front edge of the chassis. It is mounted between pin 9 of V_{4B} and the relocated C_{15} . A link, L_6 , is in-

* Assistant Technical Editor, *QST*.

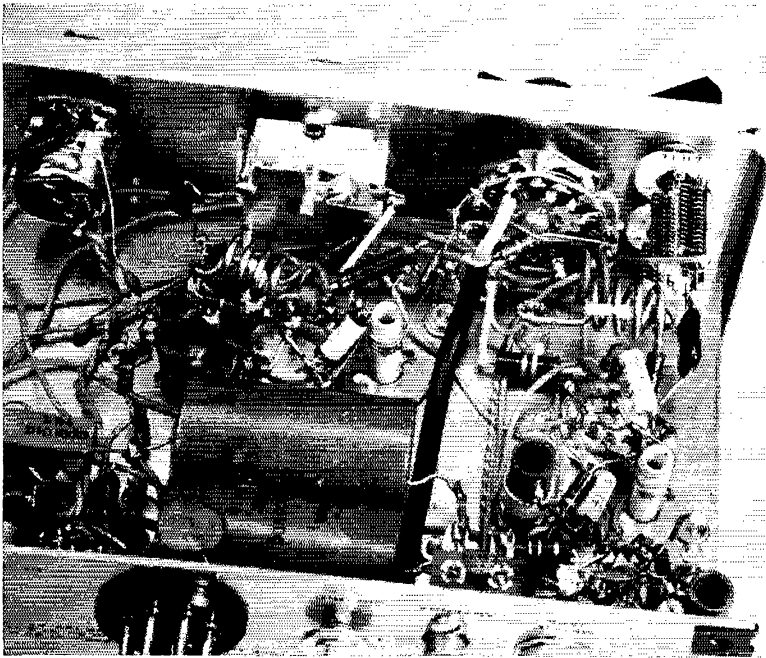
¹ McCov, "Some Useful Modifications for the Sixer and Twoer," *QST*, May, 1968.



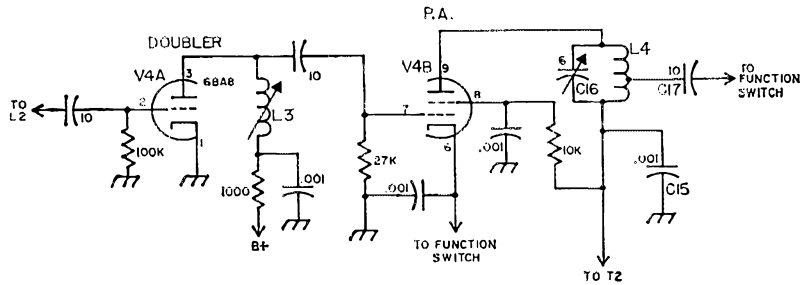
The new plate tuning and loading controls are located at the lower right of the photo. Decals have been added for identification. A smaller bar knob has been installed on the function switch to make room for the two new controls. The meter, potentiometer, and outboard crystal socket at the right-center of the panel are additions which were described in an earlier issue of *QST*.

serted part way into the B-plus end of L_4 and is tuned by C_{17} . When the transmitter is looking into a nonreactive 50-ohm load, C_{17} will be set near midrange, and L_5 will be approximately half way into L_4 . L_4 should be adjusted so that a definite peak in output is noted when C_{17} is tuned; the peak should not occur at either minimum or maximum capacitance. Once the right amount of coupling is determined, a drop of glue can be added to L_5 to hold it in place. A piece of lacing cord was used to secure L_5 to L_4 in this modification. Either method is satisfactory. To make room for the shafts and knobs of C_{16} and C_{17} , the lever knob that comes with the Twoer (send-receive switch) must be replaced by a smaller one. A knob from an older National receiver was used in this instance. The small knobs used on C_{16} and C_{17} are James Millen A001 units whose $\frac{1}{8}$ -inch shaft holes have been rebored to fit the 0.188 diameter shafts of the two E. F. Johnson miniature variables used for C_{16} and C_{17} . A No. 11 drill proved suitable for this.

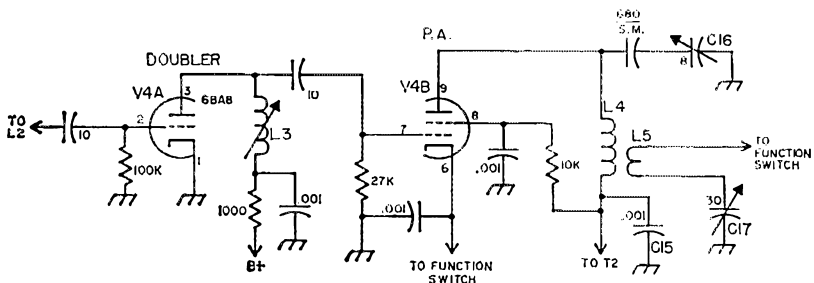
Several Twoers have been available to this writer over the past several years. None of them



Two subminiature variables have been added to the front panel (upper right) for plate tuning and loading. The amplifier tank coil is visible between the variable capacitors and the function switch. Its link is tied to the main coil by means of lacing cord once its optimum setting is determined. A new detector grid coil has been wound and is visible directly in front of the receiver tuning capacitor (front center). At the left of the coil is a subminiature variable trimmer which is the new trimmer capacitor.



(A) ORIGINAL CIRCUIT



(B) MODIFIED CIRCUIT

S.M.—SILVER MICA

Fig. 1—At A, schematic diagram of the last two stages of the unmodified Twoer transmitter channel. At B, circuit of the modified output stage. See text for discussion of L_3 changes. C_{16} is an E. F. Johnson 160-104 (1.8 to 8.7-pf.) miniature variable. C_{17} is an E. F. Johnson 160-130 (3 to 32-pf.) miniature variable. L_4 is 4 turns No. 12 bare copper wire, $\frac{3}{8}$ -inch i.d. x $\frac{3}{4}$ -inch long. L_5 is two turns of insulated hookup wire, $\frac{3}{8}$ -inch i.d., inserted into B-plus end of L_4 . See text.

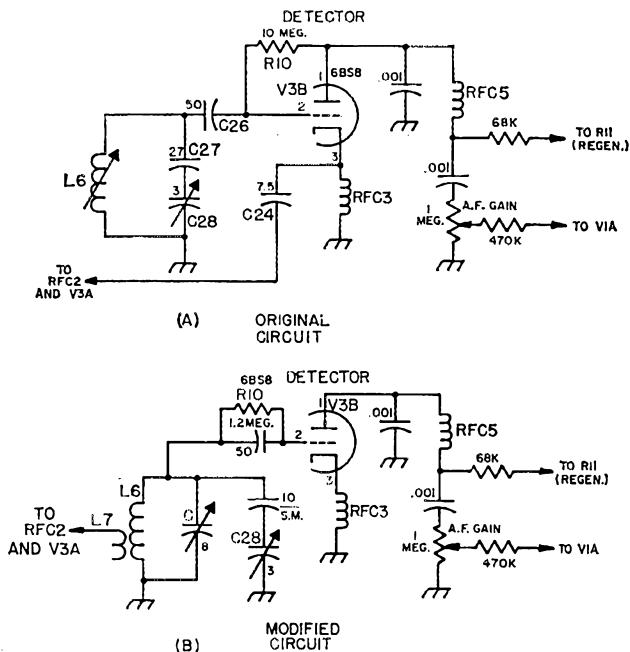


Fig. 2—At A, the unmodified superregenerative detector of the Twoer. At B, L_6 is replaced by a 4-turn, $\frac{5}{16}$ -inch i.d. air-wound inductor. Its length is $\frac{3}{4}$ inch. It is made from No. 12 bare copper wire. L_7 is a length of insulated hookup wire which is gimmick-coupled to the ground end of L_6 (see text). R_{10} has been changed from 10 megohms to the indicated value, and has been moved from the plate pin of V_{3B} to the top of L_6 . C is an E. F. Johnson 160-104 miniature variable (1.8 to 8.7 pf.). C_{28} is the original tuning capacitor.

had a doubler plate coil (L_3) that would hit resonance at 2 meters. The peak in output always occurred when the slug of L_3 was as far out of the coil as it would go, indicating too much inductance existed. The cure is a simple one; merely break the glue loose on the top two coil turns (near the end of the form farthest from the chassis) and spread them as far apart as possible, bringing the last turn out to the end of the form. The slug can now be readjusted for peak transmitter output. This will occur just as the slug starts to enter the coil.

Receiver Changes

Of several Twoers tested, the selectivity of the receiver was such that approximately four 1000- μ v. signals, 30-percent modulated, could be equally spaced across the 4-Mc. tuning range without interfering with one another. Some experiments with a battery-operated solid-state 2-meter superregenerative detector² showed that as many as 15 signals of the same type could be placed in the same 4-Mc. spread. By modifying the circuit of Fig. 2A to that of 2B the selectivity improved markedly. The 4-Mc. tuning range now accommodates 12 signals of the same strength and modulation percentage mentioned earlier. The improvement results from a shift in quench frequency with relation to the signal frequency³ and because L_6 has higher Q .

The changes require that R_{10} be moved from the plate of the tube to L_6 and that its value be reduced to 1.2 megohms. Originally, L_6 was a slug-tuned coil. It is replaced with an air-wound inductor with a much larger wire diameter. Where L_6 was formerly mounted a miniature variable, C , is installed. C is used as a trimmer for the new circuit. C_{27} is changed from its original value (22 pf.) to 10 pf. in order to retain the dial calibration of the Twoer across its range. C_{24} is removed and discarded.

A gimmick-type coupling circuit is added between the r.f. amplifier, V_{3A} , and the detector, V_{3B} . In the schematic it is labeled L_7 . Actually, it consists of a short length of insulated hookup wire. One end is soldered to the plate end of RFC_2 ; the remaining end is wrapped three times around the last turn of L_6 (near ground) to provide a small amount of capacitive coupling between the two stages. No other changes are necessary. Trimmer C is adjusted to give the desired dial calibration just as was the slug of L_6 in the original circuit. These changes also resulted in a marked reduction in receiver radiation, a common problem with superregenerative detectors.

The improved receiver selectivity should help when band conditions are crowded, especially when the signals are strong. The sensitivity of the receiver is about the same as before the changes were made. A 0.3- μ v. test signal with 30-percent 1000-c.p.s. modulation was plainly audible at room level with the Twoer's audio gain set at midrange.

² DeMaw, "The Connecticut Bond Box," *QST*, August, 1968.

³ *The Radio Amateur's Handbook*, 45th Edition, 1968, page 392.

Technical Correspondence

THE TRANSCIVING CONVERTER FOR 160

Technical Editor, *QST*:

I would like to offer some comments for your consideration in regard to the 160-meter transceiving converter¹ described in November *QST*. These thoughts involve reducing the mental arithmetic for the operator and easing the alignment problem.

As described, the selection of the 3.8- to 4-MHz. transceiver range results in the transceiver dial advancing in frequency as the 160-meter frequency decreases, thus presenting an inverted mental-arithmetic problem, especially with all of the sub-band allocations now imposed on 160. Further, the sideband sense is flipped. That is, upper sideband selection on the transceiver panel results in lower sideband output on 160. Of course, if the operation is a.m. no one cares, but these expensive appliances generally neglect this mode. In addition, if one checks the "birdie" charts (a necessity for converter design) it will be observed that low-order (2nd and 3rd) spurious signals appear to cross at 1933./3 3966.7 MHz. on both transmit and receiver. These may be too low-order to be tolerated. The proposal being offered here eliminates all of these objections and requires changing only one double-tuned circuit.

Suppose that the 5800 kHz. crystal is changed to 5200 kHz. and that the transceiver operating range now is between 7000 and 7200 kHz. Presto, the sidebands transmitted (or received) on 160 have the same sense as those indicated on the transceiver. Further, the direction of frequency progression at 160 is the same as on the transceiver dial. End of mental gymnastics. In addition, there are no in-band spurious frequencies for either transmission or reception. On transmission, the nearest and strongest spurious is a fifth-order "character" at 6933.3/1733.3 kHz. with the dial at 7000 kHz. (output 1800 kHz.). Even this one is 40 to 50 db. down and departs from the tuning ranges involved. On receive, a fourth-order birdie is also possible at these same frequencies but the usual 2- or 3-kHz. selectivity of the receiver prevents its observation. This is not true if the transceiver range of 7100 to 7300 kHz. is chosen.

Implementing this modification is simple. Replace the crystal with one at 5200 kHz. and adjust L_1 . However, there might be more margin for coil tolerance if one increased the value of the 100-pf. capacitor by 20 or 30 pf. The bandpass circuit involving L_6 and L_7 will need to be shifted to 7 MHz. However, the design and alignment problems are much easier because the required 200 kHz. bandwidth is a smaller percentage of 7 MHz. than of the former 4 MHz.

On this particular circuit I would also suggest a change in alignment technique to simplify life for

¹ DeMaw, "A Transceiving Converter for 160," *QST*, November, 1968.

the average ham with minimum test equipment, (Maybe I should have said minimum knowledge, too.) When adjusting the new L_7 , clip a swamping load consisting of a 1000-ohm composition resistor in series with a 0.005- μ f. capacitor across the opposite coil, L_6 . The input frequency should be 1900 kHz. (dial at 7100 kHz). Adjust L_7 for maximum received signal. To adjust L_6 , switch the load to L_7 and again arrive at maximum signal. Remove the load and the bandpass should be reasonably flat from 7000 to 7200 kHz (assuming the design homework was proper). Why does this work unambiguously? The loading of one of two overcoupled circuits lowers the Q and thus reduces the coupling below the critical value. The result is a single response peak rather than two poorly-defined ones, neither of which is at the center of the passband. Normally, the alignment of overcoupled double-tuned circuits, even with a sweep generator, can be troublesome if the two circuit Q s are not equal, or if one gives up and tries to stagger-tune them. Besides, what typical ham has access to a sweep-frequency generator and a scope?

One criticism of my proposal vs. yours is that if the transceiver used is poorly shielded, including this converter, the 7-MHz. transmitter phone leakage appears in the c.w. spectrum for the ham next door. In your choice, the leakage is all in the phone band, but still QRM. In either case, it is essential to have a well-shielded receiving setup or the leak-through signals from 75 or 40 meters make life unbearable at 160.

"160" has been terrific this year and your article should go a long way toward returning it to the popularity it once enjoyed prior to WW II. — Carl W. Brown, W3LUL, 3310 Greencastle Road, Burtonsville, Maryland 20730.

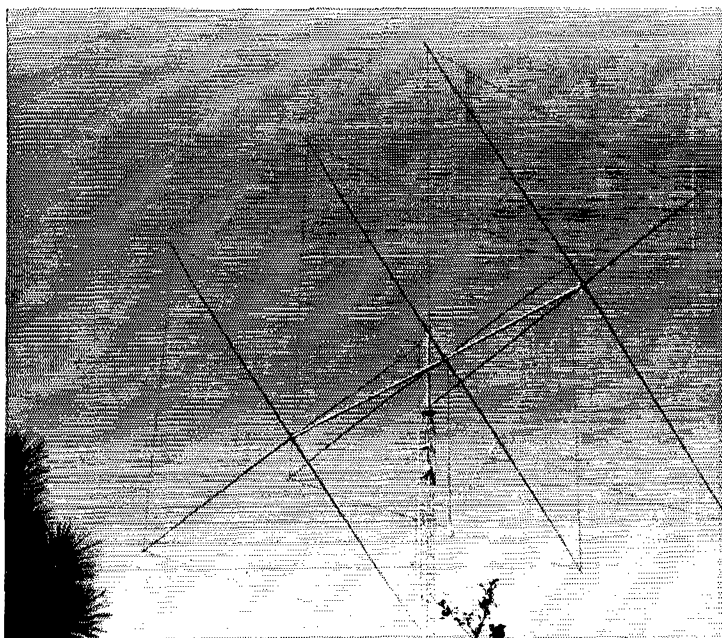
(Editor's Note: The use of a 7-MHz. i.f. was considered at the time the transceiving converter was designed. As W3LUL points out, the higher i.f. would have lessened the chance for image response of any serious magnitude. However, it seemed more prudent to design the equipment for use with a 75-meter transceiver since more low-cost units of that type are in service. The selectivity of the 160-meter transceiving converter proved to be quite adequate for use with the 3.5-MHz. i.f. as indicated during lab tests on a spectrum analyzer. If it is practical for the builder to use the higher i.f. (7 MHz.), it is recommended for the reasons pointed out in Carl's letter. The tuning arrangement he suggests for aligning the bandpass circuit is noteworthy. It should greatly simplify initial tuneup.)

DIRECT CONVERSION

Technical Editor, *QST*:

The inexpensive hot-carrier diodes used in "Direct Conversion, A Neglected Technique," *QST*, November, 1968, are now available from Hewlett Packard as matched pairs and quads. The quads are sold as type 5082-2805 for \$4.40. I have used two of these matched quads in doubly-balanced modulators from 2 through 20 MHz. and in both cases have obtained more than 40-db. carrier suppression with no special effort to achieve better balance than carefully-wound transformers afford. Considering their v.h.f. capability, inexpensive hot-carrier diodes are a definite quality/price breakthrough.

I have been operating a similar homodyne circuit to that described in the above article since Field Day '68. I used three RCA linear integrated circuits in a 40-meter c.w. transceiver version with full break-in. A CA3028A is employed as a VXO autodyne converter ($\Delta f \approx 10$ kHz.) followed by ≈ 120 db. of



W4MW's Three-Element Quad

audio gain in a CA3035. In transmit mode, a CA3032A amplifies the VXO output of the converter to ≈ 300 mw. The squelch capability of the CA3020A is used for keying.

Although the zero-i.f. concept has been around quite a while, current device and circuit technology make it much more appealing. A phasing-type direct-conversion s.s.b. transceiver using unique broadband r.f. phase shifters is my current project in this domain. — *Julius M. J. Macey, K2KGI/W6FAW, 55 Durham Road, San Anselmo, Calif. 94960.*

THREE-ELEMENT QUAD

Technical Editor, *QST*:

Publications on quad antennas that have come into my hands have given measurements for 2- and 4-element jobs but skipped over the 3-element variety. I enclose a photo of one I have built using commercial fiber glass fish poles and crossarms. The boom is two 11-foot lengths of 2-inch diameter flag-pole material (aluminum) with a 4-foot length of steel conduit telescoped into the center and fastened with stainless-steel self-tapping screws. The outer ends had 3-inch-long telescoped ring sections inserted so the ends of the boom would not crush. The remaining holes were plugged with plastic caps from detergent bottles. The rest of the mountings are standard in form.

Because of surrounding palm trees and shrubbery, I had to assemble the elements with the boom in a vertical position (already fastened to the tower). The director went on first; then the boom was reversed and the driven element and reflector were installed, followed by the 50-ohm coaxial cable and gamma-matching device. The driven element is spaced $1\frac{1}{2}$ feet from the mast and, of course, the other two are on the extreme ends of the boom, leaving 9.5 feet between driven element and reflector and $12\frac{1}{2}$ feet between driven element and director. These measurements were not scientific, but an uneducated guess which worked out extremely well as far as my particular location was concerned.

This antenna is a monobander for 20 meters, and holes were drilled in the spreaders for distances from the center as given in the quad article in February 1967 *QST*¹. The spreaders, already fastened to the crossarms, were spread-eagled on the ground, properly spaced, and the wire strung through the holes. For those that haven't been christened — make positive that you leave enough slack between tips or you will have bows and arrows. Once up in the air, the unevenness in the wire cannot be noticed, but the crossarms will be in a plane vertical to the ground and esthetically acceptable.

I believe the secret in quad success lies in the tuning, and that should be done preferably at full height or nearly so with the s.w.r. bridge *at the antenna*, not in the shack. In this location, following the tuning procedure an impedance measurement was taken which indicated very close to 50 ohms. Slight reactances were thereafter corrected with a transmatch and loading was beautiful. The front-to-side ratio is phenomenal and the front-to-back wound up to be similar to the 3-element Yagi previously in use. This was satisfactory to me and I did not bother to tune the director and reflector again, having depended on luck.

The results? I hear and work stations I never worked before without benefit of a linear amplifier, and the pile-up response has gone from about number 40th to from the 3rd to 5th call. Incidentally, the height from ground to boom is 40 feet.

I mention W4SD in thanks, as it was he who did the climbing and tuning. — *Jack Heidt, W4MW.*

¹Fitz-Randolph, "Practical Consideration and Application in a Multielement Quad," *QST*, February, 1967.

Feedback

In Fig. 2A, page 27, November 1968 *QST* (Gimmicks & Gadgets) the lead from the upper diode should go to Q on FF_{1B} instead of J on FF_{2A}. The J input on FF_{2A} has no connection. Also, the correct spelling of the street name in the Signetics address is Arques, not Aeques.



Hints and Kinks

For the Experimenter



TUBE ADAPTER

To improve the performance of older receivers, it's often necessary to replace an octal tube with a 7-pin miniature. As shown in Fig. 1, an easy way to do this is to make an adapter from a 7-pin socket and a male multiwire connector.

Begin making the adapter by removing the grommet from the connector cap. Then determine if the miniature socket will fit flush with the top of the cap. In case it won't, increase the size of the hole with a small file. Next solder a 3-inch length of hookup wire to each pin of the miniature socket. Leave sufficient insulation on the wires so that crossing leads will not short. Insert the wires in the appropriate pins of the octal plug, and pull the wires taut. To complete the adapter, solder the wires to the connector pins, and plug in the miniature tube. — *Hank Van Hooser, W4DIJ*

USING A CENTER LOADED LOW-BAND WHIP ON 50 MHZ.

WHEN I had my 3.9-MHz. loading coil in my Master Mount mobile antenna, I accidentally turned my multiband 3-watt rig to 50 MHz. On hearing a station, I gave him a call, and much to my surprise, he came back and gave me a fair report. Since then I have had several dozen 50-MHz. contacts using this combination, some of them with stations that were more than 30 miles distant.

After my initial v.h.f. QSO with the low-band antenna, I tried each of the available coils in making a test with one station. We discovered that the 7-MHz. coil gave a small but noticeable improvement whereas the 14-MHz. coil or a jumper across a loading coil gave a serious decrease in signal strength.

Somewhat later I put an s.w.r. bridge at the input of the 50-ohm coaxial cable which feeds the antenna. The measurements were consistent with these observations: The s.w.r. was the least (2 to 1) with the 7-MHz. coil and only slightly higher with the 3.9-MHz. coil. Perhaps the s.w.r. could be lowered by trimming a coil exactly, but the inconvenience seems hardly worthwhile since losses in a short line are insignificant when the s.w.r. is down to 2 to 1.

While at 50 MHz. the electrical length of the whip is less than a half wavelength, it can be surmised that the presence of the 7-MHz. coil accidentally loads it to make it appear to have a length of about $\frac{3}{4}$ wavelength. If one is willing to accept a vertically polarized mobile antenna when most stations are horizontally polarized, he is unlikely to find one that is more effective than this one. — *Yardley Beers, W0EXS*

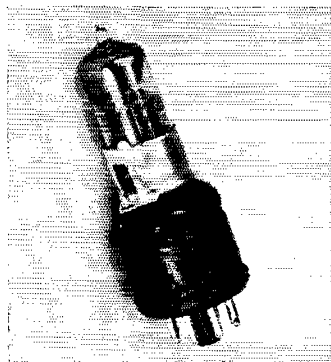


Fig. 1—A miniature-tube adapter for an octal socket.

"TOUCH TO TALK" FOR THE C.W. OPERATOR

IN the October 1968 *QST* article "Touch To Talk," KH6CU outlined the advantages of the touch-to-transmit system for phone operation. However, I found the touch system to be even more advantageous for c.w. work.

Referring to Fig. 1 in the KH6CU article, for c.w. operation the contact plate can be merely a wire that is wound around the key knob or paddle in such a position that, during transmitting periods, the operator's hand will always be in contact with the wire. By just touching his key — it isn't necessary to close it — the operator can mute his receiver, turn on his oscillator and switch his antenna. The transmitter can then be keyed normally. By removing his hand to pick up a pencil or punch the mill, the operator can immediately activate his receiver. For a form of break-in, with a little practice one can learn to rest his knuckle away from the paddle (and the contact plate attached to it) between words and sentences.

Once again, in reference to Fig. 1 in the KH6CU article, C_1 should be of reasonable quality because the operator will be subject to shock if the capacitor breaks down. Preferably two capacitors should be used in series, one at the control unit and one at the key or microphone. Then if one capacitor breaks down, there still will be no danger.¹ The control unit should be mounted in a grounded metal box, and the leads from K_1 to the transmitter should be bypassed to ground. A shielded wire between the box and the contact plate will reduce the possibility of r.f. pickup by the device. — *Harry F. Hillman, W7DVZ*

¹ The minimum-voltage rating given for C_1 in the KH6CU article is a little on the stingy side if a large transient appears on the a.c. line. Use one or two 1600-volt capacitors for C_1 and there will be no need to worry. — *Editor*

TAPPING PLEXIGLAS

A screw hole may be tapped in Plexiglas or polystyrene by simply driving the screw into a hole of slightly smaller diameter than the screw. To greatly reduce the chance of cracking the plastic, place a small amount of liquid soap on the screw and in the hole prior to tapping. — *Robert J. Tanis, WA8UDG/4*

SILICONE RUBBER SEALANTS

It is not uncommon to experience intermittent I connections in ham radio antenna systems. More often than not, the condition is brought about by weathering and corrosion at the joints where the feed line is attached to the beam or wire antenna.

An excellent sealant compound is available from Allied Radio in Chicago, and it can be used to protect antenna connections from the weather. The sealant is manufactured by the Dow Corning Company, and its trade name and number are Silastic RTV 732. A 2-ounce tube costs \$1.50 in single lots. A similar compound is made by General Electric and is known as RTV-108. A 3-ounce tube costs \$1.75 from Allied Radio.

The feedthrough bushings in Fig. 2 show the results of weatherproofing and weathering. The insulator bolt at the left was treated two years ago with RTV-108 and is clean and still encapsulated with sealant. No deterioration of the silicone compound was noted. The right-hand bolt is very rusty, and corrosion exists between the bolt and the feeder wire.

The RTV compounds are also useful for sealing coaxial connectors and their cables against the weather when they are used out of doors. In addition the sealant is handy for sealing airtight compartments of transmitters when blower fans are used. — *WICER*

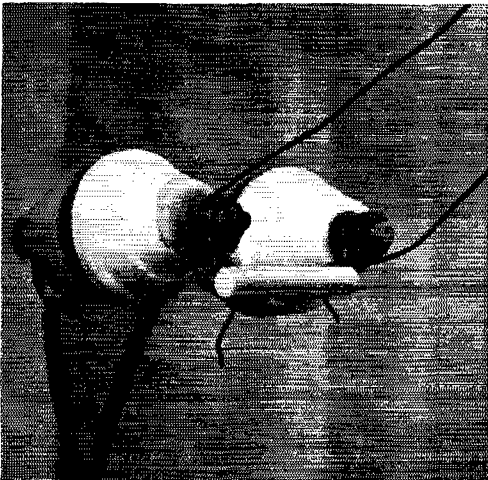


Fig. 2—The use of silicone sealant on the connection at the left kept it free from becoming corroded like the connection at the right.

PREVENTING THE BINDING OF CHEAP VERNIER DIALS

In the construction of a small portable transceiver I used a cheap vernier dial to turn the main tuning capacitor. However, I found that the capacitor would rotate through only part of its range. An investigation showed that the shaft of the dial was out of true: that is, the shaft wobbled when it rotated, and therefore the connection to the capacitor made it bind.

Space was not available to install a flexible shaft coupling. However, I reasoned that the problem could be solved by reducing the rigidity of the capacitor-mounting bracket, so the capacitor could shift to a position where its rotor could rotate freely. I removed the bracket, which was made of sheet aluminum and was held by two machine screws, and made three long cuts in it with a pair of shears. As shown in Fig. 3, two cuts were made from one side, and one cut was made from the other side. When I remounted the bracket, I used only one machine screw.

These changes resulted in a complete solution to the problem, and the capacitor shaft rotated freely. An alternative solution would have been the construction of a bracket from some No. 14-gauge wire. — *Yardley Beers, W0EXS*

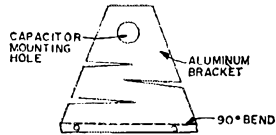


Fig. 3—Semirigid bracket permits a variable capacitor to be used with a cheap vernier dial that might bind in a normal installation.

CLEANING EQUIPMENT

AFTER five years of mobile operation, my Drake TR-3 had developed a few birdies and other strange problems that couldn't be eliminated by alignment. I suspected stray coupling because of the quarter-inch of dirt that had accumulated beneath the chassis. A friend (the late K4HY) suggested a thorough cleaning in a solution consisting of eight ounces of household ammonia, five ounces of "Mr. Clean," four ounces of acetone and seven pints of water.

I simply dunked the transceiver into this solution and brushed the dirt out of the nooks and crannies with a small paint brush. Then I thoroughly washed out the rig with the garden hose. Four hours in the XYL's oven at 145 degrees completed the job. The copper chassis now looks like a new penny and all the problems are gone.

Because the treatment removes all traces of oil, after such a cleaning it is necessary to lubricate all capacitor bearings, band-switch junction surfaces and so forth. — *Thomas W. Webb, W4YOK*

EQUIPMENT FINISH

WHEN new equipment is purchased it is a good idea to give it a coat of automobile wax. This preserves the finish and makes dusting easy. — *Louis Berman, K6BW*

A.F.S.K. for RTTY

(Continued from page 16)

capacitor to guard against r.f. getting into the unit. This is not shown on the schematic.

Power Supply

Fig. 3 shows a suitable power supply if you need one. Depending upon what 12-volt transformer you use, you may need to change the value of the 56-ohm resistor to get a current of 10-20 ma. in the Zener regulator.

Adjustment and Use

You can connect a pair of headphones (or an audio counter) to the v.h.f. output and compare what you hear with a standard 2125 tone from an accurate audio oscillator, musical instrument, tape recorder, tone standard or whatever you have available for the purpose. The other pots may be set by first causing the keyboard to go to space. Holding down the "break" key will accomplish this. As mark does not change while adjusting the space tone, this is a simple and quick adjustment.

The unit is designed to work from a 12-volt supply and draws about 50 ma. We changed the voltage from 8 to 16 and the output frequency changed only one hertz. There will be perhaps 10-15 Hz. warm-up drift the first few seconds after you turn the power supply on.

In the past two months, the author has never found the 850 shift to be off more than 1 Hz., after warm-up, regardless of room temperature.

In using the AK-1 make certain that you do not overdrive the transmitter with too much audio. This is easily checked by reducing the microphone gain control until the output drops noticeably. This will be the gain-control setting which you should never exceed. If you're tempted to ignore this admonishment and run the audio too high, trying to get that last ounce of power from the machine, all we can do is tell you that this is not the way it's done.

An additional 30 to 40 db. carrier suppression can be achieved by moving the b.f.o. frequency 1 kHz. as suggested to transmit 2125- and 2975-Hz. tones. QST

The W8HRF Short Beam

(Continued from page 17)

voltage rating of 1800 volts up to 30 Mc. for a wall thickness of 0.02 inch.

Adjustment

Preliminary adjustment should be made as far as possible above ground. If the adjustment is made too close to ground, or other surrounding objects, the resonant points will change when the antenna is raised to its final height. For the phone portion of the band, I adjusted the driven element to resonance at 14.3 MHz., and the director to 14.8 MHz. Start out with the element lengths shown in Fig. 1, and adjust to resonance at the required frequency by sliding the coil

clamp back and forth on the element to compress or elongate the coil. Keep the adjustments at the two ends of the elements as nearly identical as possible. Use a grid-dip meter loosely coupled to one of the loading coils to indicate resonance. Approximate resonance is set by coil adjustment. Final or vernier adjustment to the exact desired frequency is accomplished by shortening or lengthening the element. The gamma match should then be adjusted for minimum s.w.r. on the line, as described in *The ARRL Antenna Book*.

For the final check on driven-element resonance, I used an Omega-T noise bridge.³ If this method is used, be sure to follow the precautions mentioned in the reference article. The first check that I made with the noise bridge showed that the resonant frequency had increased when the antenna was raised, so it was necessary to lengthen the elements to the final value shown in Fig. 1. A final check on the s.w.r. showed 1.05/1 at 14,300 kHz., 1.3/1 at 14,350 kHz., and 1.5/1 at 14,200 kHz., which was better than I had expected with elements so short.

I used a vertical and a half-wave dipole for comparative signal reports from the stations I worked, and I also did a lot of listening. The beam does a consistently better job, not only as to signal reports, but in greatly attenuating the signals off the sides and back. The antenna will easily handle 2 kw. p.e.p. on s.s.b., or 1 kw. on c.w. For the ham with limited resources or space, this antenna will be found to be a very worthwhile project. QST

³ Hart, "The Antenna Noise Bridge," *QST*, Dec. 1967.

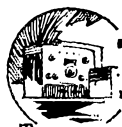
Antenna For 80 and 40 Meters

(Continued from page 40)

be over eight inches long. These leads are brought out of small holes in the side of the container.

The 115-volt leads from the relay to the shack were run at right angles to the antenna for about fifteen feet down the support. At that point the leads were run horizontally over the operating room. The entire length of 115-volt line was run at right angles to the antenna and taped to the coaxial cable which followed the same route. I had some misgivings about r.f. getting on the 115-volt line to the relay but I experienced no difficulty when running my Heath SB-200 linear full blast. Be sure to use good quality zip cord as it will be exposed to the weather.

The results obtained with this antenna have been very acceptable to me. An appreciable amount of European DX has been worked on both 80 and 40 meters. The s.w.r. as measured on the bridge included in my Heath SB-200 is quite acceptable throughout both 80 and 40 meters as indicated in Table I. Note the necessity to short out the 80-meter loading coils when operating on the higher frequencies of the 40-meter band. This condition appears to be caused by a self-resonance in the loading coils which causes the s.w.r. to increase at the high end of the 40-meter band. QST

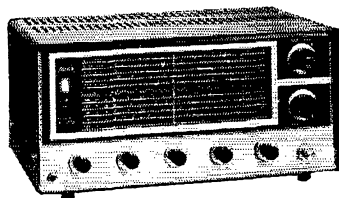


Recent Equipment



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

Allied A-2515 Receiver



THE Allied A-2515 is an inexpensive general-coverage receiver imported from Japan. Basically speaking, the A-2515 is a solid-state, single-conversion, 455-kHz. i.f. superheterodyne. A total of 24 semiconductors are used — two dual-gate FETs, nine bipolar transistors, and 13 diodes. The A-2515 may be operated from either the 115-volt a.c. power line or a 12-volt d.c. supply.

Two tuning dials are used in this receiver, which tunes from 0.15 to 30 MHz. in five bands: 0.15 to 0.40 MHz., 0.55 to 1.6 MHz., 1.6 to 4.8 MHz., 4.8 to 14.5 MHz., and 10.5 to 30 MHz. Calibrated electrical bandspread is provided on five of the six amateur bands that can be tuned. The 40-meter band is covered in two segments, 7.0 to 7.145 MHz. and 7.145 to 7.3 MHz. Bandsread calibration is provided every 10 kHz. on 80 meters, 5 kHz. on 40 meters, 50 kHz. on 20 and 15 meters, and 100 kHz. on 10 meters. There is no calibrated bandsread on 160 meters. The bandsread dial requires approximately $7\frac{1}{2}$ turns to cover the 80-meter band, 19 turns on

40 meters, 3 turns on 20 meters, 5 turns on 15 meters, and 7 turns on 10 meters. This results in a tuning rate of 67 kHz. per dial revolution on 80 meters, 16 kHz. per revolution on 40 meters, 117 kHz. per revolution on 20 meters, 90 kHz. per revolution on 15 meters, and 320 kHz. per revolution on 10 meters. As with any two-dial receiver, bandsread calibration depends on how accurately the main-tuning dial can be set.

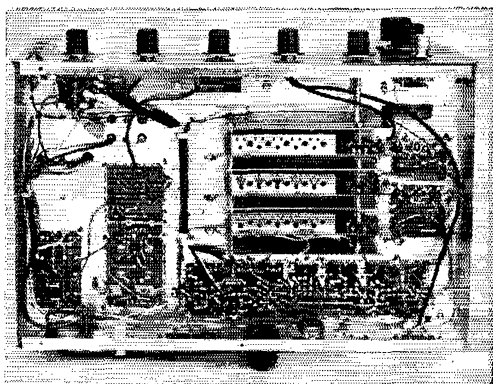
Circuit

The overall design concept of the A-2515 is presented in Fig. 1. All the requirements of a basic communications receiver have been met using straight forward design principles.

As shown in Fig. 2, front-end protection has been added to the A-2515 prior to any r.f. amplification. Two back-to-back germanium diodes, CR_1 - CR_2 , are connected directly across the antenna terminals to limit the amount of voltage at this point. The r.f. gain control, R_1 , is a potentiometer connected directly across the antenna. This is a "brute-force" technique but it works quite well. Q_1 , a dual-gate MOSFET, is used as a tuned r.f. amplifier. As far as we know, this is the first inexpensive communications receiver to use MOSFETs. The antenna-trimmer control peaks the input circuit throughout the tuning range. Care has been taken in the design of the receiver to eliminate the chances of parasitic oscillation by inserting small-value resistors in series with the r.f. input gate and drain leads of Q_1 . An r.f. decoupling network consisting of a series resistor and a bypass capacitor prevents r.f. coupling through the power leads.

When the receiver is operated in the a.m. mode, the a.g.c. circuit shown in Fig. 2 controls the gain of Q_1 . As a strong signal is tuned in, a negative voltage is developed across the 470K resistor in series with the control gate. This overcomes the slightly positive gate voltage present with no signal applied. As the control-gate voltage is made more negative, the gain of Q_1 is reduced. When operating in the c.w./s.s.b. mode, the a.g.c. circuit is disabled by breaking the connection at point X in Fig. 2.

Q_2 , also a dual-gate MOSFET, is used as the conversion mixer. The r.f. signal is fed into one



Under-chassis view of the A-2515 receiver. Notice the neat, uncluttered appearance. The band switch and associated circuitry are located in the right center of the chassis with the r.f. amplifier input coils nearest the front panel. With the cabinet in place, access to the r.f. amplifier, mixer, and h.f. oscillator frequency-determining components is gained through holes in the cabinet bottom. Specific component locations for alignment purposes are clearly indicated on an adhesive label.

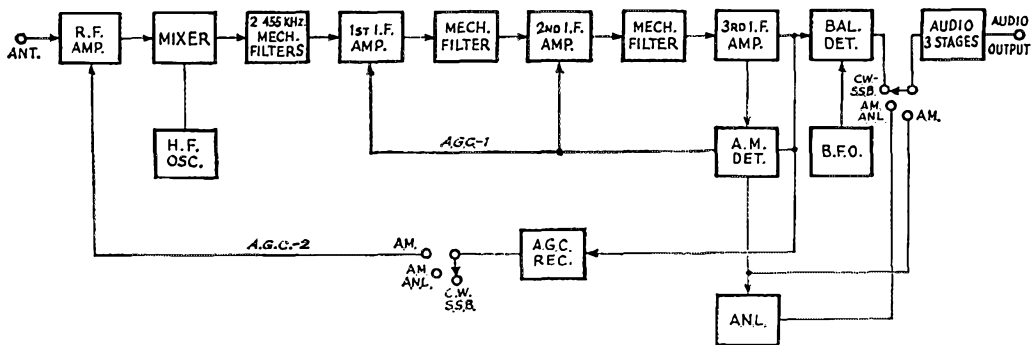


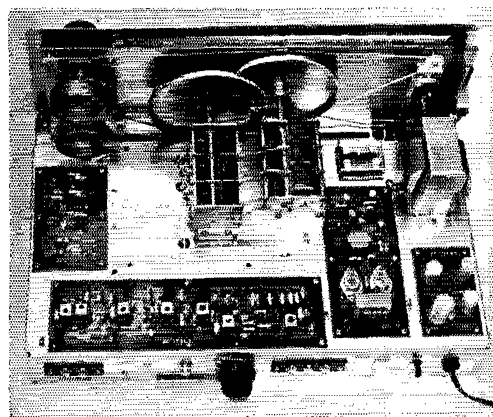
Fig. 1—Block diagram of the Allied A-2515 Receiver

gate and the oscillator signal is fed into the other gate. The high-frequency oscillator is of the Hartley variety and uses a single bipolar transistor, Q_3 . The base and collector voltages to Q_3 are regulated by Zener diode CR₅. On all frequency bands the oscillator operates 455 kHz. above the signal frequency. There is no apparent temperature compensation. Parasitic suppression is provided by a 330-ohm resistor in series with the collector lead of Q_3 .

Three stages of 455-kHz. i.f. amplification are provided. Four mechanical filters of the ceramic variety provide a selectivity rated at plus-or-minus 1.5 kHz. at -6 db. A.g.c. voltage obtained

from the a.m. detector varies the base-bias voltage on the first two i.f. stages, subsequently controlling their gain. An S-meter has been included in the A-2515 and it is an inherent part of the i.f. amplifier circuitry. The S-meter is actually a low-range voltmeter bridged between the emitter of the first i.f. amplifier and a Zener-regulated reference voltage. An S-meter zeroing control is located on the receiver's rear panel. The S-meter functions on all modes of reception.

Two separate detectors are used, a simple diode for a.m. reception and a two-diode balanced detector for s.s.b.-c.w. reception. The balanced detector is very similar to the one used several years ago in "Single Sideband Junior."¹ The input of the product detector is coupled to the collector of the third i.f. amplifier by a 20-pf. capacitor. The center tap of the product detector coil is grounded, and the b.f.o. signal is injected at the junction of two series shunting capacitors. Audio output from the balanced modulator is single-ended. The b.f.o. circuit uses a single bipolar transistor in a Hartley configuration. The b.f.o. supply voltage is Zener regulated. A b.f.o. tuning control allows the b.f.o. frequency to be varied plus or minus 3.5 kHz. U.s.b. and l.s.b. frequencies are indicated on the front panel. A single diode acts as a shunt-type noise limiter which can be used only for a.m. operation.



The A-2515 receiver removed from its cabinet. The two cast flywheels shown in the upper-left corner of the photograph are part of the dial-drive mechanism. Just in front of the flywheels is the r.f. circuit board on which are mounted the r.f. amplifier, mixer, and high-frequency oscillator circuits. Mounted on the long circuit board along the rear wall of the chassis are the i.f. amplifier and mechanical filters, the b.f.o., the detector circuits, and the a.g.c. circuits. To the right of this board is the audio-amplifier printed-circuit board. The power-supply board is mounted in the right rear corner of the chassis. The two tuning capacitors are mounted in the center of the chassis; the main-tuning capacitor is to the right. To the right of

the main-tuning capacitor is a plastic-covered fuse holder and the power transformer. A real convenience to anyone wishing to service this receiver has been provided by the manufacturer—each component location on the circuit board is numbered so as to correspond with the schematic diagram. In addition, all printed circuit foil paths have been traced out on the top side of the circuit board in green paint. Along the rear wall of the chassis from left to right are the antenna terminals, a metal plate which may be removed to accommodate an SO-239 coaxial connector, the zeroing control for the S-meter, an auxiliary control socket, the audio output terminal strip, a 12-volt input connector, the a.c./d.c. switch and the line cord.

¹ The circuit was originally a balanced modulator in a simple transmitter described in G.E. *Ham News* for November-December, 1950; also, *Ham News Sideband Handbook*.

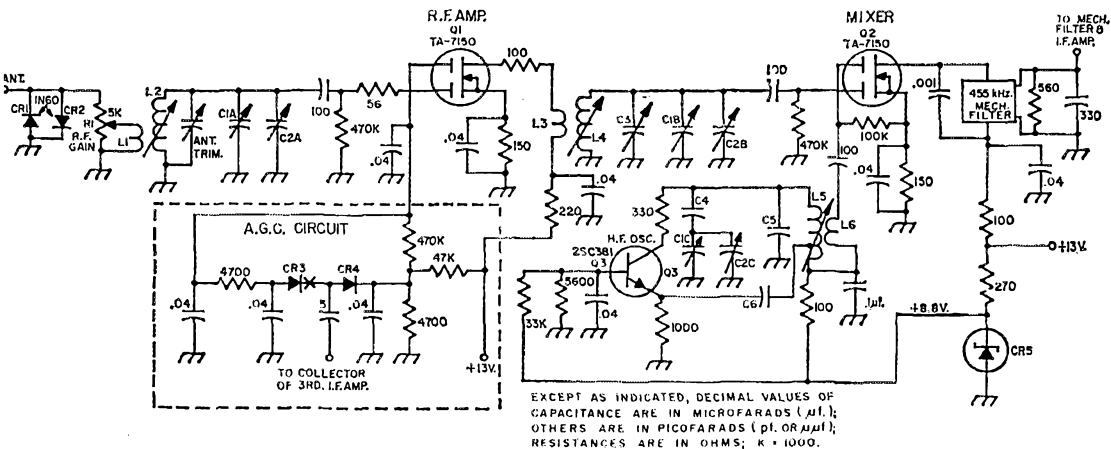


Fig. 2—Schematic diagram of r.f. amplifier, mixer, and h.f. oscillator of Allied A-2515 receiver with all switching circuits omitted. C_{1A}, C_{1B}, C_{1C} is the main-tuning capacitor; C_{2A}, C_{2B}, C_{2C} is the bandsread capacitor. C₃-C₆ inclusive and L₁-L₆ inclusive are selected for the particular band in use.

Three stages of audio amplification are used—two preamplifiers and a class B push-pull output circuit. A thermistor stabilizes the bias on the output stage. Negative feedback is introduced from the output stage to the emitter of the second preamplifier to minimize distortion. Transformer coupling into and out of the final audio-amplifier stage is used. The output transformer has taps for 4- and 8-ohm loads. If an 8-ohm speaker is used, plugging in headphones in the front-panel jack automatically disconnects the speaker, but if a 4-ohm speaker is used, audio will be heard simultaneously in the headphones and the speaker. The manufacturer recommends headphones ranging from 8 to 2000 ohms.

A rear-panel switch selects either 115-volt a.c. operation or 12-volt d.c. operation. The a.c. supply uses a step-down power transformer with three secondary windings. One winding provides about 14 volts to run the two pilot lamps. Another winding is connected to a full-wave rectifier circuit and RC filter; this supply is used to power the two audio preamplifiers and the audio power amplifier. The third winding, also connected to a full-wave rectifier and an RC filter, is used to power the entire r.f. complement of the receiver. A Zener diode operated off this supply regulates the h.f. oscillator and b.f.o. supply voltages. Standby-receive switching is simply a matter of removing the d.c. supply voltage from the r.f. amplifier and mixer stages. Two taps on the transformer primary winding permit either 115- or 100-volt operation; the receiver comes wired for 115-volt operation. The transformer primary is fused at one ampere.

When switching to d.c. operation, a 4-pole double-throw switch performs the transfer. On d.c. all receiver circuits, including the pilot lamps, are run from the common supply voltage, although the h.f. oscillator and b.f.o. supply voltages remain Zener regulated. A separate one-ampere fuse is used for d.c. operation.

Performance

After connecting the A-2515 to a 135-foot long-wire antenna and tuning across one of the short-wave bands it was quite apparent that a cross-modulation problem existed. As a first step, protective diodes CR₁ and CR₂ were removed, and with the diodes removed there was no noticeable cross modulation or tendency of the receiver to balk at strong signals. Eliminating the diodes does, however, present the problem of possible front-end damage when the receiver is used with a nearby transmitter. Silicon diodes will clip at higher amplitudes than the germanium diodes originally used but will yet provide front-end protection. By placing back-to-back silicon diodes on the arm side of the r.f. gain control, R₁, no cross modulation will be experienced in most locations. Here at the ARRL lab where we are surrounded by several broadcast stations it was necessary to use two silicon diodes in series for each leg of the back-to-back combination.

With the A-2515 set up for a.m. operation, the sensitivity was measured to be 0.4 μv. for a 10 db. signal-plus-noise-to-noise ratio with a 30% modulated signal, on each of the five calibrated amateur bands. Image rejection was much in line

Allied A-2515 Receiver

Height: 7 $\frac{3}{8}$ inches.

Width: 15 inches.

Depth: 10 inches.

Weight: Approximately 18 lb.

Power Requirements: 115 volts, 50/60 Hz., or 12 volts d.c., 10 watts.

Price Class: \$100; matching speaker \$10.

Distributor: Allied Radio Corporation,
100 N. Western Ave., Chicago, Illinois
60680.

with what can be expected from a single-conversion receiver having a 455-kHz. i.f. The image rejection was 45 db. on 80 meters, 46 db. on 40 meters, 25 db. on 20 meters, 15 db. on 15 meters, and 5 db. on 10 meters. Because the h.f. oscillator is always on the high side of the desired signal, the antenna-trimmer control should be set on the high-capacitance side to minimize image response.

Some inexpensive receivers are plagued with the problem of oscillator harmonics beating with strong signals and producing spurious responses. Such is not the case with the A-2515. With the A-2515 operating on each of the six ham bands covered, the signal generator was swung through the frequency spectrum from 2 MHz. to 200 MHz., and all spurious responses were down a minimum of 45 db. (this does not include the image responses previously mentioned).

No actual stability measurements were made, but the electrical stability appears to be quite good. A 10-meter s.s.b. signal was tuned in when the receiver was first turned on and remained tuned in after several minutes of listening. Mechanical stability is also adequate. While lifting the front of the receiver and dropping it to the operating table produced a change in frequency of the beat note on a 28-MHz. c.w. signal, the receiver did come back to its original

frequency within a second or two. Single-signal c.w. operation is quite feasible with the degree of selectivity provided. Crowded-band conditions might entice the owner to use an audio filter or Q-multiplier.

The total quiescent current drain of the A-2515 using a 12-volt d.c. supply is about 300 ma. The current drain increases to about 500 ma. with full audio output. Quiescent current drain can be reduced to 40 ma. on d.c. operation if the two pilot lamps are disconnected. By removing a single wire from the a.c./d.c. switch the pilot lamps will automatically be disconnected when switching to d.c. operation.

As a final test the power-output capability of the audio amplifier was measured. The undistorted output was 0.5 watt into an 8-ohm resistive load. Although 8- to 2000-ohm headphones are recommended by the manufacturer, when 2000-ohm phones were plugged in a low-frequency audio tone was heard. This can be attributed to the fact that the audio-output amplifier is very lightly loaded. By placing a 68-ohm 1-watt resistor from the 4-ohm output terminal to ground, this oscillation was removed.

The instruction manual contains basic operating information, a block diagram, parts list, alignment information, and a full-page schematic diagram. — *KITVF*

Bridge Break

(Continued from page 30)

required voltages could be used.

Construction

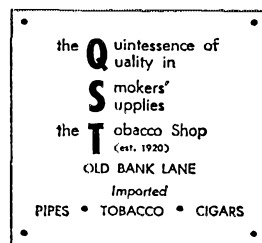
While a home-made printed-circuit board could be fabricated for the audio switch, bias keyer and keying-monitor circuits, I prefer to use prepunched terminal-board material along with push-in terminals for projects of this type. With the described transistor circuits, lead lengths and dress are not important, and these circuits may be arranged to suit the individual constructor.

The t.r. switch is mounted on a small bracket assembly made from a thin sheet of brass. Horizontally the bracket is 1 3/4 inches long and 1 3/8 inches wide. The vertical section of the bracket is 3/8 inch wide. The vertical lip is drilled and tapped for 6-32 machine screws, with the two tapped holes spaced to use the upper two holes in the side frame formerly used to mount the now deleted antenna relay in the TCS transmitter. A nuvistor socket is mounted near the center of the bracket. It is soldered in so the tube installs inverted. Three tie points are required on the bracket and may be of any type that's handy and will fit. If you're using a transmitter other than the TCS, remember that the t.r. switch should be mounted in the vicinity of the final amplifier. The full plate voltage is on the amplifier at all times so be sure to turn off the high voltage when making checks around the t.r. switch.

C₄, the special 5-pf. coaxial capacitor, is made from a two-inch length of RG-58/U. The outer braid is one terminal and the inner conductor the other terminal. About 3/8 inch of the black outer covering is removed from one end of the braid and the exposed braid is carefully tinned, with special care taken not to melt the dielectric. A half inch or so of the dielectric should extend past the tinned end of the braid to increase the flash-over path. Be sure the dielectric and inner conductor out the other end are long enough to reach the connecting point of the pi network. A short piece of bus wire is soldered to the tinned portion of the braid and used to connect to the input tie point on the t.r. switch bracket assembly.

QST

Stays



K1QQX found this ad in a stage company news bulletin.
Must mean smoke signals, eh?

225 Miles on 2300 MHz.

It seemed clear back in 1963 when the 165-mile 2300-MHz. record contact was made between Cadillac Mountain, Maine, and Cape Ann, Massachusetts that it would not be difficult to extend the distance to 225 miles, by moving the southern terminal to Mt. Wachuset in central Massachusetts. In fact, this was attempted on the same day that the 165-mile contact was made, but ended when the portable generator used by W1EHF on Cadillac Mountain ran out of oil.

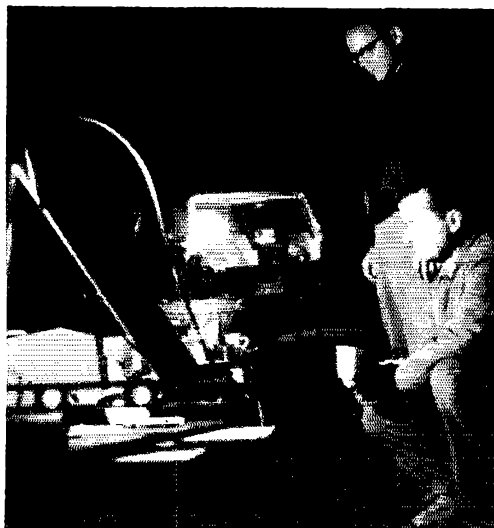
The hardest part of a new record attempt was finding someone with the time and the talent to make the long trip "down East" to Maine. Little was done while the 165-mile record held, except to hope that if someone else broke it, the new distance would not be more than about 200 miles. This turned out to be the case when DJ4AU, Germany, and HB9RG, Switzerland, made contact on January 21, 1968 over a path of 208 miles. The European record was announced in the August, 1968, issue of *QST*, which did not leave much time to organize a new assault on the record during the summer vacation months. Fortunately, Bill McNally, K1DRB, had some time available before resuming college studies after a four-year stint in the Navy, and he offered to undertake the journey to Maine.

"The Best-Laid Plans . . ."

Plans were rapidly made: K1DRB would go to Maine with one of the two pulse stations constructed by W2BVU and W1QMN, and with Bob Burke, a non-ham camping enthusiast. They would spend four days camping in Acadia National Park and check in on two meters from the top of Cadillac Mountain with K1JIX in Harvard, Massachusetts, to determine if conditions warranted a 2300-MHz. attempt. Meanwhile, W2BVU, with the help of W1QMN and K1BFA, would be prepared to go to Mt. Wachuset in Princeton, Massachusetts, on short notice to set up a 141-MHz./2300-MHz. station.

Things did not go as planned in two important respects. First, the necessary State authorization to operate from the top of Mt. Wachuset was not obtained soon enough and, second, the weather stayed cool with below-average propagation conditions persisting. By the time the last evening of K1DRB's encampment arrived, it was decided to give 2300 a last-ditch try anyway. The Massachusetts station was set up along a road on the side of Mt. Wachuset at an elevation of 1500 feet, just short of a steel cable which prevented access to the summit. This spot proved to be more than adequate, as things developed.

The pulse equipment used on 2415 MHz. was as described in *The Radio Amateurs V.H.F. Manual* except for the local oscillator. The l.o. of the AN/APG-5 r.f. assembly (a fairly common government surplus item) was used for the l.o. at 2380 MHz. These oscillators, along with the pulse



K1BFA and W1QMN waiting for K1DRB's 2415-MHz. signal to appear out of the night. Notice the carpenter's level beneath the 4-foot dish on the left; this was a necessary tool for leveling the antenna pedestal on the top of a stone wall. The 2-meter liaison station is on the tailgate of the station wagon in the background.

transmitters used, are surprisingly frequency stable. If the receiver is tuned to the desired transmitter frequency one day, it can be expected to be still tuned to the transmitter the next day. This made it possible to pre-tune the receivers and thus solve beforehand one of the two big problems in microwave DXing: where to look in frequency.

Antenna Alignment Hint

The other problem, of course, is setting narrow-beam antennas to the proper azimuth bearing. The method used to align the four-foot dishes is simple and has proven completely effective for a variety of field trips. Landmarks visible from the operating site are first identified and located on a local map of the area. The angle between the bearing line to a convenient landmark and the bearing line to the distant station is then measured. When the antenna is set up it is first boresighted on the visible landmark and then swung to the left or right by the measured angle, so as to bring it to the bearing of the other station. It would help if something like a transit tripod having an azimuth scale were available for this, but only crude wooden pedestals were used with the dishes of the two pulse stations. These rested on sheets of plywood on which the bearing lines were sketched. For both the 1963 record contact and the present one, this system

worked so well that the headings established beforehand could not be improved on by peaking-up on the actual signal received.

Going back to the night's activities on Mt. Wachuset, the 2415-MHz. station and the 2-meter liaison station were ready and the motor generator fired up by 8:30 P.M. local time. The 2-meter link used 10-element Yagis at each end, with about 70 watts input at K1DRB and a Communicator III at W2BVU/1. Contact was readily established on two meters, although the signals would frequently fade into the noise for a few seconds. The 144-MHz. average signal level was 25 to 30 db. above the noise. The operating technique used on 2415 MHz. initially was to touch nothing!

With the tuning and the antennas pre-aligned, K1DRB simply transmitted a steady pulse train while those on Mt. Wachuset listened. Nothing was heard for some time however, even when the receiver was tuned slightly, and things seemed bleak. But when the procedure was reversed, with W2BVU transmitting and K1DRB listening, a loud signal was immediately received in Maine and heard back in Massachusetts by way of the 2-meter link. Further tuning of the receiver in Massachusetts then brought in the same strong signal from K1DRB (the l.o. of this receiver was later found to have developed an

abnormal tuning "glitch"). The 2415-MHz. contact was effortlessly completed, the P-1 mode signal remaining above the receiver threshold nearly 100% of the time. Such a signal produces a pure audio tone at the output of the pulse receivers used, so that there was no fading apparent and it was very impressive listening to K1DRB's signal from afar as though it were a code-practice oscillator!

115 Miles Over the Horizon

The 225-mile path is far from line-of-site. Both of the terminal sites were at an elevation of 1500 feet, giving radio horizons no more than 55 miles distant from each end and leaving 115 miles to be covered beyond the horizons. This was probably scatter propagation, as there was no evidence of abnormal refraction conditions. It was a clear, cold night, and a check with local v.h.f.-u.h.f. operators revealed nothing good for conditions on the other bands.

The one watt or so of average power radiated by the pulse station in Maine actually sounded stronger on Mt. Wachuset than it did on Cape Ann, on the occasion of the 1963 record. It appears certain that much greater distances can be covered on the 2300-MHz. band, especially with the help of higher power and better propagation conditions. — *John Zimmer, W2BVU*

COMING ARRL CONVENTIONS

- May 9-10 — Michigan State, Grand Rapids.
- May 24-25 — New England Division, Swampscott, Mass.
- June 13-15 — Pacific Division, Sacramento, Calif.
- June 20-22 — NATIONAL, Des Moines, Iowa.
- July 4-6 — Rocky Mountain Division, Salt Lake City, Utah.
- July 4-6 — West Virginia State, Jackson's Mill
- August 16-17 — West Gulf Division, Amarillo, Texas.
- October 11-12 — Roanoke Division, Huntington, West Va.

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL for up to two years in advance.



Alabama — Announcing the Birmingham ARC first Old Timer's Banquet on February 15 at the Eastwood Holiday Inn. For further information write or contact the Birmingham ARC, Box 603, Birmingham, Ala.

Florida — The Broward Amateur Radio Club will hold its Annual Auctionfest March 1 at Chaminade High School, 500 North 51 Ave., Hollywood, Fla. Doors open 8:00 A.M., auction begins 9:00 A.M.

Illinois — The Wheaton Community Radio Amateurs (WCRA) will hold the seventh annual Mid-Winter Swap and Shop on Sunday, February 16 at the DuPage County Fair Ground, Wheaton, Ill. Hours: 9:00 A.M. to 5:00 P.M. \$1.00 donation at the door. Refreshments and unlimited parking. Free coffee and doughnuts 9:00 to 10:00 A.M. Contact Bill Lester, WA9FGP, Box 1, Lombard, Ill. 60148 for information.

Indiana — The Lake County Amateur Radio Club, Inc. announces its 16th Annual Banquet to be held at Teibel's Restaurant, U.S. 30 and 41 (near Schererville, Ind.) at 6:30 P.M., CST, February 8. Chicken dinner, entertainment, speeches. Tickets \$4.00 each from Herbert S. Brier, W9EGQ, 385 Johnson St., Gary, Ind. 46402. Positively no tickets sold at the door.

Ohio — The annual auction of the Intercity Radio Club (North Central Ohio) will be held at the Naval Reserve Armory on Friday, February 7.

Oklahoma — Keep the date of February 9 open for the Lawton Fort Sill ARC Hamfest which will be held at the National Guard Armory.

Strays

QST Congratulates . . .

Edward J. Bock, WØEKT, on becoming president of Monsanto.

Ralph H. Turner, W8HXC, elected president of the Ohio Psychological Association.

John A. Hamm, WB4GEM, on his assignment as director of the 13 and 17th Naval Districts MARS. George Jacobs, W3ASK, elected Fellow of the IEEE.

T. Benson Leavitt, WA1CYS, elected president of United Life and Accident Company.

Donald McKinley, O.B.E., Ph.D., VE3AU, appointed Executive Director of the National Research Council of Canada.

Mailing the Club Bulletin

BY HUGH CASSIDY,* WA6AUD

Here are some useful suggestions for the ham club bulletin editor in tackling his mailing problem . . . from as authoritative a source as you can get—WA6AUD is a postmaster. Thanks to the Amateur Radio News Service Bulletin, KÖNL Editor, for permission to reprint.

UNTIL January 1968 there was possible some saving in postage for most clubs in mailing their bulletins, and it was possible to mail two ounces for four cents. However, since that time the rate has been two ounces for six cents which must be compared with the first class rate of six cents for one ounce. As most bulletins are one ounce or less, there usually is no alternative than to mail at the first class rate.

Yet there still are occasions when some clubs can effect a saving in postage, and there are also some services available for first class mail and which may occasionally be useful to a club in maintaining its mailing list.

First of all, it should be understood that third-class mail is the "junk mail" which is so often vigorously condemned. This term originated within the Post Office itself and while the P.O. Department now officially frowns upon the use of the term, it was a matter of common usage twenty to thirty years ago. Many may protest that they mean by 'junk mail' the multitude of direct-mail advertising items they receive; but technically, so far as the Post Office is concerned, under the rate structure all these items are the same. It is third-class mail whether it is a Christmas card, club bulletin or a full 40-foot van deposited at your dock after being piggy-backed by a national direct mail advertising firm in the Midwest.

In actual practice you will find that third-class mail will move relatively fast in the immediate mailing area and slower the farther away the delivery point is (as it gets mixed with other third-class mail, including the aforementioned direct-mail advertising).

Thus, under our present rate structure, if your bulletin does not exceed one ounce, mail it first class. If over an ounce, think of possibly using third-class mail if your mailing list comprises only near-by destinations. If you have many distant members you should always consider first class for all these, inasmuch as practically all first-class mail going any distance these days goes by air.

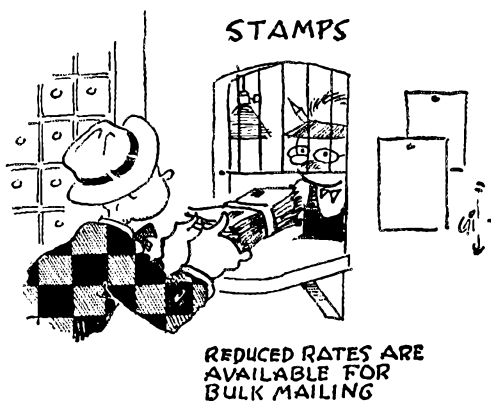
*77 Coleman Drive, San Rafael, Calif. 94901

Changes of Address

Third class does offer a method of keeping your mailing list corrected . . . at a price. To secure a change of address when a person has removed and filed a forwarding address with the Post Office, the words "ADDRESS CORRECTION REQUESTED" should be entered under the return address of the item mailed. If the item is under 4 ounces then the Post Office Department will return the item with the new address on it and collect 10¢. Over four ounces they will not return the item but will send a notice, and again the rate will be 10¢ collected. There are additional variations of this service and if you should be interested, consult the local Post Office, referring to Postal Manual 158.243.

Permits

When your mailing list gets over 200 pieces, there are opportunities to move into the third-class permit category and mail at the reduced rates available for bulk-mailing. Before charging down to the Post Office for a bulk permit, it should be pointed out that these permits cost \$15 plus a \$30 annual bulk mailing fee. Thus the initial cost to use this service is \$45 the first year, and \$30 each year thereafter. The \$30 fee is due the first of January every year.



Under the third-class rate, for most radio clubs, there are two rates to consider. One is the third-class non-profit rate and the other is the straight third-class bulk rate. Under the non-profit rate you can mail for 1.6¢ per piece. The straight third class bulk rate is 3.8¢. Remember, a third-class bulk rate does cost \$45 to get started.

If you qualify for a non-profit rate, no saving will result unless you mail at least 1100-plus pieces in a calendar year. Below the 1100 mark

(Continued on page 73)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Hassles

WE suppose man is, by nature, a selfish beast. It is characteristic of a great many of us to form logic and rationality on the basis of our own personal interests; or, if it is not possible to do this on orthodox grounds, to twist logic so that it does conform.

You can say what you please about the merits of sheer ability versus personality traits, but there is no fine line separating the two and it cannot be denied that the latter affects the former, positively or negatively, as the case may be. For example, an SEC with a maximum of background and ability may flop miserably because of some unfortunate personal characteristics, while another who is a complete boob may enjoy a measure of success purely through exercise of an extrovert, outgoing personality of the "winning" type. It goes without saying, then, that the one possessing both ability and a "winning" personality is bound to be aces high in any leadership endeavor.

Yes, there is no doubt that personality is a determining factor. You may have ability oozing out of every pore, if you do not have the personality to exert it, it will be either unacceptable or unknown.

Of recent months, in public service circles, there have been a number of difficult situations arising because of personality conflicts and selfish-interest motives. An SCM with a steel trap for a mind makes some factual comments in a manner which arouses the members of his section to a fever pitch of denunciation. An SCM and SEC in the same section, both of high ability but with diametrically opposite personality types, find that they just cannot get along. An intelligent and usually-rational amateur severely criticizes the League because it does not devote more attention to that specialty in which he is deeply involved to the exclusion of just about all else. Two NTS net managers are at swords-points because of a misunderstanding as to who does what in the system, each desiring to have the lion's share of the credit. There are arguments about rules which contenders feel should not exist, or about rules which don't exist but ought to, or about rules which used to exist but were dropped. And so it goes. A recent letter exhorted the headquarters to take action to prevent further disputes between and among amateurs. We wish we could. But as long as there are amateurs with different feelings about things (and there always will be — at last we *hope* so) there will be "hassles." They are unavoidable and they keep life from getting dull.

*Communications Manager, ARRL.



WØUGR mobile at Charles City, Iowa, just after the severe tornado of May 15, 1968.

The pity of it is that sometimes these ruckuses develop into controversies which become so noisy that they attract the attention of the League's policy-makers, sometimes even the general public, and first thing we know we are "washing our dirty linen in public." We ought to be able to solve our own problems, but sooner or later someone in a private quarrel feels that he needs support from higher authority and runs to "papa." The end result of such action is sometimes good, but usually bad — because it demonstrates to those outside the public service family that we are incapable of controlling or settling our own affairs.

What's to be done? Well, it would seem that it is essentially a matter of attitude. Perhaps if we can keep a few things in mind as we argue we can keep the argument on a constructive and progressive foundation. Such as:

- 1) Make the basic consideration the welfare of the whole, instead of what *you* want. Of course this can usually be rationalized into being the same thing, but if we follow our impulses blindly we'll end up in a blind alley.

- 2) Keep the heat down. Avoid name-calling and insults, even implied ones. References to a person being incompetent, inexperienced, unfamiliar with the situation, unable to comprehend the idea, etc., are just as insulting as calling him stupid, obstreperous or imbecilic. Resist that urge to insult, it is not conducive to persuasion and might only prove that you are precisely what you are calling the other fellow.

3) Be a giver of the benefit of the doubt. If someone says something that may be taken two or more ways, assume he means it the most favorable way, not the most insulting. If a person's motives are in doubt, assume they are the best even as yours are.

4) Keep your temper. It's a bad thing to lose in an argument. When you feel that redness around the neck, lapse into an attentive silence until it cools. A good way to cool things off is to inject a bit of humor (not satire!) if you can think of anything humorous to say. In correspondence, "hold 24 hours before answering." If that doesn't cool you off, sit down and write the guy a real nasty letter, then read it over, have a good laugh at yourself, destroy it and start over again.

5) Don't say things you wouldn't like if they were said to you (the Golden Rule), even if you think they are true. Call someone a "sap," or refer to something he said as "sappy" or "juvenile" or "stupid," then ask how you would react if someone treated you in that manner. If you decide you wouldn't like it (and you wouldn't!), then you're not going to gain a thing by making your opponent mad.

6) Try to avoid pomposity and exasperation. Sometimes it will seem that the other guy is just too nit-witted to grasp what you are talking about and you will want to throw up your hands and walk away. Ending the discussion might be called for in some cases, but don't do it that way. A much better impression is left if you simply express your appreciation for the opportunity to discuss the matter.

The above may sound like a cupola on "How to Win Friends and Influence People." Perhaps this is something we all should read. Much more could be said on the subject, but what it all boils down to is that while it is helpful to discuss controversial matters and even argue over them, we should stop short of quarreling to the extent of estrangement. We're all in this public service game together, so let's keep our arguments among ourselves.

Surely someone is going to say "Maybe you fellers at headquarters should practice what you preach." OK, we'll try. How about you?

Monitoring Services

We're tickled into this subject by a letter in our tickler file from Marv Cook, W9WWE, secretary of the Midwest Amateur Radio Service. With your permission, we'd like to present Marv's info on MWARS and let it lead into allied matters.

The Midwest Amateur Radio Service was organized in January, 1968, by K8DDT and W9WWE. Its operations are similar to and modeled after those of the West Coast Amateur Radio Service which operates on the same frequency. Membership is open to any amateur; all you have to do is check in on 7255. You will find K9DDT or W9WWE "on frequency" most of the time. The peak of traffic is in the early evening hours. During the earth tremor of Nov. 9

reports were received from nine midwest states within 35 minutes and included a direct report from the St. Louis area. On one evening last November a member logged 59 contacts in three hours, 50% of which were with mobiles.

Your net directory (you mean you don't have a copy?) shows three "Amateur Radio Service" nets operating on 7255. Originally there was the WCARS, which now boasts someone on the frequency 24 hours per day and which handles dozens of minor emergency and other incidents weekly. MWARS operates on the same frequency during daylight. The East Coast ARS calls the roll at 1700 GMT, which converts to 1200 (noon) EST, and during the May-Oct. season this occurs one hour earlier, or 1600 GMT, but the same time by your clocks. The aim is to keep this net open for emergency traffic and general contacts "all day." W2CFP is the manager, and you just might find him there.

ARRL applauds these efforts to establish general monitoring frequencies and hopes that all amateurs will participate to make them a going thing.

This brings us to the discussions concerning "ARRL Working Frequencies" which first started in Aug. '68 QST (p. 94) and provoked quite a few letters. Nearly all of them were in favor of the idea, but details varied all over the place. For the time being and into the foreseeable future, no ARRL working frequency will be designated on 40-meter phone. The ECARS, MWARS and WCARS setup on 7255 kc. serves the purpose and we would not want to create any diversion from it.

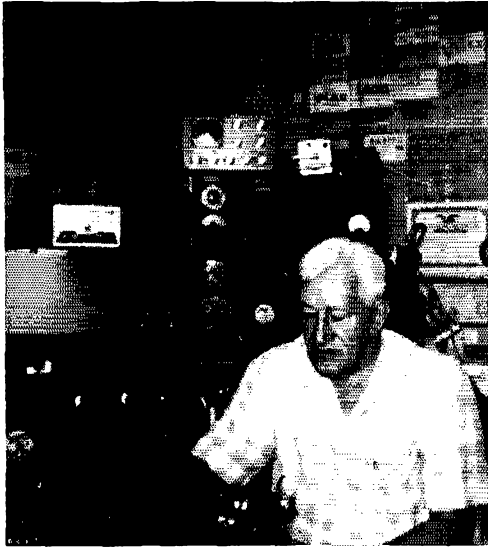
As for other ARRL frequencies, the whole project has been shelved for a while because of the press of other matters, but it has not been forgotten. Chances are that we'll try out the idea on one or two bands. If it works, other ARRL frequencies can be picked; if not, we can pull in our horns before it gets out of hand. Shall we try frequencies on 80 c.w.; and 75 phone? Watch for an announcement in the next two or three months. — WINJAT.

Diary of the AREC and RACES

A late report concerning the operations of the Viking Amateur Radio Society, Mankato Radio Club, Northstar Hibanders, Rochester Amateur Radio Club, and a group of amateurs from Albert Lea, all in southern Minnesota, has been received describing their operations in the tornado at Charles City, Iowa, on May 15. More than forty-five stations participated in supplying communications for the stricken area.

The VARS arrived in Charles City early the morning following the tornado with eight mobiles and base station equipment for six and ten meters. A seventy-foot tower was found still intact at the Floyd County Hospital and served as a perfect support for a portable six-meter beam. Using this set up, WAØGKN was able to make arrangements for the arrival of the other groups over an airline distance of about 85 miles.

The remaining groups helped the American Red Cross with health and welfare traffic, locating peo



This station belongs to W3EML. Bill has been ably directing TCC Eastern for quite a while. Do any of you other ARPSers have pictures of your stations?

ple, damage surveys and clean up crews as well as helping the hospital with communications. — WØUGR.

Members of the Viking Amateur Radio Society also helped with communications in the aftermath of the tornado at Tracy, Minn., June 13. After a "near miss" tornado watch for Waseca County was secured, WØSZW, KØKCJ, and KØSPG left for Tracy. A ten meter base station was set up at the City Hall by WØSZW while the others used portable units on foot. On the evening of Friday, June 14, KØSPG returned to Waseca and WØCHC and WØUGR arrived in Tracy. When the real clean up work started on Saturday, June 15, the VARS group helped to handle traffic, direct work crews, and locate officials. KØUYN at the club station WAØCJU kept in touch with Tracy via a high frequency station set up in the armory. The group left Saturday evening after serving for two full days. — WØUGR.

At 0255 on Nov. 16, WA6DEV came across an accident in which a small foreign car had struck a telephone pole, pinning the driver behind the steering wheel. On two-meter f.m. WB6EYH was called. An ambulance and the California Highway Patrol were summoned to the scene. — WB6DEV.

More than 100 VE6s, plus additional visiting mobiles participated in each weekend of the Alberta Motor Association's "Bring 'Em Back Alive" campaign. The mountain-top location of VE6ADX at Banff was used as the provincial control center during all three weekends of the operation covering Victoria Day, May 17-20; Dominion Day, June 28-July 1; and Labor Day, Aug. 30-Sept. 2. This was perhaps the most ambitious project ever undertaken by Alberta amateurs and was seen as a success from all viewpoints. — VE6FE, SEC Alta.

For the third consecutive year, members of the Calgary (Alta.) Amateur Radio Club supplied communications for the 1968 Canadian Marathon

Championship. A total of six mobile units operating on two meters were used along the 26 mile course of the track event. The event lasted about four hours. — VE6AFR, EC Calgary, Alta.

AREC and RACES units cooperated on Sept. 2 to provide communications for the National Air Races held at the Burke Lakefront Airport near Cleveland, Ohio. About twenty amateurs used a dozen mobiles and portables on six meters during the operation. — WA8VBK.

On Sept. 15, VE2APT/mobile acted as a check-point for the Great Montreal Automobile Rally. Twenty-two messages were passed to VE2ZA/portable via the two-meter f.m. repeater VE2MT. — VE2ALE, SEC Quebec.

Members of the Monroe County, Mich., AREC were asked by the local Civil Defense director to participate in a simulated man hunt Oct. 13. A patient was assumed to have escaped from an Ann Arbor hospital, carrying simulated radioactive material he had stolen. The escapee forced a motorist to drive to Monroe, about thirty miles from the hospital, threatening to open the canister containing the radioactive material if anyone tried to follow or stop him.

Mobiles were sent out on the search and AREC headquarters station WA8MTX assumed control of the network. Within an hour and a half the man had been "captured" and the canister, marked Radioactive Material, Simulated, was returned to the Civil Defense people. — W3NDM, EC Monroe County, Mich.

For the second year, members of the Calgary Amateur Radio Association participated in an operation to have civic election returns gathered more rapidly. The eighty and two meter bands were used. VE6MX coordinated the v.h.f. effort while the eighty-meter base station was operated by VE6s AGU ALS and AWN. More than 300 messages were handled. — VE6AVS.

On October 29, 30 and 31, members of the Hamden (Conn.) AREC participated for at least the fifteenth year in "Operation Goblin." Twelve amateurs participated in the program to help the auxiliary police. The amateurs handled a substantial number of prank complaints, freeing the regular police patrols to handle other normal duties. — W1NFG.

The Queens County, N. Y., AREC/RACES was asked to supply communications for the 105th Precinct of the New York City Auxiliary Police on Halloween. Four mobiles and seven two-meter f.m. walkie-talkies were used in conjunction with a communication van supplied by the Red Cross. — WB2RXB, EC Queens County, N. Y.

The Northwest Florida FM Association was asked by the local press and commercial radio and TV to assist in the collection of election returns, Nov. 5. Headquarters was set up at Fort Walton Beach while mobiles were dispatched to nine different precincts in the area. Since distances of 30 to 50 miles were involved, the two-meter repeater WA4EVU at Destin was utilized. The polls closed at 1900 and all results were in by 2000. One of the local commercial radio stations had representatives at each poll to telephone the results. The radioed returns came in first in all instances. About fifteen

amateurs participated either as mobiles or as operators at the base stations. — *W4RKH, SCMW, Fla.*

Queens County, N. Y., EC WB2RXB was notified, on Nov. 12, by the Red Cross in Jamaica, N. Y., that high tides were expected that evening because of a high wind buffeting the Rockaway Peninsula. Since flooding was a distinct possibility, an alert was called in case evacuation became necessary. The two, six and ten meter AREC Nets were activated, but it was apparent immediately that the required number of mobile units would not be available. Kings County EC WA2UCP was contacted and agreed to supply additional mobiles for the operation. By 2100 the wind had shifted and it was decided that if any flooding occurred, it would not be until the high tide at 0130 the following morning. The nets were closed but the AREC remained on the alert until after the high tides passed, with no flooding. — *WB2RXB, EC Queens County, N. Y.*

On Nov. 12 it was deemed necessary to continue the session of the New Jersey Emergency Phone Net after the normal session because of the many out-of-state stations calling in for information on weather conditions and storm damage in various parts of the state. Ten stations remained on the net frequency until 0220 GMT with WA2TEK as net control and W2PEV as alternate. — *W2PEV.*

Forty-three SEC reports were received for the month of October, 1968, representing 15,654 AREC members. This is four fewer reports and just over 3000 less members than October, 1967. Sections reporting: Ala., Alta., Ark., B.C., Colo., Conn., Del., E. Fla., E. Mass., Ga., Ind., Kans., Ky., Mar., Mich., Mo., Mont., Nebr., N.H., N. Mex., NLI, N.C., N.N.J., Ohio, Okla., Org., Que., S.Dgo., S.F., S.C.V., Sask., S. Dak., S.N.J., S. Tex., Tenn., Utah, Va., Wash., W. Va., W. Fla., W.N.Y., and W. Pa.

National Traffic System

The principal complaint these days seems to be the lack of traffic. The Christmas rush kept us all pretty busy, but by the time you read this we'll be in the middle of the post-Christmas doldrums and many of our NTS nets will be suffering from traffic malnutrition, that disease which can be debilitating to any traffic net or system. Nets don't keep functioning if there is nothing to do, if all that happens

during a net session is a roll call or exchange of a few pleasantries or procedural signals. Some nets meet primarily for ragchewing, but NTS operators get on there for a purpose — to handle traffic — and if there is none to handle, sooner or later they are going to stop showing up.

There is one very good solution to lack of traffic. *Originate some!* If we all originated just two messages a week during slack seasons it would assist greatly to alleviate the shortage in between times. Not silly, inconsequential messages such as thanking someone for a QSO or a birthday greeting to some ham you worked in the SS, but messages to friends or relatives or relatives of friends or friends of friends inquiring as to their welfare or giving a short piece of news of some kind. Do you know any servicemen overseas? Messages of this nature are welcome, now that we have a system for handling them, and the recipient usually really appreciates them. Ask for replies to the messages you originate, so traffic will flow in both directions and so that your net will get inflow as well as outflow.

Keep the texts short. So often one comes across a message with a check of 27 with a text that could have been said even better in fifteen words. The average originator seems to feel some sort of compulsion to be wordy, perhaps because it's free. We ought to discourage this tendency. The experience and satisfaction in handling a message is just as great — in fact greater — if the message is a short one, a concise one.

Traffic in NTS definitely has seasonal tendencies, and this can be noted in all traffic handling. The high month is always December, but the low month varies from year to year. In 1968 it was July, in 1967 it was July, in 1966 July, in 1965 January, in 1964 June, in 1963 January, in 1962 January, in 1961 September, in 1960 July. Records going even further back show a low month of May (1958), but this is unusual; Mother's Day usually keeps the totals up that month, as does Easter in April (or sometimes March) and Thanksgiving in November. August and September are usually helped along by "fair" traffic. June and July are definite doldrum months, when everybody is vacationing and there are few fairs or expositions.

The point is, don't holler about not having traffic if you never originate any yourself — that is, from your station. The game of traffic handling is not just getting a message from one station and giving it to another. It includes originating and delivering the traffic as well as relaying it.

It's a little late for New Year's resolutions (not actually, but it will be by the time you read this), but why not resolve (1) to report into your NTS net more often in 1969, and (2) to report in with at least one message on your hook every time you do so. Now for heaven's sake don't misunderstand us — we would 100% rather have you report in QRU than not report in at all because you have no traffic. But isn't the possibility of originating a message once in a while worth thinking about? — *W1NJM.*

November reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN.....	30	1749	1,260	58.3	97.8
CAN.....	30	1168	1,046	38.9	100.0
PAN.....	30	976	.933	32.5	100.0
1RN.....	60	582	.392	9.7	95.0
2RN.....	59	561	.716	9.4	95.3
3RN.....	60	583	.440	9.7	99.6
4RN.....	59	616	.446	10.3	91.9
RN5.....	60	675	.408	11.3	88.7
RN6.....	60	949	.655	15.8	88.9

(Continued on page 83)



Members of the Apricot Net provided communications for the Cleveland (Ohio) Thanksgiving Day Parade. Some of the participants above are (l. to r.) W8SUS, W50JF/8, W88ULF, XYL W8UDG, W88ULX, W83QFK, Parade Coordinator Koch, W88LEM, K8ONA, W8UDG.

The ARRL Museum of Amateur Radio



For the concluding article in this series, let's take a look at some of the old tubes. In the upper panel of the photograph on the opposite page we have some early Western Electric receiving tubes. There's the J tube, not to be confused with the VT1. The former has a smooth plate; the latter is corrugated. Then there are some round bulb ones like the famous VT2 and some receiving amplifier tubes, both r.f. and a.f. At the far right of this display is a "mystery" tube. It is obviously a kenetron for high voltage, but it also bears a patent date of 1904, a little early, I think. Above it is a little "magnetron," a tubular diode which was used in RCA's synchronous detector. Not used by hams.

... On the next tier are some transmitting tubes. We have the CG1144A which was the immediate predecessor of the 203, some 203As of various makes, an "H" tube and the famous 852 which opened up the high frequencies with some substantial power. The more powerful tubes include a UV204, a "P" tube, the first 250 watt and a Mullard quarter-kilowatt affair. This particular tube was used by Herbert Hoover, Jr. to get across the pond the transatlantic tests of 1921-1922.

... On the next two shelves down are some major items from the Stewart Collection. Charlie Stewart, 3ZS, was the League's first vice-president. Partially shown is his transmitting oscillation transformer, wound with very hard brass strip. A nice job. Next

to it is the RCA tuning inductance which was very popular. The Clapp-Eastham rotary tuner has a flock of taps, 121 in number, I seem to recall when I did it over! Stewart also made a gem of a loose-coupler, here shown. Below is his spark transmitter housed in a heavy wooden box. The lid of the box supports the rotary gap. You can just see it in the far lower right. There is also a large high-voltage transformer and an old Thordarson spark transformer.

... Over in the second bay, top shelf, is a remarkably preserved complete station as it was in 1907. You should look this over sometime. Underneath are a variety of good old "Electrose" insulators, miscellaneous small items and a flock of telegraph sounders, etc. Just below are more small items including a variable mercury-rotary condenser. On the bottom there is representation of old-time spark transformers, Acme, Clapp-Eastham, etc. Incidentally, these are all in working condition.

... In the third bay, which you can't see too well in the photograph, are more tubes. Starting with a Fleming valve, there are, in addition a number of small receiving tubes, the UV 200, 200-a, etc. We have three-tiny triodes believed to have come from Edison's lab. The elements are single fine-platinum wires. They are about the size of an automobile headlight. A rare Wireless Specialty triode, a sodion tube, some curious affairs with external grids and a flock of others are shown.

. . . On the third shelf there is a "coffin" high-voltage transformer which has an open core and appears to have been copied from the famous United Wireless transformers of the day. One of Paul Godley's first receivers made and sold by the Adams Morgan Company is a monster having multiple variometers, large condensers, and lots of switches for series parallel connections, etc. and other doo-dads. Armstrong is said to have looked at it and told Godley that it wouldn't work below a thousand meters. Whereupon, Paul went to work and came up with the famous Paragon receivers, expressly designed for hams. Incidentally, this huge outfit has no detector — it's just a tuner.

. . . Referring to the top left of the photograph at the left is a shelf devoted to trophies, cups and the like. Here is Warner's famous "Transatlantic Derby" which he won as a bet with England's Burnham that a U.S. amateur would hear many American Stations in Gt. Britain. All old timers will recall the exploits of Paul Godley in Scotland during those tests of 1921-1922. Hey, we have a handsome, carved trophy to be awarded for the first two-way amateur communication between Earth and Mars! Probably won't be claimed for some time, but this trophy has been here for some years now. Maybe it will come to pass after

all. We're on the way, I think. The next two shelves are devoted to National Receivers. These include an SW3, SW5, SRR, 110, FB7 and an early HRO. Also we have the type AGS receiver which accompanied Byrd to Antarctica. It is still in good working order. On the bottom shelf is one of 9ZN's receivers.

. . . In the center bay are a number of famous Grebe receivers. We have six different types in all. Just underneath is a very famous receiver. This is the original single signal superheterodyne. The crystal filter in this rig is one of the finest ever designed, in this writer's opinion. It really peaked up a c.w. signal to the virtual exclusion of everything else nearby. In this bay are some homemade transmitters and receivers, including a first v.h.f. rig to get across the pond.

. . . In the right bay is a Kennedy type 110 and 2-step audio, a Tuska Superdyne Jr., and an arc transmitter. This latter is not a piece of ham gear, but is included because some amateurs did use arcs for c.w. I did, myself, and know they gave a lousy note. A large number of tubes, mostly "spares" are just below. Many of them will eventually be displayed separately. Lots of other goodies — Come see.

—WIANA, Curator.



Happenings of the Month

EX-AMATEURS ELIGIBLE FOR NOVICE

The Federal Communications Commission has changed its rules governing eligibility for Novice. After January 24, any person who has not held an FCC amateur license in the twelve months preceding his application may take the Novice test. If successful, the applicant will receive a regular two-year Novice license.

At the same time, FCC turned down the ARRL request that Technicians who have not held Novice licenses during the past year also be eligible. Here is the text of the FCC's order in Docket 18266:

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

In the Matter of

Amendment of Part 97 of the Commission's Rules concerning the Novice Class amateur radio license.

DOCKET NO. 18266
RM-1288

Amendment of Part 97 to extend special privileges to amateur Novice Class applicants and licensees over 40 years of age

RM-1324

REPORT AND ORDER

Adopted December 12, 1968: Released December 18, 1968

By the Commission: Commissioner Robert E. Lee absent.

1. On July 26, 1968, the Commission released a Notice of Proposed Rule Making in the above-entitled matter for Docket 18266. The Notice was duly published in the Federal Register on July 31, 1968 (33 FR 10883) and all comments submitted in response thereto have been fully considered.

2. The rule change proposed in the Notice was suggested by the Electronic Industries Association (EIA) in a petition (RM-1288) and would permit a former holder of an amateur radio license to obtain the Novice Class license if he has not been licensed for at least the twelve months preceding the date of his application. The purpose is to afford persons who have been unlicensed for extended periods an opportunity to start as beginners in order to obtain the operating experience and proficiency for advancement in the field.

3. Almost without exception, the comments received support the proposal and urge prompt adoption of the rule change. Typical of the comments were the following:

"Early in my college days I was introduced to Amateur Radio. I studied for and obtained a Novice Class license. I was somewhat active, but my studies prevented a level of activity and study

of code and theory to attain a General Class license. . . . Now, however, I do find a little time when I could again be active. I further believe that I would be able to qualify for General or perhaps Advanced if I had the opportunity to work with CW as a Novice."

"My Novice license—expired on October 1, 1966 and I did not take the exam for a General license. I have no trouble at all sending and receiving code at the rate of 15 wpm, but I do have considerable difficulty with the mathematics of electronics necessary to get the higher license. I feel that if given the opportunity to have a Novice license for 2 years, I might be able to advance myself further."

4. One result of the proposed rule change would be to discontinue the practice of concurrent holding of the Novice and Technician Class licenses. There was objection to this limitation in a few of the comments, including the one submitted by the American Radio Relay League, Inc. (ARRL), based upon the contention that Technician Class licensees would be denied the opportunity to obtain code speed practice for advancement to higher class licenses. However, it does not appear that such advancement is dependent upon the holding of a Novice Class license. Technician Class licensees are able to utilize some of their assigned frequencies for on-the-air code speed practice. Alternatively, use can be made of code tapes, records, ARRL conducted code practice transmissions, and commercial station transmissions. The Commission finds, therefore, that eliminating concurrent availability of these two license classes is appropriate.

5. The EIA petition (RM-1288) contained other proposals considered in this proceeding. They contemplate, for the Novice Class license, reduction of the code speed requirement, a five-year renewable license term, additional frequency allocations, and



Frank Baker, Jr., W1ALP, receives the ARRL Certificate of Merit from Robert York Chapman, W1QV, (at right) director from the New England Division while Ed Murbeck, W1AKY, looks on. Frank was honored for his service as SCM of Eastern Massachusetts since March 11, 1940.

radiotelephony operating privileges. In a separate petition (RM-1324) which he requests to have considered in this proceeding, Mr. George Nims Raybin (WN2GWB) joins in the EIA proposals with the exception that he would limit the code speed reduction, the radiotelephony operating privileges, and the license renewal feature to persons who have reached forty years of age.

6. The additional EIA proposals were not favorably considered for the reasons detailed in the Notice. Basically, these proposals were found to require denial as being contrary to the purposes for which the Novice Class license is available. Nearly all of the comments concurred in this Commission finding. Mr. Raybin's proposal for an age qualification does not warrant a different determination since a licensee's age is not regarded as either a valid distinguishing factor or as an equitable one in this instance.

7. In consideration of the foregoing, the Commission concludes that amendment of Section 97.9(f) of its Rules as proposed, to permit the issuance of the Novice Class license to former amateur radio licensees who have been unlicensed for at least one year, is in the public interest, convenience, and necessity. Authority for this rule change is contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended. Accordingly, IT IS ORDERED That, effective January 24, 1969, Part 97 of the Commission's Rules is amended as set forth in the Appendix attached hereto.

8. IT IS FURTHER ORDERED, That the petitions RM-1288 and RM-1324 have been fully considered, and, to the extent that they are at variance with findings and determinations herein, they ARE DENIED.

9. IT IS FURTHER ORDERED That this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE, *Secretary*

APPENDIX

1. Part 97 of the Commission's Rules is amended as follows:

1. Section 97.9(f) is revised as follows:
§ 97.9 Eligibility for new operator license.

* * *

(f) *Novice class.* Any citizen or national of the United States, except a person who holds, or who has held within the 12-month period prior to the date of receipt of his application, a Commission-issued Amateur Radio license. The Novice Class license may not be concurrently held with any other class of amateur radio license.

EXPERIMENTAL RESERVATION DENIED

FCC has denied a petition of Joseph Marshall, WA4EPY, filed in 1963, which proposed segments of at least 10 kHz. in each of the h.f. bands for experimental purposes only.

In denying the request, RM-250, the Commission said that the amateur service rules give wide latitude in the use of frequencies and modes of transmission because detailed technical standards are not specified.

Further, FCC will issue "special temporary authorizations" (STAs) so that amateurs may carry out experiments not permissible under the regular rules, as for instance the STAs granted to a number of amateurs for slow-scan TV in the



The September cover plaque award went to William H. Fishback, W1JE, (second from left) for his article, "600 to 20,000 Meters." Bigelow Green, W1EAE, vice director from the New England Division makes the presentation, backed up by Ed Gosselin, W1BCN, (left) an assistant director, and Bob Edwards, K1LEK, president of the Cape Cod and Islands Radio Club.

h.f. bands, which led to a rules change last year.

Application is made by letter addressed to Amateur and Citizens Radio Division, FCC, Washington, D.C. 20554. The exact nature of the experiment, the time period desired, and the qualifications of the applicant should be stated in detail. The applicant should also show the section numbers of rules he would like waived in order to carry out the experiment. FCC usually requests, in granting such authorizations, that a report be made to it upon completion of the tests.

AMATEUR LICENSE SUSPENDED FOR SUPERPOWER

The Amateur Radio Operator License K6EVR issued to Ronnie J. Camp, Temple City, California, has been suspended for three months for operation of the transmitter with excessive input power, in violation of Section 97.67 of the rules, in a Decision by a panel of the Review Board (Docket 17598). One member issued a statement that since, in his view, the violation was willful and there are no mitigating circumstances, he would suspend the license for a period of six months.

A Commission order released June 19, 1968, suspended Mr. Camp's license for six months, charging that he operated his amateur transmitter on March 18, 1967, with a power input exceeding one kilowatt to the plate circuit of the final RF amplifier stage, a direct violation of the rules. At Mr. Camp's request, he was granted a hearing that included issues to determine whether he had committed the violation, and if so, whether the facts or circumstances warranted any change in the suspension order. Hearing Examiner Jay A. Kyle, in an Initial Decision released August 2, 1968, concluded that Mr. Camp had violated Rule 97.67 and recommended affirming the six months suspension order. The panel of the Review Board concurred with the Examiner's decision, stating "it is clear and undisputed that the measurements of the first test transmission were made on Camp's meters and that

these measurements showed an input power well in excess of the authorized maximum. . ."

However, the majority of the Review Board panel noted the Examiner's findings that Mr. Camp has been a Commission licensee for 14 years, and has never before received notice or warning of any statutory or rule violation. "Based upon such findings," the majority said, "and the fact that this is Camp's first violation and relates to a single, not repetitious, incident, we think that under these circumstances a modification of the suspension order to the extent that the period of suspension be reduced to three months is warranted. . ." The panel emphasized the fact that they did not find the evidence "in any manner" insufficient to sustain the conclusion that a violation of Rule 97.67 was committed, and that they do not regard the violation as "of a technical or minor nature."

[FCC news release, December 9, 1968]

UNLICENSED C.B. OPERATOR GETS JAIL TERM

James F. Dilg, of Huntington Beach, California, was sentenced to six months in jail for failure to observe a court order to cease operating in violation of FCC Citizens Radio Service Rules. Dilg was sentenced by Judge Charles F. Carr of the Federal District Court, Central District of California. Judge Carr had issued a consent judgment on May 14, 1968 ordering Dilg to cease operation. His Class D CB license had been cancelled in November, 1966. The contempt sentence was based on findings that Dilg had continued to operate in defiance of the court order in June, July and November of 1968. (From FCC news release, December 11, 1968)

RESTRICTIONS REMAIN ON 6 METERS

FCC has denied the latest ARRL effort to keep six meters fully open to holders of renewable amateur licenses. Thus, the frequencies 50.0-50.1 MHz. remain restricted to holders of Extra and Advanced Class licenses, and presumably the further restriction of 50.0-50.25 MHz. will be allowed to go into effect on November 22, 1969 (unless FCC decides, in its own review of

all "incentive licensing" segments, to hold off).

The pertinent portion of FCC's order appears below:

. . . The ARRL requests amendment of Section 97.7(a), which provided that, effective November 22, 1968, the band 50.0-50.1 MHz will be reserved for the exclusive use of Advanced and Extra Class amateur licenses; and, effective November 22, 1969, extension of the reservation to include the band 50.0-50.25 MHz. To support this proposal, ARRL states as follows:

"The 50 MHz band, while interesting territory for all classes of amateurs, has been most widely used by Technician Class licensees. Although some of these amateurs will be encouraged by the subband restrictions to try for higher license status, most are believed to be either incapable of achieving Advanced or Extra Class status, largely because of the code requirements, or are unwilling to attempt it. The end result will be either an abandonment of the 50 MHz band, reversing the current trend toward more effective use of this assignment, or shift of operations to portions of the band fraught with interference problems."

Petitioner also asserts that many of the new amateurs who are getting their first taste of radiotelephony in the 50 MHz band "see little reason to try to obtain a higher class of license."

3. The Commission is not persuaded by these arguments. The 50.0-50.1 MHz subband, which was reserved exclusively for Advanced and Extra Class licensees on November 22, 1968, is now available only for radiotelegraphy. Accordingly, it is believed that the initial reservation will have little effect on the operating privileges of the Technician Class licensee. The reservation may cause some shifting of telegraphy operation to frequencies above 50.1 MHz by licensees who do not upgrade their licenses. However, the Commission does not believe, as suggested by petitioner, that this would create a problem of such significance that it would result in either the abandonment of the band or a shift in operating frequencies to a part of the band conducive to increased television interference. Further, in Docket 15928 the Commission said it would stay in whole or in part, as appropriate, any reserved frequency assignments which do not appear to be sufficiently occupied. This statement was reiterated in a number of Commission actions since the deter-

WHO THE DEVIL IS WHO?

Tenth in a Series of Call Conversion Charts

Here are additional calls of amateurs taking advantage of new rules which allow Extra Class licensees licensed 25 years ago or longer to acquire two-letter calls. If you should be listed here, let us know by post card right away.

Now	Was	Now	Was	Now	Was	Now	Was
W1BL	K100R	W3UF	W3HHT	K6JK	WA6DQA	W8BC	W8LEX
W1IS	W1AGP	W3UI	K3HBD	W6JX	W6EHZ	W8GI	W8ISI
W1JH	W1MUN	K4IT	W3NSE	K6JZ	W6PWO	W8HC	W8AZU
W1KK	W1MNG	K4JS	K4CGK	W6MQ	WA6IXG	W8HS	W8JFH
W2OK	W2ALK	W4JS	W4BHJ	W6MU	K6BSE	W8IF	W8ZKQ
W2WD	K2GUN	K4JW	W4IVS	W6NN	K8LCN	W9CY	W9OTL
W2YD	K2SUX	W5GJ	W5EZE	K6NT	WA6JBB	W9EN	W9JUT
W2YF	W2NNL	W5GP	W5FRE	W6WD	W6BCX	W9EP	W9FTC
W3RI	W3APH	K6CZ	W6JRI	W7U	W7ESN	W9FP	K9HZF
		K6IG	W6RGR	W7LK	W7DJY*	W9JP	W9EXS

*Correction from Dec.

Behind the Diamond Number 12 of a Series



Do all "airplane drivers" have blue eyes with a permanent twinkle, deeply-tanned skin, and a fresh breezy approach to life? Maybe not, but **Carl L. Smith, W0BWJ** does. A captain for Western Air Lines, Inc., Carl has represented the Rocky Mountain Division of the League since January 1, 1961. He was vice director in 1957-1958, an assistant director in 1955-1956, and SCM in 1959-1960 of the Colorado Section.

Carl has served on the Executive Committee since 1966; during the 1968 election for this post he had the votes of all 15 of his colleagues on the Board. He has also been on the Public Relations Committee for three years (one as chairman) and three years on the Merit and Awards Committee.

His ready wit has lightened many a too-serious moment at Board Meetings, but his steady theme has been more and better service to the public by amateurs. To this end, he has established annual PICON Awards in Utah, Wyoming, Colorado and New Mexico for an amateur in each state who performs an outstanding service in the "Public Interest, Convenience or Necessity." (The phrase, whose initials comprise the acronym PICON, comes from the Communications Act of 1934 where it is used to measure need for a proposed radio station license in nearly every service.) His actions back up his words: he's a member of both the Amateur Radio Emergency Corps and the Radio Amateur Civil Emergency Service.

Carl lives in Denver with his charming wife Terri and four children. He's a past president of the Denver Radio Club, has served as advertising manager for its publication *The Roundtable*, and is a Charter Life Member of ARRL.

nation in Docket 15928, including the Order (Mimeo 20884) released August 13, 1968. The Commission's intention to review the suballocations remains unchanged. However, until the initial phase of the implementation has been accomplished and time allowed for necessary transitions, there is no real basis for evaluating the effects of frequency reservations on the Amateur Service in general and incentive licensing in particular.

4. Another contention by petitioner is that restricting the use of 50.0 to 50.1 MHz to the two top grades of license will have the practical effect of cutting the lower class licensees off from the opportunity they now have of communicating with more skilled amateurs in code. However, the reservation will have little or no effect on the General or Conditional Class licensees since they now have, and will continue to have, access to the lower frequency bands where radiotelegraph operation is plentiful. Moreover, telegraphy is permitted throughout the entire 50 MHz band and, therefore, there will be little, if any, effect on Technicians as a result of the initial reservation. It should be noted also that the problem of improving one's skill in the use of code is not unique to VHF-oriented amateurs. The same problem confronts most Novices and many licensees of long standing who, over the years, have concentrated on radiotelephone operation. The ability to send correctly formed code characters at a reasonable speed is one mark of an accomplished operator. While practice is essential to the achievement of that skill, on-the-air practice is not required. Those who do not have access to code tapes, records, or

other learning aids, may practice by listening to the ARRL conducted code practice transmissions, the transmissions of commercial stations, and to other amateurs. Without doubt, on-the-air communication is helpful in developing and refining operating procedures, but it is not essential to improving one's skill in code.

5. Finally, ARRL contends that the 50.0-50.1 MHz reservation will inhibit propagation study because the band may be open for long distance communications via the F2 layer of the ionosphere at the low edge and closed at 250 kc/s higher. The anomalies of propagation by the F2 layer are such that band openings would probably occur at 50.1 MHz as frequently as at 50.0 MHz. Although there may be differences in the length of the opening and the relative signal strength at the two frequencies, such differences would have little significance. In addition, the period in which F2 openings can be expected are so limited by sun spot activity, time of day, and season of the year that the impact of the initial reservation of the lower 100 kc/s of the band on the usability of the band for propagation studies is not believed sufficient to justify a change in the rules at this time.

6. As can be seen from the foregoing, the Commission does not find that the ARRL has presented factors which warrant the abandonment or suspension of the rule changes relating to reservation of the 50-50.25 MHz band. Accordingly, IT IS ORDERED That the American Radio Relay League, Inc., petition IS DENIED.

FEDERAL COMMUNICATIONS COMMISSION

QST

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

HAM RADIO AT THE OLYMPICS

During the Olympic Games in Mexico, amateur radio stepped in to play an instrumental role. Station 4A3P was activated from the Caleta Hotel which housed over 700 male contestants and committee members. A six-meter f.m. net was used to aid local communications and liaison with the Chief of the Olympic Committee. The station also operated s.s.b. on 40 through 6 meters. It is reported that the response to the station by Olympic competitors and foreign dignitaries was remarkable.



The station operated from October 13-27 and contacted more than 600 stations in 80 countries. Pictured above is XE1AL standing, and sitting from left, XE1PY and XE1GE. Other participating amateurs were XE1IK, XE1CK, XE1FE, and XE1HHQ.

LOST IN THE BUSTLE?

With the "bustling metropolis" now a way of life in all nations — agricultural and industrial — what problems are created for amateur radio? The *Amateur Radio Society of India* reports, "It seems amateur radio is not making much headway in the large cities of our country as the folks keep busy in many other activities and have no time for this hobby." There is hardly any interest in amateur radio as well as other scientific hobbies.

ARSI suggests that attention be directed toward the villages. India has many village schools well-equipped with science laboratories and hobby centers — an excellent environment in which to introduce youth to amateur radio. Plus, the villagers have increased leisure time to devote to amateur radio.

There are currently slightly more than 400 radio amateurs in India. ARSI points out that amateur radio could play an important role in scientific development and provide vital links of communications in emergencies and looks toward India's educational authorities for assistance.

WORKED ALL CONTINENTS?

During 1968, IARU headquarters issued a total of 2000 WAC awards. They included 857 for s.s.b., 3 for RTTY, 3 for 1.8 MHz. and 1 for 3.5 MHz. work. If you are interested in applying for this award, send to the IARU society in your country a confirmation from each of the six continents (North America, South America, Europe, Africa, Asia, and Oceania) along with your name and address and sufficient return postage.

1969 IARC PROPAGATION RESEARCH COMPETITION

The International Amateur Radio Club (4U1ITU) announces sponsorship of the 1968 Propagation Research Competition. The aim of the contest is to provide information on prevailing propagation conditions between each of the International Telecommunications Union's zones as a function of amateur band used, month and solar activity. The object is for amateurs around the world to contact as many other amateurs in as many different CPR Zones as possible. The contest period is, for c.w. and RTTY, from 0001 GMT March 1, to 2400 GMT March 16, and for phone, from 0001 GMT March 29 to 2400 GMT April 13. Any of the amateur bands from 1.7 to 30 MHz. can be used; several entry classes will be accepted; and, certificates will be available for high scorers. For further information and log forms write the International Amateur Radio Club, 1211 Geneva 20, Switzerland. All entries must be postmarked no later than June 1, 1969 and sent to L. M. Rundlett, W3ZA, Chairman, IARC Contest Committee, 2001 Eye Street, N.W., Washington, D.C. 20006.

ALL SIZES

How large is a national amateur radio society? Our IARU membership roster shows that the "average" society membership is slightly over 4000. However, by this definition, only about three or four of the IARU societies are "average" in size — most are either smaller or larger. The *Bahamas Amateur Radio Society* for example has 20 members, while the *American Radio Relay League* serves 100,000. Other large societies

include the *Radio Sports Federation of the USSR* with 71,000; the *Deutscher Amateur Radio Club* (Germany) with 18,000; the *Japan Amateur Radio League* with 23,000; and, the *Savez Radio-amatera Jugoslavije* (Yugoslavia) with 30,000.

DX OPERATING NOTES

Reciprocal Operating

(**Bold face** indicates changes since last list.)

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France, Germany, Guyana, Honduras, India, Ireland, Israel, Kuwait, Luxembourg, Monaco, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Surinam, Switzerland, Trinidad and Tobago, United Kingdom and Venezuela. Several other foreign countries grant FCC licenses amateur radio operating privileges on a courtesy basis; write headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, Israel, Luxembourg, the Netherlands, Nicaragua, **Norway**, Senegal, Switzerland, United Kingdom, U.S. and Venezuela.

Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the regular international communications facilities — may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries: Argentina, Barbados (only U.S. stations/8P) Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

DX Restrictions

U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia, Thailand and Vietnam forbid radio communication between their amateur stations and such of other countries. U.S. amateurs should not work HS XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided are HS JY XU XV XWS and 3W8.



Recently, the Radio Society of Ceylon received W7EOC and W5EYC of the S.S. *HOPE* as guests. Pictured from left to right are (standing) SWL Sabdrasegram, 4S7LB, SWL Perera, 4S7DW, 4S7PG, 4S7WJ, RSC President 4S7LM, W7EOC, RSC Treasurer Paumaperuma, 4S7BC, 4S7NE, (sitting) SWL deSilva, 4S7RN, 4S7WP, SWL Somapala, 4S7EA, and RSC Secretary 4S7EC. The Radio Society of Ceylon has a membership of 103, and conducts the Southeast Asia Network daily at 1200 GMT on 14,320 kHz. (W5EYC photo)

Strays

Project Moonray (see Nov. 1967 *QST*, pg. 56) bulletins are transmitted by K2SS on Mondays (Tuesday GMT) from Garden City, Long Island, New York. RTTY bulletins are on 14.090 to Europe at 0001 GMT (Tuesday), to Africa at 0015 GMT, to USA (beamed south) at 0200 GMT and (beamed west) at 0210 GMT. S.s.b. bulletins are on 14.235 to Europe at 0030 GMT, to Africa at 0040 GMT, to USA (beamed south) at 0300 GMT, and (beamed west) at 0310 GMT. No bulletins will be transmitted on the first Monday of each month. Further information about Moonray may be obtained by writing Nastar, P.O. Box T, Syosset, L.I., New York 11791.

QST Congratulates . . .

Lawrence LeKashman, W9IOP, appointed president of Electro-Voice, Inc.

Kenneth G. Bucklin, W2CDP, on his retirement as Commercial Engineering Manager of RCA Electronic Components.

Julio Ereneta, W6ZOM, recipient of the San Diego County "Ham of the Year" award.

Doug Christensen, W5OOG, decorated for his actions during Hurricane Beulah.

Beryl Mattison, K7CFC, featured as "Man Behind the Counter" in Associated Grocers publication *Ink*.

J. Leonard Walker, VE2UK, elected president of the Bank of Montreal.

Joe Kochis, W7CXT, on receiving the Carnegie Hero's Award.

D.C. Summerford, W4FR, retiring Chief, U.S. Army Strategic Communications Command-CONUS Thomasville Georgia Facility.



Correspondence From Members-

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

PHONE PATCHES

☐ Apparently you have judged phone-patches as unjustifiably occupying space in our crowded h.f. bands (December editorial) and suggest that requests for this service be refused with the alternative that any message be handled through regular traffic nets. Considering the convenience and low cost of telephone calls today, I agree that domestic phone-patches satisfy no essential need during normal conditions. But the same can be said of regular traffic nets and their less-certain delivery of messages. Paradoxically, almost all traffic delivery by NTS is by telephone and some, worse yet, by mail. However, traffic nets are not maintained for normal conditions but as practice for emergencies. Arguments favorable to—and against phone-patches—can be identically applied to the traffic nets so vigorously applauded by *QST*. And phone-patches do have the overwhelming advantage of personal contact, immediate knowledge of success of delivery, and wider public participation and support than that given NTS where a large volume of the traffic handled is originated by net members.

I believe it is premature for *QST*, where phone-patches have rarely been acknowledged in the past, to condemn the service without adequate consideration of the huge potential for ham public service. Instead, ARRL might study development of national and international phone-patch nets with the same vigor that NTS is supported.—*Matthew Lefkowitz, WB4KRR, Herndon, Virginia.*

[EDITOR'S NOTE: It is not the text of a message handled by amateur radio which is most important (short of emergency, of course), but rather the training it provides the operators handling it.]

☐ If one considers the logic which you use in most of the article, the major two points seem to be: (1) An amateur by virtue of his license ought to have the right to carry on third-party traffic which is legal; (2) An individual ought to have the right to use his telephone in a manner which does not disrupt the normal operation of the telephone equipment (whether or not he should pay for this privilege does not affect the logic of the argument at present). . . . Your statement about not running patches within the country is, however, untenable. Sure we could use the land line or send recordings. For that matter we could write letters or send telegrams instead of using NTS; but, we prefer to do things by amateur radio, because that is our hobby, and we enjoy doing things by amateur radio. Phone patches are no exception. Extending your irrational statement to its extreme would imply that we should stop talking to each other within the continent and send tapes back and forth. Perhaps you should change the name of ARRL to ATRL (American Tape Relay League).—*Benjamin H. Gorsky, W8IUS, Cleveland Heights, Ohio.*

☐ The complaint that domestic phone patches overcrowd our h.f. bands is certainly true. It was suggested that when we hear someone calling "CQ

Miami, phone patch," we suggest they use the landline.

We heartily agree! By the same reasoning we can eliminate the W1AW code practice sessions and suggest the listeners purchase code tape machines. Then too, we could eliminate more overcrowding by ceasing to have contests. Instead, suggest chain letter writing.

Well then, just what are the ham bands for? In case we've forgotten (or didn't know), the frequencies were given us to help us improve our technical knowledge and ability. The correspondence from readers in *QST* shows we lack considerably in maturity when we write in soapboxing our particular interest and damning those interested in another facet of the hobby. A well-rounded ham should participate in all areas at one time or another.

As for the legal aspect, FCC and mother Bell both know that an unenforceable law is in fact not a law. Finally, as to interference to phone lines caused by phone patches: Balderdash! We have yet to hear a complaint of crosstalk. Telephone engineers know an overdriven phone line could only break over into other wires in the same cable connecting a patch and the central office—not a whole exchange!

All in all, it appears this editorial does not represent the beliefs of the majority of the ARRL membership, FCC, or the Bell System.—*Robert L. Keplinger, KOCTK, Kansas City, Mo.*

☐ I am pleased to see an honest, factual report of the present status of "foreign attachments" and telephone company tariffs. Most non-telephone industry publications, including other amateur publications and newspapers, have indicated that anything is now permissible. It is nice to see the whole complex situation so well summarized.

I am a former employee of "Ma Bell" and am still very interested in the telephone business. I subscribe to a weekly telephone trade journal and have been following the latest developments in the area of new tariffs permitting connection of devices formerly considered "foreign." You do justice to the situation.—*Ronald E. Guentzler, W8BBB, Ada, Ohio.*

2-YEAR WAIT FOR EXTRA

☐ Having been involved in hamming for about one year (I have my Advanced), I find a two-year "experience" requirement reducing my c.w. privileges noticeably. I suggest that the two-year requirement be maintained but with an alternative of taking a test (oral or written) on the many facets of operating and also enforce an operating-time requirement similar to the requirement for renewal but naturally much larger.—*Lee Nackman, WA3IRQ, Randallstown, Maryland.*

☐ The two-year waiting period for the Extra Class license is no longer justified. It seems, a prospective or new amateur cannot have full privileges for two

years. This is unjust; it's a hangover from earlier days when the Extra Class ticket was merely a prestige license and when full privileges were conveyed by the General ticket. This rule, perhaps, discourages more newcomers to amateur radio than any other single facet of the incentive licensing system jammed down our throats last month. If a person can pass the Extra exam after less than two years, of operating, he has the competence to hold the license. — *Mark Connelly, WAIION, Arlington, Mass.*

[EDITOR'S NOTE: The waiting period is a "hangover," not from the days when the Extra was only a prestige license, but long before that when the Class A conveyed special phone privileges and had its own waiting period.]

I FLUNKED

¶ Ever since the incentive licensing issue started, I have been reading many letters in *QST* from hams tooting their own whistle about passing their Extra Class exam. I thought maybe some of the readers would like to know that not everybody passed. I flunked. — *Al Reed, W8WVU, Manitou Beach, Michigan.*

ARRL MUSEUM

¶ Just to keep the records straight, the ARRL Museum (*QST*, Oct.) acquired its first cabinets and cards in 1936 or early 1937. The late Clinton B. DeSoto, author of *Two Hundred Meters and Down*, managed the exhibit and wrote most of the cards explaining the contributions. Many of these cards bore the DeSoto trademark of bountiful polysyllabic phraseology. His classical description of the correct use of the Rettysnitch is retained to this day, as are many other of his colorful word pictures.

Further, Curator WIANA modestly failed to mention that it was *he*, Roland Bourne, who spent the hundreds and hundreds of hours restoring the many pieces to their present immaculate condition. The Museum is very fortunate to have such a talented and devoted Curator. — *Byron H. Goodman, W1DX, East Hartford, Conn.*

FREE SPEECH

¶ I am among the hams who consider rag chewing an important and enjoyable aspect of amateur radio. I do not think so many QSOs should consist merely of signal report, QTH, name, rig, weather and 73. I am always pleased when I find someone who likes to discuss social and political issues, and other topics of mutual interest though not related to ham radio.

Apparently some hams feel that discussions of controversial issues should not be carried on via ham radio. On several occasions when I was expressing my opposition to the Vietnam War in a QSO, someone has broken in on the frequency, chewed me out for my views, and refused to identify himself. I usually respond by inviting the breaker to join our discussion, but it doesn't work — these guys won't give their calls.

Such operating practices are illegal, but what is more important, they are rude. In these times when lack of communication is the cause of distrust and even violence, I think hams should use our means of communication for furthering understanding; and at the very least, everyone should let his fellow hams talk about whatever interests them. — *Frank H. Letton, K4KAD/G, Berkeley, Calif.*

¶ Is a LID the guy who breaks in without ID when your 15-year-old daughter is discussing the U.N. problems with a bright young man and tells her that she should get off the air with that stuff because ham radio is a hobby?

Or is it the same character who, when the OM finally shames him into ID-ing, says that our hobby is governed by an unwritten law restricting our conversations to weather, rigs, antennas and technical talk, and precludes religion, sex and politics?

To me, our hobby provides the opportunity to serve, to build, to be prepared for emergencies, but most of all, to ragchew in a relaxed, friendly manner. Just between us, I don't give a damn if another ham is running a Swan, a Goose or a Duck. It matters less whether his skywire is a Zepp or a Schlepp. If he is alive, alert and aware, he's the joe I want on the other end of a QSO. Hams like that are hard to come by, and I resent some unprincipled idiot who suffers from controversyphobia trying to keep us quiet! If the issues of the moment offend him, let him reach for the on-off switch instead of the p.t.t. switch! — *Jay C. Jacobson, WABCQ, Philadelphia, Pa.*

[EDITOR'S NOTE: These are good points. Yet we must be careful not to carry them to a ridiculous (and possibly fatal) extreme. See the editorial this month for further comment.]

SINCE NOVEMBER 22

¶ The greatest change noticed in the lower 25 kc. of the c.w. bands since the new regulations went into effect is not occupancy, but the lack of U.S. stations calling "CQ DX." Many can still be heard in the higher portions, however.

There must be a correlation between the call "CQ DX" and the class of license. — *Tom Orr, W6BIF, Placencia, Calif.*

¶ I have had a General license continuously for 40 years and during this time operated almost exclusively c.w. By incentive licensing you are wrecking true amateur radio. On 20 meters for example the foreign amateur has phone almost exclusively from 14,100 to 14,200 kcs. Then you give them for all intents and purposes, along with a few electronic specialists and engineers, 14,000 to 14,025 kc. and next year 14,000 to 14,050 kc. And then RTTY occupies sometimes up to 30 kc. between 14,070 and 14,100. So that leaves the regular c.w. operator at present with 14,025 to 14,070 and next year you will leave him with a paltry 20 kc.

You are killing off the regular amateur radio c.w. operator.

I will never even consider belonging to ARRL again as long as there is incentive licensing. — *Edward D. Wells, W8EW, Grand Rapids, Mich.*

¶ Contrary to many black prophets I found no chaos in the upper reaches of any band. I did note many stations crowding too close to 14.2 MHz. with trailing sidebands and splatter well below the limit.

Thank you for your efforts with FCC and others concerning incentive licensing. I strongly have believed for years that the strength in amateur radio is the quality and not the quantity of operators. The 22nd of November will rest in amateur history as a new dawn of strength for us. — *Gary Davis, K1LEM, Williston, Vermont.*

YL news and Views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Where the Action is . . .

ONE nice part of amateur radio is that this activity is filled with tangibles. There is a great satisfaction in looking at that rainbow of certificates on our walls, as well as that special gratification of knowing that their acquisition wasn't easy. When we entertain non-amateur visitors and have to answer that inevitable question, "But just what do you get out of all this?," we point out the array of these trophies of the chase. Quite often we are faced with another query from these visitors that involves that well known phrase used in news items about major disasters, that the only link with the outside world is through 'ham radio operators,' and we are asked, "Have you ever done anything like that?" If we have, and there are hundreds of YLs who can claim that distinction, our friends will be treated to exciting experiences of amateur communications during a disaster.

If these people should ask gals such as WA1GAB, K2JBX, K2KQC, W4WQM, K5HPW, W5LGY, K7CHA, K7DCH, K8CHW, K8LGA, K8ONV, W9ENU, W9MUL, W9QYY, W9RTH, K9ZLB, W0DVB, WA0JEV, K0ONK, W0ZWG, W0ZWL, KL7FLS, KL7BJD, or VE7BBB, they'd really get an earful of stories, for these women all hold appointments as Emergency Coordinator in the AREC, while

*YL Editor, QST. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



K4LMB, Ethel Smith, SEC, Virginia ARRL Section.



W2RUF, Clara Reger, SEC, WNY ARRL Section

K4LMB, WA4EFP, and W2RUF have been appointed Section Emergency Coordinator for their ARRL Sections.

These twenty-seven women are the ones who are responsible for the emergency communications set-up within their communities which are located in 17 states, as well as one Canadian province. To them goes the job of knowing the amateurs of their areas who are AREC members. But they do far more than just sign and mail out that little yellow membership card. These gals organize and maintain the regularly scheduled AREC nets, and are constantly planning the operation that these nets will use if disaster should strike their particular community. Some of their nets have been in existence for over ten years without a single break in the pattern of drill nights, even when it occurred on Christmas and New Year's Eve! One EC said, "True, they were very short drills, but we maintained the premise that disaster is no respecter of holidays." Another wrote that while these drills might seem cut-and-dried they "sure paid off" when a sudden disaster activated the net without any previous warning. "You should have heard those kids check in just as if it were another net drill," she wrote. "No fuss, no QRM, all business."

AREC membership is a vital part of any EC's activity. Some of the YLs have developed some pretty tricky methods for recruiting members, as in one case where the lady simply took a handful of application blanks to Field Day and collared every amateur who showed up at the site.

These gals know their area and keep in contact with the local American Red Cross chapter and other disaster agencies to make sure they are aware of AREC's existence in the community.

Does it all sound like a lot of work for a very little reward other than a certificate of appointment and a title? Those are merely the tangible evidence that she can show. For her, the trophies of the chase are the intangibles. The stimulation of operating under extraordinary conditions can never be put into words: The knowledge that she and the many, many AREC members are able to lend themselves, their equipment, their skills and trained to know how to keep their community in touch with the rest of the country when other, normal forms of communication have broken down, or are overloaded.

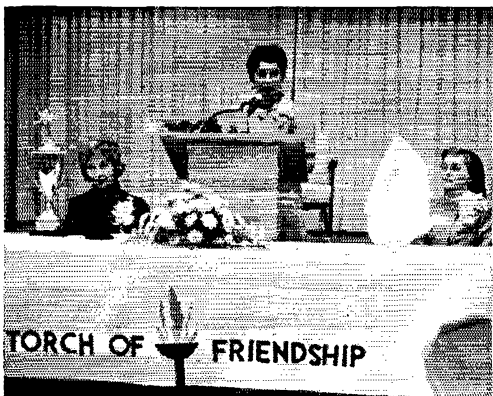
This is where the action is because it is the *raison d'être* of our wonderful "hobby." For "Amateur Radio exists as a hobby because it qualifies as a Service."

1968 YLRL Anniversary Party Results WINNERS:

Corcoran Award	K5YIB*	9,827.50
Phone Cup	K5YIB*	8,215
C.w. Cup	WA8USU*	1,997.50
North American Hager Award	VE3GTI*	5,478.75
World DX Hager Award	PY2SO	7,520

C.W. SCORES

K1QFD*	1,705	WA8USU*	1,997.50
WB2OQU*	1,899.50	WA8EKQ*	1,640
WB2PYI	1,247	K8ONV	1,304
WA2WHE*	517.50	K8ITF*	1,295
W2EBW	391	WA8FSX	1,025
K3SQX*	700	K8LHF*	688.50
W3CDQ	306	WA8ARJ	498.75
WA3ATQ confirmation		WA9HLV	1,912.50
WA4BVD*	1,860	W9GHO*	1,365
K4RHU*	1,187	WA9TVM	1,053
W4HWR	36	KØEVG	520
K5YIB*	1,612.50	VE1AMB	180
K5LUZ*	1,062.50	VE3GTI*	1,631.25
W5QWI*	776.25	VE5DZ*	665
WA6MIW*	1,020	VE6ANK	1,408
K6VFE	528	VE6ABV	1,334
K6DLL*	225	PY2SO	2,016
K6HHH*	100	VK5KS*	1,595
WA7BDD*	852.50	YV5CKR/1	1,540
		ZL2JO*	390



Jessie, WA6OET making her acceptance speech as ISSB president. Left to right: KAICA, founder of ISSB, WA6OET, WAØJIE



Photo of TV program on KCOP, Hollywood featuring Army MARS Vietnam Public Service operation. Left to right Lenore Jensen, W6NAZ/A6NAZ, who provided contact between 6500 servicemen and their families in 1968, Bob Burns, WB6KPR/AL6KPR, Sgt. Dick Sandler, then NCS at AA6WAH, Fort MacArthur, now in Vietnam, Mrs. Hap Saunders who represented the families of the servicemen in RVN and the program moderator Florence Thalheimer of the KCOP staff. (Photo courtesy WB6KPR)

PHONE SCORES

WB2OQU*	1,885	K8VCB	2,840
W2OWL	1,800	WA8FSX*	1,938.75
WA2WHE*	630	WA8KMT	832
W2EEO	143	K8TVX*	776.25
W3RJX*	1,020	WA8USU*	225
WA3AOJ	989	K9LUI	6,902
W3MDJ confirmation		KØEPE	4,940
K4AOH*	4,350	WØUVV*	3,638.75
W4HWR	3,984	KØEVG	3,008
K4RHU*	3,270	VE3GTI*	3,847.50
W4EHN	1,976	VE4ST*	1,080
W4TVT confirmation		VE6ABP*	2,635
K5YIB*	8,215	VE3ANK	2,480
K5LUZ	5,750	DL3LS*	525
WA5JFZ	3,276	DJ2YL	1,980
K5MLZ*	937.50	JH1GMZ	442
K6DLL*	6,875	PY2SO	5,504
WA6AOE	2,920	VK2AOK*	6,655
K6VFE	1,984	VK3KS	4,859
K6KCI*	1,207.90	VK7ZA	216
K7UBC*	3,753.75	ZØ1JE	312
W7NJS confirmation		ZL2JO*	2,920
WA7FLC confirmation		ZS5OB	1,365
K8ITF*	4,565	ZS2AA confirmation	
WA8EKQ*	2,945		

Combined PHONE and C.W. scores

K5YIB*	9,827.50	K6VFE	2,512
K6DLL*	7,100	WA8USU*	2,220.50
K5LUZ	6,812.50	WA8WHE*	1,147
K8ITF*	5,860	PY2SO*	7,520
K4RHU*	5,385	VK3KS*	6,454
WA8EKQ*	4,585	VE3GTI*	5,478.75
W4HWR	4,020	VE6ANK	3,888
K8FSX*	2,953.75*	ZL2JO*	3,310

Note: Asterisk after a call means low-power multiplier was claimed. Asterisk after a score means low-power multiplier was claimed for one contest and not the other.

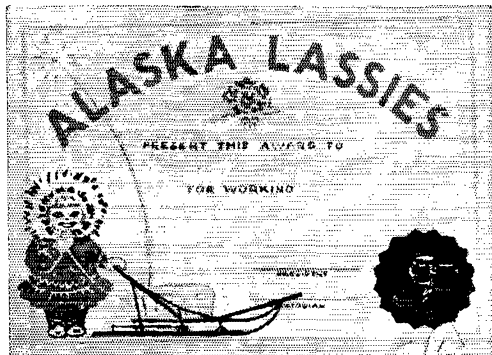
W4TVT, YLRL VP says I appreciated the good sportsmanship shown by the YLs who turned in scores when they knew they were way down. All round courtesy was noted. If some scores appear changed they are mostly for the better as some forgot to credit the DX and some added wrong. Some very good scores had to be deleted because they were postmarked after the deadline.



WA6OET, and her OM, Pete, as she received the Presidential Trophy of the ISSB. Jessie, is the first YL to become ISSB president.



The actual "birth" of the Alaska Lassies certificate at the home of KL7FJW. Left to right KL7FQQ, a non-licensed neighbor, KL7FJW, KL7GFU.



Alaska Lassies Certificate.

C.L.A.R.A. Net

The CLARA club has set up a net which meets every Tuesday with two time spots. The frequency is 14.160 MHz. There will be a morning net from 1300 to 1600 GMT, and an evening net from 2300 to 0200 GMT. Net control station will be VE3BII, Jan Burgess. Both YLs and OMs are invited to check in on both s.s.b. and c.w.

Meet the Club — The Alaska Lassies

When Betty Marsh, KL7JFW, earned her call in 1966, she started a YL-hunt for other KL7 women. So she checked her *Call Book*, wrote a lot of post-cards, and the result was a casual rag chew group of YLs meeting on 75 meters. They met to discuss the sort of thing with which we all are so familiar in our daily routine such as swapping salmon or moose recipes, cabin building, mukluk sewing, and floods.

For a while, the kaffee klatsch type of net continued, but then they decided to issue a certificate. Now, a certificate requires the signature of a presiding officer, so the Alaska Lassies became an official on-the-air club in 1968. That it be strictly on the air as a club was a necessity, for the 14 members were widely scattered. Six are in the Fairbanks area, two in Tanana, 135 miles west, two more in Anchorage, 200 miles south, two others are at Nondalton, 185 miles southwest of Anchorage, and two are located midway between Fairbanks and Anchorage, at Healy, and Lake Minchumina, Alaska. Really a far-flung group for one state.

The membership is made up of military wives, a miner's wife, homesteaders, teachers, pilots, missionaries, and a village chief's wife.

The net meets Mondays at 8:30 A.M., AST, and Wednesdays at 7:30 P.M., AST, on 3.866 MHz., and all YL amateurs are invited to participate.

The net certificate is a real souvenir of Alaska, with the State Flower, the Forget-me-not, the smiling little "Kuspuk Kid," with her calico kuspuk (a sort of Alaskan Mumuu) and mukluku. To acquire it, amateurs in the 49 States and Canada must submit log information of having worked five Alaska Lassies; DX amateurs submit log information of having worked three; and Alaska amateurs must submit log information of having worked seven of the members. The custodian is Rose Rybachek, KL7FQQ.

QST

Strays

Feedback

In the Field Day results (November QST), the score of the Binghamton Amateur Radio Assn., W2OW/2, was omitted. This group was in Class 5A and totaled 3673 points (ABC power, 15 operators, 502 contacts.) Sri, OMs.

.....

Robert Leo, whose article on impedance matching appeared in December QST, is now W7LR.

.....

A last-minute change in transistor types used in the Andrews' article on "Transistorized A.G.C. And Squelch Circuits" which appeared on page 40 of the December 1968 issue of QST results in a more-rapid switching time in the squelch circuit and hence a characteristic "pop" is heard when the squelch opens or closes.

.....

The current rating of silicon diode CR₁ in K6-KOL's t.r. switch in Hints & Kinks, January QST, should have been 500 ma. instead of 50 ma.

Strays



Here are photos of where some of the action took place during the International Jamboree-on-the-air, October 18-20, 1968. Left, is K2BFW, club station of the Boys' Life Radio Club which made over 250 contracts with Scouts throughout the world.



Right, W3RXP/3, Troop 90 of Blessed Sacrament parish, Washington, D.C., is shown. They contacted Scouts in 16 countries.

Mailing the Club Bulletin

(Continued from page 55)

the costs of the permit and mailing fee offsets any possible saving. Over 1100 you do save money. There will be an additional saving the second year and subsequent years because the \$15 permit cost is a one-time item. After the first year the savings would start if you mail 700 plus pieces a year.

Not qualifying for the non-profit category, your rate is 3.8¢ per piece which means that the first year break-even point would be about 2100 pieces per year.

The non-profit mailing permit is available to eight categories and these are: religious, educational, scientific, philanthropic, agricultural, labor, veterans and fraternal. You can qualify only if you are in one of these categories and a statement from the Internal Revenue Service that you qualify as a non-profit organization is not sufficient. Applicants must show in their By-Laws what the intent of the organization and if it is not shown there, your documentation must prove the point. Second-class mailing is very difficult to qualify for and it is doubtful that few, if any, club publications could qualify for this rate.

Free Information

There are a number of informational pamphlets available from the Post Office for the asking and these do supply a lot of basic information. These include:

Domestic Postage Rates (POD No. 3)

Mailing Permits (POD No. 13)

How to Prepare Second and Third Class Mailings (POD No. 21).

How to Address Mail (POD No. 28)

It is frequently possible to borrow a *National Zip Code Directory* rather than shelling out \$7.50 to purchase one. It is best to ZIP Code your mail inasmuch as distribution operations for outgoing mail is largely done by ZIP number now, and this is true whether it is distributed mechanically as is done in a few of the largest post offices or by hand as it is done in most of the offices.

In my own instance I mail a bulletin weekly, the *West Coast DX Bulletin*. Except for overseas subscribers and exchange copies, it goes in the mail Saturdays as first class and is regularly delivered throughout the United States Monday morning . . . every copy is ZIPped. The Post Office still moves a lot of mail a long distance and in a short time. No one will claim these days it is perfect but you can still get a lot of service for 6¢ . . . and possibly a lot more if you understand the regulations a little.

QST

**SWITCH
TO SAFETY!**





CONDUCTED BY BILL SMITH,* WB4HIP

What is "Communication?"

We have been communicating as amateurs for a good number of years, but no one has precisely defined what communication is, for purposes of awards and other recognition. Generally, a QSO has been accepted as authentic if complete calls, a signal report and confirmation of this information having been received is acknowledged by both stations. This, too, has been shortened, especially in contests. Some contests require only identification of the calls and confirmation. Accepting anything less should not be considered.

Meteor-scatter and weak-signal operators have established among themselves the requirement of an exchange of calls, signal report, usually consisting of one letter and one numeral, and a confirmation from both stations that the information was received. Such an exchange leaves no doubt. If there is a doubt, or if one has to use the telephone, a tape recorder, or another hand to confirm what he thinks he has received, then true communication cannot be said to have been established.

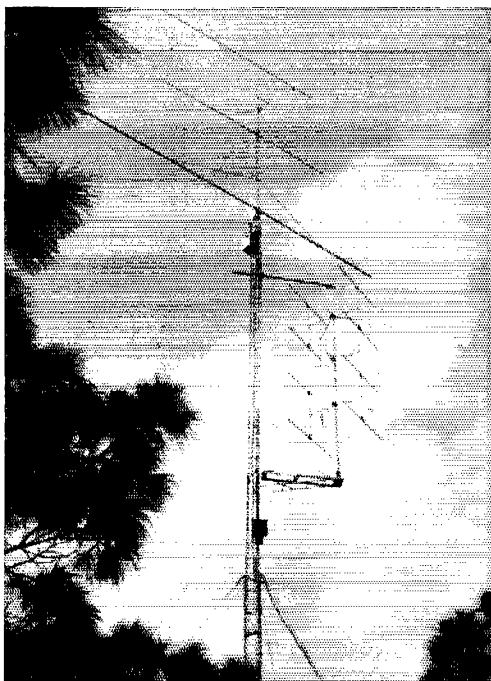
In some circles, an exchange of calls and confirmation has been accepted. I, personally, would accept this as an authentic two-way contact, but most v.h.f. DXers favor the longer exchange. The extent to which this "unwritten law" is policed is indeed a credit to the integrity of the v.h.f. DXer. In nearly two years of writing this column and sifting through some 4,000 reports, I have yet to encounter a contact I would consider an outright fraud. There have been questionable situations, but after investigation, these were attributed to over-zealousness, or a hoax not the fault of both operators.

Now we come to the point of this writing. In recent years there has been considerable work done developing weak-signal reception techniques. Some systems are capable of detecting signals that are below the audible threshold. Such a signal can not be copied by ear directly, but can be received if, through some special detection system, it keys an audio oscillator, or is displayed upon a scope or strip-chart recorder. The question is — can all, none, or some of these systems be employed for valid communication?

Working intently for several months, WB6IOM perfected a system which allows him to detect the presence of signals he has yet to hear. It is with this system, that on November 9, WB6IOM exchanged information of sorts with G3LTF.

The distance, 5492 miles, exceeds the existing W1BU — KH6UK record by approximately 400 miles. The information exchanged consists of a series of five-second dashes recorded on a strip-chart, Fig. 1. The operators used a code of two-second dashes until reception was established, and then the five-second dashes signifying reception. Both stations having received the five-second dashes is considered to be two-way confirmation. However, there is nothing to indicate an exchange of calls, a previously-accepted requirement. Visual means were not necessary for G3LTF to copy WB6IOM. The California signals were audible to the ear in England, rising several decibels over the noise level.

At this point, I wish to make extremely clear I do not question that Fig. 1 does indeed record the signal of G3LTF as received at WB6IOM. But I feel that we need identification to qualify this work as a new record.



Here is the antenna system at K4IXC. From top to bottom; 12-over-12 on 220, 30-foot 144-MHz. Yagi, eight 11-element Tilton Yagis on 432 and a 1296 horn. The boxes house the converters. (K4PDV photo)

*Send reports and correspondence to Bill Smith WB4HIP, ARRL, 225 Main St., Newington, Conn. 06111.

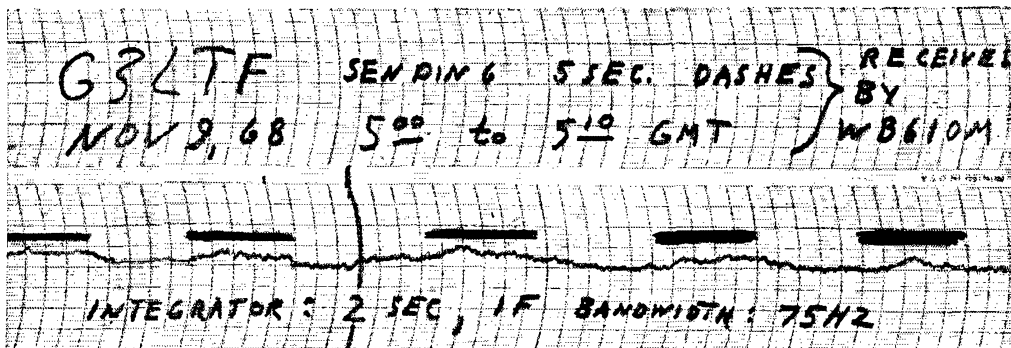


Fig. 1—Stripchart recording of G3LTF's 1296-MHz. moonbounce signal received at WB6IOM. The heavy horizontal bar outlines the 5-second reception periods. Nine such key-down dashes were received, five are shown here. Stripchart courtesy WB6IOM.

Everyone applauds WB6IOM and G3LTF for their fine work, and I have no doubt that they will move into the "records" box before long, just as I have no doubt that their DX, too, will be bettered. That is what's happening in the world above 50 MHz.

50 MHz. in the Pacific

Although stateside 50-MHz. DXers have been disappointed with the lack of *f-layer* propagation, conditions in the Pacific have been fairly good, as we learn from John Rice, KH6GHC. John and Bert Ingalls, K7DTH, are the operators of KH6EQF, Honolulu, Hawaii.

The KH6EQF 24-hour beacon was activated on 50.098, September 8. Only local Hawaiian stations were worked until September 28, when ZK1AA on Cook Island was contacted. Stu, ZK1AA, had heard the Hawaiian beacon every night from September 9th to the 27th. The next evening, KH6EQF worked KX6FX in the Marshall Islands, and ZK1AA again. On September 30, 50 MHz. opened between Hawaii and South America and KH6EQF worked LU3EX, CE3QG and CX7AG.

Six remained open to South America regularly throughout October. Contacts were made on October 1, 2, 3, 11, 15, 16, 17, 21, 23, 24, and 30 with CE3QG, OA4C, CX7AG, LU3EX, CX6BW, 4A3P (Mexico), ZP9AY and LU3DCA. On October 9 and 17, KX6FX was again contacted, and KH6EQF continued to hear the ZK1AA 51 MHz. beacon through the first two weeks of October. At times, ZK1AA's signal was audible using only an 18 inch piece of wire in the converter input! ZL3GA reported hearing KH6EQF's beacon from October 4th through 14th. And on October 12th, KH6NS caught a marginal opening to California, making two contacts.

The first opening in November came on the 2nd when PY2CSS and ZP9AY were contacted. On the third, the signals of LU3DCA, LU3EX and CX7AG were worked. The 4th found 50 MHz. open to the U.S. mainland for 28 minutes, beginning at 2255 GMT. KH6EQF worked 35 stations in California, three in Arizona and NE1s GE and PY, Mexico — 40 contacts in 28 minutes is certainly making the best possible use of an opening! The next day, two more Californians were worked, followed by CE3QG on the 6th. However, from November 7th until December 4th the band was quiet.

On December 4th, KH6EQF worked California and Arizona, and the same path was open on the 5th.

Last summer, W4ZXI sent 5W1AR a 50-MHz. transverter. Trivor, 5W1AR, sent W4ZXI this report on six-meter conditions in Samoa. On October 31, the KH6EQF beacon — beamed on the U.S. — was heard at 0731 GMT. In November, 5W1AR heard KH6EQF on the 5th, 6th and 24th. ZK1AA was heard by 5W1AR on November 20th, 23rd and 24th.

On December 2nd, 5W1AR received permission to transmit below 51 MHz. Trivor moved to 50.090 and on the 5th, worked KH6EQF.

KH6EQF lists the following as the equipment being used by 50 MHz. stations in the Pacific.

KH6EQF: SB-110, 8-element Yagi atop Diamond Head, 450 feet above sea level.

KH6GKL: 80 watts, s.s.b. and c.w.

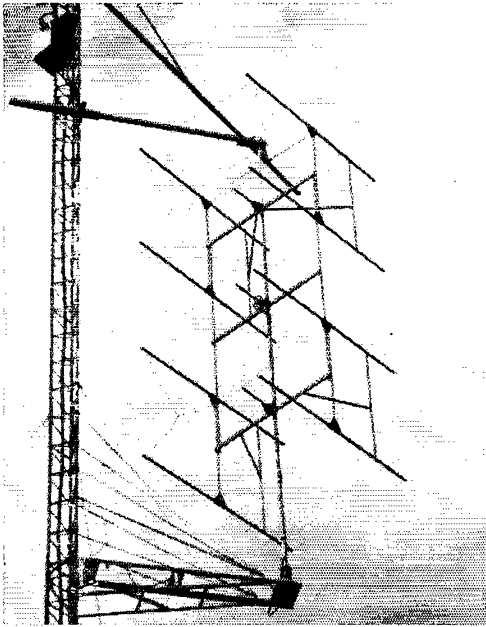
KH6NS: Swan 250, pair 4-400s, rhombic.

5W1AR: HT-37, HA-6, 4-element Yagi at 70 feet, prefers 50.090.

ZK1AA: 150 watts, 2-element Yagi, prefers 50.020.

220- and 420-MHz. STANDINGS

220 MHz.				420 MHz.			
WIHDQ...13	5	450	W3RUE...14	7	585		
K1JIX...11	4	600	W3UJC...9	4	400		
K1BFA...8	3	225	K3IUV...9	4	310		
K2CBA...17	5	1090	W4FJ...17	7	940		
W2SEU...12	5	325	K4QIF...14	6	1065		
K2RTH...11	3	300	K4EJQ...12	5	550		
K2DNR...10	3	300	K4NTD...8	3	835		
W2GRS...8	3	200	W4VHH...4	--	150		
W3UJG...14	5	460	W5RCL...19	6	880		
W3RUE...10	5	480	W5ORH...11	4	700		
K3IUV...10	4	310	W5AJG...7	3	1010		
K4IXC...3	2	1090	W5TKQ...6	2	590		
W5RCL...10	5	910	W5AWK...3	2	222		
W5AJG...3	2	1050	W6DQM...4	2	360		
W6WSQ...4	4	945	K7ICW...4	2	225		
K7ICW...4	2	250	W7JRG...2	2	420		
W7JRG...2	2	959	W8PT...13	7	715		
W8PT...11	6	660	W8MINT...13	7	600		
W8EYE...8	2	825	K8REG...12	6	625		
VE3AIB...7	4	450	K8JEO...12	6	150		
K1BFA...10	4	470	W8IVX...11	6	495		
W1QVF...10	5	400	W8ROL...10	6	425		
K1JIX...10	4	385	W8WFE...7	4	450		
WIHDQ...10	3	250	W8RVH...6	4	290		
K2ACQ...13	8	880	W9HUV...16	7	780		
K2UVH...13	6	718	W9AAG...12	4	610		
W2BLV...13	5	500	K9AAJ...12	5	425		
K2CBA...12	6	2670	W9A9KT...9	3	400		
W2CLL...12	6	693	W9JTY...8	4	400		
K2YCO...9	6	525	W0DRJ...17	5	1065		
W4ZEUS...9	4	260	W0EYK...6	2	425		
W2SEU...6	4	220	W0LCN...5	2	425		
			VE2HW...3	3	750		
			VE3EZC...7	5	510		
			VE3AIB...5	4	450		



This is K4IXC's 88-element 432 array. The horizontal arm extends six feet from the tower and is 60 feet above ground. There is a top bearing to prevent side-sway, and the array may be rotated a full 360 degrees. (K4PDV photo)

F2-Layer Christmas Present

The 50-MHz. band opened for the Northeast on Christmas morning. VE2AIO found HK3OK, Bogota, Columbia, in his stocking at 1458 GMT. Backscatter from K1IKN, W3KWH and W8GZ was heard from the direction of Ascension Island at this time. More backscatter came through the next morning, but no South American signals were heard. HK3OK came through on the normal great-circle heading. K1AGB, also worked him, at 1521 GMT, 50.101 MHz. c.w.

At 1555, KV4FU, Virgin Islands, heard W0PFP and W0EKB (central Iowa) in contact. He worked them, and K0SYI, Omaha, Neb., and WA9UQK, Sturgeon Bay, Wis., before the band faded out at 1632 GMT.

OVS and Operating News

50-MHz. F-layer DX slacked off during late 1968 and many six-meter DXers are of the opinion this spring is now or never. We note, however, there was F₂ DX as late as 1960, some three years after the 1957 peak of solar cycle 19. Honors for what may be the only U.S.-to-Africa six-meter contact of cycle 20 go to W2UTH and ZD8NK. The New York to Ascension Island path was covered on December 1st at 1515 GMT. The contact, made on c.w. and confirmed by QSL card, lasted until 1521 GMT, when signals disappeared. W2UTH also asks if anyone knows where to QSL VP2AC who was active on six meters New Year's Day 1968.

Pacific F₂ DX was reported December 5th when W6ABN heard the KH6EQF beacon from 1930 to 2015 GMT. W6ABN worked KH6GHC on the 4th, and heard W1ELP briefly on the 2nd. In the Virgin

Islands, KV4FU says he has heard no *f-layer* DX since the South Americans disappeared around December 1st. LU3DCA says he heard Hawaii throughout November, but nothing since. And there has been no *TE* from the southeastern states to South America since October 7th. This spring, however, should find 50 MHz. open once again to South America on *TE*.

The winter *Es* season has provided some interest, though. On November 17th, K6RNQ, W6DPD, WB6UYG and K7ICW worked XE1ANN, who also signs XE1OE and W8NRM. Other single-hop *Es* were reported by the same stations, and WA7GFP, during November.

During December, *Es* were noted on the 2nd between Florida and California, on the 6th from Florida north to New York and west to Indiana and the next night from Florida to Tennessee and Missouri. Also on the 7th, K4LFF, Florida, worked California and XE1PY. There were several spotty openings until the 21st, when six broke wide-open. WB4KUN, Florida, worked KV4FU, KP4DFH, plus a log page full of 2s, 3s, 8s, 9s, and 0s. Conditions were nearly as good on the 22nd, and on the 23rd, WB4BND, Miami, reported multi-hop *Es* to California.

On Christmas Eve, HI8XDS was again worked from southern Florida on *Es*. HI8XDS presently runs a 5894 on 50.103 a.m., but is building s.s.b. gear. Swaney says he has had trouble getting QSL cards printed, but will be sending out cards shortly. His address is James Swan, P.O. Box 1377, Santo Domingo, Dominican Republic. He will be active for at least one year and is a good operator.

144-MHz. meteor jockeys had varying degrees of success during the December Geminids. The Geminids, like the August Perseids, produce similar results year-to-year and is one of the more dependable meteor showers. At deadline time, here is my list of those making contacts.

K1HTV: W0LCN
 W2CRS: W5RCI, W0RLI
 K4IXC: W9VWY
 W0LER: W3LUL, W4WDH, WA4HGN, VE3BQN
 W0LCN: K1HTV
 W0RLI: W2CRS, VE3ASO
 K0MQS: W1JSM (New Hampshire)

Undoubtedly there were more contacts, but those are the ones reported. Here are some comments from around the circuit. K1HTV, Connecticut, who worked 30 states during 1968, says the Geminids peaked the evening of December 13th when he worked W0LCN, Minnesota. That contact was W0LCN's 27th state. W0LCN ran an unsuccessful schedule with K7VTM, Wyoming. K7VTM has only 50 watts output, but put numerous pings and short bursts into W0LCN's receiver. High power helps on meteor scatter, but the low power c.w. boys should give it a try. I have worked many stations on m.s. running 40 to 50 watts at the antenna. Florida's meteor-king, K4IXC, worked W9VWY, Illinois, on a solid 90-second burst December 14th, and had a near miss with W1VTU, Connecticut. W2CRS added states 27 and 28 to his list from New York by working W5RCI, Mississippi, and W0RLI, Minnesota. K4GL, who has some 30 years v.h.f. experience, had near misses with K1BKK, W8IDT and W9DID, and heard pings from K5TQP, New Mexico, and W0ENC, in the Sioux territory of South Dakota. Jack says he heard nearly all of his schedules, even the low power ones, better than they heard him. He says his antenna-mounted preamp helps much, but in this day of the inexpensive

transistor there is no excuse for poor converters. Jack suggests a simple diode noise generator in every shack. He checks the performance of his converters each day and quickly knows if something is wrong. That's good advice that Jack offers. Both editions of the ARRL *V.h.f. Manual* describe construction of a suitable noise generator. WØLER, Minnesota, agrees that the shower peaked the night of December 13th. No wonder, he worked W3LUL, Maryland, W4WDH, Georgia, and VE3BQN that night! And then added WA4HGN, Tennessee, on the 15th. WØLER noted a 35 to 40-second burst at 0541 GMT, December 13th. As the meteor moved across the United States from an easterly direction, he heard several stations all using 144.049! That bottom 100 kHz. sure is needlessly crowded.

While meteors provide most of the winter 144-MHz. DX, tropo can afford some surprises, especially in the southeastern states. One such opening came the evening of December 2nd along a stationary front over the Gulf states. That night W5DFM, Baton Rouge, worked W4WDH, Georgia, and W4UUF, Florida, with a 522 rig. Also in Louisiana, W5MCC worked stations from Texas to South Carolina, and W5JFB in New Orleans nailed down two contacts each in Alabama, Georgia, and Mississippi. John says even Heath Twoers were covering 400 to 500-mile paths with ease. K5EJP, also in New Orleans, worked into Florida on the 146.94 f.m. channel, and worked a handful of a.m. stations along the coast. In Georgia, K4HQI, worked the tropo DX from Louisiana to Florida with 20 watts a.m. and 16-element collinear. For several of the stations involved, this was their first taste of 144-MHz. DX.

If not by the time you read this, it will not be long before KØMQS in Iowa works ZL1AZR in New Zealand via the earth-moon-earth route. They nearly made the first U.S. to New Zealand 144 MHz. contact on November 28 having almost 100 percent copy both ways. KØMQS also copied ZL1AZR on their December 14th schedule.

220-MHz. is becoming more popular with the m.s. clan. K4INC ran a Geminid schedule with K1AGB, Mass., but received only pings and letter fragments. This, of course, was over a north-south path which didn't produce good results even on 144. The Geminids shower peaked on east-west circuits.



Well-known v.h.f. men all, here are (l. to r.) W3KWH, WØEYE, KØRJ and W5ORH. (K7NII photo)

2-METER STANDINGS

W1JSM	35	8	1400	W5MCC	25	8	1430
K1ABR	34	8	1478	K5PTK	17	5	1330
W1AZK	34	8	1412				
K1WHT	31	8	1300	W6GDO	17	4	1326
K1HTV	30	8	1310	W6WSQ	16	4	1390
K1WHS	29	8	1300	W6NLZ	12	5	2540
K1UGQ	29	8	1280	K8HM8	11	4	1258
K1BKX	28	7	1275	K8JYO	11	4	1240
W1EDQ	27	7	1040				
W1VTU	22	8	1296	W7JRG	27	6	1320
K1MTJ	20	7	1225	K7NII	24	5	1290
K1JLX	18	6	800	K7ICW	16	4	1246
K1RJH	17	7	1450				
				W8PT	41	9	1260
W2NLY	37	8	1390	W8IDT	31	8	1150
W2CXY	37	8	1360	W8IDU	27	8	1150
W2ORI	37	8	1320	W8TTU	24	8	1000
K2HLA	36	8	1305	K8ZES	22	8	675
W2BLV	36	8	1150	W8NOH	17	7	—
W2AZL	36	8	1380	WA8VHG	13	6	165
W2ZGK	33	8	1340				
K2RTH	31	8	1215	K9SGD	42	9	1300
W2CR8	26	8	1270	WA9DOT	41	9	1303
K2DNR	22	7	1200	K9UIF	41	9	1150
K2YCO	20	7	750	K9AAJ	40	9	1200
W2FNB	20	6	915	W9AAQ	37	9	1200
W2APX	19	6	1000	W9YFV	32	8	1050
				W9PBP	32	8	820
W3RUE	36	8	1100	W9IFA	32	8	—
W3KWH	35	8	1335				
W3GKP	32	8	1108	W6BFB	45	10	1350
K3MFA	35	8	1200	K9MOS	43	10	1590
W3BDP	31	8	1100	W3NXP	42	10	1326
K3OBU	21	7	930	W3DQY	41	9	1300
W3TIE	20	8	1310	WØLFE	38	9	1040
W3LHF	19	6	700	WØLER	36	9	1250
W3TFA	17	7	1342	WØEYE	35	9	1380
				WØEMC	33	9	1334
W4HJQ	39	9	1150	WØLGN	27	8	1000
W4WNI	38	9	1350	WØDRL	25	9	1295
W4HHK	38	9	1280				
K4EJQ	37	8	1125	F8DO	1	1	5100
K4INC	36	8	1403	KH8UK	2	2	2540
K4QB	35	8	1225	OH1NL	1	1	5850
W4CKB	34	8	1325				
W4FJ	34	8	1150	VE1AUC	7	2	500
W4VHH	33	8	1100	VE2HW	11	5	800
K4GL	31	8	—	VE2BGF	9	4	600
W4AWS	29	8	1350	VE2DPO	9	4	600
				VE3EZO	32	8	1283
W5TGO	42	10	1398	VE3AIB	29	8	1340
W5RCL	42	9	1289	VE3EYV	25	8	1100
K5WZX	36	10	1451	VE3BQN	25	7	1250
W5AJG	33	9	1361	VE3ASJ	21	7	850
W5TKQ	29	8	1151	VE7BQI	3	2	1248
W5LHV	27	10	1285				
K5TQP	27	7	1254	VK3ATN	3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised May, 1968.

A number of stations are looking for 220 m.s. schedules, including KIUGQ, to be active from Maine in the summer; W2CR8, New York; K4INC, Florida; K4GL, South Carolina with stacked Tilton Yagis; W5ORH, Oklahoma, who has a kw. and Yagi; W5RCI, Mississippi, with 600 watts and 13-element Yagi; K5TQP, New Mexico; W6WSQ; W7JRG, Montana; WØEYE, Colorado, and WØDRL, Kansas.

220-MHz. news is topped this month with the report of the first two-way duplex t.v.-to-t.v. video and sound contact. On November 8th, W9VRV, worked W9NAU, both Chicago. W9VRV operates on 444.5 MHz. video, 449 MHz. sound carriers.

There is a new second-call-area states worked leader. K2ACQ has just edged K2UYH for the top-spot honors. K2ACQ's 13th state was Maryland's W3UJG, worked on December 10th. K2ACQ says his biggest problem on 432 is keeping his 128-elements in the air.

Now these 432 notes. W1EIJ, Mass., has worked 9 states and has plans for a 250-watt final to be built this winter. K4INC has an 88-element Yagi array and worked his first DX December 2nd, a 375-mile hop to W4VHH in South Carolina, making use of that inversion reported in the 144 MHz. section of this column. K4INC welcomes schedules on 432 as does W5RCI. Rex is feeling the push on his number one nation-wide standing by W4FJ and WØDRL. K5TQP is aiming towards 432 with a varactor tripler. QST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

ARRL DX Contest time!

December's *QST* went into rules details (pp. 64-65) early enough to pass the word far and wide. WIAW and the League's trusty Official Bulletin Stations have further spread the invitation. Thousands of routine DX workers closed recent QSOs with "see you in the Test!" The more the merrier, to be sure.

Your 1969 shebang should be DXtraordinary for extra reasons. Historically, years ending in "9"—1939, '49 and '59—have always been record smashers. This relates directly to sunspot cycle status, naturally; we're now near the top of Old Sol's happy hill again.

FCC's new incentive-licensing subband allocations are certain to curtail over-all W/K point totals. If not, those revised regulations wouldn't be working properly in the first place. And this is really no new departure, just an updated version of old Class A, B and C days when the Class B-C 'phone gang missed out on 20 until they won Class A spurs. Current Generals should grow more determined than ever to light their study lamps and relegate bothersome 25-kHz. bandmarkers to the ashcan.

King Twenty will doubtless bear the brunt of activity as usual, but ARRL's new Five-Band DXCC should spread a heavier helping of action from 1.8 through 28 MHz. More than a few participants will have 5B-DXCC foremost in mind. Concentration on multipliers need not necessarily hurt one's score.

By the way, DX hounds hitting the 35th ARRL International DX Competition hard for 5B-DXCC purposes should note the latter's Rule 6 (p. 110, October '68 *QST*). "... No credits will be given for confirmations via DX contest or other logs." Better dig fast for those QSLs. Good fishin'!

What:

Class distinction on voice subbands is old stuff, but the modern c.w. application is abruptly new to most W/Ks. Non-Extras can still catch plenty of code DX in their allotted portions of 15 and 20 meters, but 40 and 80, where overseas stations hug the bottom edges, are very rough going indeed. Right now Generals can regain DX ground with daytime 28-MHz. attacks. A spin of the "How's" dial on

10 c.w. reveals **Ws** 3HMR 4YOK 7BE 8YGR, **Ks** 1HDO 8BCK **WAs** 1DJG 1FHU 2BHJ 3GVP 5PPZ 8MCQ 8MGD 8YXE, **IIs** DFE ER and **KP4DBJ** radiotelegraphing with **A2CAQ** (28,000 kHz.) 1800 GMT, **CEs** 1AD 16, 6EZ 17, **CRs** 4HB (104) 14, 6CK (40) 12, 6BT 7, 7BN (22) 15, **CTAs**, **CXs** 2CO 3BH 13, 4JK 19, 7BY, **DM2s** BRN (57), DEO (33), EA9AQ (56) 11-12, **ELs** 2BE 15, 5BA (37) 16-17, **ET3USA** 14, **FG7TG** 12, **GM3s** 8ZQ (60), **NO** (25), **GW3s** FSP (27), **SSK** (10), **HAs** 1SB 2RB (57), **HG2KRD** (35) of Hungary, **HH0DL** (50) 16, **HK3s** BAE (20) 19, **RQ** 14, **HP1XH9** 19, **HZ1AB** (25) 12, **JAs** 2PWS 11, 6AA,

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



W8BT/LX, also signing ON8VO/LX, was joined by ON4NM (right) in a Luxembourg lark last summer. Al and Jan concentrated mostly on 15 and 20 c.w.

JX2BH (26) 14, **K3GWA/KL7** 19-20, **KH6IJ** (10) 19, **KV4s** AMI 18, FZ 13, **LAs** 7Y (35), **OAD**, **LUs** 3EX 19, **SDQ** (100) 20, **8FBH** 14, **LXICW** (35) 16, **MP4s** BFO (26), **BGX** (32) 12, **OA4PF**, **OD5s** EJ 1X (76) 15, **OH0NM** (80) 13, **OY4R** (75) 17, **PJ2VD** 15, **PYs** 2BGL 2BBO 2SO 5BAZ 16, 6FI (44) 11, 7VNO 19, **SMICXE** (21), **SVOs** WN (30) 11, **WP** 11, **TF3MA**, **TG0CD** 18, **TJ1s** AL QO 15, **TL8GL** 13, **TU2BQ**, **UAs** 2KAC 08DX 12, 0BX 9-14, 0MX 11, **UD6s** HW 9, **KBO** 7, **UF6s** CR 14, **DM** 7, **UH8s** AE 12, **BX** (52) 10-11, **UI8BI** (44) 10, **UJ8A** 11, **UL7s** AJ 11, **FJ** 10, **JT** 11, **UM8s** ABC (50) 11-12, **AP** (50) 12, **UNIBR** 12, **UO2KCS**, **UR2Ms** (15), **UT5s** EH KCD (32), **KDP** (25), **UW9PI** 12, **UY5s** AG NY (17), a page of **VKs** including 6A1 6LU 6OV 7GK 13, 8FA 8HQ 12-13, **VO1JF** 20, **VP2VL** (60) 19, **VOs** 8CC (23) 12, **8CI** 7, **8CJ** 9, **9B**, **Vs** 6AA 8, 6FX 8-9, 9MB **VU2s** DKZ JA, **NE2AAG** (25) 19, **XW8s** BP (30) 12, **CS** (61) 7, **YO**: 2BS 2HV (34), 9CNC (43) 14-15, **VU3s** BB (58), **SX** (55), **ZD**: 5X (15) 12, **7DI** 8J (25) 19, **ZEs** 1DC 7, 3JO 11, 8JN (38) 8, 8JV 9, **ZLs** 1AJU (40) 20-21, **IDS** (30) 21, **2AUM** 11, **3GQ** 11, **ZSs** 1XR 2BZ 11, 2QW 15, 2WY (37) 17, 5DE 13, 6AL 6BEJ 6J (63) 11, 457DA (18) 13, **4UIITU** (30) 13, **5As** 1TY 17, 3TW (16) 11, **5R8AM** 11, **5Z4s** GF 8S 9, 6V8XX 15, **7Q7RM** (76) 11, **8RIJ** (50) 19, **9F3USA** (46) 17, **9G1FL**, **9H1s** AZ (24) 13, **BL** 9, 9JZs BC MX 9, **RA** (50) 15, **NZ** (23) and **9U5AC** among a vast assortment of more plentiful DJ-JK-DL F G HB 11 OK OZ SM SP UA-UV-UW and mainland-VK codehounds.

40c.w., continuing with our documentation of doings by the key-thumpers as promised, is replete with these observations by **Ws** IARR 3HNC 7BE 8YGR, **K4FCB**, **WAs** 1DJG 1FHU 2APG 3IYS 5SOX 8MCQ 8PVN, **WBs** 2DZ 4GTI and **WN3JRY**: **AP5HQ** 0, **BY1s** F PK, **COs** 2DZ 23, 2JC (7) 3, **3BU** (5) 10, **3CS** 5, **CT1s** GD 22, **HT** (4), **LN** 7, **DMs** 2ATD 2BOB 2BOG 2BTO 2CUL 3LOG 8XI 9ADL, **DUIAT** (17) 19, **EAs** 2DT 20-21, 4CR 22, **ELs** 9Q (3), 8BS, **Fs** 2MA (9) 0, 50A (2) 5, **STAl**, **FG7s** XC NX 23, **GD3TNS**, **G3XGI**, **GMs** 2HCZ 5AII, **HA5HC** (10), **HB9AGH**, **H3AMG** (5) 5, **HK3RQ**, **HP1XH9** 3, **IS1AEW** (10) 19, **ITIAGA** 0, **JAs** 1EUV (4) 1LZr/mm 1OHV 3GZN 3LWZ 4BVB/mm, **JH** 1EYB, **KH6s** EFV 8, G8Q (5), **KP4s** BCL (19), **CQ** 22, **IW** 1, **KV4s** DB FZ 3, **LA7Y** (8) 19, **LU5DON**, **LZs** 1H (4), **1KPG** (3) 1, **1KSA** (21) 2, **1KSK** (1), **2KSK** (4), **OA4ZS** (2) 11, **OEASZV** (19), **OH2s** AC AM, **OX3ZO** (7) 1-2, **PA9HO**, **PYs** 1DCG (5) 10, **1CYZ** 0, **2DRP** 23-0, **2NE** 1, **4AP** 21, **4ABL** 1, **4BNK** 23, **4BOC** 22, **6WF** 0-1, **7ANQ** 22, **7ARC** 23, **7AS** F(9) 0, **7AUU** 7AVE (35), **7QBQ** (17), **PZIDE** 0, **SPs** 6ALL 6KBE 6PWR 7CHP 8BAJ 8BUH 9DH 9PAO, **SVs** 1CD 21-22, **OWN** (8) 0, **TA2NF** (5) 22, **TF2TF** 0, **Ti2s** LA PZ (11), **TT8AQ**, **UAs** 2AC 9CZ 23, 0BK 0PY 22, **UR5s** LS RR (20), **ZE** (25), **UC2s** DU (8) 19, **KBK** (17), **IJ** (4), **UD6s** AD (5) 2-3, **AR**, **UF6s** CR (7) 23, **CX** (32) 0, **LB** 23, **UH8DC**

1, UJ8KAA 18, UL7s FH (3) 10, JI 22, UP2KNP, UO2PG (19), UR2KAA (20) 0, UTSs KH5 (17), QJ (16), UV9KAG 2, UW9JF, UY5s AD (1), XI, VKs (16), 2HK (10) 1, 2KM 2NS (5), 2VN (8), 3ANT (5), 3KS (8), 3QK (17), 3XB 4YP, 5KO 9CR, VP5 2PJ 3, 8JG (8) 3, VU2s JA LO OLK, XEs 1EK (5), 2JJA (5), 2JO 6, YOs 2AMU (17), 3AKF (17), 4CS 5AT (8) 3, 7EL (10), 7NA (1) 2-3, 8KGC (4), Ys 4UY (3) 1, 5ANT 4, 5AVJ 5AZG 22, ZDs 8J 8Z (5) 20, 9BE 0, ZLs 1ATW 7, 2ANX (10) 11, 2BCO (5) 9, 4BO (9) 6, ZP5s CE 23, GZ (5), 3A2EM 21, 4UITU, 4X4s NMU (17) 20-21, WN 21, 4Z4NH 20, 5As 1TY 2, 3TW 21, 5Z4KL 19, 6W8XX (15) 8, 8P6s AB AE (5), 9F3USA (15) 0, 9H1I 0, 9J2MX 4, 9K2BJ (25) 21, 9U5AC (23) 4, 9Y4TU and numerous DJ-DK-DL G OK UA-UV-UW YU friends, very few rising above the new U.S. Extra slot.

80 c.w. comes through for WISWX, K4IEX, WAs 1FHU and 8MCQ with such as DJ2BW/LX, DM8ROS 2, EA6AR, EIs 5BH 9J, Fs 3DM 5CT, GAsZY/CN, GCs 2FMV 3AET, G13SKH, GW3WVG, H5K7F, HK4ALE, JAs 1JWI 3KVO (5) 15, 9CLX (10) 15, 0DBy (10) 14-15, KH6GLU, KPACQC, KV4s AM FZ (10) 4-5, LAs 1H 3X 7Y, LZIKRD, OH0RJ (10) 23, OK2KBR, ON4UN, OYs 6PRA 5, 7ML (8) 23, OZ1LO, PAOs DC LOU, PJ2VD (25) 3, SP3KX, SMs 4CMG 6DLY, TF3SG 21, UAs 2KAW 6CQ 9GU 9KAZ 9ZB (45) 0, 0AG 1-2, KAA (5) 23, UP2s KBA KNP, UR2EK, UW9GU 2, UY5NH, VEOMD, VKs 2AGH 2CK 2NS 201 2QL 2VN (14) 11, 3ABR 3AKN 3APN 3HC 3IQ 3KF 3OP 3XB 5KO 7GK, VO1AW, VP9BQ 6, VS5DO 10, WIFZJ/KP4 (5) 3, YSIRT 5-8, YUs 1AG 3BU 5YU, YV5ANT, ZC4MO, ZD8J 5, ZLs 3GQ 4AV 4IE, 3A2CJ, 5WIAR, 9F3USA 20, 9Y4s KK and LA, the lion's share of this 3.5-MHz. booty from the log of WISWX up New Hampshire way.

160 strives to regain its DX equilibrium under new liberalized FCC frequency and power stipulations. The old DX-only grooves now are frequently cluttered with W/K chatter but the stuff is still there for talented and well-equipped cycle-slicers. W1BB, K1KSH and club literature recommend watching for top-band enthusiasts CXs 1UL 3BH, DJ7YR, DLs 3FF 9KRA, EI9BL, countless Gs, GD3TNS, G13s OQR, VNI, GM3s, FXM FPQ 1AA JNW TMK TNT UXM, GWs 3WDF 3WWN 3XJC 5TW, HB9YL, JA 1RQA 1RST 2CLI 3AA 7CQB, KH6GLU, KV4FZ, OE3ZJ, OH2KH, ON4WC, two dozen OK-OLs, PJOs CC MM, PYs 2BTH 3APL, VKs 3GU 5KO, VO1FB, VP5 2GBR 5AA 8KF, WIFZJ/KP4, XEOGEN and ZE3JO. . . . W1BB's 1.8-MHz. emanations, both r.f. and postal, are abated while Stew assists XYL W1DQF's recovery from heart difficulties. Let's keep the W1BB mailbox full of good wishes! Reminder: This month's 160-Meter DX Tests, detailed on page 95, November '68 QST, are scheduled for the 1st-2nd and 15th-16th, coinciding with the 35th International DX Competition of ARRL. Ready?

Early future "How's" pages will analyze DX goings-on among other bands with the prime assistance of

(10 phone) Ws 1EGM 2VOZ 3HNK 4UF 8YGR, K1HDO, WA8MCQ, WB2DZZ; (15 phone) Ws 2DY 3HNK 4UF 4YOK 8YGR, WAs 1IDP 2BHJ 9MIQI 9SQY 9URY, WB2DZZ; (15 c.w.) Ws 3HNK 3HNR 4YOK 7BE, K5MHG/6, WAs 1EGM 2DQE 2FOR 3GVP 3JRY 8VBY 8YXE 9SQY, WB2DZZ, WN9WLF; (20 phone) Ws 2DY 2VOZ 3HNK 4NJF 4UF 4YOK 8IBX/2 8YGR, K4TWJ, WAs 1FHU 1IDP 2BHJ 3HR 3IID 5PUQ 8MCQ 9TMT, WEs 2BCI 2DZZ 4GSS 6WLH/3; (20 c.w.) Ws 1VAH 2ICO 2KXK 3HNK 4YOK 6YKS 7BE 8IBX/2 8YGR, K4TWJ, WAs 1FHU 1GGN 1IDP 1JMR 2BHJ 3GVP 3HMR 3FRV 3IID 3JRY 3KOS 4GSS 4GTI 5PPZ 8MCQ 8VBY 8YXE 9MIQI 9NQY 9TFM; (40 phone) W8YGR; (75 phone) WA8MCQ; with other reporters to file. Always room aboard the "How's" Bandwagon—climb on!

Where:

HEREABOUTS—WAs 1EGM 8IBX/2 8YGR, WAs 2DQE 2HIU 3GCZ 3JRY 8VBY 8YXE 9SQY and 0KQO nominate your "QSLers of the Month" AP5HQ, C11HX, DLs 4FS 7NS, EA6BD, EL2AE, ET3UA, F5CV, FG7XX, GC5AET, HB9KC, HP1IE, K4PHY/YV5, KH6CQB, KL7MF, KP4BBN, KW4AA, OY1R, PZ1BL, SV1BN, PG9UZ, UP2KBC, VEOMD, VO1AW, VP7DL, W8IMZ/LX, YN1FF, ZB2AY, ZD8J, Zss 3D 6AJO, 5A4TE, 5H3JR, 6W8AL, 6Y5AD, 9G1GI and 9N1MM, plus QSL tenders Ws 2CTN 2NMN 3YI 4DQS, Ks 4RTA 9BWN and VE3IG, all commended for exceptionally prompt papyrus. Any laudables lurking on your list? Help! These italicized brethren need nudging toward QSLs from holdouts mentioned: W1ARR, EAOSP; W4TYE, ZC6AA; W0-DIAK, FP8CK '65; K7OJQ, KL7CDF; K8ANZ, FP8-AU '58, VPARS '59; WA3EFFI, AC5SQ, KS4CR, VQ9B and 9K2DX. Any 'ulp? W3ZUH affirms, "I'm 6Y5ET's QSL manager effective October 20, 1968." W2GHK & Co. began pushing PJ0MM pasteboards by December, Stu says, "With 5B-DXCC, DXpedition of the Month expects a large increase in requests for QSLs and is preparing to handle same." VE3EJU writes ARRL's WIARR, "Have logs and plenty of QSLs for the October contest operation of FG7TI/FS7." Bert acknowledges some confusion resulting from K9GCE and VE3EJU both helping Jose with mountainous QSL chores but 100-per-cent QSLing should result one way or the other. . . . "I'm in sympathy with WB4GTTI," says WA8VBY. "Shipping QSLs with postage and International Reply Coupons is a lot to swing, especially when you don't get answers. I'm averaging about 80 per cent so I'm not complaining, just wishing more QSLs would come through." "Please pass the word that YSIRFE's 1965-'66 logs are now on hand," cheers W2CTN. . . . W6GEB disclaims connection with K54 radiations bearing his label, and W8RB has no TA2 QSL arrangements. . . . "If anyone still needs my K2IVJ/VE8 cards I still hold logs and some QSLs," invites W1EGM. Ed adds that YN1FF, a Managua newcomer, is an avid collector of W/K QSLs. . . . WA8SLW and WB8ANV volunteer their services as QSL managers for DX stations in need. . . . "VR4EZ QSLs

3V8AA was an 8000-QSO production by F5OJ & Co., one of the DXpeditionary highlights of 1968. Astride a Tunisian resident in center, l. to r., are Fs 5HN 5QQ 2YZ and 5OJ. At right F5OJ milks a pile-up while F5QQ logs.



are now handled here," notifies W2CTN. "Logs on hand date from October 4, 1968." Jack also confirms his status as VK2BKM's Lord Howe island QSL aide.

A SLA—"Logs will be received from TA3AB at least every thirty days," says W5RBO, now handling that station's QSLs. "For direct return enclose self-addressed stamped envelope or IRCs. Other replies will go out via bureaus. In either case QSLing will be 100 per cent within two weeks of log receipt." "QSLs through the Laos bureau go very slow," notes K6IIPZ. "XW8BP's last batch of 500 included some cards a year in transit." Steve now handles Feng's QSLs with greater dispatch. Florida DX Club's *DX Report* observes that Box 5588, Bombay, and Box 53, Bangalore, serve as bureau addresses for QSLs to VU2 in those respective areas. W3HNK appraises, "EP2KB shut down in late November. I can confirm all his QSOs to the 26th of that month." WA4VWG takes on QSL chores for 4Z4BL as of November 1, 1968. "I'm also managing the cards of 4X4s DX UF and VB—s.a.s.e., please!"

AFRICA—GUTAL, schooling in Washington at this time, expects return to Niger early this month to resume DXing and QSL output. This via WIKE Long Island DX Association's *DX Bulletin* reports CR6GO busily attending to TR8AG's QSLing. Guy recently returned from France with a bride in tow W4YOK has it that F5DV may be a route to FR7ZS pasteboards. "9J2BK's logs are up to date and we now are modestly current with his activity," advises a year's end W2GHK DXpedition of the Month newsletter. "CN8s GE and HD remain active as the only current DotM stations in that country." "QSL manager W4NJF will have all my EL2AG logs as soon as I can get them to him," promises W4FHE who closed Liberian shop in December. "Guy will handle things for me during the next few months until I'm in a position to take over myself." "S.a.s.e. or s.a.e. plus IRCs, is a must," specifies WA8SLW, referring to WB8ANV's QSL work in behalf of ZS3NU. "Otherwise answers go in shipments via bureaus twice yearly."

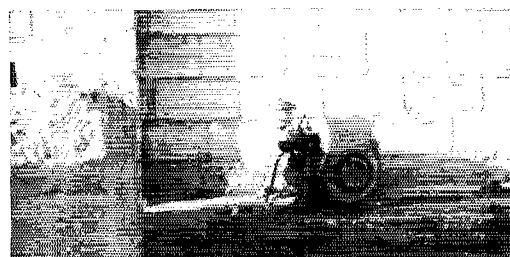
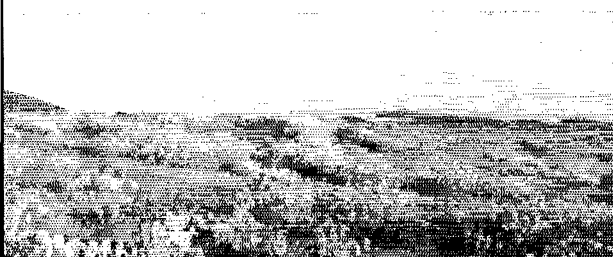
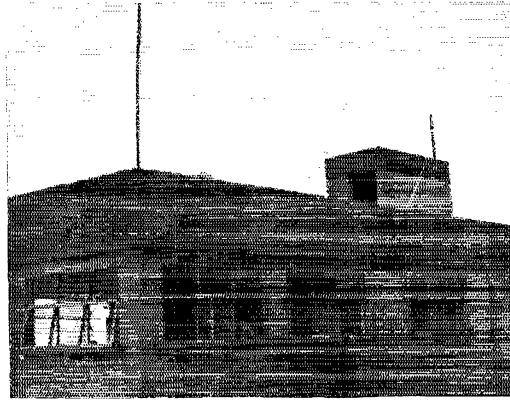
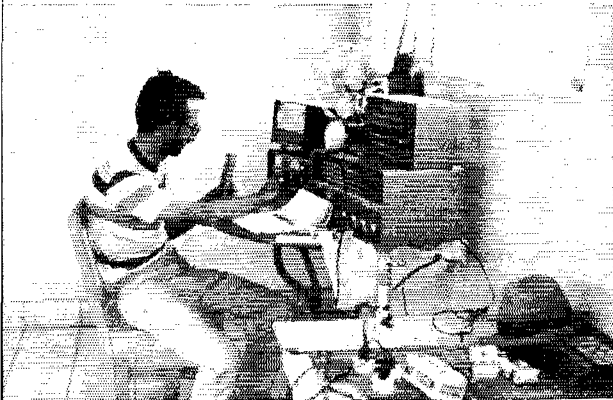
EUROPE—DL4FS (W8IMZ) communicates, "K1-DWQ/LX is now K1DWQ/5 at San Angelo, Texas, but QSLs for his Luxembourg operation should go to his Maine home address. W8IMZ/LX contacts with non-U.S.A. stations can be confirmed via DL4FS. DL4PAL, custodian of the DL4-DL5 QSL Bureau in Darmstadt, departs Germany for Vietnam. Yanks in Germany owe Pcte much thanks for the outstanding job he did handling our many cards. The new DL4-DL5 QSL Bureau QTH is Hq. StratCom, APO, New York, N.Y., 09056." "I have official word from LX1DC that there is no LX1RG," regrets F0CV (WA9FZQ) "S.a.s.e. would be appreciated," mentions WA4FIJ, welcoming QSLs for his late-'68 activity as SV0JJ, 3V8FIJ and 9H1AS G.

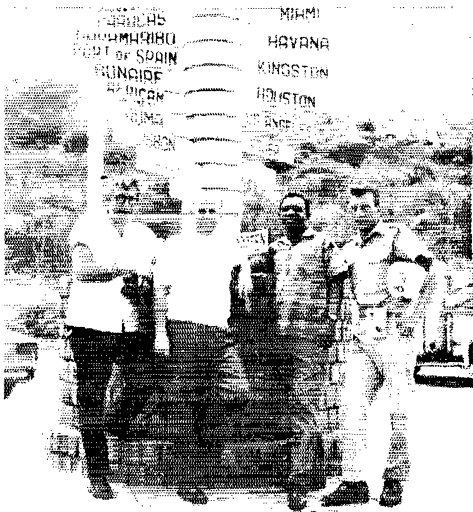
Watts's *DX News-Sheet* hears that Italian mainland hamus, all 1Is for so many years, may soon be signing 12 in the Milan bailiwick; 13, Venice; 14, Bologna; 15, Florence; 16, Bari; 17, Naples; 18, Reggio Calabria; 19, Piedmont; and 19 in Rome. 1Is will be specials, and island prefixes (1S1, 1T1, etc.) are unchanged. Apparently prefixes, like inactive hams, "always come back." Remember when 17 was Ethiopia? "Abundant thanks to the U crowd," offers WA3EFH. "Those Russians QSL for sure." W1SWX can say the same for Czech s.w.l. OK1-15803 whose request for Bob's 80-meter c.w. QSL came by registered mail.

SOUTH AMERICA—"CE0AE had a tremendous backlog of unanswered QSLs in November," comments WB2YSO. "Due to the volume they decided to reply via bureaus." Keep your local ARRL QSL Bureau branch well supplied with s.a.s.e., OMs QSL supermanager W2CTN announces, "CP3CN logs are now on hand from January, 1968." About this s.a.s.e. business—for direct reply, unless specifically waived, self-addressed envelopes with International Reply Coupons, or self-addressed stamped envelopes when appropriate, should be included in mailings to QSL managers. This is only fair when seeking postal response from anyone, for that matter. Remember, too, that U.S. stamps aren't mailable in Canada. K9CSM thinks we should also stress periodically that U.S.-issued IRCs shouldn't be inflicted on Stateside QSL managers. Here's a helping of individual recommendations found in this month's mailsack, but be mindful that each is necessarily neither "official," complete nor accurate.

- CM6HI**, Box 68, Cienfuegos, Cuba
- CO2S** **CN KC**, Box 6996, Havana, Cuba
- CR6GO**, P.O. Box 10408, Luanda, Angola
- CR8AI**, L.A. Rodrigues, Administracion do Porto de Dili, Dili, Portuguese Timor, via Lisbon, Portugal
- CT2AK**, P. Delgadas, Box 143, Sao Miguel, Azores
- DL5JO**, Special Forces Airborne Europe, APO, New York, N.Y., 09050
- EL2AE**, Box 98, Monrovia, Liberia
- FL8MB**, Box 49, Djibouti, Somalia
- GB3TDS**, c/o N. Peacock, 13 Correnden Rd., Tonbridge, Kent, England
- HC1FN**, Casilla 3208, Quito, Ecuador
- JX1OM**, c/o Norwegian Embassy, Reykjavik, Iceland
- JX3DH**, K. Sandvik, Jan Mayen, c/o Norwegian Embassy, Reykjavik, Iceland
- KV4FZ**, H. Schoenbohm, Box 310, Christiansted, St. Croix, V.I.
- LU9XM**, Puerto Deseado Zar 912, Puerto Deseado, S.C., Argentina
- OA2BA**, P.O. Box 572, Trujillo, Peru
- PJ1CU**, P.O. Box 659, Curacao, Netherlands Antilles
- PZ1DE**, P.O. Box 523, Paramaribo, Surinam
- TA3AB**, via R. Stone, W5RBO, P.O. Box 416, Anna, Texas, 75003

XE1PJL/XF4, XE1J's visit to the Revillagigedos last October, is pictured in these views of Socorro. That's Jose doing the operating in the island's weather station.





PJs 2CQ 9CQ 2CA and 2CB, left to right, meet under a DXish signpost in Curacao where PJ9CQ (WB4EHX) radiated several hundred QSOs in October. In another near-by DXpeditionary undertaking PJØMM exported 6320 St. Maarten contacts through the efforts of (l. to r.) W9ZRX (PJ5MN), Ks 9KIC 4MZU 9RHN, Ws 9ZTD and 9POK. (Photos via WB4EHX)

- TIZEVA, Apdo, 2817, San Jose, C.R.
 TIZFAU, c/o Francisco Fau Campmany, Lapuyade 11-1-D, Zaragoza, Spain
 TIIAU, P.O. Box 115, Ebolowa, Cameroon
 VK2s BPO/9 BRJ/9 (via W4WS)
 VK6US, Box 20, NavComSta, FPO, San Francisco, Calif., 96680
 VU2I W, A. Shanku, Box 5588, Bombay, India
 XE9GJR, J. Hendrix, Box 154, Tehuacan Puebla, Mexico
 YA1BC, Box 639, Kabul, Afghanistan
 YB3JM, J. MacIntyre, Dept. of Radio Telecommunications, Santo, New Hebrides
 YJ8RC, H. Graham, Vila, New Hebrides
 YN1FP, F. Parrott, jr., P.O. Box 82, Managua, Nicaragua
 YN9UDL, P.O. Box 25, Matatalpa, Nicuragun
 6W8XX, J. C. Dupin, B. P. 3013, Dakar, Senegal
 8QALK, P.O. Box 53, Bangalore 1, India (or to VU2-01K)
 9I2MG-9I4MG, S. Coosner, P.O. Box 1928, Kitwe, Zambia
 9K2CF, Box 12112, Kuwait
 9QSSN, B. P. 679, Kinshasa, R.C.
 9Y1OS, Sgt. L. Dieker, 249th Sig. Sqdn., c/o GPO, Singapore
- CP3CN (see text)
 CTHZ (via W3HANK)
 FCSRV (to F51RV)
 FG7TI/F57 (see text)
 FM7WV (to F3KKK)
 FY7YQ (via W4GQM1)
 GH2HQ (to RSGB)
 GB2SS (via G3XCS)
 GM3VS (via GM3W0J)
 HL9UD (to WA8HBL)
 JA4AS (via K6PIH)
 JX5CI (via NR1L)
 KA7CW (via K3YWJ)
 MP4BGW (via K9CSM1)
 MP4MBJ (to G3POA)
 MP4TCE (via RSGB)
 OK8AAE (to OE1WO)
 OMSUKV (via OK-CRC)
 OR4ES (via ON4VL)
 OX3JV (via SM7ACB)
 OX3UD (via W2CTN)
 PY0s OK OM (via PY2SO)
 SK2XA (via SM2COP)
 SK0AI (via 8M5COG)
 SV0JJ (to WA4FLD)
 SV0WN (to K3EUR)
 SV0WO (via W2CTN)
- TU2s AY AZ (via DL7FT)
 VE8AB (via VE8RX)
 YK2BKM/LH (via W2CTN)
 VP2GSM (to W4YHB)
 VP5 5RS 7CC (via W4GZD)
 VP8KH (via G3NMIH)
 VP8KL (via W431KK)
 VR2FS (to 9V1OS)
 VR4EZ (see text)
 VS5PH (via DL3RK)
 W0VXO/KV4 (to KV4FZ)
 XE1PLJ/XF4 (to XE1J)
 XE0DOT (to W0DOT)
 YK1AM (via YK1AA)
 Y5IRFE (see text)
 YY3MO/W4 (to KP4DCF)
 ZD8CC (via W4GZD)
 ZS3NU (via W8RANV)
 ex-ZS4MG (to 9Z2M)
 Z6BES (via DL9PU)
 4M4AJ (via YV4QG)
 4S7AS (via RSC)
 4Z4BL (via WA4VTG)
 5U7AL (see text)
 6Y5ET (via W3ZUID)
 8J1RL/mm (via JARL)

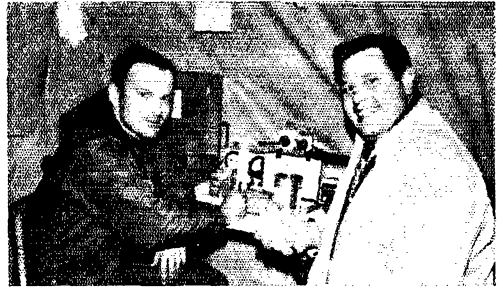
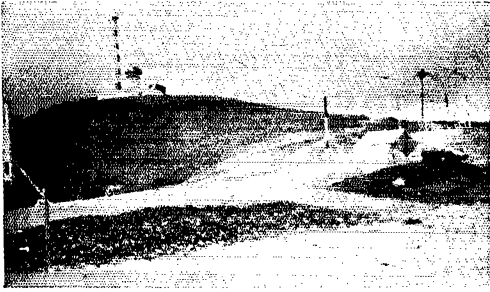
Club Bulletin (JA1DM), Long Island DX Association DX Bulletin (W2GKZ), Newark News Radio Club Bulletin (L. Waite, 39 Hannum St., Bullston Spa, N.Y., 12020), Northern California DX Club DX'er (Box 608, Menlo Park, Calif. 94025), Southern California DX Club Bulletin (WA6GLD), Utah DX Association Bulletin (W7LEB), VERON's DXpress (PAOs FX LOU TO VDV WWP) and West Coast DX Bulletin (WA6AUD). The parenthesis *into it* in this credit list may be used when directing inquiries concerning the periodicals mentioned. Some of these organizations welcome memberships, associate memberships and subscriptions from all comers; others publish on a circumscribed full-members-only basis.

Whence:

OCEANIA—"During the first c.w. portion of the ARRL DX Contest W6BPO and I will operate from Nortlok island as VK2s BPO/9 and BRJ/9," warns W4WS. "On the final c.w. week end we will work from Coocs-Keeling, same calls. Watch 7005, 14,025, 21,025 and 28,025 kHz." . . . CR8AI writes ARRL's W1JMY, "I work 15 meters daily, 1200-1700 GMT, running 240 watts of single-sideband on 21,180-21,300 kHz., or 60 watts with carrier on 21,300-21,450 kHz. On Saturdays and Sundays I also operate at 2200-0100 GMT." Neighbor CR8AH appears on 15 s.s.b. around 0900, according to FOCV . . . As if you haven't heard, it's now okay for FCC-licensed amateurs to communicate with Indonesian stations. DXers who regularly monitor W1AW bulletins were among the first in the know. ARRL Assistant General Manager WILKE, persistently hacking away at red tape surrounding the International Telecommunications Union Ban List, indicates that further progress on removals will be even more complex and difficult. As things stand at this writing, W/K QSOs with Cambodia, Thailand and Vietnam are prohibited; VE/VOs are forbidden to contact those countries plus Laos and Jordan . . . KH6BZF, in correspondence with W1CW of the ARRL DXCC Desk, says he keeps his KWM-2A, 30L-1, TD-1 and 18AVQ ready for business trips to rarish Pacific islands, especially Midway and Kure. The latter, however, is operationally inaccessible to civilians at present. Bob also hears that KH6GLU (KP6AP-VR3DY) intends to sign an FW8 call during the opening week and code ARRL DX Test week ends . . . Oceaniagrams thanks to after-mentioned literature of clubs and groups: After their DXtensive VRIP stay, VE6s AJT and APV struck out for other Pacific points. . . ZLs 1DS 11L ITU and 2AFZ intended multiband Chathams chatter through January. . . Ex-KR6UD now sigas KH6GQW. . . VS5PH (DL6PH) likes 14,112, 21,112 and 21,397 kHz. at 1000-1700 GMT.

ASIA—"KA7CW is back on the air near Fukuoka, A Kyushu," declares K3YWJ who mans the installation with five fellow radio buffs. "We're usually just below 14,250 kHz. for W/Ks at 0900-1200 GMT. Watch 14,205 kHz. for HL9 VR2 VS5 VS6 and 9M2 contacts, and we hear many rare Russians—U18s, U18s, etc.—around 29,570 kHz." . . . HL9UD (WA8HBL) pens, "After ten months in Korea I'm finally on the air

These arrived through the generous efforts of Ws 1ARR 1EGM 11KE 1JMY 1SWX 1UED 2CTN 2VOZ 3HM1R 4YOK 5IBX/2, Ws 3GVP 3JRY 7KPH/mm 8SLW 8YXE 9FZQ 9SQY, DL4FS, FOCV, Canadian DX Association Long Skip (VE3HJ), Columbus Amateur Radio Association CARAscope (W8ZCQ), DARC's DX-MB (DL3RK), DA News-Sheet (G. Watts, 62 Belmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) News (KA2LL), Florida DX Club DX Report (W4BRB), International Short Wave League Monitor (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio



PX1BW, the handiwork of KØBWN-DL5NJ and WAØQLH-DL4JA, left and right, added many Andorra DXCC credits to last October's DXpeditionary excitement. (Photos via W2GHK, DXpedition of the Month)

with an HW-100 on sideband and c.w., 15 through 40 meters, using a multiband dipole. A 14-MHz. quad is in prospect. My HL9 license, issued months ago, apparently got lost in the local mail. A visit to the U.S. Forces Korea signal officer promptly produced a duplicate ticket. My tour of duty ends in March and I'll be glad to return to college. I actually miss all that W/K QRMI! VU2CK tells K4JC of an interesting propagation incident during September's solar eclipse. "VU2BX, located about seven miles north of me, was stronger when I beamed away from him. Long-path DX with a local?" K4JC suspects back-scatter "W3KVQ tells me that 9N1MM is in the States because of family illness," relays W8YGR "Just shipped a 15-lb. batch of unneeded radio mags and manuals to the Turkey Amateur Radio Society per a recent blurb in your column," reports W5QPX. Brotherly move, OM WB6UJO has been sampling the DX end on recent visits to CR9AK, VS6AZ and 9M2NF.

AFRICA—"ZD9BE remains active on 10, 15 and 20 meters with a Swan transceiver but will be leaving Tristan this spring," goes a W2GHK release. "It is anticipated that his replacement will have access to the same equipment." W5QPX remarks, "Recent letters from a prospective Ghana ham indicate that 9G1 licensing is at a standstill." Quite temporarily, we trust WA9FZQ had to become FOCV to catch up with elusive EA9AQ on 21,270-kHz. sideband at 1130 GMT FB8XX may radiate s.s.b. this month with HB8TL's well-traveled loaner rig FR7ZR/g, though hampered by sporadic power source, managed a couple of Gloriosos kiloQSOs in November W4FHE, lately EL2AG, remarks, "Had a pleasant stay in Liberia but I'll be very glad to be back in the States. With some hard work and study I hope to be eligible to work all frequencies as an ex-General."

EUROPE—Observations from bleak Jan Mayen courtesy JX3DH: "Seven JXs are licensed here at the moment, four more expecting tickets soon, so activity is high. The island's total population is only 36. Olonkin 'city', my QTH, is badly shielded to the west toward U.S.A. by a mountain. At Whalerus bay, west of this mountain, we do much better with W/Ks. I usually work Stateside transmitting on 14,198 kHz, and listening at 14,202. Canadians and others get their chance on 14,170 kHz. My c.w. frequency is often 14,020 kHz. I use only a 20-meter vertical but beams are planned, as well as 15-meter work." WA9SQY understandably admires G3HDA's potent 75-meter ground-plane and 40-meter vertical dipole OK2PBM provides WB2BCI with an interesting list of c.w.-phone abbreviations in the Czech lingo. Anyone inclined might try s.a.s.e. to Marty W. Geddes, an official at London's famed Science Museum, says GB2SM's new RTTY gear is ready for skeds on 80 through 10 meters at 1030-1100 and 1500-1530 GMT, Monday through Friday. "It may be possible for us to operate sometimes during week ends and evenings as well." "LX1SL was very helpful in coordinating arrangements for our recent operation as K1DWQ/LX and W8FMZ/LX," acknowledges DL4FS. "Everyone from the Luxembourg radio license office to the owners of our quarters showed wonderful hospitality." DL9RE, chairman of DARC's Frankfurt branch, tells DL4FS his club soon will offer a unique diploma for certificate hunters. Consult Carl for details W2CTN points out that SV0VO is former YSIRFE. SV0JJ (WA4FIJ) opines, "Except for 10 meters, band conditions in Greece have been abominable for Stateside contacts while just great for rare DX. WAS, not DXCC, is the tough goal here."

..... Chris of CT2AT expects a year's Azores sojourn REF's 1968 French Contest drew 264 c.w. and 72 phone non-French entries, up from the previous year's 222-52 input. Among 28 U.S. code candidates Ws ITS 2ZV 3BYX 4HOS, WA5PIF, Ws 6M8M 7YBX, WA8TYP, W9JQD and WAOKDI led their call areas; Ks 1YDP 2PJV, Ws 3BYX 4ZNI and K9UCR did the same among ten voice entrants. Up Canada way VEs 1AE 2NV and 7HJ paced their areas on c.w., VEs 2AFC and 3BMB on phone. French leaders were Es 9LX 8HJ and 8OP in that c.w. sequence, Es 3KW 9WV and 9XP on mikes. In other REF regions FO8AA and TU2RK took code honors. FO8BS and 6W8DY phone plaudits. C.w. country kingspin include CR7IZ, CT1OI, DJ6QL, EA2HR, G3BSP, HA8UF, HPIAC, IBLF, JA2CUS, LA9IC, LZ2RF, OE3AX, OH2BAC, OK2QX, OZ1LO, PA0JR, SM5BNX, SP9AQY, UAs 2DM 9BZ, UW6BK, UB5HS, UC2WP, UD6KAB, UJ8AB, UP2BU, UQ2GW, UR2FU, VE2NV, VK8UG, W9JQD, YO3CR, YU1SF, ZD8HAL and 4U1TU. Phone toppers: CE3NL, CT1LN, DJ6QL, EA2HX, G3RAA, I1PHN, JA8ADQ, K2JFV, LA3RJ, OA4JR, OH2TS, OK1AHZ, OZ1LO, PY4KL, SM7CSN, SP5CLK, TG8AI, UAs 1CK 2KBD, UB5WF, UC2DR, UP2CV, UR2KBB, VE2AFC, YO4KCE, YU1IOP and 4U1TU. Announcement of this year's French Test reached us too late for last month's c.w. section but you can still catch the phone half on the 22nd-23rd of this month under last year's rules (p. 92, January '68 QST). Publications can take little for granted in announcing such activities, for East Germany's society canceled its scheduled 1968 WADAM contest on short notice.

HEREABOUTS—YN4s JAB EB YB and DAH, dad, H mom and two daughters, are a lively ham family down Puerto Isabel way. Jim, a Nicaragua customs officer, dropped in on W5QPX in September. The latter writes, "No c.w. is required for YN tickets but YN4AB is learning the art from tapes I've sent him. He's QRS now but coming along in good shape." "Just returned to 1X after a ten-year lapse," comments W1EGM, formerly K2IVJ/VE8 at Frobisher bay. "As the hunter rather than the hunted, I can work more good stuff from Connecticut than I could from Balin island." Ed's VEs kilowatt accounted for 2500 contacts with 68 countries. Another Balin graduate heard from this month is W8VQM/VE8 "PJ5-MI-FG7TI plans to activate French ST. Martin more frequently," cheers VE3EUU via WIARR. "Jose and a friend intend to erect an F57 hamshack and permanent antenna. There being no licensing authority in FST-land, permits are issued from Guadeloupe. Hence the FG7TI/F57 call; FG7XT/F57 has the only other." "Every time the local power company clears up one noise source, along comes another," complains W8YGR. "The latest is a tremendous frying noise originating about a mile away." W9HUZ submits a switch on our little "DXCC-square" game, a photo of QSLs from ARRL members in 100 countries as so indicated on their cards W4YHB, ex-W9GSM, is having another go at Grenada as VP2GSM The annual W2 DX Round-up comes off March 22nd at Newark, N.J., with a powerful program pending. Check with W2LA for attendance details without delay "The pattern of DX station frequency usage appears unchanged," observes W8-1BX-2, referring to new FCC sub-subband allocations. Kurt wonders why 20-meter c.w. folk are expected to work harder than phone chaps for full respective privileges on our No. 1 DX band "Finally got back to 28 MHz, after an eight-year absence," exclaims W3HNK, picking up a nice collection of side-

band stuff. "CX2AAJ looks for California phone relays on 28,700 kHz. nightly at 2300 GMT." PY1s OK and OM were behind that Abroholis thing as PYOs OK and OM CE3ZN and friends think about more San Felix fun, while WA6AHF talks up a summertime Serrana bank swing "I'll be signing XE0GEN on both c.w. week ends of the ARRL Test." assures W6GEN, "using a two-element quad, a 70-ft. crank-up tower, dipoles for 40, 80 and 160, and a kilowatt. Watch for me on 160 each of the four mornings at 1100 GMT on 1998 kHz., tuning both ends of the band." **QST**

ARPSC

(Continued from page 59)

RN7	56	350	.289	5.8	42.
8RN	60	504	.350	8.5	88.3
9RN	60	662	.564	11.3	94.6
TEN	60	676	.703	11.3	82.5
ECN	59	148	.184	2.5	68.9
TWN	57	292	.253	4.9	66.7
Sections ¹	1886	12,223		6.5	
TCC Eastern	120 ²	703			
TCC Central	90 ²	563			
TCC Pacific	120 ²	783			
Summary	2686	24,763	EAN	12.1	—
Record	3211	30,541	1.315	16.4	

¹ Section and local nets reporting (60); GSN, GTN (Ga.); KTN, FCATN, KRN, KYN (Ky.); PTN (Me.); CN, CPN (Conn.); VEN, FMTN, WFPN, FPTN, GN (Fla.); NMRTN (N.M.); ILN (Ill.); WSN (Wash.); PVTEN, NJEPTN (N.J.); HNN (Colo.); WSBN, WIN (Wisc.); BUN (Utah); TEX, TTN (Tex.); NCNE, NCNL, THEN (N.C.); QIN (Ind.); MDDS, MDCTN (Md.-D.C.-Del.); BN, OSN, OSSB (Ohio); OZK (Ark.); NYS (N.Y.); WSSB, QMN (Mich.); VSBN, VN (Va.); LAN (La.); MNN (Mo.); EPA, PFN, EPAEPTN, PTN (Pa.); MSN, MJN (Minn.); AENB, AEND, AENH, AENM, AENO, AENR, AENT (Ala.); RISPAN (R.I.); WMIN (Mass.); NCN, SNCN (Cal.); GBN (Ont.)

² TCC functions, not counted as net sessions.

W1EFW reports that East Mass. attendance of the late net is holding IRN down. Region Net certificates have been issued to W3Zs AMV and OCA by 2RN Manager W2FR. W8VDA/6 has been appointed by WA6ROF as assistant in charge of arranging APO/FPO and PAC liaison assignments. W7BQ says traffic loads have been light on all nets, W8CHT (and several others) report aurora making some sessions rough. W8LGG has issued TEN certificates to W0s CGZ OMC, W40s HWR QXG and VE4FQ. K2KIR thinks TCC representation should be figured along with region representation. WA9RAK was impressed with quick NCS reporting during November; however, now he expects it all the time. "Yuk," says W6VNW.

Transcontinental Corps. W3EML says November wasn't one of Eastern's better months with percentages of successful functions down, mostly because of erratic conditions. W7DZX reports that a misunderstanding on the frequency of the Station J schedules has been straightened out and the schedules are now working out okay.

November reports:

Area	Func-tions	% Suc-cessful	Traffic	Out-of-Net Traffic
Eastern	120	90.0	1911	703
Central	90	95.6	1168	563
Pacific	120	90.8	1566	783
Summary	330	91.8	4645	2049

The TCC roster: Eastern Area (W3EML, Dir.) — W1s BJG EPW EMG EOB NJM, W2s FR GKZ MTA PU, K2RYH, W4s BHN BLV CAL UWA, WB2RKK, W3-EML, K3MVO, W4s NLC UQ ZM, K4KNP, W8s ARZ IXJ UM, K8KMQ, W4As POS ZGC. Central Area (W8LCX, Dir.) — W4OQG, K4AT, WB4IN/4, W5KRX, W9s CXY DND, W4As RAK VZM, W0s INH LCX QQQ, K8AEM, W4As DOU IAW MLE SDC. Pacific Area (W7DZX, Dir.) — W0s BGF BN X EOT IPC IPW EMS VNQ VZT, W4As BRG LFA ROF, W7s KZ ZIW, K7HLR, WA7CLF, VE7ZK.

Independent Net Reports:

Net	Sessions	Check-ins	Traffic
North American SSB	26	545	327
North Eastern Traffic	30	320	540
Clearing House	30	495	399
ISSB 20 Meter	21	421	7294
7290	38	1773	1353
Mike Farad	26	462	462
75 Meter ISSB	30	1159	505
QTC	21	290	130
Hit & Bounce	30	368	593

T-Notch Filter for the HBR

(Continued from page 28)

provides a range from approximately 50 to 100 volts. The nominal 75-volt setting described earlier will provide excellent performance. However, for those hard-to-please guys the notch circuit performance can be altered to fit each individual's requirements simply by varying the applied screen potential. Alignment of the bridged-T network should be checked each time the screen voltage is changed, and alignment of the entire i.f. amplifier should be checked any time the screen voltage is changed by more than 10 volts. Usually only a very slight touch-up will be required to make the alignment perfect.

Some typical curves showing receiver passband shapes at various settings of the notch network are given in Figs. 6 and 7. Use of the T-notch circuit on the air has demonstrated its ability to notch out most closely-adjacent QRM, and to attenuate even S9-plus interference to a tolerable level. A glance at Fig. 8, which are plots of actual laboratory measurements, gives some idea of what is possible. With an interfering signal located 1.1 kHz. from the desired signal, well down on the passband skirt, tuning the rejection notch to the interfering frequency will give 20 db. of rejection. With an interfering signal located 0.3 kHz. from the desired signal, both being very close to the normal peak passband response, tuning the rejection notch to the interfering frequency will give 40 db. of rejection. A little practice in manipulating the notch, the main tuning dial, and the b.f.o. pitch will soon provide the HBR owner with the ability to separate signals which are very nearly on the same frequency. When combined in an HBR-13 with W8SX's selectoroid circuit, the T-notch will give sensitivity and selectivity capabilities which are equalled by very few receivers, either commercial or home-brew.

Acknowledgements

Mention must be made of Alex Stewart, K4FX, whose idea this was in the first place, as well as Ted Crosby, W6TC, who suggested the extra 6BJ6 stage as well as the several coupling methods which were tried. Both of these amateurs devoted considerable time and effort to discussions and experiments which made possible the circuit just described. **QST**



Operating News



GEORGE HART, WINJM, Communications Manager

ELLEN WHITE, WIYYM, Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE

Contests: ROBERT HILL, WIARR

DXCC: ROBERT L. WHITE, WICW

Training Aids: GERALD PINARD

Here Comes the DX Contest. What DX Contest? You mean there's more than one? Well, we learn something new every day. We're talking about the one which turns the low ends of the DX bands (all six of 'em) into bedlam during four weekends of each year — two in February and two in March. The one in which W's and VE's (oops, we didn't mean to omit the K's, WA's and WB's!) work amateurs in the rest of the world, a process which results in some really colossal pile-ups on a rare DX station's frequency.

The increasing popularity of DX operating in recent years leads to some speculation as to why this would be so. What's so great about it? In the old days, when amateur radio was comparatively new, the glamor of conversing, or even being heard in far-away places, was a natural attraction; the aim of nearly every amateur was to "see how far he could get" with his home-made gear. Today, the attraction has shifted to a strictly competitive one, to see how many rare ones or how many different "countries" can be worked so that a piece of qualifying colored paper can be applied for and received that attests your operating skill and the efficiency of your equipment, or so that you can be listed among the elite in this particular operating field.

An avid (but not very detailed) search of the records shows that the first DX Contest writeup

appeared in *QST* for May, 1934, but referred to DX Contests prior to that time. The writeup is very vague about these, however, and doesn't even give the dates of the contest it is talking about. So let's say that ARRL started sponsoring its annual DX Contest in the early 30's. As interest in DX increased, partially through the monthly discussion in *WIJPE's* (now *WIDX*) "How's DX?" column, a need for a regular award became evident, and in Nov. 1937 *QST* there was announced the DX Century Club Award, with five amateurs qualifying — W8CRA, W1BUX, W1TW, W6CXW and G6WY. Since then, DXCC has become a by-word in DX operating; you can't talk about it without mentioning DXCC.

In the annual DX Contest, only a few of the "big boys" are out to win. The rest of the competitors have other motives, and as often as not principal among these is simply to add to their list of "countries" toward DXCC. The contest is an ideal time to do this, and thousands of ordinary amateurs running moderate power take advantage of the opportunity.

DXCC started out as a minor part-time activity of one staff member. As time passed it became more than minor until finally it was a major part of one man, then a principal part, and finally his exclusive job. Recently it became a two-man job, and with the Five-Band DXCC in the works it

OPERATING EVENTS (Dates in GMT) ARRL-IARU-SCM-Affiliated Club-Operating Events

February	March	April
1-2 DX Competition, phone (p. 64, Dec. <i>QST</i>).	1-2 DX Competition, phone (p. 64, Dec. <i>QST</i>).	2 Qualifying Run, W6OWP
1-16 Novice Roundup (p. 67, Jan. <i>QST</i>).	1-16 IARC Propagation Research Competition; c.w., RTTY (p. 66, this issue).	10 Qualifying Run, W1AW
5 Qualifying Run, W6OWP	6 Qualifying Run, W6OWP	12-14 CD Party (c.w.)*
7-9 QCWA QSO Party (p. 83, Dec. <i>QST</i>).	8-9 YL/OM Contest, c.w. (p. 97, Dec. <i>QST</i>).	19-21 CD Party (phone)*
8 FMT (p. 95, Jan. <i>QST</i>).	12 Qualifying Run, W1AW	*League Officials and Communications Dept. appointees, only.
8-9 Arizona QSO Party (p. 112, Jan. <i>QST</i>).	15-16 DX Competition, c.w. (p. 64, Dec. <i>QST</i>).	June 14-15 VHF QSO Party
Vermont QSO Party (p. 103, Jan. <i>QST</i>).	15-17 B.A.R.T.G. Spring RTTY Contest	28-29 Field Day
11 Qualifying Run, W1AW	29-30 West Virginia QSO Party (p. 108, this issue).	Sept. 13-14 VHF QSO Party
15-16 DX Competition, c.w. (p. 64, Dec. <i>QST</i>).	29-April 13 IARC Propagation Research Competition; phone (p. 66, this issue).	Nov. 8-9 SS, phone
22-23 YL/OM Contest, phone (p. 97, Dec. <i>QST</i>).		15-16 SS, c.w.

NOTE: Possible W6OWP Qualifying Run "alternate" (same times and frequencies) is W6ZRJ.

For the first time, the S.E. ARRL Division (Atlanta, Sept. 14, 1968) had a League Official meeting, with 100% of the Division LOs present. Seated, L-R, **W4HYW** past Dir., **K4SJK** Vice Dir., **W4IYT** SEC E. Fla., **WA4WQU** SEC Ga., **W4EPI** SEC Ala., **W4EEE** Asst. Dir. Back row, L-R, **W4LVV** Dir., **W4ILE** RM E. Fla., **W4YE** Asst. Dir., **W4RZL** SCM Ga., **K4WHW** SCM Ala., **W4RKH** SCM W. Fla., **WA4NEV** Acting SCM E. Fla. and **WB4EPI** Pres. Atlanta Radio Club. Also present and taking the photo was W. Fla. SEC **W4IKB**.



could become even more than that.

In any case, it seems to us that with the upcoming DX Contest and an opportunity for all interested to add to their countries toward DXCC, the criteria for DXCC should be repeated. You will find them elsewhere in this section of *QST*. Please read them carefully and abide by them to make the issuance of the coveted DXCC award as smooth an operation as possible.

Staff Notes. Mentioned above is the fact that DXCC is now a two-man job. The other man is Al Noone, WB6SAZ, who joined the staff last October as Communications Assistant. Al comes to us from Los Angeles and will be working mostly with W1CW on DXCC, with other duties as time permits (but it doesn't look as though it will).

This leaves two vacancies: (1) an assistant for contest work to absorb some of the humdrum checking and analysis required on the mountains of logs received. (2) An assistant at W1AW to take on routine maintenance chores, entertain visitors during the day and in general be a "third man" at the headquarters station. Both these positions are best suited to young single amateurs interested in making ARRL staff work a career. — *W1NJM*.

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 meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least one year immediately prior to nomination. Petitions must be received on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, zip code and station

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPI	6807	1545	1341	204	9897
W3CHL	600	2716	2502	74	5892
K5TEY	3	2698	2603	0	5304
W7BA	16	1186	1095	105	2402
K9ONK	118	1042	1015	28	2203
K7UDG	285	790	785	4	1864
W8UPH	23	790	691	94	1598
WA9CNV	4	717	715	2	1438
W3VR	229	596	552	21	1398
W9JYO	421	382	359	24	1186
K5BNH	3	582	483	50	1118
W4STYH	4	543	455	50	1052
W4THKR	9	494	475	12	990
W0LCX	17	476	408	12	913
W1OJM	7	425	422	3	857
W3EML	9	429	353	0	791
W6RSV	8	409	242	120	779
W4DYL	4	399	327	7	736
WA9MHU	50	339	245	93	717
WA4SCK	33	351	317	11	712
W0PNB	0	351	350	1	702
W50BD	24	333	331	2	694
W6GYH	39	318	291	16	694
K3AYS	17	340	270	6	633
WA2IGG	34	296	254	42	626
K7RQZ	28	296	270	26	620
K91VG	11	331	268	6	616
WB6BBO	30	291	279	7	607
W1PEX	66	284	226	17	593
W4LEY	60	251	192	54	557
K9FZX	6	275	271	2	554
W4NLO	4	255	214	52	525
W8IXJ	76	243	124	82	525

Late Reports:

K6BPI (Oct.)	6827	1499	1283	216	9825
W6GYH (Oct.)	102	445	434	9	990
WB6BBO (Oct.)	26	286	271	1	584
WA2BHLN (Oct.)	12	252	221	25	510

More-Than-One-Operator-Stations

W6YDK	4186	193	121	72	4572
-------	------	-----	-----	----	------

BPL for 100 or more originations-plus deliveries

W8IHD	248	WA1GGN	124	W4FP	104
K4BV	4 220	WA9QQJ	119	WA6BYZ	104
W9EQO	167	W4TUV	113	K4TSJ	104
W4LE	146	W20E	112	WB2WZ	102
W8OU	146	WB2VB	111	W4JBM	101
W4BLB	145	W1TXL	110	WB9GUJ	101
WB6ZDJ	136	W3A0J	109	Late Reports:	
W6HVA	135	W3INC	109	W6MLF	(Sept.) 279
K1PNB	134	W4RIA	109	W6MLF	(Aug.) 275
W4TWD	134	W1BOL	105	W6HVA	(Oct.) 184
W1IN	129	K2KDJ	105	W6MLF	(Oct.) 146
W8LT	128	WB2VB	110	WB2VB	(Oct.) 145
				K1PNB	(Oct.) 135

More-Than-One-Operator-Stations

K2DEL/2 265

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: W3EKP, W3A1S, W8GAI, K9FZX, W9K1L.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

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.

— George Hart, WINJM, Communications Manager

Section	Closing Date	SCM	Present Term Ends
North Carolina	Feb. 10, 1969	Barnett S. Dodd	Apr. 10, 1969
Michigan	Feb. 10, 1969	Ralph P. Thetreau	Apr. 26, 1969
British Columbia	Feb. 10, 1969	H. E. Savage	May 1, 1969
Washington	Feb. 10, 1969	William R. Watson	May 3, 1969
Santa Bar.	Mar. 3, 1969	Cecil D. Hinson	Aug. 10, 1966

West Indies	Mar. 3, 1969	A. R. Crumley, Jr.	Jan. 10, 1968
East Bay	Mar. 3, 1969	Richard Wilson	Feb. 10, 1968
Arkansas	Mar. 3, 1969	Curtis R. Williams	Resigned
Los Angeles	Mar. 10, 1969	D. R. Etheredge	May 18, 1969
S.C.V.	Mar. 10, 1969	Edward T. Turner	Resigned
Maine	Apr. 10, 1969	Herbert A. Davis	June 9, 1969
Oregon	Apr. 10, 1969	Dale T. Justice	June 10, 1969
Tennessee	Apr. 10, 1969	Harry A. Phillips	June 14, 1969
E. Pa.	Apr. 10, 1969	C. S. Van Dyke, Jr.	June 15, 1969
South Dakota	Apr. 10, 1969	Seward P. Holt	July 3, 1969

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.

Kentucky	George S. Wilson, III, W40YI	Nov. 12, 1968
Sacramento Valley	John P. Minke, III, WA6JDT	Feb. 25, 1969
Orange	Ray R. Maxson, W6DEY	Mar. 1, 1969

ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League 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 (10-35 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. Each month the ARRL Activities Calendar notes the qualifying run dates for WLAW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.



DX CENTURY CLUB AWARDS



From November 1, through November 30, 1968, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

DJ7CY ... 271	W6NTQ ... 155	W4OGG ... 116	DL4QP ... 107	GD5ACH ... 102	VE3DIE ... 101
PY1WJ ... 245	W9W8M ... 149	OK2BFX ... 115	DL8RE ... 107	K4YXI ... 102	WB2UJA ... 101
W8HBR ... 222	W2CHP ... 147	K0RPH ... 114	H99ATB ... 107	W4SCSF ... 102	W4BUB ... 101
VE3DXY/	WFLAQ ... 137	ZD3I ... 113	K4PHY/	W43GUL ... 102	K1NLQ ... 100
W6 ... 211	W6AYQ ... 124	W1ESN ... 111	VV5 ... 107	512KG ... 102	K3GVK ... 100
K8HZU ... 204	H1CNF ... 121	K0SHB ... 109	P8AD0 ... 104	DJ7KJ ... 101	K0ICR ... 100
W3AES ... 199	W6CNA ... 120	W2DKM ... 109	W6JNM ... 104	F7DC ... 101	SP7AGA ... 100
W68AZ ... 178	KR6KQ ... 119	PA0JR ... 108	DK2BI ... 103	K1FRB ... 101	WB2QKQ ... 100
VE4TT ... 161	DJ1UH ... 118	W2N08 ... 108	WDLBP ... 103	K9HKJ ... 101	

Radiotelephone

IILCK ... 247	W6NTQ ... 136	VE3DXY/	WA7BPS ... 110	WA9DJO ... 103	WA0IYH ... 101
W9QLD ... 239	WB4BP ... 135	W6 ... 115	WA7RC ... 108	K4OSE ... 102	9V4VT ... 101
PY1WJ ... 237	K9GZS ... 128	H1CNF ... 114	I1DAB ... 106	O1HGW ... 102	DJ7KJ ... 101
W3AES ... 160	W6VVM ... 122	YVISA ... 114	K2QLL ... 106	H89ALB ... 101	K1DEP ... 100
W3ZNH ... 154	G3WGS ... 120	K1GXU ... 110	K5HUW ... 106	JA4W1 ... 101	W2EV ... 100
WA2CLQ ... 152	TJ4JC ... 119	K01L/CG6 ... 110	K8BGZ ... 106	K9HKJ ... 101	W2GTQ ... 100
W1DNZ ... 137	K4HGC/5 ... 118	WA2CRD ... 110	DK2BI ... 103	W8HJ ... 101	WB6DX ... 100
					WA9UGF ... 100

Endorsements

Endorsements issued for confirmations credited from November 1, 1968 through November 30, 1968 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340	300	260	VE4SK	WRKZT	160	140	WA8RXU	W3DPJ
W4TM	F3AT	I1ZPB	W4RJG	W8QH	DJ3LF	G2IM	W8DAK	WA4UQQ
320	W1RLQ	W1BFA			DJ4VK	G3UYK		WA5PSJ
I1ZL	W9QLD	W1YRC	200	180	DL7MQ	K9CZS	120	W6USV
310			KL7BZO	DJ8TF	RA3IH	KP4CRD	DL9YG	W6YLL
W5NMA		240	VE5JS	HK3AVK	K8TVO	W1DHL	K2BUI	W7YBI
	280	OE7UD	WB2CGW	I1TM	W3HNK	W2GHK/4	K8EDQ	W8CNL
305	OH5UQ		W3ZNH	VO1HH	W6HHI	WA4GQM	K8NG	W9EVX
DL1DC	W1WQC	220	WA1PFD	W4UF		WB4EWU	K9VQK	W9USP
W8ARH	WA2JBV	SM4ARQ	W6CPE	W6GTE		W7ZHZ	WA1BLC	

Radiotelephone

330	W5NMA	240	W6TGB	200	180	YN1RTS	OZ5OF	140	120
W5KBU	ZP5ET	I1SCA	XW8AX	K2DID	CE6CS		VE5FO	I1TM	K0SPH
ZP5CF		OH7UD		WB2CGW	JA7JH		VE5JS	K3CBW	VK2AOU
	280	W1BFA		WA4TSP	K1QMV		WA21BV	VE31R	W1DHL
305	W1WQC	W1HR	220	W4ZNI	W1EJE	DL5LR	W4PGZ	W2GHK/4	WA2VQ
KP4CK		W3PN	EA7IR	W8GFM	WB2JUZ	DL6JJ	W4UP	W2BFMK	W4T8Q
	300	W6DQ	W4ELB	VE30D	W8VHY	WA4QBK	W47DRP	WA4GQM	WA0TDX
W4IC	ZL3MN	W6CCB	W1EXD	ZP3AL		W8HXR	OA4BS	WA0HHQ	W7PYJ

W1AW will transmit a qualifying run on all listed c.w. frequencies at 0230 GMT Feb. 11. (In converting, 0230 GMT Feb. 11 becomes 2130 EST Feb. 10.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz. 0500 GMT Feb. 5. (In converting, 0500 GMT Feb. 5 becomes 2100 PST Feb. 4.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5-13 w.p.m. transmissions.

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 10, 15, 20, 25	9:30 P.M. EST SntTh 6:30 P.M. PST Sat	0230 MWFSn
35, 30, 25, 20, 15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 1ThSat

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

- Date Subject of practice text from December QST
 Feb. 10: *It Seems to Us*, p. 9
 Feb. 13: *What Is RTTY?*, p. 11
 Feb. 19: *Is A Balun Required?*, p. 28
 Feb. 25: *The Case For Belonging*, p. 72
- Date Subject of practice text from *Understanding Amateur Radio*, First Edition
 March 3: *Why Impedance is Important*, p. 99
 March 7: *Directivity*, p. 100

1968 ARRL SWEEPSTAKES

High Claimed Scores

Following are high claimed scores of entries received by December 20. From left to right: call, claimed score, number of contacts, number of section-multipliers. Official results will appear in a later issue.

PHONE	Score	Contacts	Multipliers
WA3GJU	198,313	1047-75	
KV4PZ	187,500	1000-75	
W2RRLM	173,625	935-75	
WA6IVN	155,863	848-74	
K8DOC (WA8LEO, opr.)	149,572	811-74	
WA7FFU	148,500	890-75	
W5WMU	144,814	796-73	
W8SH (K1ZND, opr.)	140,025	939-75	
W4MCM	138,490	923-75	
K2EJU/5	137,714	933-74	
W3GRP (K1ANV, opr.)	133,594	715-75	
W4ETO (WA4LUG, opr.)	132,273	935-71	
W9YT (K9KGA, opr.)	131,628	714-74	
WA6SDC	131,550	877-75	
K4PUZ/4	131,490	736-72	
WA5QXD	131,237	732-74	
W9DOB (WA8PJ, opr.)	130,989	741-71	
K4LPW	130,875	699-75	
K5RHZ	130,488	715-73	
KP4AST	128,850	864-75	
K0WBD	128,760	696-74	
WA0EMS	127,650	868-74	
W9RQM	127,313	681-75	
K4RIN/5	123,808	855-73	
W3AZD	117,238	803-73	
K7UKC	115,344	814-72	
W3YUW	113,040	630-72	
K4BVD/6	112,650	754-75	
K3HKK (K3AHT, opr.)	111,925	605-74	
W3GHM	110,688	607-73	
W4KFC	107,250	716-75	
WA2CLQ	107,013	613-70	
WA8LYF	106,726	731-73	
W3GM	106,671	565-73	
K1JHX	106,500	751-71	
W5PWX	106,375	575-74	
K1THQ	105,820	721-74	
W4BVV	104,475	702-75	
WA9NSR	104,155	563-74	
WA8PZA	103,250	590-70	
W2DXL	102,656	549-75	
WBQXQ	102,109	562-73	
WB6OLD/6	101,892	569-71	
WA9IAT/5	101,354	574-71	
K5AEU	100,500	541-75	
K3MNI/8	100,375	550-73	
WA7FOE	100,309	586-69	
K9LHQ/7	100,101	551-73	
K5LZO (K5LZO, WA5LES)	170,550	1163-75	
K0UKN (K0s CVA UKN)	154,781	854-75	
W9BGX (K9WEH, W9ICE)	120,816	839-72	
W3ZKH (K3EST, W3ZKH)	111,962	757-74	
K8RMK (W4CJR, K8RMK)	107,460	598-72	
WA0CJU (8 oprs.)	101,932	753-68	

C. W.

K4GSU/3	133,125	754-71
KV4PZ	132,375	783-74
W5FI	131,705	752-71
K1LPL	131,535	711-74
K1ANP/4	131,309	721-73
WA6IVN	129,315	708-74

W1AW SCHEDULE, FEBRUARY 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed February 21, in observance of George Washington's birthday.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000					RTTY OBS ^{3, 7}		
0030	← CODE PRACTICE DAILY ¹ 10-13-15 w.p.m. →						
0100	← C.W. OBS ¹ →						
0120-0130 ⁴			7.020	3.520	7.150 ⁶	3.700 ⁶	7.020
0130			7.080	3.555	7.150 ⁶	3.700 ⁶	7.080
0200	← PHONE OBS ² →						
0205-0230 ⁴		3.820		50.120	145.600	1.820	3.820
0230	← CODE PRACTICE DAILY ¹ (35-15 w.p.m. TThSat), (5-25 w.p.m. MWFSn) →						
0330-0400 ⁴		3.555		1.805			3.555
0400	RTTY OBS ³				RTTY OBS ³		
0410-0430 ⁴			3.625	14.095	7.095	14.095	3.625
0430	Phone OBS ²				PHONE OBS ²		
0435-0500 ⁴			7.220	3.820	7.220	3.820	7.220
0500	← C.W. OBS ¹ →						
0520-0530 ⁴			3.700 ⁶	7.150 ⁶	3.520	7.220	3.520
0530			3.700 ⁶	7.150 ⁶	3.555	7.255	3.555
0600-0700			7.080	3.945	14.100	3.555	7.080
0700-0800			14.280	7.255	3.945	14.100	14.280
2000-2100		14.280		14.095	21/28 ⁵	14.280	
2100-2200		14.100	14.280	14.100	14.280	14.100	
2300-2345		7.255	21/28 ⁵	21.1 ⁶	21/28 ⁵	7.255	

¹ C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02 and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s QIS WPR. *Times-days in GMT. Operating frequencies are approximate.

K3NPV/4	127,750-702-73	W4HM	108,630-604-72
W9LKL	126,746-700-73	W1BPW	105,968-597-71
W3YUW	125,344-669-75	K6VVA/6	105,960-603-71
WA9ITB	125,060-679-74	WA3IXN	104,104-698-69
K4PUZ/4	124,921-699-73	W9HHX	103,751-569-73
K4WJT	123,375-658-75	K8EBB	103,320-574-72
K8UDJ (K1ZND, opr.)	122,830-693-71	WALJTM	103,045-557-74
W5WMU	121,233-694-71	W3GHM	101,353-572-71
WA7KUW	120,611-682-71	W1YK (K1TKS, opr.)	100,826-586-69
K2KLR	119,014-671-71	WA2WLN	100,826-586-69
K5VAA	118,990-671-73	WA3HTQ	100,740-584-69
W7DI	118,392-667-71	W8QDH	100,739-584-69
K5AEU	118,213-681-70	W5QJH	100,440-703-72
K2EIU/5	117,142-793-74	K4LPW	100,376-568-71
W3IN	116,070-636-73	W4LDJG	100,080-559-72
W9RQM	115,979-637-73	W3CRE	100,080-559-72
WA3DSZ	115,560-642-72	W9RGB	100,080-559-72
W8XXQ	114,701-630-73	W6RW (W6DQX, K9ZMS)	100,080-559-72
WA6OVS	112,905-639-71		186,188-974-75
W4KFC	112,200-749-75	K5LZO (4 oprs.)	163,050-1100-75
K5RHJ	110,960-608-73	WA8LYF (WA8JUF LYF)	114,570-637-7
W3DPI	110,304-624-71		
K2KTK	109,500-600-73		

there is a complete separation of the Country in question by a minimum of 75 miles of foreign land, the Country is considered as two separate entities. This 75 miles of land is a requirement which is applicable to land areas *only*. In cases of areas made up of a chain of islands, there is no minimum requirement concerned with the separation by foreign land.

1969 ARRL DX COMPETITION

Phone: February 1—2, March 1—2

C.W.: February 15—16, March 15—16

DXCC Criteria

The ARRL Countries List is the result of some 31 years of progressive changes in DXing. The full list will not necessarily conform completely with the criteria since some of the listings were set up and recognized from pre-WWII. The general policy has, however, remained substantially the same in the makeup of the list and only specific mileages have been added. The specific mileages in Point 2(a) and Point 3, mentioned in the following, have been used in considerations made April 1960, and after. The specific mileage in Point 2(b) is being used in considerations made in and after April, 1963.

Any land area in the world can be placed in one or more of the following categories. Where the area in question meets at least one of the points in the criteria it may be considered a separate entity, i.e. a country, for our Countries List:

- 1. Government/Administration;** An area by reason of Government or a distinctively separate administration constitutes a separate entity.
- 2. Separation by water;** An island, or a group of islands, not having its own government or distinctively separate administration, is considered as a separate entity under the following conditions:

2(a). Islands situated off shore from their governing or administrative area, must be geographically separated by a minimum of 225 miles of open water. This point is concerned with islands off shore from the mainland *only*. This point is *not* concerned with islands which are part of an island group or are geographically located adjacent to an island group.

2(b). Islands forming part of an island group or which are geographically located adjacent to an island, or island group, which have a common government or administration, will be considered as separate entities provided there is at least 500 miles of open water separation between the two areas in question.

- 3. Separation by foreign land:** In the case of a Country, such as that covered by Point 1, which has a common government or administration but which is geographically separated by land which is foreign to that Country, if



The Colonie Central High School (Albany, N. Y.) will man WA2DNR from 1300 GMT February 22 until 0100 GMT February 23, 1969 in the very first of their planned "Operation's Days." Trustee W2KZN says that the main purpose of the operation is to acquaint the school hams with contest-type activity and multiband-multitransmitter operation. Keep an ear open for WA2DNR in the middle of the 80- and 40-meter Novice bands, 15- and possible 10-meter s.s.b. and 6 and 2, phone. Be on hand to give the fellows a QSO!

Stolen Equipment

The following equipment was stolen from the Grumman ARC: Collins 75S3 receiver Serial No. 10779, Collins 32S1 transmitter Serial No. 10891, and Collins 312-B4 station control Serial No. 52495. Anyone with information please contact Ray Schubnel, 29 Sterling Lane, Smithtown, N.Y. 11787.

A Swan 350 Transceiver, serial C-296111, was stolen from the car of Eugene O'Brien, WA1FJF, in Hartford, the morning of Dec. 12. The thief could not have been too well informed about amateur mobile gear. He cut the power cable, when it could have been disconnected by a plug on the back of the transceiver, and left the mobile supply in the car. Anyone having information on this item is requested to notify WA1FJF, 143 Coppermill Road, Wethersfield, Conn., 06109.

Feedback

In the article by Peterson and Williams on page 16 of QST January 1969 entitled "Notes on The SB-300/SB-301 and SB-401," the additional contact should be added to position 5 on switch wafer M4R, *not* position 4.

Readers are calling it to our attention, and writing to the author, WA2VTR, to point out that we gave no information on the r.f. choke in his 1296-Mc. preamplifier article in December, 1968, QST, page 40. Dolph assures us that the choke is not critical, and that 7 turns of No. 28 wire, $\frac{1}{8}$ inch diameter, spaced one wire diameter, will do nicely.

SCM ← AREC ← ORS ← CP ← SEC ← OBS ← TCC ← OO
 ← OVS ← AIOPR ← EC ← DXCG ← CLUBS ← RM ← OPS ← RCC → NTS → WAG

Station Activities

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

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX. RM: W3EEB. Endorsements: K3GKF as OO; W3DKX as PAM. The 1969 Delaware Hamfest will be held Aug. 17 at Whellers Park, Harrington, Del. Mark your new calendars now. Business is cutting into W3EEB's traffic-handling time. W3AGQY and WA3IID are on 2 meters. W2DXL/K3NHL is holding skeeds with K3NMY. W3HKS enjoyed the Delaware QSO Contest. The University amateur station, WA3GAY, is being put back on the air under the leadership of WA3GSM. K3NVV is back on the air as a portable. W3QQV has joined the list of retirees. WA3DYG reports the response to the RACES drive is excellent. DEPN, QNI, 70 QTC 6; DSMN, QNI 41; DTMN, QNI 37, QTC 5. Traffic: W3DKX 69, W3EEB 29, WA3GSM 21, K3NYG 12, WA3HWC 11, W3HKS 3, WA3KFF 3, WA3DUM 1, K3NVV 1.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3HK—SEC: W3AES. RMs: W3EML, K3MVO, K3YVG, W3MPX. PAMs: K3MYS, K3WAJ, V.H.F. PAM: W3FGQ. OBS reports were received from WA3AFI, W3ID, K3WEU, K3EMA, WA3INC and WA3EEC; OVS reports from K3WEU, W3CL, WA3IAZ, WA3BJQ; OO reports from K3MYS, W3NNC, K3RDT, K3EMA.

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	Daily 6:45P	366	401	K3YVG
PTTN	3610	Daily 6:00P	275	205	W3MPX
PFN	3960	Daily 5:30P	595	595	K3MYS
EPAEP&TNTN	3917	Daily 6:00P	541	241	K3WAJ
VHF (6)	50.25	Mon.-Fri. 7:00P			W3FGQ
VHF (2)	145.35	Mon.-Fri. 8:00P			W3FGQ

Reports on the recent FMT: W3JET 9.7 p.p.m., K3HNP 2.5, K3EMA 30.4, W3BFF 0.6, K3PSW 34.2, K3NOX 132.4, W3NNC 0.4, W3KEK 35.5. SS messages were received from WA3DNU, W3DQO, W3YUW, W3PNL, WA3JKB, WA3ATX/3, WA3DSZ, K3BTZ, WA3IHV, WA3JYM, WA3JQX, K3HNP, K3HPG, WA3IUU, WA3HMO, WA3IQC, W3MPX, WA3HGX, W3HMR, K3RFB, K3OIO, W3BIP, WA3JQO, W3NNL, W3GHM and W3GM. The Anthracite Chapter of the QCWA selected W3PVY, chmn.; W3OML, vice-chmn.; W3KJJ, secy. The Delaware Valley Chapter elected W3HK, chmn.; W2AEW, vice-chmn.; W2FJ, treas.; W2HX, secy. Delaware Lehigh ARC elected WA3BME, pres.; K3ANS vice-pres.; WA3GUL, corr. secy.; W3KBCV, rec. secy.; WA3ATK, treas.; WA3FPP, K3SVE, K3ADI, K3QIU, directors. The Philmont Mobile Radio Club elected K3UWO, pres.; W3VVS, vice-pres.; K3NLY, treas.; K3SPS, secy. WA3ERA got his A ticket. WA3CTW is at M.I.T. operating WIMX and is now Extra Class. WA3EXB worked portable at the OCPA Bazaar. K3WEU is going great guns with his V.H.F. Hook Review Net. WA3IUU still is struggling with a Novice traffic net. BPL certificates went to W3CUL W3VR, W3EML, K3MYS, WA3INC, WA3IUU and WA3AOJ. W3CID received his A-1 Operator certificate. W3NNL kept skeeds by taking gear along on a deer-hunting trip! K3WEU is starting classes for hams at the Akiba Hebrew Academy and the Vanguard School. At the antenna party at WA3AFI's was W3ZAT, WA3GHU, W3TIV, WA3HER and W3KTP. W3RV has a new R4A receiver and an SB-400. WA3EEC suspected a ground on his antenna; he was right, it was on the ground! K3RZE has moved from WPA to EPA. WA3EYV got his A ticket. The Marion ARC has started its second year of ham classes. The IRC ARC is cutting

up a 4-band single-feed antenna. W3ABT, at U. of P., has acquired a GR frequency standard and a complete S/Line. Please note PFN is now daily and that V.H.F. (2) is on 145.35 Mc. Traffic: W3CUL 5892, W3VIR 1398, W3EML 791, K3MYS 633, W3MPX 346, WA3AOJ 313, W3CID 280, W3ERL 280, WA3INC 164, K3MVO 163, W3AIZ 149, WA3IUU 139, W3HNC 136, WA3EXW 123, WA3CTP 113, WA3JKB 80, W3NNL 77, W3FGQ 74, W3HK 73, K3OIO 70, K1YVG 68, WA3EXB 65, W3PC 57, WA3PCP 53, WA3GUK 52, K3VFA 52, K3WEU 49, K3WAJ 41, WA3AFI 37, W3BNR 33, WA3HMTU 30, K3KIO 20, W3CHH 19, WA3IHV 19, W3KJJ 14, K3RUA 14, W3RV 14, WA3EEC 13, WA3IYC 11, W3QKE 10, W3OY 10, K3PSO 10, W3VAP 10, K3NPC 9, K3MIDG 8, K3KTH 7, K3EMA 6, K3RZE 6, WA3FPP 5, W3JKX 4, WA3DE 3, WA3ADN 3, WA3BJQ 2, WA3EUV 2, WA3IAZ 2, W3ABT 1, W3EU 1, W3FAF 1, W3ID 1, W3PST 1, W3YPF 1.

MARYLAND-DISTRICT OF COLUMBIA—Carl E. Anderson, K3JYZ—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI	Mgr.
						Avg.	
MDD	3643	0000Z	Daily	30	339	13.7	WA3HTQ, RM
MDDS	3843	0130Z	Daily	23	43	4.5	W3CBG, RM
MDCNTN	3920	2300Z	S-T-T-S	17	37	18.5	K3GZK, PAM
MEPN	3920	2300Z	M-W-F	*			K3IAG
						1800Z	S-S
MTMTN	145.206	0200Z	T thru S	26	12	7.3	W3IFW

*Not reported by the net managers
 New appointees: K2TNO/3 as OO Class IV. Endorsed appointments: K3NCM as OPS; W3FU as OO Class 1; W3CZ as OO Class IV; W3TN as ORS; W3JZY as PAM, OPS and ORS; W3BWT as ORS; W3BQV as OO Class III. This is my 24th and last report as your SCM and I would like to express my gratitude for the activity, cooperation and hard work of all the ARRL appointees in this section have exhibited for the past two years. The 75 appointees are doing a fine job in carrying the public service task for the over 2000 ARRL members in the section. W3CIDQ added a YL's touch to the Oct. CD Party on c.w. W3ZNV is repairing antennas damaged by the first winter storm. W3FU sent in about a pound of Intruder Watch reports. W3GN has been debugging equipment between contests. K3LFD has been appointed Asst. Director. W3TN made the BPL for the 10th time in 1968. WA4QLP/3 reports that the U. S. Naval Academy beat Army (West Point) and the A. F. Academy in their private contest during the SS. As reported by W3ECP, W3CER is scheduled for the hospital in Jan. W3EOV is involved with "I-K" logic and hopes he doesn't flip before he flops. W3KBU is QRL on WAS with 10 confirmed. WA3IAQ is again limited by school work. WA3JRK is again making noise on the bands. WA3IJR lost his tower and antennas in the season's first snow storm. WA3JBY reports on the unusual qualities of the QRM heard on MDD. WA3QT is rebuilding his 2-meter a.m. and f.m. equipment. W3ZSR spent his time building antennas and a ground system. Picture WA3UTQ hanging on top of the top of a new 70-ft. tower on one of our colder days trying to get his antennas ready for the SS. K1TFRX/3 is a new active station in MDC. W3MYB was active on both phone and c.w. in the SS Contest. WA3EOP reports that his new ITW 100 transceiver is a good piece of equipment. K3LCH is assembling a new Hunter 2000c kit. Traffic: W3OUC/3 329, W3TN 238, W3A1U 160, K3JYZ 150, W3CBG 162, W3IYS 100, K3GZK 95, K1TFRX/3 87, WA3IO 65, W3ADQ 63, K3LFD 58, W3EFOV 52, WA3ERL 34, W3PCP 32, W3ECP 29, W3ZNV 21, WA3JBY 20, W3JZY 16, W3AIAQ 15, WA3IJR 8, K3QDC 7.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles E. Travers, W2VPZ. SEC: W2LVW. RMs: WA2KIP, WA2BLV. PAMs: WA2UVB, W2ZL. NJEPN reports a QNI of 621 and traffic total of 261. NJN reports QNI of 409, traffic 351. The N.J. QSO Party was a big success again this year. W2ZI took first place for Mercer Co. Some 650 attended the SJRA Picnic at Molea Farms Sept. 8. Assemblyman Aikens, W2VJH, was mostly responsible for getting the amateur license plate bill passed. His interest is much appreciated. The N.J. Emergency Phone & Traffic Net's 10th Annual Dinner was held Oct. 19 at Bahers Tavern, near

Freehold, W2ZI officially turned over the net managership to W2PEV, after 15 years of service to the net. We regret to report the passing on Nov. 25 of W2W0A, a long-time member of the DVRA and its treasurer. Ex-W2BZJ/W2FFK/K4IK is now W2JI, back in Pennington. W2VU is in Hawaii. W2YPZ was in the hospital. W2DNF is a new station reporting from Princeton. WB2QMA is a new NEPN member in Lawrenceville. W2ZI attended the Goldcoasters meeting at Deerfield Beach, Fla. Nov. 18 and met over 40 old-timers he had known back in the earlier days. He also visited W4AQW, spark in Trenton in 1923. W2PU is taking on a TCC appointment. WB2FJE has a new linear, a pair of 4-400As. WB2TEN, K2PZF, W2UI, K2CPR, WB2QMA, WA2BLV, WA2DVU, WA2WLN and K2BG sent in Sweepstakes reports. W2CDZ passed the Advanced Class exams. The SNJ & EPA V.H.F. Net has moved from 50.25 to 50.4 Traffic: (Nov.) WA2ABY 217, WB2VEJ 178, W2ORS 148, WB2UVB 135, WA2BLV 113, W2XPZ 104, W2PU 71, W2ZI 62, W2KIP 41, W2BLM 30, WA2WLN 27, WA2ANL 18, K2SHE 18, WB2FEJ 17, W2UI 15, K2JJC 15, W2DNF 10, W2CDZ 5, K2SOL 4, WB2SFX 2. (Oct.) WB2UVB 225.

WESTERN NEW YORK—SCM, Richard M. Pitzeruse, K2TKK—Asst. SCM: Rudy W. Ehrhardt, W2PVI, SEC: W2RUF, RMs: W2PFK, W2MTA, W2RUF, K2KIR. PAM: WB2VSL. Nets:

Net	Freq.	Local Time	Days	Mgr.
NYS	3675	1900	Daily	W2MTA
NYSPTEN	3925	1800	Daily	K2AAS
NY PON	3912	1645	Daily	K2KQC
NYSN	3675	1000	Sun.	W2RUF
NYSCN	3675	1945	Mon., Thurs., Fri.	W2RUF
ESS	3590	1800	Daily	WA2VYS

Please note the above list as space will not allow me to repeat it monthly. Congrats to WB2VSL, a new PAM. Endorsements: W2RUF as SEC, W2SSC as OO, WA2-IXB/TPV, WN2NZA and WB2RHJ as OPSs; K2RYH as ORS, OOs W2BLF, K2KIR, K2LGG and K2LWR easily qualified for Class I OO in the Nov. FMT. WB2VSL is building a new linear using four 4X150As. NYSPTEN reports handling 240 messages in Sept. and 249 in Oct. Check-ins numbered 1568 and 1705, respectively. Sorry to report the passing of W2MXH, well known on NYSPTEN. WB2ELL takes over as asst. mgr. of the NY PON from W2TGY, who QsYs to Florida. W2JFE is the trustee of W2PE, the RAWNY club call. Congrats to WB2EDT on his new Advanced Class license. W2EDT spent a week camping in the Adirondacks and during that time introduced five fellow campers to ham radio. W2RUF gave an informative talk on AREC at the recent Fulton ARC hamfest. K2ZEL also gave an enlightening talk. The new ARRL Net Directory is now available for the asking from Hq. WA2YNS has a new 3-band quad up 50 feet and a new linear. WB2NZA goes back to higher learning. WA2AWK, Onondaga County EC, weeds out the deadwood and still has a sizeable contingency there. WA2PZD needs but 2 QSLs to cinch his WAS. W2CFP mourns the loss of his 2-meter antenna, a victim of the north wind. OO WB2YQH notes that DXpeditions cause band activity and violations to jump. The RARA aided a local radio station in its drive for funds to buy toys for hospitalized children. Ernest G. Beetow extends sincere appreciation to The South Towns Amateur Radio Society, which sent a contribution to the Roswell Park Memorial Institute in memory of the late Marion H. Beetow. The RARA Hamfest bash will be May 10. BPL—W2OE, who else? Traffic: W2OE 399, W2FR 393, WA2CAL 295, WB2GAL 279, W2BUF 149, W2OYE 143, W2QC 138, W2MTA 122, WB2SMD 120, W2FEB 85, W2VND 73, W2HYM 68, W2LQF 52, WA2-HSB 42, WB2VSL 33, W2PZL 32, K2QDT 25, K2RYH 23, WB2ZDK 22, K2DNN 20, K2LMI 20, K2OFV 20, K2KTK 18, W2PNW 14, K2KIR 12, WA2PZD 12, K2YJR 12, W2RHLJ 10, WA2AWK 8, WA2YNS 8, WA2ANE 7, WB2NZA 7, WA2GLA 6, W2CFP 5, WB2EDT 4, W2EAM 2, W2PVI 2, WB2WZG 2.

WESTERN PENNSYLVANIA—SCM, John F. Woitkiewicz, W3GJY—SEC: W3KJP, PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFB, W3NEM. Traffic nets: KSSN, 2330 GMT; W. Pa. OOOO GMT, both on 3585 kc. W3IYI received a 25-year membership pin from ARRL. New gear at WA3DBN's QTH consists of a new Galaxy V. At W3OFI it's an NC-303 receiver. Amateurs in Elk County should contact W3-VMX if interested in emergency work; also K3SMB in Allegheny County and W3RSP in Washington County. If in doubt as to the EC in your county, drop your SEC, W3KJP, an inquiry. W3VKD is now W3TV. WN3KKL will be a General by the time this gets in print. New Novices: WN3LJB, at Meadowlands; WN3LLX, at Delmont, who is only 12

years old. The Erie AREC group assisted local police in protecting youngsters during their Halloween evening convass of homes. Those participating were W3JTF, K3IOX, WA3BBV, K3QAY, K3HFL, WA3DPI, K3-QWZ, K3HDK, WA3HRJ, K3ATZ, WA3ISN and K3-TDD. This is providing a public service and good training. WA3CZE has relocated to Denver, Colo. K3UEQ has gone s.s.b. A big welcome back to W3LKZ, W3VZA, W3LFP and WA3AKH after brief sojourns in hospitals. K3AKR and WA3GJU have been pouring it on in various contests as has the Nittany ARC gang. Old Timer W3CN has been re-activating his operations. The Etna Radio club improves its score with each Field Day operation. W3ELZ is revamping his old linear amplifier for s.s.b. and DX work. WA3HSQ lost his tower and beam in strong Dec. winds. W3MFB is back on the traffic nets. W3KUN is sorely missed on the section traffic nets, being off because of the untimely passing of his son in an auto mishap. Add a New Year's resolution—To be more active in the many facets of operations offered on the amateur bands. W3LMI passed the Amateur Extra exam. New appointment: W3VAX as EC for Elk County. Renewals: W3MFB as RM, W3ALF and WA3BGE as OHSs. Is your license due for a renewal? Traffic: (Nov.) WA3LPU 241, W3-NEA 177, K3ZNP 168, W3LOS 119, W3MFB 71, W3-GJY 50, K3HAK 31, K3SOH 31, K3HCT 30, K3ASI 19, K3SIN 14, WA3AKH 12, K3SMB 11, WA3GPK 8, W2-KA1Y3 7, WA3JDT 6, W3LOD 6, W3IDO 5, W3RUL 4, W3ELZ 3, WA3HSI 3. (Oct.) WA3AKH 166.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU, PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	T/c.
LEN	3940 kc.	1400Z	Sun.	24
ILN	3760 kc.	1000Z	Daily	132
NCPN	3915 kc.	1300Z	Mon.-Sat.	724
NCPN	3915 kc.	1800Z	Mon.-Sat.	
ILL.PON	3915 kc.	2245Z	Mon.-Fri.	518
ILL.PON	3915 kc.	1430Z	Mon.-Fri.	
ILL.PON	145.5 Mc.	0300Z	M.W.F.	150
TNT Net	145.35 Mc.	0300Z	Sun.-Fri.	276

W9QLW reports that the Ninth Regional Net had a traffic count of 662 during Nov. Newly-elected officers of the Gypsy Amateur Radio Society of Joliet, Ill., include W9QQM, W9OEQ and K9QMO. K9IFE, W9-JUV/K9OSO, W9KIQ, W9GFF, W9VYB, K9WMP, K9-RAS and W9XO participated in the ARRL's recent Frequency Measuring Test. The League's Executive Committee approved the application of the Morris Area Amateur Radio Club as a duly affiliated society. W9-UHD received a 25-year ARRL pin and is operating with a new Galaxy 2000 and linear. W9BUB reports that 146.7-Mc. RTTY is active every evening. It was active during operation "Eagle Eye" on election day with W9VX, W9JBT, K9VSN, K9ZAM, K9WAP, W9-FZA, W9CRD, W4FQM/9, W9IPO and W9OKF participating. K9DTB has a new 12-wave antenna on 160 meters. A new Novice in Chester is WN9AAM, the XYL of WA9YQT, who has just passed the exam for his Extra Class license. The Palestine ARC has 21 members with 19 who took the Novice Class exam in Dec. New officers of the Six Meter Club of Chicago are WA9IRZ, K9ZJU, K9ENX, K9ZVV, WA9BWB and Blanche Thuma. A new OVS appointee is W9NFO. The 75-Meter Interstate Single Sideband Net had a traffic count of 505 according to W9NWK, net manager. WA9PDI is using his new HQ-180A in enlisting club participation on the local nets. WA9QZE is using a new 500-watt 2-meter transmitter of his own design. WA9SSO, WA9VOB and WA9VYB are now active on RTTY. WA9ZPR has a new TR-3. The Barrington ARC is using its new HW-17 for its club operation. K9DQU has the call WR9ATE for his second station in northern Illinois. WN9ABK is celebrating the arrival of his first harmonic. K9FRZ, trustee of WA9WFE is now Extra Class. WA9ELS was promoted to Specialist 4th Class. K9IFE is back to work after an illness. W9AZP received his Extra Class ticket. Dick George discussed model airplane radio control including digital controls at the Chicago Suburban Radio Association's Dec. meeting. New licensees in the CSRA include WA9-VYM, Advanced; WA9TZH, Technician; WN9AAR Novice. WA9CNU and WA9MHU are RPI certificate recipients this month. Traffic: WA9CNU 1438, WA9-MHU 717, WA9AKR 413, W9NXX 217, W9OTD 183, W9HOT 190, W9JXV 104, WA9ZVE 69, WA9TCC 66, WA9QXT 62, WA9LDC 61, K9FRZ 57, W9YH 50, WA9-PPA 40, WA9WNH/9 39, K9DRS 23, WA9SPA 20, K9-

HSK 13, K9RAS 11, WA9DBP 10, W9HPG 10, W9PRN 10, K9TXJ 9, W9LNQ 8, WA9QXT 7, WA9LHU 5, W9IDY 3, K9DTB 1.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	Freq.	Time	Nov. Tfc.	Mgr.
IFN	3910	1330Z Daily	2300 M-F	238 K9IVG
ISN	3910	0000Z Daily	2300Z S-S	560 K9CRS
QIN	3656	0100Z Daily		176 W9HRY
Ind. PON	3910	1245Z Sun.		37 K9EFY
Ind. PON V.H.F.	50.7	0200Z Mon.-Thurs.		83 WA9NLE

W9PMT, mgr. of the Hoosier V.H.F. Nets, reports Nov. traffic as 90. W9AUM is operating WA9WFE at Hanover College. K9EFY has his Advanced Class license. WA9YKA has his Extra Class license. WA9YXA and WA9YKA are new in southern Indiana. WA9JNJ has a new S.S.B. on 6. W9JQB is keeping a sked with Cincinnati, Ohio on 6 three days a week. WA9NJD has s.s.b. on 6. WA9KLY has a new tower. The Annual Lake County ALC Banquet will be held at Teibels Feb. 8, 1969. The committee includes WA9TOL, WA9RAMT, WA9MOE, WA9BBC, W9JZA, K9ULU and W9PUB. WA9ITB is back on the air via K9NBH at Great Lakes Naval Station. WA9QKD is home from the hospital. WA9VNF now has a TA-33 at 50 feet. K9LSB has a complete Drake Line station. WA9QKD reports 50.4 activity loss. W9BUQ is now a Life Member in the ARRL. WA9BYL has a new baby girl at his QTH. To all League appointees please check your certificates for endorsement dates. QIN Honor Roll: W9BDF 29, K9VHY 25, K9DHC 22, K9HYV 18, W9QLV 18, QIN needs more net control to help out. *Amateur radio exists because of the service it renders.* RPL certificates went to W9JYO, K9IVG, K9FZX, W9EQO and WA9QQ. Traffic: (Nov.) W9JYO 1186, K9IVG 616, K9FZX 554, W9EQO 481, W9HRY 267, WA9VZM 234, W9ICU 226, WA9QQ 200, W9QLV 173, K9HYV 153, W9AM 121, W9JQB 103, W9BUQ 94, WA9RSI 72, WA9AUM 57, K9CRS 48, K9EFY 41, K9VHY 40, WA9GJZ 35, K9CBA 34, W9UEM 30, WA9KCO 28, W9RWQ 28, WA9KYG 23, WA9IPS 22, K9QVT 22, WA9QOR 21, W9SNQ 21, W9FWH 20, K9JQY 20, W9YXX 20, WA9TJS 19, WA9AXF 17, K9ILK 17, W9CUC 14, WA9VGB 14, W9DOK 13, W9PMT 13, K9VGN 11, W9CMT 10, W9L G 10, WA9RNT 10, WA9WME 10, WA9OHX 9, WA9BDP 8, WA9BNX 6, WA9QEW 6, W9ALM 5, WA9BYL 3, WA9ABI 1. (Oct.) W9QLW 260.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9NGT, PAMs: K9DBR, WA9IZK, W9LVC, W9NRP and WA9QNI. RMs: K9KSA and W9DND.

Net	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1245Z	Mon-Sat.	432	258	W9NRP
BFN	3985 kc.	1800Z	Daily			W9LVC
WSBN	3985 kc.	2300Z	Daily	1408	413	WA9QNI
WIN	3662 kc.	0115Z	Daily	266	56	W9DND
WSSN	3780 kc.	0030Z	Daily	131	33	K9KSA
WRN	3620 kc.	0130Z	Sun.	12	1	K9GSC
SWRN	50.4 Mc.	0300Z	Mon-Sat.			K9DBR
SW2RN	145.35 Mc.	0230Z	Daily	296	40	WA9IZK

Net certificates went to K9TBY for BWN and to W9TTU for BWN and WSBN. New appointments: WA9QKP and WA9TXX as ORSs. Renewed appointments: K9UTQ and W9SZL as ECs; W9APB, W9WJH, WA9RAK and W9RQM as ORSs; K9GDF, K9MKC and W9KCR as OOs; W9RQM, W9NUW, K9UTO and W9YT as OPSs; W9RQM, W9YT, K9GSC, WA9PRW, K9FWF and W9FBC as OVSs. W9KCR had a net result of 32.3 p.p.m. error in the recent FMT. A RPL certificate for Nov. traffic went to WA9GJU. New rigs: WA9VCK, an SB-101; WA9GJU, a Swan 350; and K9UTQ, an SR-160. K9LBQ is operating from Dugway Proving Grounds. Traffic: (Nov.) WA9QKP 491, W9ESI 325, WA9GJU 310, W9DND 264, W9CXY 250, K9CPM 241, WA9RAK 149, WA9QNI 136, K9HJ 109, WA9PKM 63, K9TBY 59, W9DNU 58, K9KSA 54, W9NRP 40, W9AYK 38, W9KRO 30, WA9YCK 26, K9GSC 21, WA9UMT 21, W9RCH 19, WA9SYD 19, WA9TXX 19, W9CBE 16, WA9LRW 14, W9IRZ 12, WA9TUP 10, K9UTQ 8, K9GDF 7, WA9LWJ 6, WA9SAB 5. (Oct.) WA9LWJ 3. (Sept.) K9JPS 41.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopsichke, Jr., W0TCK—SEC: WA9MZV. RMs: KOORK, WA9RRA, PAMs: WA9MMV, WA9HRM. MSN meets daily on 3685 kc. at 0030Z. M/N meets Tue.-Sun. on 3685 kc. at 0100Z. Noon MSPN meets Mon.-Sat. at 1805Z on 3945 kc., Sun. and holidays at 1500Z. Evening MSPN meets daily on 3945 kc. at 2315Z. WA9IEF has resigned the SEC post. Says he was discouraged by lack

of EC interest. We want to thank Gary for the effort he placed in this work. WA9MZV will be our new SEC. Let's all show Harley we are interested and back his plans. Congrats to WA9RRA, new RM for MJN. Our thanks to WA9EPX, who managed this net for the past few years. Appointments renewed: K9ORL as ORS and RM for MJN and to W9PAN for OPS. New officers of the Minneapolis ARC are WA9PVF, pres.; W9IYP, vice-pres.; W9RQJ, secy.; W9GEI, treas.; WA9OOS, WA9CCR, W9ZHN, directors. New officers of the 10,000 Lakes ARC are WA9TOG, pres.; WA9QMP, secy.; Don Wilson, treas. The club call is WA9MIV and meetings are held every Mon. and Wed. at 1:15 P.M. WA9ODB has a new TR-4 on the air. WA9LPR erected a new tower and 15-meter beam. W9OOC has all antennas back up after a windstorm. W9AIH, W9XCR and W9BE operated WA9TO in the recent WW DX Contest. WA9LVG got a new WC-200 rig on the air. W9PAN assisted the Bloomington CD on Hal-lows-eve. WA9PQF is having a ball operating as KG6-AQI in Guam with a Swan 500C and quad. Traffic: (Nov.) KOZRQ 315, W9OMC 192, WA9MMV 162, W9OUMX 104, W9ODB 102, WA9EPX 82, W9OBU 72, KOORK 70, W9FHH 64, K9MIV 58, K9ICG 57, W9TCR 56, WA9QPT 52, WA9ONS 48, K9SRK 41, WA9DPV 35, WA9DFT 33, W9ATO 28, W9ORR 25, W9MFW 23, WA9BWK 22, W9EQO 19, W9OKY 19, W9HEM 17, WA9VHU 16, W9BE 14, K9CNC 14, WA9JKT 14, W9FHO 13, WA9JPR 11, W9AAU 10, K9FLT 9, WA9NAX 9, W9KNR 8, WA9SSN 7, W9BUQ 6, W9KLG 6, WA9NH 5, WA9RKP 5, WA9TLN 5, W9FDK 4, WA9HRM 3, WA9EZO 2, WA9KWO 2. (Oct.) WA9IAW 189, WA9LVG 37, WA9RKF 26, WA9OEJ 15, WA9HRM 11, WA9KWO 6, W9PAN 3.

NORTH DAKOTA—SCM, Harold L. Sheets, W9DM—SEC: WA9AYL. OBS: K9SPH. PAM: W9CAQ. RM: WA9RSR. W9ECX left for Florida and is working portable from the trailer. WA9RWM and ham family spent the Thanksgiving holiday in Iowa, visiting ham friends on the way. W9HBR received a 25-year membership pin from the ARRL. WA9VMA, ex-W9TAZV, is a new Advanced Class Ticket holder in Grand Forks. WA9RRI went into a huddle with K9RSA to make tentative plans for the next International Hamfest at the Peace Gardens in July. K9SPH was in Iowa, too, for Thanksgiving using mobile to report back to the RACES Net. WA9TBR took off for a six-week trip. WA9OVT spent his vacation in Northern Minn. with a good portable signal. K9PYZ made it to Chicago where he is employed by a railroad for the winter. W9WID spent some time in the hospital for eye surgery. W9DM has been keeping weekly skeds with W9TXQ who has been in the Veterans' Hospital in Spokane on 15 meters. K9MSP/O and WA9UKD of the Minot AFB won second high in the nation for Field Day in the one-transmitter and two-operator class. They are doing some 6-meter work and h.f. tele-type work. K9MSP/O worked portable while deer-hunting in the Turtle Mountain area. WA9GRX and WA9MND have the YL Weather Net going again and have about 25 check-ins each morning. K9SOE is in Tucson for the winter.

	Sess.	Check-ins	QTC
N.DAK.PON	13	240	44
YL WX Net	15	309	10
NDRACES	23	704	173

The ND PON meets on 3915 kc. Sat. 1730 CST. Sun. 0000-1730 CST. K9PZK, W9KKS, W9DWC, WA9RRI, NDRACES meets on 3996.5 kc. Mon. through Fri. 1730 and 1830 CST. NCS 1st session: K9ATK, K9TYT, WA9MPT, W9BF and WA9RWM. 2nd session: K9PZK, W9GFE, W9EFJ, K9WYD and W9HJU. YL Weather Net meets Mon. through Fri. on 3995 kc. at 0730 CST. NCS: WA9GRX and WA9MND. Traffic: WA9HUT 250, W9NNM 152, K9PZK 29, WA9UTS 29, W9EFJ 19, W9BF 18, WA9GRX 13, WA9MND 13, W9DM 12, W9DWC 8, W9WVL 8, WA9TBR 7, W9GFE 6, WA9WRM 6, WA9JPT 5, WA9GZA 4, WA9REW 4, W9DGO 3.

SOUTH DAKOTA—SCM, Seward P. Holt, K9TNW—SEC: WA9CPX. RM: W9JPF. PAM: WA9CWW. Net Managers: W9ZWL, W9JPF, WA9LLG, WA9PNB, WA9OYT. Reports are that a goodly number were successful in passing the Advanced and Extra Class tests at Sioux Falls. A new licensee is WN9WBH, at Sisseton. Congrats to K9KXR's NYL on passing the General Class test. The nightly sessions of SDN are proving to be successful. Net reports: WX Net, 403 QNI, NJQ Net, 320 QNI, 226 QTC, 36 informals. Early Session Phone Net, 238 QNI, 19 QTC, 25 informals. Late Session Phone Net, 1265 QNI, 55 QTC, 143 informals. SDN for Oct.: 63 QNI, QNS 16, 7 QTC; for Nov. 110 QNI, 23 QNS, 17 QTC. Traffic: WA9PNB

702, W0ZWL 392, WAQNZ 44, WAOLLG 24, WODVB 20, W0DJO 12, WA0PBL 5.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Schaefer, WA5IIS—SEC: W5PBZ. PAM: WA5PPD. RM: W5NND, WA5KAK is now on the DX bands as GM5AMD and looking for Arkansas contacts. Our section was well represented in the SS Contest. The Razorback Net now meets on 3995 kc. W5HXS and WA5FRU are running a very successful licensing program for the Southeast Arkansas Amateur Radio Club. New hams in Pine Bluff are WA5VIA, WN5VPH, WN5VIM, WA5VW and WN5WCH. W5PBZ made CP-20 and WA5IIS got DXCC 140. Net reports for Nov.:

Net	Freq.	Time	T/c.	QNI	Mins.	Mgr.
OZK	3.790	0100Z	38	242	614	W5NND
APN	3.885	1200Z	8	498	1402	WA5QMQL
Tecunage	3.995	2330Z	29	335	173	WA5QPI
RN	3.995	0030Z	?	?	?	WA5PPD

Traffic: W50BD 690, W5NND 212, WA5KEF 51, W5MYZ 39, WA5QPI 23, WA5OWZ 5, W5PBZ 4, K5VBF 4, WA5TLS 2.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: K5ANS/5. V.H.F. PAMs: WA5DXA, W5UQR.

Net	Freq.	Days	Times/GMT	Net Mgr.
LAN	3615	Daily	0030/0400	W5MBC
Delta 75	3905	Sun.	1330	WA5EVU
LAPON	3915	Sun.	1300	W5KC
LARTTY	3612.5	Sat.	0100	W5GHP
Cen GCHN	3935	Daily	0015	WA5NRG

Yours truly has recovered completely from throat surgery. The OOTC held its semi-annual dinner recently and over 35 attended. The LARC won first place in Class 3A in this year's Field Day activities. W5WAIU was awarded the W5PM Annual La. QSO Party Trophy for his 1968 win. W5CEZ, who has recovered very successfully from eye surgery, got his ticket renewed. Cart, incidentally, was awarded a Certificate of Merit for his outstanding service to amateur radio in the development of LAN over a period of many years. WA5NDW, WA5QOB, K5ARI, WA5OIH and others really came through with loads of activity during the SS Contest. According to the information received here La. hams with call plate licenses should have their annual inspection in April. According to WA5QVN, the Twin City ARC visited a TV station as a meeting activity. WA5SXE has built a new s.s.b. rig. K5UAR/5 and WA5WBZ, new to LAN, are pounding the brass. According to K5WOD, WA5FRU divided his time between working toward his pilot's license and ham radio. W5ERR, now retired, spends most of his time chasing DX and v.h.f. propagation! Traffic: W5KRX 137, W5CEZ 136, K5ANS/5 87, W5MXQ 86, W5EA 10, W5PM 10, WA5QVN 8, WA5OJG 1.

MISSISSIPPI—Acting SCM, Clifton C. Comfort, WA5KEY—The Gulf Coast Side Band Net Semi-Annual Dinner was its usual success. The MSBN has moved its net frequency from 3947.5 to 3900 kc., same time, 0015Z daily. The most prominent reason for the move was to be in close proximity of the Miss. RACES Net. Nearly all are members of both nets thus giving Mississippi the benefit of using two nets without retuning during any "natural" disaster. Congratulations to WA5JWD on being appointed RACES Radio Officer in his county. We welcome WA5WJP, who was WA6DIX to Mississippi. Keeler ARF AR Pres. WA8WNK/5 transferred to Craig ARF; Selma, Ala. WA5SKI, a housewife and student takes 17 hours of math, is on the Dean's List and still finds time to run 6 sprints a week with Okinawa and Guam for CAFB MEN. New Advanced Class holders: WA5SEG, WA8RXV and WA5UIH. W5BW, vacationing in Fla., is missed in our net activities. Traffic: K4RIN/5 44, WA8WNK/5 35, WA5PTE 18, WA5SIM 5.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. RM: WA4YEM. PAMs: W4PPF, WA4YBT, WA4EWW, WA4CRU.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980	Tue.-Sun.	0030Z	26	1440	115	WA4YBT
TPN	3980	M-Sat.	1245	30	1143	151	W4PPF
		Sun.	1400				
ETPN	3980	M-F	1140	21	527	54	WA4EWW
TCN	3980	Thurs.	0200	4	34	1	W4TVY
TPO	3980	Mon.	0030	4	101	7	K4RTA
TN	3635	Daily	0100	30	243	99	WA4YEM
TFN	7290	Daily	2200	30	399	78	WA4CRU

ETVHF 50.4 Tu-Th-St. 0000 13 173 1 WA4TJ
ETVHF 145.2 W&F 0000 8 39 1 WA4TJ

W4HHK and WA4HG have been conducting over-the-horizon tests on 2304 Mc. over a distance of 117 miles. WB4FT may have some WNs in his family soon. All appointees are requested to send a report in for January as an indication of your continued interest in the appointment. ECs should report the SET activities in your area to SEC W4WJH. I would appreciate any comments or suggestions that you would like to have presented at the next Delta Division meeting of Director, Asst. Directors, SCMs and SECs. Those interested in ORS or OPS appointments should contact the RM or PAM. For EC appointments contact the SEC. For other appointments contact the SCM. Endorsements: WA4TJJ as GVS. Appointments: WB4ANX, K4RUC, WB4JTS as ECs; WA4UAZ, W4KQL as ORS. Traffic: K4AT 161, WB4ANX 139, W4KQL 123, W4SQE 110, WA4UAZ 57, WA4NEC 50, WB4WBK 40, W4AGLS 33, WB4HYV 32, WA4TWW 22, WA4JTI 21, W4PPF 10, WB4JFT 17, WA4VYV 17, K4LTA 16, WB4DYJ 13, W4TVY 13, WA4CGK 12, K4RTA 12, W4OQG 10, K4UMW 8, W4CYL 7, WB4EHK 6, WA4EWW 6, W4WJH 6, WA4YON 4, W4VJ 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Appointed: W4OTP as PAM (FCATN): WB4CTV as EC. Endorsed: WB4FOT as OBS. WA4OMH as GVS. Traffic totals trend up with occasional exceptions (like Nov.).

Net	Freq.	GMT	QNI	QTC	Mgr.
KRN	3960	1130	318	30	K4KIS
MKPN	3960	1330	503	101	K4TRT
KTN	3960	0000	1001	135	WA4AGH
KYN	3600	00+0300	484	548	W4BAZ
FCATN	50.7	0200	74	43	W4OTP

Your new PAM for FCATN is ex-K3TVX, recently retired from the Army. The net meets TWFS. WN4IWI finally got on 15—and on 15, WN4IZY bagged a legit VQ9 thereby greening up the eyes of some DXers of note. MARS rifles have been boosting the traffic totals and creating lots of good will; one message recipient recently drove clear across Owensboro to personally thank the operator who had delivered him a message from his son. Insist on a proper check count before receipting for a message. It sure helps reduce garbles. Traffic: (Nov.) WA4DYL 737, WN4LO 525, WB4BAZ 227, WB4HU 123, WA4WVW 122, K4HOE 108, W4OYI 74, WA4VZ 67, WA4AGH 63, WB4HQW 63, WANBZ 57, K4TRT 53, WB4EOR 51, W4UK 50, K4MAN 45, WB4AIN 40, WA4UAZ/4 34, WB4EQU 30, W4VYS 30, W4CDA 25, K4YDO 24, K4AVX 21, WB4FDK 20, K4UMN 20, WA4UHR 19, W4KJP 15, K4OEX 15, K4NYO 9, WA4UIH 2, (Oct.) K4TRT 107, K4DZM 90, W4SZB 13, W4VYS 12.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ, W8IXJ. PAMs: K8GOU, K8JED. V.H.F. PAMs: W8CVQ, W8YAN. After 10 years your SCM "retires" as of 4/29/69, so get your petitions in now for your next SCM. None for W8FX, please. Appointments: W8DCT, WA8VXE as ECs. Silent Key: WA8QFC. Net reports:

Net	Freq.	Time	Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	969	570	90	W8FWQ
WSSB	3945	2400	Dy	858	129	28	K8WRJ
PON-DAY	3945	1600	M-Sat.	353	265	24	K8LNE
R/R-MEN	3930	2300	M-Fri.	865	103	25	K8LJS
PON-CW	3645	2400	M-Sat.	89	13	26	W8DPO
GLETN	3952	0230	Dy	922	76	30	WA8ON
M6MTN	50.7	2400	M-Sat.	288	33	26	WA8LRC

New officers: Motor City RC—WA8DHP, pres.; WA8IML, vice-pres.; WA8VIF, secy.; K8ZJU, treas. HPLers: W8IXJ, W8IHD. K8CII is well over his heart attack. K7NLG/8 is back from Thailand. K8JJP is back in the Michigan Legislature. W8AMS again is TAWAS Reg. of Deeds. W8GZF sold gear but will be back on soon. WA8ZPH is doing well in QMN. W8DSE has an HW-100. W8MPD plans for the AREC meet at the Grand Rapids Convention. W8OWG is changing his QTH. Genesee County RC station W8ACW now has moved to the new Red Cross Building. WA8ZBQ wants a chess partner on 1830 kc. K8VFR has a new baby girl. WA8UNR has a new 40-ft. tower. W8KAZ blew the top insulators on his Hy-Tower—with less than a kw? WA8SIQ has a regular sked with WB4JNP, ex-WA8VGA, on 21,300. WA8RQI had his mobile rig stolen a second time, while in the police

parking lot! The Central Michigan ARC has its repeater from a 340-ft. tower in the Lansing area. K8-MFO is now in Vietnam. The CMARC and the Muskegon Area ARC have their code and theory classes going. Muskegon ARC also handled election reports from outlying townships. New officers: Saginaw Valley ARA—W8QQK, pres.; K8IIB, vice-pres.; WA8ILU, secy.; K8LNR, treas.; WA8GRI, trustee. Traffic: (Nov.) W8IXJ 525, W8HED 359, K8KMQ 352, K8LNF 250, WA8SQ 208, W8DET 168, W8QQK 161, W8NOH 150, W8GAI 143, K8ZJU 125, W8JTQ 96, K8GOU 92, WA8ZPH 82, K8JED 66, W8MO 65, W8RFX 53, K8HKM 50, WA8OGR 48, WA8MGM 34, K8MXC 32, WA8ONZ 30, W8YAN 28, W8TBP 25, WA8UPB 24, W8UFS 21, W8FWQ 18, WA8ZAV 18, W8TUC 14, WA8-QCQ 12, WA8VGQ 12, WA8LRC 10, WA8KRH 8, K8-IDA 8, W8BW 7, WA8MCO 5, W8WVL 5, W8DSE 4, W8MPD 4, W8OWG 3, WA8VBL 3, WA8WGM 2, W8-AAM 1 (Oct.) K8MXC 72, WA8MCQ 70, WA8LAY 4, WA8QCW 1.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU, RM: W8IMI, PAM: K8UBK, V.H.F. PAM: WA8ADU. Oct. traffic net reports:

Net	QNI	QTC	Sess.	Freq.	Time	Mgr.
OSSBN	1704	977	56	3972.5	2345Z	K8UBK
BN	558	492	60	3580	0000 & 0300Z	W8IMI
OSN	161	90	28	3580	2325Z	WA8VNU
06Mtr. N	259	50	30	50.6	0000Z	WA8ADU

BPL certificates for Nov. traffic went to W8UPH, W8LT and W8OUU; Net certificates (06MtrN) to K8-IDG, WA8YHN, WA8WJR, WA8JJD, K8CKY, WA8-JEH and WA8JSW. Congratulations to new Advanced Class licensees WA8UIH, W8IMX, K8AAV and WA8-VKN. Welcome to the newly affiliated Vandala-Butler MARS Amateur Radio Club. New officers of the Buckeye Ratcheters are WA8VBK, pres.; K8USW, vice-pres.; WA8JUV, secy.; WA8OKI, treas. New officers of the Canton chapter of the OCWA are W8EHR, chmn.; W8NBE, vice-chmn.; W8NAT, secy.-treas. W8DAE reports that the Traffic Hounds Morning Watch has terminated after many years. The Queen City Emergency Net provided communications for the Muscular Dystrophy drive in Cincinnati. Stark Co. EC K8DHJ is now Civil Defense Radio Officer. K8ONA reports the arrival of jr. operator No. 4—a YL, W8YGR received his DX pasteboard for confirmed country No. 300. Nov. appointments: K8EHE as OO, W8GDQ as OBS, WA8YHN as OVS, W8UX as OPS, W8BBB and WA8-RQQ as ORs. K8ONA reports that 13 members of the Apricot Net provided communications for the Muscular Dystrophy Drive in Cleveland. W8IO announces the start of an Ohio Slow Net Novice Section daily at 1930 local on 3709 kc. Contact W8IO or W8IUS for details. Seventy messages were received for the Phone Sweepstakes and 61 reporting e.w. activity. Columbus' CARA's new officers are K8EJU, pres.; W8ELE, vice-pres.; W8BACF, secy.; WA8UQL, treas. WA2WEA tells us that W8TNO was Ohio section winner of the N.Y. State QSO Party. During Nov. I visited the Intercity RC in Mansfield, Brunnerdale and Canton ARCs in Canton, Ohio State University RC in Columbus, Westpark RC in Cleveland, Chippewa RC in Brecksville, and the Greater Cincinnati ARA. WA8CPT, chairman of OCARC, presented an award for the best news coverage on behalf of amateur radio to the *Mansfield News-Journal*. The many club bulletins I receive indicate that the clubs that take part in OCARC activities are doing a good job in getting their members to vote on the several proposals made at the last OCARC meeting. A worthwhile quote from SEARC (Cleveland) *Ham-Pax*. "... realize that OCARC speaks for SEARC in absentia. Regardless of the pros and cons, I once again strongly urge representation. . . ." It would be nice if more of the local nets would send representatives to the section nets. Traffic: (Nov.) WRUPH 1598, W8IMI 358, W8LT 241, W8STV 227, W8OUU 165, WA8VNU 161, W8SZU 136, WA8FSX 135, W8QCQ 126, WA8LAM 125, W8UDG 124, WA8UTX 121, W8RED 119, W8GVX 118, W8RYP 118, W8OZK 107, W8FGD 106, W8ETU 104, W8WLD 102, W8FRV 102, K8ONA 100, WA8SED 92, WA8QFK 85, W8VND 85, WA8PPK 84, W8PMJ 81, WA8CXV 74, W8OFE 73, W8TJ 69, K8-URK 68, W8CHT 66, WA8RQQ 62, WA8CXV 58, W8-GOE 57, W8DAE 55, K8BYR 50, W8CWO 49, K8VCW 48, K8QYR 45, W8VND/4 45, WA8ADU 42, W8HNP 39, W8WLD 35, WA8SX1 34, WA8SP 33, W8WUD 33, W8EFF 32, W8LRE 32, WA8MCR 30, WA8MHO 28, WA8GRR 26, WA8OCG 25, W8HII 24, W8IUS 24, K8-DDG 22, W8NAL 22, WA8YHN 21, W8AAJZ 20, W8B-BZX 20, K8LXA 19, WA8JM 18, W8OQX 18, W8RBB 16, W8DQD 14, WA8WTK 11, WA8JEH 8, K8WZI 8, W8AJW 7, W8ELE 7, WA8MTS 6, W8YGR 6, K8CKY

5, K8DHJ 5, K8DMZ 5, W8DYF 5, K8LFI 5, W8AEB 4, WA8AQH 4, WA8COA 4, WA8UPI 4, W8LAG 3, K8-ONQ 3, WA8SRQ 3, W8GRT 2, WA8JSW 2, W8WEG 1, WA8WJR 1, W8WUO 1. (Oct.) W8DAE 40, K8SUB 10, K8DMZ 5, W8AEB 3.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN—Asst. SCM: Ruth Rice, WA2VYS. SEC: W2-KGC. PAM: WB2VJ, RM: WA2VYS. Section nets: NYS, 3765 kc. nightly at 0000Z; ESS, 3590 kc. nightly at 2300Z; NYSPT&EN, 3925 kc. nightly at 2300Z. On the club circuit: W2WIY spoke at the Nov. meeting of the Westchester County ARA. W2YM was at the Communications Club of New Rochelle Dec. meeting. Nov. heard Gerry Morris of NYTel on Microwaves. Note the time and date change (again) for the WARA Technical Net, which is returning to 29.690 Mc. at 0100Z Thurs. New equipment will be arriving for K2YJC, New Rochelle Club station, which will soon be active on 80 through 2. Individual activity reports: WB2UHZ, HARC Convention "Miss Amateur Radio" was featured in the magazine section of the *Sunday N.Y. News* Nov. 24 as the result of hard work by WB2PYZ. SS reports were received from WA2BHN, WB2YBQ, WB2-DRW for W2SZ, WB2SH, W2DXL and WA2CRW, WB2GXF reports the E.N.Y. Section V.H.F. Trophy goes to W2JKI for first place in the June V.H.F. Contest, with WB2CWA, WB2YQU and WB2GXF making the award on 12/1. WB2RBG, in Albany, reports working W4, W9, W0 and VE4 via sporadic E in Nov. and Ws 1, 2, 3, 8 and 9 and VEs 1, 2 and 3 during the aurora. Look for Asst. SCM WA2VYS/mobile on 75 and 40 s.s.b. If you're interested in contests or DX, contact WA2OJD or W2DXL re E.N.Y. organization to foster these two activities. Late congrats to WA2BHN on making the BPL in Oct. with a total count of 510. All stations, please send in traffic reports, etc., to reach the SCM by the seventh of each month for this column. WB2YQU is making progress on a 220-Mc. f.e.t. converter. Welcome to WN2HSF, now becoming active on the traffic nets (e.w.). A Section Net certificate for ESS was issued to WA2BUE. We are very sorry to hear that W2MXH has joined the Silent Keys. Net traffic for Nov.: ESS 245, Traffic: (Nov.) WA2BHN 348, W2EAF 215, WA2VYS 189, WA2VYT 109, WA2CRW 105, WB2SH 75, WB2RBG 65, K2SJN 42, W2ANY 30, W2-TPV/2 22, K2YJC 17, W2FOA 16, W2BIO 7, WA2-QEG 3, W2HFW 2, WB2YQU 2. (Oct.) WA2BHN 510.

NORTHERN NEW JERSEY—SCM, Louis J. Amoros, W2ZZ—Asst. SCM: Edward F. Erickson, W2CVW. SEC: WA2ASAP.

ARPC Section Net Schedules.

Net	Freq.	Time	Days	Sess.	QNI	T/c.	Mgr.
NJN	3695 kc.	7:00 p.m.	Dy	30	409	351	WB2DDQ
NJSN	3740 kc.	8:00 p.m.	Dy	20	66	20	WB2RKE
NJEPTN	3929 kc.	8:00 p.m.	M-Sat.	30	621	261	W2PEV
NJPON	3930 kc.	6:00 p.m.	Sun.	4	55	27	WA2TEK
NJAN	50,300 kc.	8:00 p.m.	M-F	21	314	61	WA2KTFZ
PVETN	145,710 kc.	7:30 p.m.	Dy	30	337	299	K2KQD
ECTN	146,700 kc.	9:00 p.m.	Dy	30	338	195	WA2TBS

RMs: WB2DDQ and WB2RKE, PAMs: W2PEV, K2-KDQ, WA2KZF, WA2BTS and WA2TEK. New appointment: WB2WNZ is OPS. Endorsements: WA2-KZF as PAM and OVS. OO reports: W2TPJ 26, W2BYE 23, W2JDH 13. New officers of the West Morris ARC are WB2VFX, pres.; WA2EUX, vice-pres. Now that the call letter license plates are on the road, may I suggest you send Assemblyman W2VJH, who made it all possible, a "thank you" note. WA2CUR put his quad up. WB2DYB has a new Swan 400. WA2TAF reports his RTTY gear is in operation. W2CVW plans to use a Varactor for a tripler to 432 Mc. W2JDH and WA2CCF sent in reports for the Nov. FMT. WA2CRF is planning RTTY. School work has both WB2AMV and WB2BKC QRL. W2NVA lost his 2- and 10-meter beam during the Nov. storm. WA2DMF is putting the HW-100 together. WB2DGL has a dish for a 1296-Mc. Moonbounce try. WN2DPV has 4 countries confirmed toward WAC. W2JDH has put up homebrew stacked Big Wheels for 144 Mc. WA2DQE is waiting for the cards for his WAC and WAS. K2SBW received his Advanced Class license and is now in the A-1 Operators Club. WB2VFX passed the General and has a 150-watt rig ready. WN1IZT/2, WN2GGN and WN2EGR are now General Class. WB2FNG is a new General in South Orange and is chasing DX with a HT-46 and a two-element beam. WA2BCT received his Advanced Class license. WB2FEH and WB2SOR passed the Advanced Class exam. WA2EUX is using a new homebrew 120-watt c.w. rig. WB2EYC reports having TVI problems. WA2AMM received first-place certificates for both the Washington and Georgia QSO Parties. W2-BSC's group added the R4R to the setup. WB2DRJ received his WAC phone. WA2CKS is planning for an

s.s.b. transceiver after receiving his Advanced Class license. WB2DRJ and W2ZZ plan to flip a coin to decide who is in what week end of the ARRL DX Contest. Traffic: (Nov.) WA2IGQ 626, WB2RKK 495, K2-DEL/2 309, WB2DDQ 268, K2BKQ 257, WA2TBS 246, WB2NSV 132, WB2WNV 108, WB2AMV 88, WA2SCF 83, WA2CRF 78, WA2ACJ 68, WB2BKK 62, WB2ZSH 61, WA2CAP 48, W2ZZ 37, WB2TUL 36, W2CVV 33, W2-PEV 28, WA2KZF 22, WA2BCT 21, WA2NJB 20, K2-DEL 19, K2ZF1 17, WB2DYG 12, WA2EUX 11, K2ITY 10, WB2YXY 10, W2DRV 9, W2EWZ 9, W2LDH 9, WA2DQE 8, WB2FEH 8, W2OV 8, WA2BAN 7, WB2-BCS 7, WA2GIE 7, WA2GLI 7, K2MIF 7, W2TFM 6, WB2BK 5, K2PBP 5, WB2DRJ 4, WN2GKI 4, W2-ABL 2, K2QJ 2. (Oct.) W2CVV 35, WB2TUL 31, W2-DRV 11, WA2GIE 6, WB2SC 5, WA2FEH 1. (Sept.) WB2JWB 28.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, KOMHX—SEC: KOLVB. PAM: WOPZO. RM: WOLGG. OBS: WOLCX, W0JQA, WAOMIT. Officers of the recently-chartered club at Goldfield are WOMOW. pres.: WN0-WDY, vice-pres.; WA0TJD, secy.-treas. Classes are held twice weekly for prospective hams. New licenses are WN0UZH, WN0VEK, WN0VTJ and WN0WDY. WAORXQ is attending Iowa State and WAORXR is at Luther College. K0GEY is building a 44-element Yaqui for 432 Mc. K0EUKN was high scorer in the Phone Sweepstakes with all 75 sections. WAOSDC got all sections in both c.w. and phone. K0AZJ also worked 'em all on c.w. Another good scorer on both modes was K0YVU. W0JQA reports KORZO-W0ZMU-ICIRI suffered severe burns at HCJB, Quito, Ecuador, but was improving at last report. WA0TE is looking for the last confirmation to complete 40 zones. K0AZJ, W0DIT and K0TDO participated in the Nov. PMT. Dave averaged 4.4. National Convention chairman is W0UDO. Lee reports registrations are coming in already. Watch for full details in an early issue of QST. W0DDW has a new home-brew keyer. Bill has made and sent etched circuit boards to several friends. The Fertilizer Net Board members enjoyed a pre-holiday dinner meeting with K0BND.

Net	Freq.	Day	GMT	QNI	QTC	Mar.
Iowa 75	3970	M-Sat.	1830	1112	142	WOPZO
Iowa SSB	3970	M-Sat.	2350			W0YLS
Iowa 160	1815	Daily	0100	700	9	K0TDO
TLCN	3560	Daily	0030	128	121	K0AZJ
PON	3915	W & F	0030	89	30	WA0DYV
PON C.W.	3697	Tue. Sat.	0030	37	4	WA0DYV

Traffic: W0LXC 913, W0LGG 96, W0DIA 85, WA0-DYV 77, WA0JUT 56, K0KAQ 37, K0TDO 30, WA0-MIT 22, W0JJP 15, K0TPT 12, WA0AD 11, WA0-AIW 8, K0JGJ 8, WA0TE 6, WA0EFN 4.

KANSAS—SCM, Robert M. Summers, K0BXF—SEC: K0EMB. PAM: K0JMF. RM: WA0JFV. V.H.F. PAMS: WA0CCW and WA0LSH. The hams of Kansas extend their deepest sympathy to the families of K0MEJ and W0VRZ. Silent Keys. New appointees are K0LHE as OO and W0GU as EC Zone 9. A late report for Oct. from K0EMB showed Zones 7, 13 and 15 low-band AREC nets combined for a total QNI of 136 and QTC 6. Kans. Wx. Net reports QNI 685 and QTC 175. The amateur radio operators of Hiawatha provided that town with communications for its 54th Annual Halloween Parade Oct. 31. Also a message center was set up to receive messages as a public relations point for amateur radio. Sweepstakes messages were received from the following: C.W.—K0PFV, K0FPC, W0QQQ, WN0TAS, W0CHJ, W0INH and W0LYC. (The highest score submitted was W0INH's—1468 contacts in 72 sections for a total of 67,392 points.) Phone—W0INH, W0LXA, K0PFZ, WA0VDO, W0QQQ, WA0THQ and K0BXF. (Highest phone total by W0LXA—479 contacts in 70 sections for a total of 67,060 points.) Zones 7, 9, 10, 13, 14 and 15 are doing fine jobs on their low-band AREC nets with QNI 284, QTC 7 in 30 sessions. As of Dec. 1 the AREC membership stands at 480 members registered. Why not drop K0EMB or K0BXF a card asking for details. Net reports for Nov. (first figure QNI, second QTC): QKS—137/20; Ks PI Net 64/5; Ks WX Net 701/119; KSNB 784/205; KPN 225/26; KSPON 977/922; Ks EC Net 43/0; HBN 552/70. WA0BHG, net mgr. of HBN is reported recovering after a heart attack. Late report (Oct.): KPON 974/1164. V.H.F. nets reported QNI 120, QTC 22 with Zone 7 averaging 11.8 QNI per session. Traffic: W0INH 202, W0LXA 182, K0HGI 167, WA0LLC 158, W0PSN 153, WA0LBB 151, WA0NFP 125, W0QQQ 104, K0JMF 96, K0BXF 89, W0CGZ 125, K0JDD 40, WA0NDZ 39, WA0QWH 31, K0GIT 27, K0GZF 26, K0MRI 25, W0BXC 18, WA0QZP 18, K0UVH 18, WA0CCW 17, W0HI 16,

W0ICV 16, W0FI 15, WA0KPE 15, WA0JOG 14, WA0SHG 11, WA0THQ 10, W0FDJ 6, W0SPF 5, W0CLJ 1, W0LYC 1.

MISSOURI—SCM, Alfred E. Schwaneke, W0GS—SEC: W0BUL, WA0HTN received ORS appointment. W0KIK and W0UOD renewed ORS appointments. New Officers of the St. Louis ARC (K0LIR) are WA0CNS, pres.; WA0GGE, vice-pres.; WA0KMF, secy.; K0HUO, treas. New officers of the N.E. Mo. ARC, Kirksville, are K0EMF, pres.; WA0ELM, vice-pres.; W0BY, secy.-treas.; W0YRL, act. mgr. Net control stations for MossB Net are K0BTD, WA0-EMS, K0HNE, K0ONK, K0RPH, W0RTO and K0VH. K0LGZ is now living in Md. with the call W3IWP. W0KCG was winner of the 1968 N.Y. QSO Party. WA0BJR in Springfield is a new regular on MON, and is recovering from a broken leg. WA0KMF passed the Advanced Class test. K0AEM, K0RPH and W0TDR passed the Extra Class examination. W0EEE displayed the new operating console on campus during University Day at UMR and originated traffic for the visitors. The PHD Net on 50.45 each Mon. night has had 135 individual stations in 4 states report in. In the last 10 months they have had 963 check-ins and, at present, PHD is the largest 6-meter net in the K.C. area. PHD ARC will be starting code and theory classes again at the first of the year. SS messages were received by the SCM from W0BY and WN0UAM. An OVS report was received from WA0-ITU. Net reports for Nov.:

Net	Freq.	Time	Days	Sess.	QNS	T/c.	Mgr.
MEN	2885	2300Z	M-W-F	13	143	5	W0BUL
MoSSB	3963	2400Z	M-Sat.	26	814	848	W0RTO
MNN	7063	1900Z	M-Sat.	25	64	12	W0UOD
SMN	3585	2200Z	Sun.	4	7	5	W0UOD
MoPON	3930	2100Z	M-F	25	79	34	W0HVJ
PHD	50.45	0130Z	Tue. (GMT)	4	87	8	WA0KUH
MON	3585	0100Z	Daily	—	—	—	K0YBD

Traffic: (Nov.) K0ONE 2203, WA0HTN 228, W0UOD 125, WA0QXG 123, K0RPH 121, WA0BJR 102, K0AEM 99, K0VHV 59, WA0EMS 40, W0BY 37, W0RTO 34, W0EEE 25, WA0KUH 21, W0BUL 19, K0ORB 18, W0BVL 7. (Oct.) WA0EMS 68.

NEBRASKA—SCM, V.A. Cashon, K0OAL—SEC: K0ODE. Monthly net reports for Nov.: Nebr. Storm Net, WA0LOY, 0030Z session, QNI 122, QTC 156; 0130Z session, QNI 785, QTC 56. Nebr. Emergency Phone Net, WA0GHZ, QNI 1020, QTC 365. Nebr. Morning Phone Net, WA0JUF, QNI 1130, QTC 68. West Nebr. Phone Net, W0NIK, QNI 573, QTC 19. AREC Phone Net, W0IRZ, QNI 160. AREC C.W. Net, WA0EEI, QNI 11. Nebr. C.W. Net (NEB), WA0HWR, 0100Z session, QNI 85, QTC 17; 0400Z session, QNI 169, QTC 43. 160-Meter Phone Net, WA0CJB, QNI 523, QTC 8. WA0IXD and WA0UER now are operating Galaxy 5s. W0LVO is studying for Extra Class. New Pine Ridge ARC officers are K0OAL, pres.; W0BFN, vice-pres.; WA0JKN, secy.-treas.; WA0PIF, act. mgr. If you are not already an AREC member, become one by contacting your EC or K0ODE. Traffic: (Nov.) WA0BE 419, WA0DOU 410, WA0-CHZ 390, W0HTA 242, W0LOD 116, WA0LY 61, K0JTV 53, W0FQB 48, WA0HWR 47, K0KJP 38, W0QLE 38, WA0CJB 32, K0HNT 28, K0JFN 28, WA0IMG 23, K0ATE 27, K0FRU 26, W0NIK 23, W0BFV 22, WA0BOK 20, K0OAL 18, WA0GVJ 17, W0AGK 14, WA0JH 14, K0ODF 13, WA0PC 13, WA0OHO 12, W0VEA 12, K0DGV 11, W0HOP 11, WA0EEI 10, WA0JUF 10, WA0PF 8, WA0KG 7, W0FV 6, WA0LXD 6, WA0PSN 6, W0BFN 5, K0JPP 5, WA0BL 4, K0PTK 4, K0SFA 3, WA0-BSX 2, WA0IK 2, WA0JKN 2, K0ODH 2, W0YFR 2, WA0NYM 1. (Oct.) WA0GVJ 22.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNassor, W1GVT—SEC: W1PRT. RM: WA1HSN. PAM: W1YBH. V.H.F. PAM: K1SXF. Net reports for Nov.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	30	343	420
CPN	3880	M-S 1800	Sun.	1000	30	558 369
YHF 2	145.98	M-S	2300	21	111	106
YHF 6	50.6	M-S	2100	21	207	85

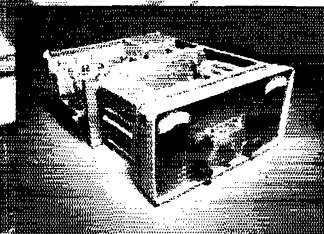
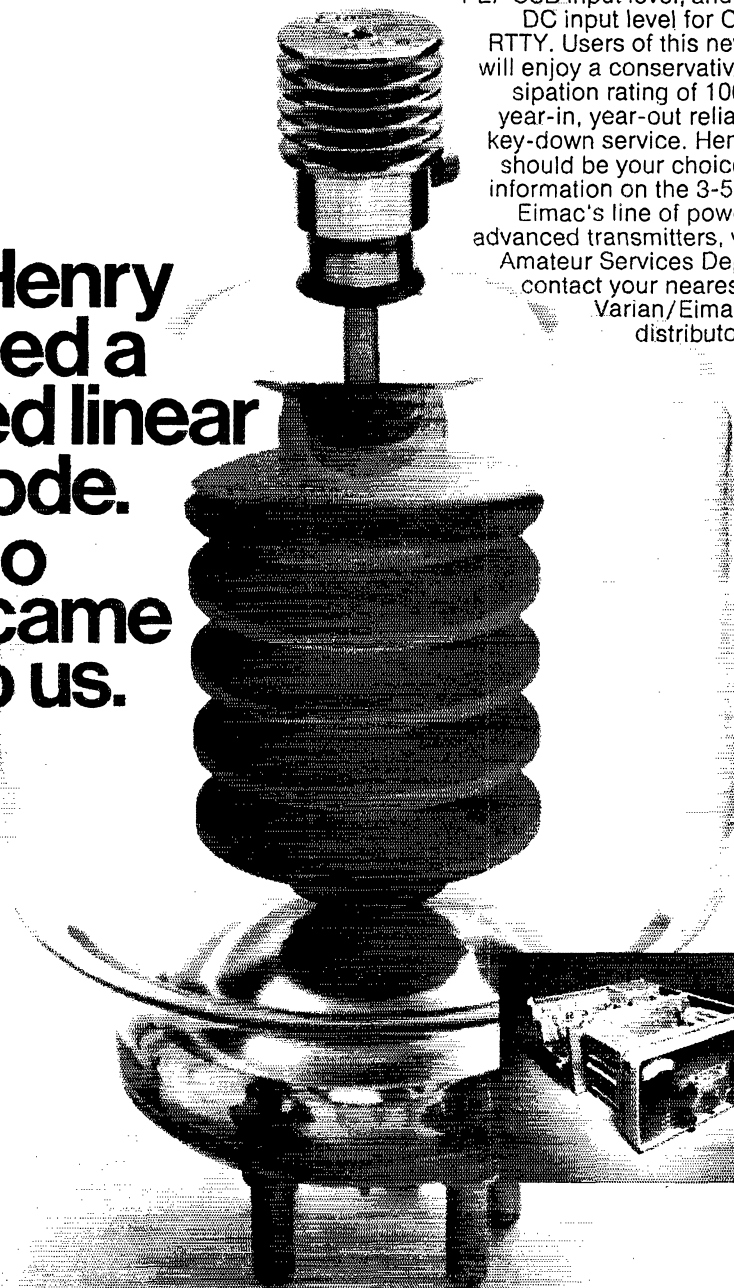
High QNI: CN—WA1HL, WA1GN and WA1HSN, CPN—W1GVT and K1SXF 30, WA1FXS 25, WA1HEW, W1NBP and W1YBH 24, K1YGS 23, WA1HOL 22, W1LUH/WA1JYK and W1YU 18, K1TXG 11. SEC W1PRT vacationing with KIIF sends a fond Aloha from K1H-Land to all ECs and urges your continued support. The Talcott Mt. U.H.F. Society welcomes new members with an interest in u.h.f. operation. Contact W1HDQ for more information, Southampton

**Ted Henry
needed a
rugged linear
triode.
So
he came
to us.**

Two rugged Eimac 3-500Z high-mu triodes are featured in Henry Radio's new 2K-3 linear amplifier. Henry designed the amplifier around versatile Eimac power tubes because these popular triodes are ideal for grounded-grid operation at the 2 kW PEP SSB input level, and at the 1 kW

DC input level for CW, AM and RTTY. Users of this new Henry rig will enjoy a conservative plate dissipation rating of 1000 watts for year-in, year-out reliability under key-down service. Henry's choice should be your choice. For more information on the 3-500Z and on Eimac's line of power tubes for advanced transmitters, write Eimac Amateur Services Department or contact your nearest

Varian/Eimac distributor.



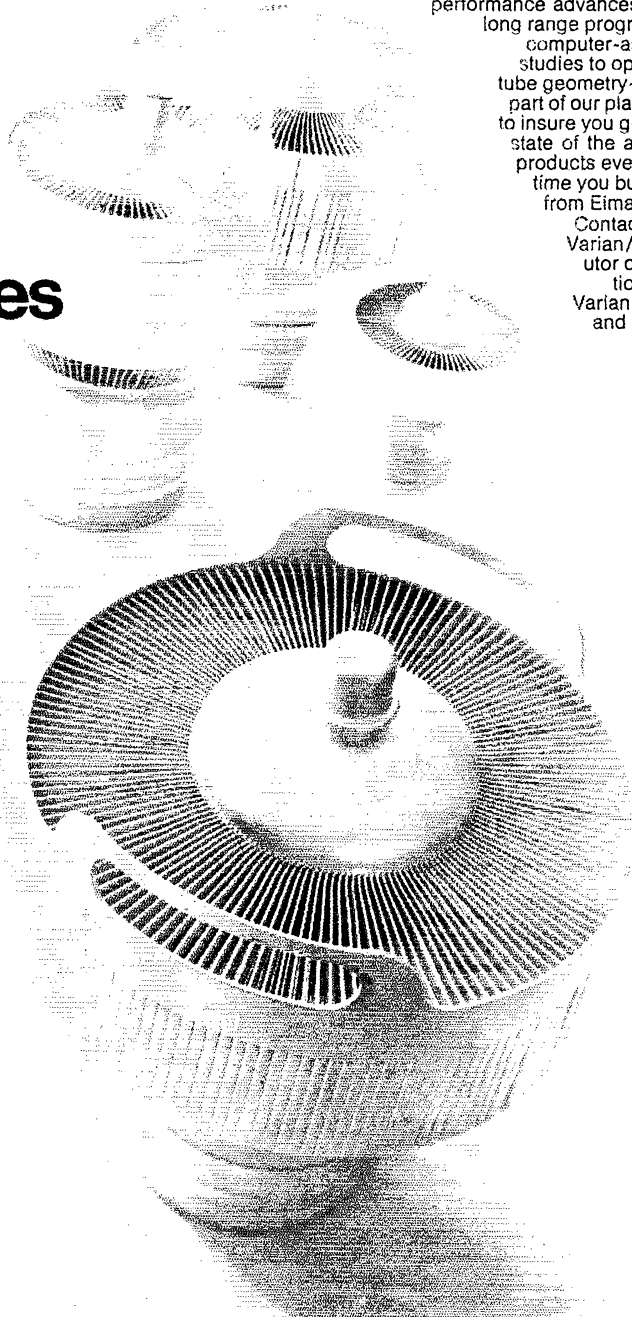
In the power tetrode field we're defining the state of the art by demonstrating intermodulation distortion better than any other known tubes. In 1966 we introduced the 4CX1500B, a 1.5 kW tetrode with the highest linearity then known: better than -40 dB 3rd order IM distortion. Since then we produced the 4CX600J, a 600 watt tube with -45 dB 3rd order IM products—without feedback—and later a 5 kW tetrode with the same figure. Now the latest tetrode in our program, a 15 kW tube, exhibits -40 dB 3rd order IM products. We can show IM distortion improvements from 10 to 20 dB in a practical quiescent plate current range.

Other tetrodes now under development will deliver up to 40 kW with linearity as high as -45 dB IMD, according to preliminary data. Such performance advances are part of a long range program employing computer-assisted design studies to optimize internal tube geometry—all part of our plan to insure you get state of the art products every time you buy from Eimac.



Contact your nearest Varian/Eimac distributor or ask Information Operator for Varian Electron Tube and Device Group.

**No tetrodes
with higher
linearity.**



ARA's new officers are W1AGJ, pres.; W1GVZ, vice-pres.; W1EFW, secy.; W1IOB, treas. The *Candlewood Newsletter*, *One KVN Bulletin* and the *CN Natmeg Net News* contain a wealth of information. Clubs can benefit from a monthly newsletter. How about your club? The Third Annual One Land QSO Party will be held Apr. 26 and 27. Contact K1VGM for complete information. Net activity indicates the need for more outlets in all parts of the state. Please urge your club to provide outlets for your area daily. 10, 15 and 20 meters offer good possibilities for amateurs in the armed forces to work stateside. Please make it a point to look for them. Congratulations to: W1AFNJ on Extra Class; W1AGGN and W1IHOL on Nov. BPL; and W1EBO, W1QV and W1YU on FMT participation. The 2- and 6-meter nets are ideal for late evening traffic. Please join in the fun! Traffic: (Nov.) W1EFW 486, W1AGGN 310, W1AHSN 297, W1AHEW 259, W1YU 253, K1SXF 214, W1AW 178, W1AIHOL 168, W1ARR 139, W1GWT 137, W1AFNJ 54, W1BYB 50, W1BDI 48, W1AHEK 45, W1AIGX 38, W1AIEG 33, W1AIPX 23, W1QV 14, W1ICTI 13, W1AIDJG 10, K1YGS 9, W1OBR 7, W1BNB 6, W1CUB 6, K1UDD 5, W1AUCX 4, W1BCWE/1 3, W1AIGEK 2, K1TKS 2. (Oct.) W1AFNJ 166.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—With regrets we report the following Silent Keys: W1s SGL, MCR, UOC, K1FYI and ex-1PX, an old friend of W1NF. Ex-W1QOI, here on a visit, landed in the hospital. Heard on 75: W1s NA, SE, DJJ, K1PBF, W1HA and W1AICO have HW-17s and W1ALP will have his on soon. W1QFO is in Navy MARS on 2. K1AVS is becoming active again. W1KEY, in Boston, is K3QNT. K1LZV is on 160. W1AJJY, Lowell Tech. ARC, is on the air. The Whitman ARC had an auction. W1AU is chief engr. WOKW and a newsman. W1HRY is on 80 c.w. K1BR is back from Florida. W1AEC has a new beam for 6. W1NF helped out in the Santa Parade for the c.d. K1JRE/1 has a new integrated circuit keyer and will be on with an HW-16. W1A1TR/1 has automatic antenna t.r. change-over. The Wellesley ARS had a demonstration of Computer Graphics by K1PRB in Boston. W1OJM, W1PEX, W1AEYY and K1PNB made the BPL. K1PNB has a new tower for the 80 antenna. W1AHHK has his Advanced Class license. W1MX is on 6-meter s.s.b. W1VAF has a two-element Tribander beam. W1s AYG and BGW took part in the Nov. FMT. The 6-Meter Cross Band Net had 16 sessions, 83 QNIs, 3 traffic. EM2MN had 21 sessions, 144 QNIs, 151 traffic. SEC W1AOG received reports from W1s HKG, JVZ, RPF, W1ADX1, K1s DZG, MPD. New appointments: K1PRB and K2GLQ/1 as ORSs; W1AHHK as OVS. Appointments endorsed: W1EJU and W1ADPX as OVSs, W1BB as EC and OO. K1EVM-W9GTC/1 now is on RTTY/a.f.s.k. on 6. The Middlesex ARC had an auction. W1MX worked K1YON in Connecticut on 220 Mc. W1AJKZ now is General Class. The Capevay RC's new officers are K1LOE, group mgr.; W1UOH, asst. group mgr.; W1EYU, rec. serv.; K1HGT, cert. secy.; K1IPB, treas. The 79 RC met at W1MKN's QTH. W1ABGP spoke at the Framingham RC on "Radio Control of Model Planes." W1BB has his 160-Meter DX Bulletin out. W1CJY lost his antennas during a storm. W1KVO showed some films at the Massachusetts ARA. W1EJU has sixteen states on 2 and nine on 432 Mc. W1AECY is in Germany. A meeting of the ARA/NEEFN was held at Northeastern U. with about 40 present, thanks to K1KED. Some of those at the meeting: W1s AGG, KAN, AKN, ALT, JSH, EHT, DFS, TG, FMG, K1s PNB, YUB, ZZY, KED, W1s AGQ, HCD, JPRS. ION, W1AOGSAL, Hollis Baird. Congrats to W1EAE on being reelected Vice-Director. New YLs: W1KKI New Bedford, W1NKLC Framingham, W1AFHU now is an AI-Operator. W1AIFD has a Viking 2 for 160. Massachusetts ARA has a certificate for working 5 stations in Plymouth County. Two must be members of the club. Write to W1AIFD for full details. The club has a net 145.32 Tue. at 8:15 P.M. W1AGXC has his Extra Class license. New calls in this section: W1AKLG, W1AKKU, W1s KJZ, KJY, KKH, KKG, KKI, W1s KJU, KJV, KJT, KJK, KJO. W1MX's beam fell down. William Ramsey, R.P. EE, spoke at the Yankee RC. Traffic: (Nov.) W1OJM 857, W1PEX 593, W1AEYY 557, K1PNB 231, W1AIFD 199, W1EMG 164, W1AIFL 156, K1PRB 115, W1MX 87, W1CTR 66, K1CLM 59, W1AHHK 56, W1AFHU 54, W1AIGX 32, W1DOM 25, W1AOG 14, W1AJAJ 10, K1LCO 10, W1AIFH 10, W1ADPX 8, W1AIED 6, W1DKD 6, W1HKI 6, W1AIDEC 5, W1AIFL 4, K1OKE 3. (Oct.) K1PNB 243, W1MX 121, W1AIGX 21, K1LCO 20. (Sept.) W1AIGX 23, K1LCO 23.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1CLF. RM: W1BJG. PAM: W1AIFG. Traffic nets:

The Sea Gull Net meets Mon. through Sat. at 1700 on 3940 kc. Pine Tree Net meets daily on 3596-kc. c.w. at 1900. A hearty welcome to K6CAG/1, at Brunswick, who is doing a nice job on the PTN and the IRN. W1AJNC did a fine public service job for people in 4-Land. He is with the Air Force at Loring. W1AQW has an NW-100 on the air and likes it real well. Traffic: W1BJG 356, WINND 89, W1AIFG 60, K6CAG/1 14.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: K1QES. RM: K1BCS. PAM: K1APQ. Endorsements: K1RSC as EC, W1ALE and K1PSR as OVSs; W1EVN and W1MHX as ORSs; W1AJJ as ORS and OPS. Net reports: NHAREC 135/23, W1VAREC 115/5, GSPN 782/50 and the BCAREC 40/2. W1YAJ and W1SWX did excellent in the recent Frequency Measuring Test. W1AIII took first place for N.H. in the Mid.-D.C. QSO Party. W1W1MK has finished his new SB-101 and SB-200. He is now busy passing out rare N.H. QSOs and QSLs. Seems that most of the N.H. gang is stuck on 75 and don't know other bands exist. W1BYS/K1TXC has a new KWS-1. Heard on 80 c.w. were W1IB and W1IQD. Activity in the recent SS contest was shown by W1AJTM, W1AIII and W1SWX. The Sept. V.H.F. SS results show W1JJO, W1AJTK, W1AZK, W1ALE, W1MAS, K1FTG, W1AIDC and W1HFM in that order at the finish line. W1JY (ex-K1WKP) has a new Christmas tree with 2, 6 and tri-bander beams. New officers of the Manchester Radio Club are K1HRG, pres.; K1ACX, vice-pres.; W1AIDE, rec. secy.; W1AHGT, corr. secy. The DXCC list still shows W1KZ as the top DXer in N.H. K1RSC is heard often on 75 meters. Traffic: (Nov.) W1AIII 171, K1PQV 37, W1MHX 9, K1QES 5, W1SWX 4, K1TXC 4. (Oct.) W1MHX 21, K1QES 9.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1JLI. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPAN report: 30 sessions, 474 QNI, 94 traffic. The Fidelity Amateur Radio Club, K1NQG, is holding an informal net using "Call CQ FARC" on 3710 kc. at 2030 EST Mon. Code speed will be approx. 10 w.p.m. The W1AQ Club held its Thanksgiving Dance with many hams attending. Chairman K1JLI reported that the evening was a success. W1AICQ and his committee also worked on the program. W1FNH has started instruction on basic radio during the club meeting on Fri. evenings. W1WAC has installed electric baseboard heat in a portion of the club room. W1CVF visited the club on his school vacation. W1AIII has completed most of the renovations to the club's exterior and during the winter will be completing the interior work. The NCRC Club of Newport will have New England Director W1QV as guest at a future meeting. The club has a very active net and offers a certificate for contacting club members. Traffic: W1TXL 313, W1BTV 48, K1VYC 39, K1TPK 17.

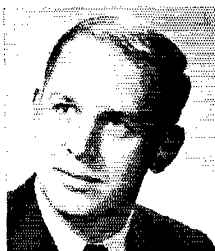
VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Time	Days	QNI	QTC	Net Mgr.
Gr. Mt.	3855	2230Z	M-S			W1VMC
Vt. Fone	3855	1430Z	Sun.	89	1	W1AIED
VTNH	3685	2330Z	M-F	61	61	K1UZZ
VTCO	3990½	1500Z	Sun.	40	8	W1AD
Carrier	3855	1400Z	M-F	20	7	W1KKD
VTSB	3909	2230Z	M-S	712	89	K1DVP/1
		1330Z	Sun.			

We urge you to be active during the Vt. QSO Party Feb. 8-9. Mark your calendar and let the world know there are some Vt. hams. Full details outlined in Jan. QST. Give it a try and I guarantee you will have fun. K1RMG is geared on 2-meter f.m. and many others are in process. K1WSI is back from the hospital, also W1KKM. Traffic: (Nov.) K1BQB 336, K1MPN 24, W1PRT 22, W1MRW 4. (Oct.) K1UZZ 8.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DWW reports attendance picked up in Nov. with better coverage in the Berkshire and Worcester areas. Missed 100% IRN coverage by one session. Stations in order of attendance were W1DWW, W1ZPB, K1WZY, W1BVR, W1STR, W1ZEL, W1HHI, W1KK, W1AJZB, K1SSH, W1YK, W1AIDNB, W1AITL, W1EOB, W1ABW, W1AISJ, W1HRC, W1EOB spent a week at a rare DX spot as T30CC on Curacao, near Venezuela. He and his group racked up over 6300 QSOs. The QSL Bureau continues to keep a busy pace with K1PMK managing excellently. W1ZPB is working on a new RTTY demodulator and is having nice QSOs with the present one-lunger. K1DPP has a new homemade fold-over tower for use in his antenna experiments. K1MXX has a Model 26 RTTY going sampling the goings of the TTY crowd. K1KVI is chasing OH stations while lacking confirmation. K1JHC has his WAC award. W1DNT indicated he reads this column while having

One of a series of brief discussions
by Electro-Voice engineers



TESTING, 1, 2, 3, 4

WILLIAM RAVENTOS
Field Engineer

Testing of microphones ordinarily takes two distinct forms: laboratory tests and field tests. The former is basically objective in nature and results in performance specifications, while the latter provides a subjective evaluation of the microphone under actual use conditions. Both forms of testing are valuable, but on occasion the field results do not seem to fully support the laboratory tests.

The difference, of course, lies in the "idealized" conditions that consistently form the basis for laboratory tests. No such uniformity exists in the field, yet the need for correlation between specifications and actual performance is increasingly felt.

In order to more thoroughly explore the causes for deviation from laboratory response, Electro-Voice has undergone a series of tests of varying types of microphones using its large anechoic chamber as a research tool. To date the investigation has concentrated on effective polar response, effects of distance on frequency response, and the results of multiple in-phase and out-of-phase microphone pick-ups. While the studies have just begun, causes of several common problems have been pinpointed.

Polar response was investigated by rotating the microphone in the anechoic chamber, while speaking at constant volume. This test pointed up the necessity for uniform response off-axis as well as on-axis. With microphones such as the Model RE15, level changed with rotation of the microphone, but voice quality (hence frequency response) remained constant. However with directional microphones that did not offer uniform off-axis response, sound quality quickly became unacceptable. Using such a microphone to reduce unwanted pickup to reasonable levels can alter the tonal character of the unwanted sound, as well as distort the apparent acoustical characteristics of the studio or hall.

It was also noted that many omni-directional microphones exhibited directional characteristics that were quite audible at an angle as small as 80° off axis. This proved to result from interference of the microphone case, and was directly related to increasing case diameter.

In another series of tests, the effect of distance on frequency response and articulation was investigated. A male voice was recorded at distances from 2' to 25' in the anechoic chamber. Levels were then equalized, and tonal quality and articulation was compared. No significant difference could be noted as distance increased. It is evident that the "loss" of highs with distance is not due to reduction in actual intensity. Rather the changing phase relationships determined by environment acoustics has an increasing effect with rising frequency. This is interpreted subjectively as a loss of intensity.

Further tests of this type will be discussed in future columns, and suggestions for other areas of investigation are welcome.

For reprints of other discussions in this series,
or technical data on any E-V product, write:
ELECTRO-VOICE, INC., Dept. 293Q
631 Cecil St., Buchanan, Michigan 49107

Electro-Voice®

A SUBSIDIARY OF GULTON INDUSTRIES, INC.

Silent Keys

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

- K1AKU, Robert H. Davis, Cochituate, Mass.
W1BBA, Charles J. Mahoney, Providence, R. I.
W1CBX, Frank Carpenter, Esmond, R. I.
W1ILEM, Joseph F. Rozendes, Fairhaven, Mass.
W1KIS, Ronald Kiernan, Shelton, Connecticut.
W1PGX, Deane C. Gould, Waterbury, Connecticut.
W2AGQ, Archie Coe Davis, Angola, N. Y.
K2BSB, Ronald Spencer, North Troy, N. Y.
W2EXM, Fred Parsons, New York, N. Y.
K2ITW, Dolphin Tunzer, Sr., New York, N. Y.
W2MXH, Thomas Roy Silvernail, Millerton, N. Y.
W82NBD, Sewell A. Bruner, Basom, N. Y.
WA2OQZ, Kenneth Stamler, Plainville, N. Y.
K2ZEM, Grover McMillen, Massapequa Park, N. Y.
WA3HPC, Charles E. Sholes, Verona, Pennsylvania.
W3LNL, Robert P. Nick, Lancaster, Pennsylvania.
W3WXX, Clarence Wolford, Indiana, Pennsylvania.
W4C1Y, Hugh Harness, Jr., Mobile, Alabama.
W4CRP, Irby H. Boyd, Arlington, Tennessee.
W4TYI, Rollin R. Wallick, Bristol, Virginia.
W4MB, John E. Cain, Jr., Nashville, Tennessee.
W4ZFF, Earl Stine, Memphis, Tennessee.
W5AS, Joe B. Latimer, Del City, Oklahoma.
W5VQW, Dally Crites, Dallas, Texas.
W6BOT, George Peck, Eureka, California.
W6KUC, Henry J. Clinton, Los Angeles, Calif.
WA6MNA, Frank A. Watson, Napa, Calif.
WB6TRJ, Ralph D. Armstrong, Ojai, Calif.
K6TSR, ex-W7RSY, OA6AB, David E. Hemington, Burbank, Calif.
K6UGD, Charles Edward Kemper, Ventura, Calif.
W7DDI, Sanford De Leo, Union, Washington.
ex-W7FAM, Mayo Gould, Ronan, Montana.
W7QPA, Tom Mitchell, Cottage Grove, Oregon.
WA8EFJ, Lawrence J. Holwezer, Dayton, Ohio.
WA8FSS, Frances R. Durham, Kinross, Michigan.
WA8GEG, Stephen McClun, Washingtonville, Ohio.
W8LI, Richard E. Sibert, Wapakoneta, Ohio.
K8MQM, John Dietrich, Muskegon, Michigan.
W8NUP, Edward C. Dowling, Cincinnati, Ohio.
WA8PSL, Kenneth Gulcher, Columbus, Ohio.
WA8QFC, Maurice C. McGeish, Sr., Berkeley, Michigan.
K9CGE, James H. Morito, Evanston, Illinois.
W9ZME, Charles F. Bremigan, Sr., Homewood, Illinois.
W8MPF, R. Elmer Ford, Normandy, Montana.
W8UUC, Eugene J. Hoover, Muscatine, Iowa.
VE3FPW, Brock B. Wilcox, Collingwood, Ontario, Canada.
ON4LV, Lucien Vervaeke, Knokke, Belgium.
K116CUP, Harris F. Tarumoto, Honolulu, Hawaii.
DF6NI, Felix Cremers, Krefeld, West Germany.
VE6VH, Harry Higa, Alberta, Canada.
VE7APC, John MacDonald, West Vancouver, Canada.

an eyeball with the SCM. Two new calls in Southwick are WN1JUK and WN1JYB. WAIHUI is looking for someone interested in 2300 Mc. The HCRAT had a very fine meeting with the VIP's W1QV, W1LVQ, W1BDQ, WINJM and yours truly at ARRL night. The gang found this group most informative and enjoyable to listen to. K1MEB is back in Fitchburg after a tour of duty with the Navy. Traffic: W1ZPB 105, W1DVW 93, W1EOB 88, W1BVR 56, K1WZY 49, W1HEJ 40, W1STR 40, W1IC 19, W1VPH 17, W1A1BW 3.

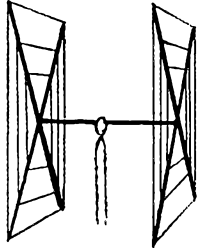
NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—KL7-EWH has finally gotten an antenna up that does work. Her new ZL seems to be solid down to VK-Land. Now it seems that instead of antennas at minus 40 F

GOTHAM ANTENNAS ARE MUCH BETTER OF COURSE, YOU PAY MUCH LESS

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 16 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—



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 fool-proof 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!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

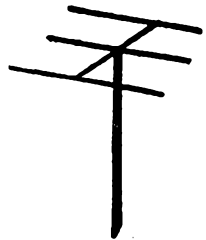
Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	\$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1TU. THAT ANTENNA WORKS!WN4DYN



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 E1 20	\$19	4 E1 10	\$18
3 E1 20	25*	7 E1 10	32*
4 E1 20	32*	4 E1 6	18
2 E1 15	15	8 E1 6	28*
3 E1 15	19	12 E1 2	25*
4 E1 15	25*		*20' boom
5 E1 15	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MNV, 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, KP4ÁQL, 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

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

NEW 1969

WRL

Electronic Equipment CATALOG



Brand New!
Filled with amazing
buys in electronic
equipment includ-
ing dozens of new
and exclusive
items you can't
buy anywhere
else!

Anything in the
book on easy
credit terms,
TOO!

LATEST...Most Up-to-Date Selection of the Best in ELECTRONICS!

92 pages — filled with the most complete
inventory of Hi-Fi, Radios, Tape Recorders,
CB equipment, Ham gear, Electronic equip-
ment. Parts and tools...at real money-
saving prices. Send for your copy now!

FREE! JUST MAIL IN COUPON!

World Radio Laboratories
3415 West Broadway
Council Bluffs, Iowa 51501

Dept. QST-838

Gentlemen:

Please send me your Free 1969 Catalog.

Name _____

Address _____

City _____

State _____

Zip _____

its Aurora alarms around Fairbanks way. The instigator of this bit of activity is KL7EVO. Code practice sessions are running on 3735 kc. M-W-F at 7 P.M. AST. KL7FJV has gotten her Advanced Class license and is now going for the Extra. KL7FLS is mighty proud of her latest memento of the Smith-Nash Mt. McKinley Expedition. She received a copy of the official log, in which she was listed as their "official contact with the states" and an autographed copy of a photo of the expedition leaders on the summit. Just saw a copy of the "Alaska Lassies" certificate. It's mighty impressive and we are looking forward to earning one in the near future. Check with any of the gals for information. KL7FQQ is doing the paperwork on these. Traffic: KL7CAH 164, KL7FLS 2, KL7FON 2.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7-THX. The FARM Net convenes week days on 3935 kc. at 0200 GMT. The Idaho C.D. Net convenes week days at 1515 GMT on 3991 kc. and Sun. on 1979 kc. at 0500 GMT. K7CBW caught his arm in his crank-up tower and required medical treatment. The Eagle Rock Club had an open house that was well attended by the general public, including the Mayor of Idaho Falls. W7-DZH has installed a new dipole with tuned feeders and tuner. Endorsements: WA7BDD as ORS. K7THX as SEC. WA7EWW as OBS. The Lewiston Clarkston Club had a Christmas Party. W7ZNN has a new HW-100. K7KRO has a new 2500-watt generator for emergency power. FARM Net report: 21 sessions, 853 check-ins, 109 traffic handled. Traffic: WA7BDD 86, W7GHT 54, WA7ETO 47, WA7AXL 38, W7ZNN 30, W7GGV 26, K7-CSL 12, W7IY 8.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W7ROE. RM: WA7DMA.

Net	Freq.	Time	Days	QTC	Mgr.
Mont Traffic	3910	0100	M-F	588	111 W7ROE
Mont PON	3950	1515	Sun.	432	39 K7PWY
Mont Sect	3950	1700	Sun.	32	3 W7TYN
Big Sky Net	146.76	0300	Sun.	13	4 WA7FLG

The Billings group is moving to 146.76 for an FM. W7LR, W7NPV/W7OOY and W7OIQ are on the same frequency in the Bozeman area. W7EXU is on with a new Swan 500C. Congratulations to W7PGY and W7-QLB on their election as Director and Vice-Director, respectively. New officers of the Gallatin Amateur Radio Club are WA7DVU, pres.; W7OIQ, vice-pres.; W7N7XT, secy.-treas.; WA7HDD, act. mgr.; WA0-ATY/7, EC. W7GDM continues as the trustee for W7ED. Congratulations to our SEC and all of the ECs for a first-place listing in our state ARPSC activities in Class III. The 1969 officers of the Missoula Hellgate RC are WA7IQ, pres.; W7MAK, vice-pres.; W7IBH, secy.-treas. If you have news for its great club paper write P.O. Box 599, Missoula. WA7JQG and WA7JXM are new calls in the Missoula area. We are considering changing the time of the Montana Section Net. If you have a time to suggest, check with your SCM or SEC. The Butte Amateur Radio Club has moved into a new room in the courthouse. Traffic: (Nov.) K7EGJ 39, K7PWY 21, WA7ZR 15, W7FIS 3, W7LKB 3. (Oct.) W7FIS 1.

OREGON—SCM, Dale T. Justice, K7WWR/WA7-KTV—RM: W7ZFH. PAM: K7RQZ. Section net reports: W7ZFH reports for the OSN for Nov.: Sessions 22; check-ins 149, high 11, traffic 60, high 15. WA7AHW reports for the AREC Net: Sessions 30, maximum number of counties 23, check-ins 954, traffic 33, contacts 109. QSTs 4. K7IFG reports for the BSN: Sessions 60, traffic 223, contacts 299, check-ins 1431. Net schedules:

Net	Freq.	Time	Days	Mgr.
BSN	3875 kc.	2000/0300Z	Daily	K7IFG
OSN	3585 kc.	0300Z	Tue.-Sat.	W7ZFH
AREC	3875 kc.	0300Z	Daily	WA7AHW

K7OUF spent a week in bed in Nov. and still handled a number of messages. K7YEV passed the Extra Class exam. WA7DWK has his Advanced Class ticket. W7-CPV and W7CMK are in So. Cal. for the winter. WA7-CKL is going into the Coast Guard. K7IWD is setting up some new gear to better his traffic-handling capabilities. K7DVK has been moving and setting up his gear at the new QTH. WA7FTN made 474 telephone relays to S.E. Asia during the month, and has run relays to all states three times. WA7GFP reports some 8-meter skip Nov. 23. New appointment: W7LXR as OPS. Russ works 40 meters most of the time with his three-element wire quad. Traffic: (Nov.) K7RQZ 620, K7IFG 172, K7OUF 128, K7NTS 53, WA7HKV 56, W7-ZFH 52, WA7HJV 40, W7VHJ 40, K7WVR 28, K7KPT 26, WA7ICD 22, W7BNS 21, W7DEM 11, WA7KIU 8,

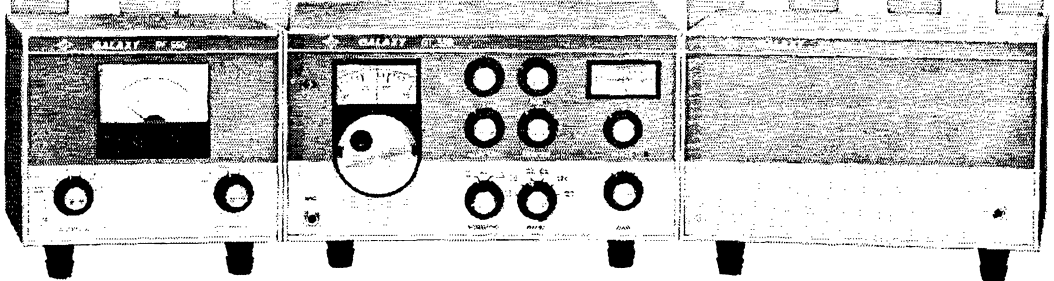
NOW—GALAXY PROUDLY UNVEILS

NEW Power!
NEW Features!
NEW Beauty!

THE EXCITING NEW
GT-550
TRANSCEIVER

5 BAND
SSB
Mobile or
Fixed
Station

★ AND A COMPLETE LINE OF HANDSOME
MATCHED ACCESSORIES!



The New Galaxy
Wattmeter/Antenna Selector

The Powerful New Galaxy
GT-550 TRANSCEIVER

The Beautiful, Matching
Galaxy Speaker Console

"HOT," Husky, and Handsome!

You asked for it...now it's here! The new GALAXY GT-550 and a complete line of handsome matching accessories!

Your suggestions made it possible. We took your ideas—added some of our own and went to work. We built in new power, new conveniences—such as a 25 kHz calibrator option, and no frequency jump when you switch sidebands. Then we hired the best designers in the business to give GALAXY a distinctive "New Look"!

Our new GT-550 has all those great qualities of the famous Galaxy V's...and then some! It has new POWER...550 watts SSB, making it the hottest transceiver made! A new single scale VFO Dial makes frequency interpolation child's play...the new skirted knobs make tuning and band-changing a split-second job...and, that slick, king-sized finger-tip tuning knob works like a dream! *Still the most compact—only 11¼ x 12¾ x 6"!*

P.S. Sounds unbelievable but it's an even HOTTER receiver than our previous Galaxy V's!

Space prevents telling you all about the handsome, matched accessory line. Write for a free brochure that's loaded with exciting news!



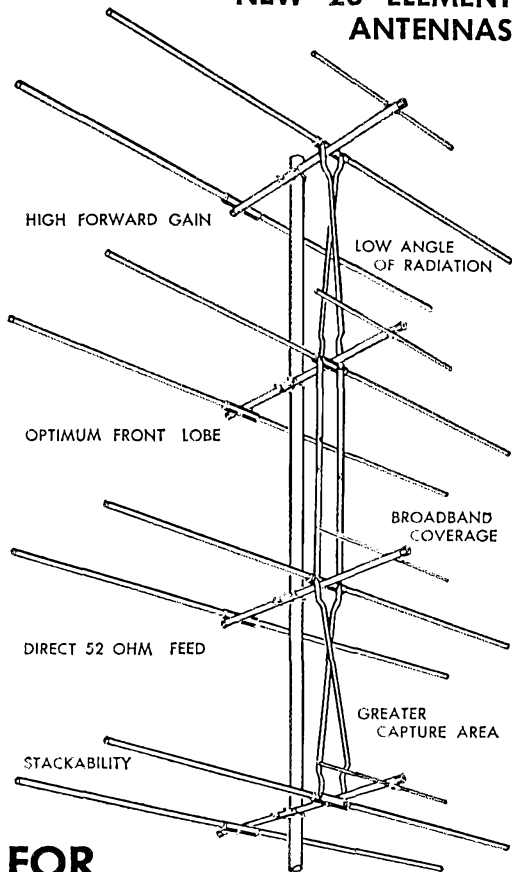
GALAXY ELECTRONICS

"Pacesetter in Amateur/Commercial Equipment Design"

10 South 34th Street • Dept. QST-AA38 • Council Bluffs, Iowa 51501

DX-ARRAY

NEW 20 ELEMENT ANTENNAS



FOR
144 mhz 220 mhz 432 mhz

A breakthrough in VHF/UHF Amateur antennas! The new Cush Craft DX-Arrays combine the best yagi and colinear features into the World's most advanced amateur communication antennas. Realizing that the antenna is the most important part of your station, Cush Craft engineers have devoted two years of intensive development and testing to perfect DX-Array. DX-Arrays have already established new records in Dx-ing and moon-bounce programs. Whatever your interest may be, ragchewing, contests, DX, or moonbounce, get in on the excitement of VHF hamming today with DX-Array.

DX-120 — 144 mhz \$29.50
DX-220 — 220 mhz 22.50
DX-420 — 432 mhz 17.50

See your local distributor or write for complete specifications on these exciting new antennas from the world's leading manufacturer of UHF/VHF Communication Antennas.

**621 HAYWARD STREET
 MANCHESTER, N. H. 03103**

W7MLJ 8. (Oct.) WA7ICD 27, WA7GLP 2.

WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

WSN	3590 kc.	Daily 0245Z	QNI 383	QTC 246	Sessions 30
NTN	3970 kc.	Daily 1930Z	QNI 865	QTC 526	Sessions 30
WARTS	3970 kc.	Daily 0200Z	QNI 1469	QTC 281	Sessions 29
NSN	3700 kc.	Daily 0400Z	QNI 287	QTC 70	Sessions 30

If you have not sent your report on the Jan. SET get it in ASAP. The privilege of license-plate identification is based on public service. All amateurs should support our ARPSC, which includes the AREC, NTS and RACES, all of which are designed for service to the public. Register with your local EC or check in on your Section NTS net. New appointment: W7WPR as OO. W7PI was elected new WSN Mgr. relieving W7ZIW, who did a commendable job the past year. WA7HKR was elected NTN mgr. for 1969 after filling out a 1968 unexpired term. New officers of the BEARS are WA7KNI, pres.; WA7HKD, vice-pres.; K7ANP, secy.; W7EWY, treas. K7YKG retired as editor of the BEARS *Ham'n Equester*. New officers of the Apple City Radio Club are WA7DIH, pres.; W7WCV, vice-pres.; K7SNG, secy.; K7UDG, EC; K7RNQ and K7OGW, trustees. OVS K7MWC reports numerous stations in the Seattle area are conducting earth current measurements. Current officers of the U. of W. ARC are K7WYV, pres.; WA7AVL, vice-pres.; WA6UCC, secy.; W7JGO, publicity. The Tacoma Club has an FB roster of committee chairmen for the Washington State Hamfest in July. W7PUL reports the local AREC Net meets Tue. at 7 p.m. on 29.6 Mc. in the Spokane area. Newly-appointed OBS for the Seattle area v.h.f. nets is WB8-YPO/7. W7GVC reports from the Walla Walla Club on an AREC drill involving the hospital and ambulances, together with the police, fire and sheriff's departments, using 29.6 Mc. ORS W7JEY is back with a repaired receiver on WSN and RN7. We regret the passing of W7LTK of Pullman on Dec. 3. WA7EYN is looking for his homebrew amplifier, misappropriated from his unlocked shack. New Generals in the Richland area are WA7KXZ and WA7CHN, sr. operator of K7QOM, who is in Vietnam waters with the Navy. W7FQE sends in his first ORS report. Traffic: (Nov.) W7BA 2402. K7UDG 1864. WA7HKR 990. WA7BZY 265. W7PI 212. K7CTP 183. WA7EYN 174. W7KZ 163. WA7AXT 143. W7BQ 141. WA7JBM 110. WA7DZL 70. WA7EDQ 55. W7GYF 52. W7BTB 50. W7IEU 48. K7JXO 42. W7GVC 41. W7BUN 40. WA7ACQ 35. W7FQE 35. K7THG 35. W7RXH 33. W7APS 30. K7SUX 29. W7JWJ 28. WA7BDB 24. WA7CY 21. WA7HSJ 21. K7EFB 13. K7TCY 13. WA7GVB 12. W7UW 12. W7AIB 10. K7YFJ 10. W7ZHJ 10. K7LRD 9. K7MGA 9. WA7ILC 8. W7OEB 7. W7WPR 4. (Oct.) WA7GVB 13. (Sept.) WA7GVB 9.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6GHZ. PAM: W4UAF/KH6. RM: KH6AD. V.H.F. PAM: KH6EEM. QSL Mgr.: KH6DQ. RACES Nets (40, 10, 6, and 2 meters) coordinate with KH6AIN.

Nets	Freq. (Mc.)	Time (GMT)	Days
League Appointees	7.290	0700Z	Wed.
Friendly Net	7.290	2030Z	M-F
Pacific Interisland Net	14.330	0830Z	M-W-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
S.E. Asia Net	14.320	1200Z	All
MARIANAS Island Net	3.850	0830Z	2,3,4 Tue.

With deep regrets I must report the passing of KH6-CUP, owner/manager of Precision Radio Ltd., Honolulu, and the former Crescent City Electronics in Hilo to Silent Keys. KH6AD recently returned to the Mainland with his XYL Virginia to see their daughter married in Washington, D.C. KH6AD seen recently around his old neighborhood with binoculars at night was only looking for arcing insulators causing power-line-leak QRM and was not a neighborhood "Preping Tom" as neighbors first suspected. KH6EEM, our V.H.F. PAM and OO recently lost his bachelor status by marrying the very lovely Winnie Faxan. Good luck to both. Every active amateur is invited to submit a monthly station activity report to the SCM on the first of each month. Your SCM welcomes club, net, traffic or personal news as well as operational data from individuals or groups. His address is on page 6 of each issue of QST. Let's see the Hawaiian report continue to grow. Traffic: KH6BZF 83.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. The Euroka QCWA Nevada Chapter has been formed by W7CSB. W7ZT is home recuperating from an operation. W7YRY was active handling Antarctica traffic and provided emergency communications between Amchitka, Alaska, and Jackass Flatts,

a complete amateur radio station



in one
portable package

SWAN *Cygnet*

A 5 BAND 260 WATT SSB TRANSCEIVER WITH BUILT-IN AC AND DC SUPPLY AND LOUDSPEAKER

The new Swan Cygnet is a complete SSB transceiver, with self contained AC and DC power supply, microphone and loudspeaker in one portable package. The Cygnet features full frequency coverage of the 10, 15, 20, 40 and 80 meter bands with a power input rating of 260 watts P.E.P. in single sideband mode, and 180 watts CW input. A crystal lattice filter at 5500 Kc is used in both transmit and receive mode, and provides excellent selectivity with a 2.7 Kc bandwidth at 6 db down. Superior receiver sensitivity of better than $\frac{1}{2}$ microvolt makes it easy to pull in those DX signals, and with the Cygnet, if you can hear them, you can work them. Audio fidelity is in the well known Swan tradition of being second to none, providing smooth, natural sounding voice quality. The Cygnet is temperature compensated on all bands, featuring solid state oscillator circuitry with zener regulation which permits wide variation in supply line voltage without frequency shift.

Unwanted sideband suppression is 45 db, carrier suppression 60 db, and distortion products are down approximately 30 db.

The new Cygnet is designed to provide efficient, high quality communications in the 5 most commonly used amateur bands. Its low cost is a tribute to Swan's well known techniques in value analysis, and simple, direct circuit design. Above all, these techniques lead to a high degree of reliability and foolproof performance. Dimensions are: 13" wide, 5 $\frac{1}{2}$ " high, and 11" deep. Weight is 24 lbs.

The transceiver comes complete with AC and DC input cords, and carrying handle; thus making it the most versatile and portable set on the market, and certainly the best possible value.

Amateur net **\$395**

P.S. Yes, for our customers who require some of the extra features, there will be a deluxe version of the Cygnet coming soon, which will sell for approximately \$495

**ASK THE HAM
WHO OWNS ONE**



SWAN
ELECTRONICS
OCEANSIDE, CALIFORNIA

QST PROTECTOR!



EVER TRY to find a back issue of *QST* in the stacks lying around your shack?

Are you tired of hearing complaints from the XYL, YL or Mom about those magazines being such a mess?

Why not satisfy the ladies and make it much easier to use your *QST*s by placing them in binders? Each one holds 12 issues and comes with a nice gold label to show what year is inside.

QST BINDERS are available only in the U.S. and possessions for \$3.00 each—
Postpaid.

**AMERICAN RADIO RELAY
LEAGUE**

Newington, Conn. 06111

Nev., both AEC installations. W7JLV, C.D. Washoe County, was host providing refreshments and a film on the Alaskan earthquake to amateurs in the Reno area. Las Vegas RAC officers are K7RBM, pres.; WA7GIV, vice-pres.; W7CDH, secy.; W7AKE, treas.; K7TDQ and K7PPE, dir. at large; K7RKH, past pres. W7CV and XYL vacationed in NE-Land. W7FJM is home from FAA school. WA7BAV had a nice Sweepstakes report. W7FBI is a school teacher. W7HOP, K7QOP, K7YVN and K7ZAU continue to do an outstanding job with the WCARS-7255 "Sentinel." It's nice to see such a large number of Nevada amateurs display call letter license plates. SNARC officers are W7PRM, pres.; (tenth consecutive term) WATESM, K7RKH, K7ZOK, vice-pres.; W7PBV, treas. and certificate custodian; Mrs. Ellis, secy.; WA7BEU, dir.-at-large.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, WA6TQJ, RALs: W6LNZ, WB6YTX, WA6RBD (Red Bluff) and K6RPN (Grass Valley), members of NCN, have been appointed ORSs. OO K6CG received a letter of appreciation from an amateur who was warned by Dick for excessive tuning. WB6MZX was the only station to send an SS message to his SCM. WB6VSC thinks he may have the room to install a 40-meter rhombic! WA6CXB is fed up with ignition noise on 2 meters and is about to switch to horizontal polarization. W6GDO has been very busy with his remote station, W6GDD, on Mt. Vaca. WA6YZD reports the following who gave some of their time to help in the Red Cross "Voices from Home" program: W6SI, WB6HAW, W6PUI, WB6LIK, WB6LXH, WB6MZX, WB6QMT, WA6CXB and W2YYP, who is now W6JON. K6RHW reports that the Nevada Co. Slow Speed Net is no longer in operation. The Nevada Co. ARC is slowly establishing a net on 1915 kc. WA6JDT finally qualified for his DXCC after working at it on and off for five years; I had about 50 countries as DXers, but no good out here. Good luck to all you DXers in the 1969 ARRL DX Competition. Traffic: W8VDA/6 77, W6LNZ 76, WB6YTX 49, WA6JDT 19, WB8MAE/6 16, WB6WJO 15, W6NKR 4, WA6CXB 2, W6VUZ 1.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLV. WB6PQE received the annual award from the Marin Club as the Ham of the Year for his work in amateur radio during the past year. WB6UJO has returned to DXing from a trip to the Orient where he visited DX friends in Singapore, Malaysia, Macao, Hong Kong and Japan. WB6JQP was home for Thanksgiving and then went out to sea again. The Petaluma Radio Klub held its Christmas meeting, Dec. 13, the Marin Club held its Dec. 7 while the San Francisco Radio Club held its Dec. 14. New officers of the San Francisco Club are W6VYC, pres.; WA6VLX, vice-pres.; Bob Lyon, ex-W6, secy.; W6FAX, treas. WA6DJI is secy. of the Central California Radio Council for the coming year. The Humboldt Radio has increased its membership to over thirty and is looking for more in the northwest corner. K6KGI, of Eureka, who received commendation for emergency activity in the 1955 floods, was awarded the Distinguished Flying Cross recently in Viet Nam. WB6LPL was the big scorer in the recent Sweepstakes. WA6KFC/6 is a recent newcomer to Marin who is getting active in traffic work. WA6CPZ is again active in amateur radio in San Francisco after a long absence. WA6BYZ keeps the string going and made the RPL again in Nov. A new EC in the Willits area is WA6NHF. W6RQ made an average error of .00006% in the Nov. FMT—and Al still is the OO with the longest string of consecutive FMTs in the ARRL, some fifteen years of it. W6BWV reports that all the signs indicate a wet winter in the Eel River Country where there were the disastrous floods in 1955 and 1965. WB6QPQ is a new AREC member in Arcata. Traffic: (Nov.) WA6BYZ 398, W6KVQ 380, W6WLV 175, W6FAX 37, WA6AUD 23, K6TWJ 18, W6BWV 18, WB6JQP 16, K6TZN 14, W6PZE 11, WA6QXV 6, WB6QPQ 2, W6CYO 1. (Oct.) WB6NHF 5.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The Central California Single-Sideband Assn. held its Christmas Dinner in Visalia, with 35 in attendance. WB6OHB is on all bands with a Drake line. W6TRP and W6JUK are holding 6-meter S.S.B. skeds. W6DCP is on all bands s.s.b. WB6RSS was in the SS Contest. WB6SUP has an SB-401. The Bakersfield repeater is coming along and should be on the air soon. It will be on 2 meters. W6NKJ is on RTTY. K6KDM is on 2-meter f.m. WB6WCY has a TR-108. K6KQL has an HW-17. W6GRA has an HW-17 also. WA6PXC is on 2-meter s.s.b. The Kern River Valley Amateur Radio Club got the call WA6OUX. W6VQS is pres.; WB6UHK, vice-pres.; WB6LUV, secy.; and the club has 12 members to start. WB6WJR was in the SS and made 38,130 points. WB6RSS made 25,515 in the SS.

FREE! World's Largest Electronic Kit Catalog

● **Deluxe Color TV** . . . the sets you've read about that give better performance yet cost no more; three models: 295, 227 & 180 sq. in. rectangular; exclusive built-in self-servicing aids. Custom, wall, or cabinet installation. New optional wireless remote controls, and new Heathkit antenna line.

● **Transistor Organs** . . . deluxe 19-voice and low cost 10-voice Thomas models in kit form—save up to \$500. Also VOX "Jaguar" combo organ at \$200 savings.

● **Electric Guitar Amplifiers** and accessories...amps,"fuzz" booster, microphones and speakers.

● **Portable and Table Radios and Phonographs** . . . AM, FM, short-wave radios . . . mono or stereo phonographs.

● **Stereo/Hi-Fi Components** . . . stereo receivers (including the famous Heathkit AR-15), amplifiers, tuners, speakers, turntables.

● **Amateur Radio Gear** . . . world's most popular line . . . SSB transceivers, transmitters, receivers, accessories.

● **Citizen's Band Radio** . . . fixed and mobile transceivers, walkie-talkies.

● **Test and Lab Instruments** . . . a complete line for home & hobby, shop, educational and industrial use. Newly designed and styled.

● **Scientific and Educational** . . . Berkeley Physics Lab, Malmstadt-Enke instrumentation including Analog/Digital equipment, kits for home & classroom study.

● **Marine Electronics** . . . radios-phones, RDF, depth sounder, fuel vapor detector.

● **Photographic Aids** . . . Heath/Mitchell Fotoval[®] and Colorval[®] darkroom computers for perfect B&W and color printing; electronic photo timer.

**New . . . Over 300 Kits
For Every Interest . . .
Save Up To 50%**



MAIL COUPON NOW!

- **Biggest Selection** . . . Over 300 Kits
- **Up to 50% Savings**
- **Easiest To Build**
- **World Famous Easy-To-Understand Construction Manuals**
- **Highest Quality Components**
- **Best Performance**
- **Unique Creative Satisfaction**
- **Pride Of Achievement**
- **Free Technical Consultation**
- **Easy Credit Terms**

HEATH COMPANY, Dept. 9-2
Benton Harbor, Michigan 49022

Please send **FREE** HeathKit Catalog

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

CL-339

ABSOLUTELY

NEW

TRI-EX

W-51

FREE STANDING TOWER.

SUPPORTS 9 SQ. FT. OF ANTENNA.

Shown with internal Ham M rotator and 2" mast.

INCLUDES

- **FREE: RIGID BASE MOUNT**
- **PRE-DRILLED TOP PLATE — For TB-2 thrust bearing.**
- **HIGH STRENGTH STEEL TUBING LEGS. Solid rod, "W" bracing.**
- **EASY MAINTENANCE — No guys or house brackets needed.**
- **RISES TO 51 FT. — Nests down to 21 ft.**
- **HOT DIPPED GALVANIZED AFTER FABRICATION! All welding by certified welders.**

IMMEDIATE DELIVERY

\$393⁴⁰

FREIGHT PREPAID INSIDE CONTINENTAL U.S.A.



Tri-Ex TOWER CORPORATION

7182 Rasmussen Ave., Visalia, Calif. 93277

W6DPD is looking for contacts on 145.05 Mc. nightly on s.s.b. W6UYG is working DX on 6 meters. W6YKS is on 6 and 2 with homemade equipment using a 5763 in the final. He reports activity is slow in Stockton, but he is working into Fresno. Traffic: (Nov.) W6ADB 402, W6HVA 213, W6LPC 180, WA6SCE 123, K6KOL 105. (Oct.) W6HVA 398.

SANTA CLARA VALLEY—SCM, Edward T. Turner, W6NVO—SEC: W6VZE, RM: WA6LFA, W6ZRJ is reporting this month for the SCM. It is hoped that by this time, our SCM, W6NVO, is back on his feet and settled. Ed has been in the hospital for both tests and observations and on top of this contracted the flu. WA6LFA is operating on the NTS nets and holding down the fort in his capacity as RM of the section. If you are interested in supporting our c.w. traffic operation or holding an ORS appointment, contact Jim via letter or on the air. All stations are invited to check into our section net, NCN, on 3630 kc. any night at 0300Z or NCN slow-speed at 0430Z. W6BPT is active on NCN. W6AUC has been keeping daily skeds with K6LXG/MM. Russ is active on several nets. W6VZT works TCC. W6VK is active with the QCWA and other local nets. W6YBV is culling for Nevada stations on NCN as he has had to mail much traffic. Anyone with contacts in the area is invited to check into NCN to QSP. W6DEF is active on NCN and reports on the activity of the SCARS and the PAARA. The SCARS was busy making plans for its Christmas Party and the PAARA was planning to hear a talk by Hal on traffic operation at its Dec. meeting. The SCARRA also was making plans for its Annual Christmas Dinner. The San Carlos C.D. Radio Club elected WA6CCA, of Belmont, as president. Reports are a little low this month. If you have any items to report, please send them to your SCM. Addresses for all SCMs are found on page 6 of any issue of QST. Traffic: W6RSY 779, W6YBV 302, W6DEF 123, WA6LFA 83, W6AUC 50, W6BPT 28, W6ZRJ 13, W6VK 6.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM and Acting RM: James O. Pullman, W4VTR, SEC: WA4LWE, PAM: W4AJT, V.H.F. PAM: W4LJZ, W4VON has a G4ZU beam up and says he is doing lots of 10-meter c.w. work. WA4KWC has been appointed EC for Buncombe County. K4TTN says, "A Novice recently licensed was Sister Suzanne, a Catholic nun. The first nun licensed in North Carolina is a product of our club's (Buncombe County ARC) code and theory classes." K4MPE, WB4BGL, WN4JYB and W4VON all reported good scores in the C.W. Sweepstakes, and WA4FFV reported good scores in both the C.W. and Phone SS. K4SHU has a new Johnson 6N2. WB4GNU and WB4IGH are forming an s.s.b. net on 28.550 Mc. at 0130Z daily. K4DFI is DXing with a new SB-101.

Net	Freq.	Time	Days	QTC	Mgr.
NCN(E)	3573 kc.	2330Z	Daily	157	W4IRE
THEN	3923 kc.	0030Z	Daily	143	W4ZZC
SSBN	3938 kc.	0030Z	Daily	31	WA4LWE
Late: (Oct.)					
SSBN	3938 kc.	0030Z	Daily	34	WA4LWE

Traffic: W4EVN 403, W4FDV 83, WA4VNV 45, K4EO 36, WA4GMC 31, WA4KWC 30, WA4UQC 19, W4ZZC 19, WA4VTV 17, K4GTN 16, WA4AKX 14, W4VTR 14, W4BNU 7, K4ZKQ 6, W4VON 1.

SOUTH CAROLINA—SCM, Charles N. Wright, W4-PED—SEC: WA4ECJ, RM: K6QPH/4, PAM: WB4BZA.

SEC: WA4ECJ, RM: K6QPH/4, PAM: WB4BZA.			
SCPN	3930 kc.	0830 and 1530 EST Sun. 12	Noon Daily
SCN	3795 kc.	0000Z and 0300Z Daily	Nov. Tfc. 69
SCSSBN	3915 kc.	0000Z Daily	Nov. Tfc. 196

The Anderson ARC toured the NASA STADAN station at Roseman, N.C., and returned with big eyes over the 300-ton beam they saw! WB4FAN is finishing an HW-100 and WB4AQF is immobile with an HW-12. WB4LMS is keeping 40 meters heated up from Spartanburg. K4WJT, in Cayce, is a new Class III OO. W4JA,

We probably have the best inventory of good lab test equipment in the country, and an exc. assortment of communc. eqpt., and line-power regulation & freq.-changing eqpt., but please do not ask for catalog! Ask for specific items or kinds of items you need! We also buy! What do you have?
WANTED: GOOD LAB TEST EQPT & MIL COMMUNIC.

R. E. GOODHEART CO. INC.

Box 1220-QST, Beverly Hills, Calif. 90213
Phones: Area 213, office 272-5707, messages 275-5432

550 Big Watts!



The GT-550 by GALAXY

Based on the proven Galaxy V Mk 3 design... the GT-550 comes on stage with an entirely new look. And under this beautiful new exterior Galaxy has packed 550 watts... the highest powered unit in its field. Henry Radio, always the first with the best, is proud to introduce this fine piece of equipment along with an equally fine line of accessories.

Come on in, look them over. Or write or phone. We'll send you detailed specifications.

GT-550,	550 watt transceiver	\$449.00
AC-400,	AC Power Supply, 110/230 VAC, includes cables	\$ 89.95
G-1000,	DC Power Supply, 12/14 VDC, Neg. Ground	\$125.00
RV-550,	Standard Remote VFO provides dual frequency control for GT-550 only	\$ 75.00
RF-550,	3000/400 watt Wattmeter/Antenna Selector (Available after April 1)	\$ 69.00
SC-550,	Standard Speaker Console, 5 x 7 speaker 8 ohm, (AC-400 will mount inside)	\$ 19.95

Henry Radio has a great antenna package program... big savings. Write for literature.

EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin.

TED HENRY (W6UOU)

BOB HENRY (WØARA)

WALT HENRY (W6NRV)

CALL DIRECT... USE AREA CODE

Henry Radio Stores

Butler, Missouri, 64730

816 679-3127

11240 W. Olympic, Los Angeles, Calif., 90064

213 477-6701

931 N. Euclid, Anaheim, Calif., 92801

714 772-9200

"World's Largest Distributor of Amateur Radio Equipment"

Give your Gear

Protax®

Protection

Operating an unprotected rig is like driving an uninsured car. You're asking for it . . . what with every ham's antenna-layout an open invitation for a lightning-hit during a storm.

A Waters PROTAX Antenna Switch (with silver-plated conductors) will further protect your ham gear investment by grounding the entire antenna system when the rig is not in use.

PROTAX handles 2000 watts PEP through 150 MHz . . . comes with knob and erasable-marking escutcheon plate. Play it safe with PROTAX!



Model 375. 6-position with rear axial connectors. \$13.95



Model 376. 5-Position with side radial connectors. \$12.50

WATERS
MANUFACTURING INC.
WAYLAND, MASS. 01778

Waters Manufacturing is a member of Electronic Industries Association.

finishing up a new 2-meter transceiver, has been active on 2, both mobile and fixed, in the Charleston area. WA4YAV is recovering from a busy season of football eliciting! The reports still are coming in from the Operation 68 election return reporting project. Much valuable experience was gained from this exercise and the next one should be even better. Keep the news coming in from your local clubs. Traffic: (Nov.) K4-OCU 98, K6QPH/4 97, K4LND 92, W4MC 38, W4NTO 21, W4PED 21, W4JA 18, W4FVV 13. (Oct.) K4LND 47.

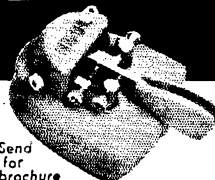
VIRGINIA—SCM, H. J. Hopkins, W4SEJ—SEC: K4-LMB. RMs: K4MLC, WA4EUL. PAM: W4OKN. We regret to report that W4JDB joined the Silent Keys in late Oct. W4BZE received his Extra Class license and the new call is K4JM. WA4EUL and WB4JEZ went to Advanced Class. WB4HRA plans to join the nets with his new HW-100. The Coast Guard Amateur Radio Club, K4CG, now is ARRL-affiliated with K3WUW, WB4FQR and KLTEGA as officers. Sweepstakes participation from Virginia appears to be a new all-time high. There are still some complaints that some net members are refusing to accept traffic which must be mailed in order to effect delivery. This is not a wholesome practice and we must face up to the fact that traffic must frequently be mailed to destination—we just don't have the complete section coverage. Unless you can suggest a better routing via radio (another net), accept what is offered and mail it. Traffic: (Nov.) W4RHA 238, W4UQ 235, W4NLC 220, K4TSJ 213, K4KNP 201, WB4CVY 190, WA4EUL 149, WB4DRB 101, WB4HRA 84, K4KDJ 78, WA4SJT 76, K4FSS 63, W4YZC 62, K4DC 60, WB4DOY 57, W4OKN 53, WB4FDT 50, W4ZM 49, WB4JEZ 44, W4KX 41, K4MLC 34, K4GR 33, WA4PBG 29, WB4-FJK 28, W4BZE 27, W4GEQ 24, WA4JFF 23, W4ZSS 22, K4VCY 19, WB4FLT 18, K4CG 17, K4JM 17, WB4GS 12, WA4YRH 12, W4KFC 11, W4THEV 10, W4SEJ 9, WB4GYV 8, W4MK 7, W4ZAU 7, WB4GDO 6, W4DM 4, W4JUJ 4, W4TE 2, K4YEE 1. (Oct.) WB4HRA 121, WB4JEZ 45.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. RMs: K8MYU, K8TPF. PAMs: K8CHW, W8IYD. Net Mgrs.: C.w.—K8MYU; phone—WA8YOF.

WEST VIRGINIA QSO PARTY

March 29-30

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 Mar. 29 and ends 2400 GMT Mar. 30. Use all bands, all models. 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 station 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 Frank Wilkin, WA8LFZ, 681 Forest Circle, South Charleston, West Virginia 25303. To be eligible logs must be postmarked no later than May 1, 1969.



Faster CW—
BETTER READABILITY

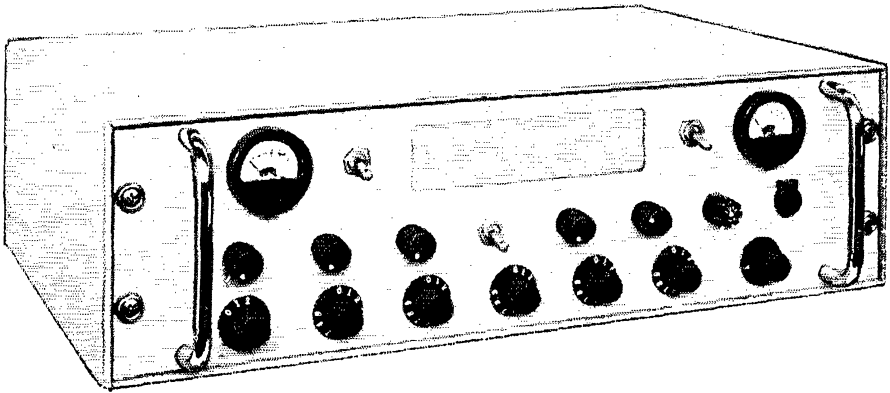
AUTRONIC 19.95 AUTRONIC 79.5
KEY KEYER

Preferred by better operators

ELECTROPHYSICS CORP
898 W. 18th St., Costa Mesa, Cal

RF-505

If you paid twice as much
—it would still be a bargain!



RF COMMUNICATIONS RF-505

HF SSB-ISB ALL PURPOSE RECEIVER

RF Communications now offers an all purpose receiver that provides all of the features and performance of the most sophisticated equipment—all of the ruggedness and reliability of mil-spec gear—at an unbelievably low price.

If you need an ISB Receiver and you are budget minded, don't fail to investigate the features of the RF-505. This versatile receiver can be used in applications that range from laboratory measurement to military transportable shelters—or ship-board use. Wherever you need a receiver with a frequency synthesizer and state-of-the-art performance, you'll want the RF-505.

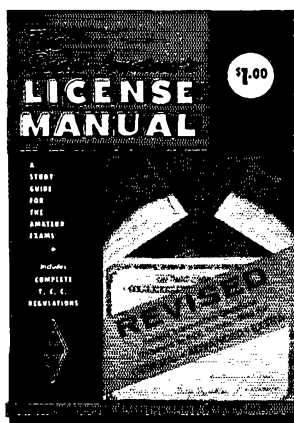
- Frequency range: 1.6000 to 29.9999 MHz.
- Frequency synthesizer: 100 Hz steps.
- Frequency stability: ± 1 pp million.
- Continuous tuning provided.
- Sensitivity: $0.5 \mu\text{V}$ for 10 db S + N/N.
- Dynamic range: 125 db.
- Modes: USB, LSB, CW, AM and ISB.
- Image rejection: -70 db.
- Input: AC—100 to 260 volts, 48 to 1000 Hz or
- Input: DC—10 to 40 vdc.
- Temperature range: -28°C to $+55^\circ\text{C}$.
- All solid state.

For further information
please write Dept. 3C.



RF COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE • ROCHESTER, NEW YORK 14610

For employment opportunities, send your resume to the Personnel Director. An equal opportunity employer.



With new regulations in effect, every amateur should have the latest information. And, the latest information is contained in the current *LICENSE MANUAL*.

Complete FCC Regulations—in addition to sample questions for Novice, Technician, General, Advanced and the Extra Class examinations.

\$1.00

POSTPAID

The AMERICAN RADIO
RELAY LEAGUE INC.
NEWINGTON, CONN. 06111

W48KCU has turned over the EC post in Cabell County to W8SQO. W48YSB, W48RJO, W8VEN, K8MYU and W8LZA submitted excellent reports on frequency measuring. Wood County has an emergency net operating on 6 meters. W88BBG enjoys c.w. and is a new ORS. W48WIX and W8EEO are new OBSS. Stubenville ARC, composed of Tri-State amateurs which includes Weirton, held its 3rd Annual Fellowship Dinner. K8-BIT is now W3EXC, and his wife, ex-K8MQB, now is W3EXG in Pittsburgh. K8VQG has a new three-element beam. K8VNL has returned to West Va. High winds played havoc with the beam antennas of K8QYG and with W8CKX's 3.5 antenna. W8EEO enjoys county hunting. W8VMP has been transferred to Louisiana. WVN C.W., with 31 sessions, 7.2 average QNI, passed 128 messages. WVN Phone, with 30 sessions, 692 stations, handled 134 messages. The Opequon Radio Society held its Annual Mid-winter Dinner at Martinsburg in Jan. K8BHV, W8EG and W8AKQ are West Virginia's really old-timers. Traffic: W8SQO 158, K8MYU 76, W48RQB 54, W8AHZ 40, W48YOF 39, W48NDY 37, W8HZA 32, W48WCK 30, W8CKX 29, W8JM 23, W48-WIX 20, W88BBG 15, W8FKB/8 14, W48YSB 11, W8-DUV 9, W8WEJ 9, W8QJE 7, K8ZDY 6, W48LTFZ 5, W8VOL 5, W48CKN/2 2, W8ETF 2, W48TWR 2, W48-AGC 1, W48KGU 1, K8RW 1, K8KZR 1, W8NCD 1, W8QEC 1, K8SOR/8 1, W48THX 1, W48UNP 1, K8-VNL 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—SEC: W5PNY. PAMs: W5DMG, W48FFL. OO: W5-QNQ. RM: W48FJK. ORS: K5MAT. OPSs: W5NUI, W5PNY, W5BWV, W48MIY. Many appointments are due for renewal. Check your certificate; if the date shows it is due send it to your SCM for endorsement. EC's, don't forget your monthly reports to the SEC. Even reports of no activity are important. N.M. section winner of the '68 N.Y. QSO Party was K5MAT. Claimed SS scores: W5MIYI, 27, 999-s.s.b.; W5QJH, 100, 800-c.w.; W5EU, 92,808-phon. W48FJK now is Extra Class. W5NUI's telescoping mast supporting all his antennas untelescoped because of the cold weather. Jim is retiring from the AF in Feb. W5YGR is experimenting with 20 through 10 meter-quads now atop his new tower. W5QJM and W5PNY are on ATV in Los Alamos. W0E2T was the guest of K5MAT during Thanksgiving. W5DMG's father passed away late in November. Many condolences Bob. Traffic: (Nov.) K5-MAT 73, W48UJY 38, W5NUI 18, W5DMG 16, W48-FJK 13, W48JNC 13, W48MIY 11, W48MIY 8, W5NON 7, W5BWV 4, W48TWA 4, W5PNY 2. (Oct.) K5MAT 79, W5PNY 30, W48UJY 23, W5NUI 20, W48JNC 13, W48FJK 10, W5NON 4, W48MIY 3, W48TWA 3.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. W7EVK is the 1969 pres. of the UARC, with W7VEO and W7LPH, vice-pres.; and K7SOT, secy.-treas. Utah will host the 1969 version of the Rocky Mtn. Division Convention July 4, 5, 6. Keep this week end in mind. Utah participants scored quite well in the SS this fall. The following claimed scores have been reported: Phone—K7QEZ 79,650; K9LQB/7 99,463. C.W.—W7CYH 77,553, K7CLS 81,090. W7EM will be attending an FAA school in Oklahoma until April. K7ZJS participated in the November Frequency Measuring Test and also is very active in OO activities. Utah nets: BUN, daily 1930 GMT 7272 kc. UARN, Sat. and Sun. 1500 GMT 3987.5 kc. W7PPG is a new assistant NCS on UARN. W48DVT is net manager. W7OHR, at B.Y.U., has a TH6DX at 140 feet and dipoles for 40 and 80 at 140 feet at center. Traffic: K7HLR 189, W7OCX 139, K7SOT 55, W7EM 36, W48-KUW 5.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSS: K7SLM, K7NQX, W7SDA, K7TAQ. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; Wx Net, Mon. through Sat. at 0630 on 3920. K7TCF was married in Casper in Nov. and is now finishing his military service in Germany. K7VWA and

SURPLUS EQUIPMENT WANTED TO BUY BY THE FASTEST GUN IN THE EAST



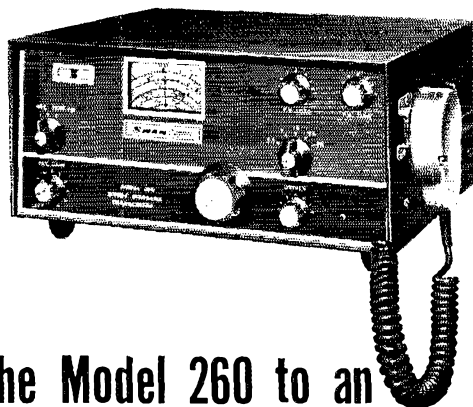
No horsing around, we pay fast . . . in 24 hours . . . and we pay more. We'll swap or trade new equipment too . . . We quote fast too. We also pay for shipping, insurance, etc. You call fast, now, collect, for fast quote.

SPACE ELECTRONICS
div. of MILITARY ELECTRONICS CORP.
11 Summit Ave., East Paterson, N.J. 07407 (201) 791-5050

many have tried
 but **SWAN SUCCEEDED**

a complete station
 for only

\$395⁰⁰ Just hook the Model 260 to an antenna and you're on the air.



Its that simple! There is nothing else on the market comparable to the 260. Look what you get for \$395.00.

- ★ Complete frequency coverage on all five bands ★ 10 meters ★ 260 watts PEP
- ★ Built-in power supply . . . AC and DC ★ Portable . . . only 26 pounds, complete with handle, built-in speaker and mike
- ★ Designed and built with the same ruggedness, reliability and craftsmanship that has made Swan a household name the world over.

And coming very soon will be another star in the Swan line, the 270 deluxe. Everything that the 260 has, plus many additional features for those who can pay a little more. The 270 will sell for \$495.00, still a low price for a complete station.

And if you need an antenna, Henry Radio can make that a simple matter with its cost saving Antenna Package Program.

We know its hard to believe, but come on in to a Henry Radio Store for a demonstration. If you can't come in . . . write or phone. We'll give you more information, terms, and will ship anywhere.

EASY FINANCING • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin.

TED HENRY (W6UOU)

BOB HENRY (WØARA)

WALT HENRY (W6NRV)

CALL DIRECT . . . USE AREA CODE

Henry Radio Stores

Butler, Missouri, 64730

816 679-3127

11240 W. Olympic, Los Angeles, Calif., 90064

213 477-6701

931 N. Euclid, Anaheim, Calif., 92801

714 772-9200

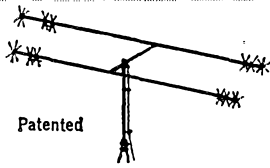
"World's Largest Distributor of Amateur Radio Equipment"

Now... 2000 Watts P.E.P.

Full Power/Minimum Size

FOR APARTMENTS • SUBURBAN HOMES

Marine and Portable Operation
Packaged for APO and FPO Shipping



6-10-15-20 METERS

The time proven B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Bands	6-10-15-20 Meters
Power Rating	2000 Watts P.E.P.
El. Length	11'
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model B-24
Net \$59.95

MULTIBAND COAXIAL ANTENNA for 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV hardware. Patented.

Power Rating	2000 Watts P.E.P.
Total Weight	5 lbs.
Height	11'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.



Model G4 Net \$34.95

Send for Free Brochure
If there is no stocking distributor near you order direct from factory. We pay shipping to your Qth if in Continental U. S. A.



1001 W. 18th Street - Erie, Pennsylvania 16502

• LEADERS IN COMPACT ANTENNAS •



M & M's Electronic Keyer the "DAH-DITTER®"

MODEL EK-1A

ONLY \$34.95 Assembled and Tested

- All solid state with space age integrated circuits
- Fully self-completing on both Dah and Dit
- Fixed 3/1 Dah/Dit ratio for perfect code
- Built-in AC power supply
- Fully isolated reed relay output
- Built-in side tone oscillator and speaker
- Speed range 5 to 40 WPM.

Send your order direct to:
M & M ELECTRONICS

6835 Sunnybrook, N.E., Atlanta, Georgia 30328

OM have moved into Tensleep for the winter. New Extra and Advanced Class licensees in Casper are W7VDZ and WA7KKH. W7BXS has headed south for the winter; he plans to work portable. The Annual Wyoming Hamfest is tentatively planned for July 5-8 to be held at Story. Make your plans now to attend as the Sheridan Club plans a better-than-ever event. W7LVU is busy assembling more 225-Mc. equipment and the Casper group is getting more activity on 6. Traffic: K7NQX 292, WA7CLF 168, K7KSA 146, W7-TZK 106, WA7GYQ 47, W7NKR 42, K7ITH 35, WA7-EUX 30, W7YWW 25, K7SLM 22, W7BHH 18, WA7-VVA 15, W7SDA 10, WA7FKF 9, K7DEJ 7, K7AHO 6, K7JED 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. PAM: WA4EEC. RM: K4BSK. Thanks to K4WHW for the fine leadership over the past two years. I solicit your help in maintaining the excellence in the Alabama section. WA4NPL is the new EC for Jackson County, replacing K4YMB. It's good to hear that the Gadsden Radio Club is very active again. WA4WGF is back with us after a long trip to Viet Nam. Thanks also to W4FPI for his fine job as SEC. W4USM is back on the air with a new tower and quad. Congratulations to K4VLL on his second retirement. Discover real fun and excitement in hamming—join a c.w. traffic net. You'll love it. Nets in the section:

Net	Freq.	Time	Day	Purpose
AENB	3575	0100Z	Daily	CW Traffic
AEND	3725	2330Z	Daily	CW slow speed
AENH	50.7	0200Z	Sun.-Tue.	Traffic
AENM	3965	0030Z	Daily	Traffic
AENP	3955	1230Z	Daily	Traffic
AENR	50.52	0115Z	Wed.-Fri.	Traffic
AENT	3970	2230Z	Daily	Teenage Training Net
AENO	50.54	0115Z	T-Th-Sat.	Traffic

Traffic: K4AOZ 148, K4BSK 85, WB4EKJ 68, WA4VEK 43, K4WHW 28, WA4FYO 22, WA4ROP 22, W4MKU 20, WA4AZC 18, WN4ESL 16, WA4EEC 9, WB4KDN 7, WA4NWI 6, K4JK 5, K4UUC 5, W4WLG 4, K4KJD 3.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5OB—The code classes for fifteen prospective hams are going real well. The Classes are sponsored by the CARG. Congratulations to KZ5WR and his XYL on the arrival of their second harmonic. KZ5MAI and KZ5NN returned to the states for retirement. 73 and 88 to Roy and Marcy. New hams are KZ5KN and KZN. K9BCT is expecting his KZ5 call soon. KZ5CT and KZ5SA are the proud owners of a new Drake TR-4. Traffic: KZ5-OA 158, KZ5WH 93, KZ5SW 69, KZ5WL 50, KZ5OB 30, KZ5MIV 26, KZ5WR 18.

EASTERN FLORIDA—Acting SCM, William G. Blasingame, Jr., WA4NEV—SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM: 75M: W4OGX. PAM 40M: W4SDR. V.H.F. PAM: WA4BMC. It is very easy to tell from the traffic reports that winter and the holiday season is here. Traffic totals have increased considerably. It surely would be nice if the individual reports would increase so that we could be number one. W8BZY/4 reports he is well on the way toward DXCC and hopes to make it before being transferred. WA4QLZ has reported for active duty with the Navy. It is quite possible that we will hear John soon as a maritime mobile station. I am very sorry to report the passing of the XYL of W4-DVO. "Cy, we are all thinking of you in these trying times, and look forward to hearing you active again soon." The Vero Beach Amateur Radio Club has elected W4DFZ, pres.; W4LEP, vice-pres.; WA4QVJ, secy.; WA4SCK, treas. The Indian River Amateur Radio Club set up stations at four locations on Nov. 23 to handle Thanksgiving traffic. Approximately eighty-five messages were handled in the one-day affair. There is an increase in 2-meter f.m. activity in the Jackson-

"HOW TO MAKE MONEY IN Mobile Radio Maintenance"

AUTHORITATIVE GUIDEBOOK ABOUT THE ROOM IN TWO-WAY MOBILE RADIO. GIVES FACTS, FIGURES, PAY RATES. WRITE TODAY!

FREE

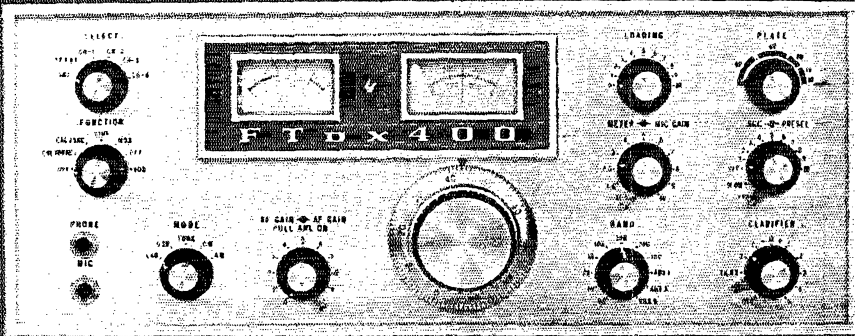


LAMPKIN LABORATORIES, INC. Mfg. Div. BRADENTON, FLA.

TOP OF THE YAESU



LINE



THE FT_{DX} 400 TRANSCIVER

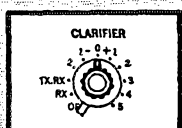
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace-setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

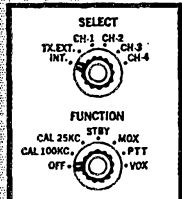
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

SPECIFICATIONS: Maximum input: 500 W PEP SSB, 440 W CW, 125 W AM • Sensitivity: 0.5 uv, S/N 20 db • Selectivity: 2.3 KHz (6 db down), 3.7 KHz (55 db down) • Carrier suppression: more than 40 db down • Sideband suppression: more than 50 db down at 1 KHz • Frequency range: 3.5 to 4.7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). • Frequency stability: Less than 100 Hz drift in any 30 minute period after warm up.

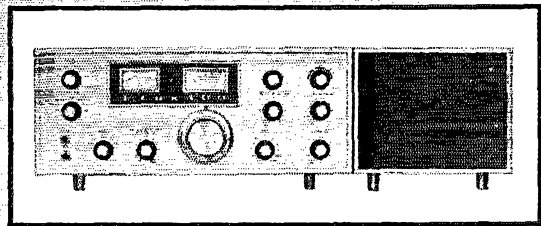


CLARIFIER CONTROL — Does the work of an external VFO — allows operator to vary receive frequency 10KHz from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL — Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.

FUNCTION CONTROL — Selects crystal calibration marker frequency and desired transmit mode of operation.

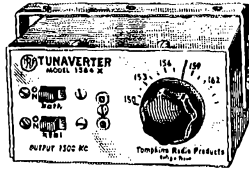


FT dx 400 \$599.95 — SP-400 \$14.95

HAMS
POLICEMEN
FIREFMEN
EMERGENCY
GROUPS
CB'ERS

KEEP IN TOUCH! LISTEN TO NEWS AS IT HAPPENS!
POLICE - ETC CALLS ON YOUR BROADCAST RADIO
WITH TUNAVERTER, KING of the CONVERTERS!

OUTSTANDING
PERFORMANCE
with
MORE FEATURES
plus
EASY installation
and 100% American
made dependability!



Crystal & Tunable by the flip of a switch! Its getting TWO converters for the price of ONE! Extra Sensitivity & Selectivity with unique 3 gang tuning capacitor—a signal peaker on X control! Changeable Crystals for versatility & usability! Change crystals at will! Never obsolete! SQUELCH accessory for NOISE FREE MONITORING!

- 9 volt battery powered
- Includes coax, mount
- 1 year guarantee
- Size—2½" x 3½" x 4¼"

Models for AM & FM Tunable & Crystal! (less crystal)

BAND	MODEL	COVERS	OUTPUT
CB & 10 M	273 X	26.9-30 mc	1500 kc
6 meters	504 X	50-54 mc	
2 meters	1450 X	144-150 mc	
Police, fire, and VHF weather Aircraft	348 X 1564 X 1828 X	33-48 mc 150-164 mc 118-128 mc	

ONLY \$32.95 each ppd.

No crystal needed for tunable use.

SQUELCH FOR YOUR TUNAVERTER!!

Noise free monitoring with adj. electronic squelch! No wires to Radio or Converter! Just plug in coax! For all 1500 kc outputs. 9 or 12 V. 1" x 4" x 2". \$17.50 ppd.

- Coupling Loop & Ext. Antenna for use with home and Transistor Radios \$3.95 ppd.
- Mobile Battery Eliminator, 12V to 9V \$4.95 ppd.
- Crystals—State Exact Listening Freq. \$5.10 ppd.

See Your Dealer or Order from: AIR MAIL add \$.85 ea.

HERBERT SALCH & CO.
Woodsboro Q1, Texas 78393

Marketing Division of
Tompkins Radio Products

ENJOY EASY, RESTFUL KEYING

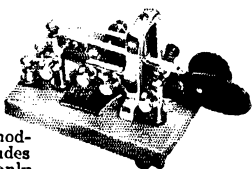
With **VIBROPLEX**



Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLux models also include Chromium Base and red finger and thumb pieces. Five models to choose from. priced at \$25.95 to the 24K Gold Plated Base "Presentation at \$43.95.

VIBRO-KEYER

Works perfectly with any Electronic Transmitting Unit. Weighs 2½ lbs., with a base 3½" by 4½". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model \$20.95; DeLux model includes Chromium Plated Base at only \$27.50.



Order today at your dealers or direct
THE VIBROPLEX CO., INC.
833 Broadway New York, N. Y. 10003

FREE Folder

vile area. We have direct communication from the beaches area to Baldwin and Hilliard. A group has gotten together and is working on a repeater station Traffic: (Nov.) W4ASCK 712, WB4AIV 445, W4ILL 427, W4ANEV 335, W4AJH 314, K4BV/4 220, W4FPC 219, W4SDR 211, WB4HJV 167, W4TWD 151, W4LJE 147, W4DF 146, W4AHD 130, W4AFGH 121, W44LDL 119, W4SMK 68, W8BZY/4 68, W4DFU 64, W44FJ 63, WB4HQX 44, K4LEC 44, W4HBGW 41, W44CQ 41, K4DAX 40, WB4ADL 39, W4ZAK 37, W4IAD 33, W4OGX 30, W4KRC 28, W4YEX 25, K4LPS 24, W41YT 20, W4GDK 17, W4NGR 14, W4AQLZ 14, W4CBE 13, W44EYU 12, W4DVO 11, K4SJJ 11, W4TJM 11, W4LEP 8, K4EBE 6, W4VPO 6, WB4GUEH 5, K4DSN 3, W4SOM 1. (Oct.) W44HDIH 65, W4BKC 8. (Sept.) K4IEX 24.

GEORGIA—SCM, Howard L. Schonher, W4RZL-SEC: W44WQU, RM: W4FDN, PAMs: K4HQI, W4YDN, K4OWV visited with W44WQU, WB4EALV now is active with an HW-12A, WB4DTY and W4JCA are sporting new quads. WB4DCY is on with a 4-1000 linear, WB4EUV has a new HW-100, W4ICA has a new 60-ft. crankup, W4BQU is working 100-w.p.m. RTTY. The Georgia State Net met all 32 sessions with 355 stations and 194 messages. Meet the nets on 3595 kc at 0000 and 0300 daily. W4PIM has a new grandson courtesy of his youngest daughter. Two new stations on 2 meters in the Atlanta area are W4BGI and W4LYG. 50-Mc. activity was somewhat reduced in Nov. W4HYW is on the QCWV Chapter 43 QSO Party committee. W4BGG and W4YNL are on 8-meter a.s.b. W4BTW has a 420 tripler, Atlanta 2-meter stations are using the Mt. Alto repeater in Rome, Ga. A new fm repeater soon will go in operation on Stone Mt. W4LRH is working into La. and Ala. on 2. WB6UTC has a Drake 2C. W4TYE has a 14AVS, K4TXK hoisted a new antenna with the help of the telephone company with a cherry picker on one end and a fire truck on the other. WB4EMF lost his TA-33 when the guy broke Traffic: WB6UTC/4 154, W4FDN 122, W44RAV 88, W4DDY 79, W4TYE 65, W44WQU 50, W44UQQ 48, W4PIM 42, K4TXK 41, W4YDN 13, W4RZL 8, WB4HDIH 6, W44KQ 5, W4REI 5, WB4EMF 3.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr. W4RKH-SEC: W4IKB, PAM H.F.: W7BNR/4, PAM V.H.F.: W4UUF, RM: K4UBR, Nets:

Net	Freq.	Time	Days	Sess.	QNI	QTB
WFPN	3957 kc.	2300Z	Daily	30	682	53
QFN	3651 kc.	2330/0300Z	Daily	60

Pensacola: W4AXP, RM, ORS and ex-SCM, joined the Silent Keys. W4EPIH is at school in Virginia. WB4DVM is collecting parts for linear, likewise WB4JCV and K4CFS. K4ZLE put up a new tower just in time to be transferred! The FFARA is furnishing instructors for a code and theory course lasting 6 months. K4DOT maintains OO activity. Crestview: W4OCQ was seriously injured in an auto accident. Fort Walton WB4LRW received his new ticket (ex-WN4EQT). K1 WYS/4 is on 6- and 2-meter mobile. W4OHA/4 is mobile on 2-meter f.m. The N.W. Fla. FM Assn. sponsored a clinic for production-line tune-up of FM unit for members. W4ZWD sends greetings from the *Steel Traveler*, Panama City: The PCARC held its annual installation dinner. New officers are W44IMC pres.; K4AHV, vice-pres.; W44KJB, secy.; W44ZTC treas. WB4LXK is a new OPS. W44VTV had a good score in the SS. Port St. Joe: W4VEB and W44IXI monitor 146.94 Mc. for mobiles during the day. Chipley: W4IKB has a 146.34/146.94 f.m. repeater going. Marianna: WB4LRX is a new ham on 2 meters. Cypress: W4KCA is mobile on 2-meter f.m., and has pair of five-element beams up 50 feet at home. Traffic (Nov.) WB4DM 43, W4WEB 34, W4IKB 13, WB4IXI 12, W4KCA 12, W44GTY 9, W4RKH 8, WB4EQU (Oct.) WB4EQU 4.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Gary M. Hamman, W7CAF, PAM: W7UXZ, RM: K7NHL, The Saguaro H. S. Cit

25KC MARKS
Locate New Sub-Ba.
Accurately! Four wires connect IC-3 Divider to your 100KC calibrator give 25KC marks. Circuit board 1¼" x 1¼". Specify supply voltage — 3-300DC, 10 ma. (Lowest is best.) Send for IC-3, \$7.25 postpaid.
PAXITRONIX INC. BOX 1038 (C) Boulder, Colo. 803

RCA has all-new FCC commercial license training

**Get your license—
or your money back!**

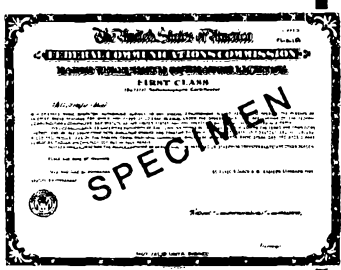
Now RCA Institutes Home Study Training has the FCC License preparation material you've been looking for—all-new, both the training you need, and the up-to-date methods you use at home—at your own speed—to train for the license you want!

2 Convenient Payment Plans—You can pay for lessons as you order them, or take advantage of easy monthly payment plan. Choose the FCC License you're interested in—third, second or first phone. Take the course for the license you choose. If you need basic material first, apply for the

complete License Training Program.

SPECIAL TO AMATEURS. This course—while designed for Commercial license qualification—contains much of the new material called for by FCC Docket 15928—advanced and extra class you'll want to qualify for before November of 1969. QRX until you get the information.

Mail coupon today for full details and a 64-page booklet telling you how RCA Institutes Home Training can show you the way to a new career—higher income—and your FCC License.



RCA INSTITUTES, INC.
Dept. BA-29
320 West 31st Street, New York, N.Y. 10001

Please rush me without obligation, information on your all-new FCC Commercial License training.

Name _____

Address _____

City _____ State _____ Zip _____

HATRY ELECTRONICS

500 Ledyard St., Hartford, Conn. 06114

(1 Block East of Wethersfield Ave. off
Airport Rd., Rte 6)

See **CORKY, W1KXM** or
WARD, W1WRQ

ANTENNA STUFF

In 100 foot rolls only

450 ohm open wire. Per 100 feet	\$4.62
300 ohm open wire. Per 100 feet	4.29
Standoff-Mast or Screw-In19

In 100 ft. interconnected coils

18 Copperweld. Per 100 feet	\$ 1.09
14 Copperweld. Per 100 feet	2.74
12 Copperweld. Per 100 feet	3.79
14 Copper-Solid. Per 100 feet	3.95
12 Copper-Solid. Per 100 feet	5.26
Times T4-50 L/Loss 8U. Per foot18
Times T5-50 L/Loss 58U. Per foot10
Times Solid Sheath Alumafom in stock Kits with connectors 50/100 ft	
Glass Line-guy wire. Per 100 feet 500 lbs Test	3.52
Glass Line-guy wire. Per 100 feet 1000 lbs Test	5.27
Hy-Gain Balun. Each	14.95
W2AU Balun. Each	12.95
Blitz Bugs. Each	4.95

(Canadian Amateurs Send U.S. Funds Only)

F.o.b. Hartford

Please Include Postage

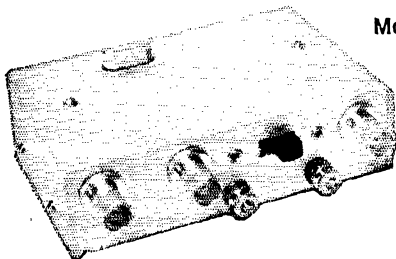
CONNECTICUT'S OLDEST HAM STORE

... "THE BEST" 2 METER CONVERTER

Model 407

\$34.95

ppd.



144-146 MHz in, 28-30 MHz out
or 146-148 MHz with a second crystal

A full description of this fantastic converter would fill this page, but you can take our word for it (or those of hundreds of satisfied users) that it's the best. The reason is simple—we use three RCA dual gate MOSFETs, one bipolar, and 3 diodes in the best circuit ever. Still not convinced? Then send for our free catalog and get the full description, plus photos and even the schematic.

Can't wait? Then send us a postal money order for \$34.95 and we'll rush the 407 out to you. NOTE: The Model 407 is also available in any frequency combination up to 450 MHz (some at higher prices) as listed in our catalog. New York City and Sales residents add local sales tax.

VANGUARD LABS

Dept. S-2, 196-23 Jamaica Ave., Hollis, N.Y. 11423

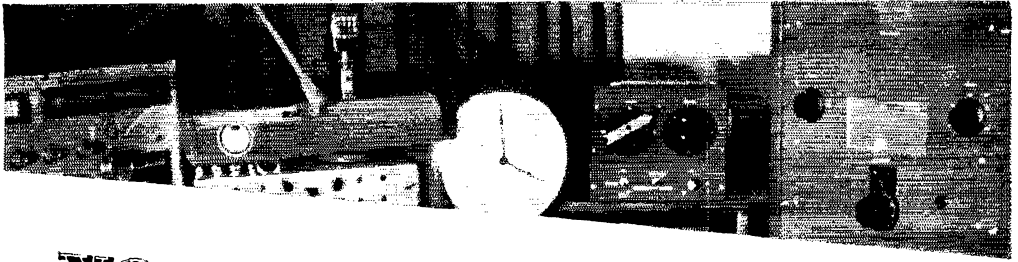
is sponsoring the Annual Arizona QSO Party Feb. and 9. See Jan. QST for details. The Old Pueblo AR completed a successful year with a membership of about 120. The Scottsdale ARC elected W7OPS, pres K7EIG, vice-pres.; W7FMO, secy.; K7JWB, treas K7GPZ, member-at-large. The 75-meter transmitt hunt of the Arizona ARC was won by WA7DGY, but he sure took the hard way to get there. Here are some of the radio clubs in the state with the times, day and locations of the meetings: Arizona ARC, 2000, 1 & 3rd Thurs., 1510 E. Flower; Phx. Arizona Repeat 2000, 2nd Tue., 2002 E. Camelback; Phx. Cocoin ARC, 1930, Fri., 1601 N. East St., Flagstaff, Maricopa C.D., 1930, 4th Thurs., 2035 N. 52nd St., Phx. O Pueblo ARC, 1930, 2nd Wed., Randolph Park Club house, Tuc. Phoenix V.H.F., 2000, 1st & 3rd Wed., 15 E. Flower, Phx. Scottsdale ARC, 1930, 3rd Mon., 35 Old Scottsdale Rd. Yuma Valley ARC, 2000, alternate Wed., member's homes. Permits for 30 and 60 days operate in Mexico are available from LMIRE, Box 90 Mexico City. W7IR is working lots of DX on 40 with a three-element beam. W7LLO is now mobile on and 80. Traffic: W7GEP 346, K7NLL 259, K7JTY 10, WA7DUB 69, W7OUE 47, W7CAP 30, K7KFI 28, WA1F 20, W7KYM 15, W7MES 15, W7AVR 13, W7AEG 12, W7AEG 12, W7UXZ 12, W7CEN 8, W7A7UH WA7IFD 8, K7JFY 6, W7QHD 5, W3BF/B 4, K7UC 4, WA7EIS 3, K7RLT 3, W7DQS 2.

LOS ANGELES—SCM, Donald R. Etheredge, KUMV—Asst. SCM: Harvey D. D. Hettland, WA6KZ BPL congratulations to W6GYH and WB6BBO! A net has been formed in the section called CNN, Cal Novice Net, which meets daily at 0400Z on 2737 M Write WB6USX, 1209 Hoffman Ave., Long Beach 90801 for further information. WB6SXY reports he is installing a new tower. New gear includes the following: WB6SI an RBC-3 receiver, WB6SSZ a keyer, WA6DPP an SB-3 receiver. New officers of the San Fernando Valley I Club include W6GP, prexy; W6ED, Vice-prexy.; W6APX, secy.; W6RW and K6YRA, directors. WB6TS and WB6RLP are both active on 220 Mc. K6ROC, L. City RACES members, recently visited their Hq. station on Mt. Lee and welcomed W6EL, WA6TII a WB6VKQ as new members. The East San Gabriel Valley AREC provided communications for the Long Beach Veterans Day Parade. W6OEO honeymooned in Europe recently. W6CRQ is still active on jury duty. The Pasadena ARC reports WA6s KZB and JQB as new members. W6OZ and WA6YKP are both JMM service men and WB6MTL recently sailed on the hospital ship *Ho*. WB6TMC, then WA6MIC, is now W6JPH! The K6BB crew recently held a charity auction and also welcomed WB6MWT as a new member. W6INH and WB6TQS both working on linears. OVS W6GEN operated XE6GEN in the recent c.w. test. New officers of the West Valley ARC include WB6TVH, prexy.; W6CXX vice-pres.; W6GCSN, secy.; W6BKPN, treas. K6AV notes a new 6-meter converter. Recent tower losses include WBUD and WA6EKL. While W6EJL lost quad, WA6AGU and W6NHS are new to the Val Radio Club W6SD crew. The Marina ARC reports W6DGP as a Silent Key. New Extra Class hold now include W6BHGU; W6NJU and K6YRA are 1 Advanced Class. WB6WPO, the TRV ARC, has 1 antennas up and includes W6VCZ, WB6DOW, WB6FT WB6SNX and W6EQUE as recent members. W6RR operated from PJOC late last year. W6FNE and K6Y both have linears operational now. Lockheed's W group reports WB6s CAR, OFA and WUV new arrivals DXers in the So. Calif. area got together at a recent meeting of the So. Calif. clubs to hear of WA6FC Vatican City operation. The West Valley ARC has a call, WA6LXN, and counts WB6s, NNU, TQS, U ZMI, W6s CSD and ZUW as new members. WB6U reports new gear in the shack because of extension trading. Note the new frequencies for W1AW practice schedules. Traffic: (Nov.) W6GYH 664, W BBO 607, W6BHG 253, K6CDW 107, WB6TOS 86, W YSG 49, WB6OLD 40, WB6GKX 28, WB6SXY WB6USX 25, W6DQX 23, W6FUJ 21, W6JPH K6FA 15, WA6KZI 15, K6UMV 14, K6CL 10, INH 10, W6USY 10, W6DGH 7, K6ASK 4, W 4, W6GEN 1, W6SRE 1, (Oct.) W6GYH 990, W

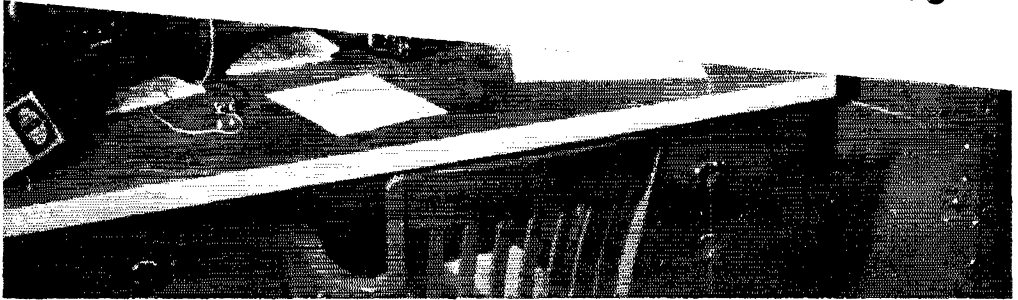


Can give you personal service helping you select better gear dollar for your operating pleasure. Over 30 years experience. Big trade easy terms. Used bargains.

VAN SICKLE RADIO SUPPLY
Gene Van Sickle, W9KJF Oz
4131 N. Keystone Ave.
On the northeast side of
Indianapolis, Indiana 4620



YOU'LL NEVER MISS...



...THE GOOD OLD DAYS

YOU KNOW WHAT WE MEAN
if you saw us at Las Vegas, Miami, or Fresno
last month . . .

IF NOT . . .
we'll soon be at a major ham convention near you.

MEANWHILE . . .
keep a sharp eye
on your favorite ham radio publications!



signal/one

A Division of ECI (An NCR Subsidiary)

2200 Anvil Street N. • St. Petersburg, Florida 33710

"CHOICE OF THE DX KINGS"



2 ELEMENT—3 BAND KIT SPECIAL

CONTENTS

- 8 Fiberglass Arms—skyblue color
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler—h.d. aluminum
- 16 Wraplock Spreader Arm Clamps **Add \$3.50 for PPD**
- 1 CUBEX QUAD Instruction Manual **Frt. Cont. U.S.**

ONLY
\$59.95

2-3-4 or more element Quads available
Write for FREE BROCHURE and Price List

CUBEX COMPANY

P.O. Box 732, Altadena, California 91001
Phone: (213) 798-8106

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"



**Radio Amateurs
Reference Library
of Maps and Atlases**

WORLD PREFIX MAP—Full color, 40" x 28", shows prefixes on each country... DX zones, time zones, cities, cross referenced tables... postpaid \$1.00

RADIO AMATEURS GREAT CIRCLE CHART OF THE WORLD—from the center of the United States! Full color, 30" x 25", listing Great Circle bearings in degrees for six major U.S. cities; Boston, Washington, D.C., Miami, Seattle, San Francisco & Los Angeles... postpaid \$1.00

RADIO AMATEURS MAP OF NORTH AMERICA! Full color, 30" x 25"—includes Central America and the Caribbean to the equator, showing call areas, zone boundaries, prefixes and time zones, FCC frequency chart, plus informative information on each of the 50 United States and other Countries... postpaid \$1.00

WORLD ATLAS—Only atlas compiled for radio amateurs. Packed with world-wide information—includes 11 maps, in 4 colors with zone boundaries and country prefixes on each map. Also includes a polar projection map of the world plus a map of the Antarctica—a complete set of maps of the world. 20 pages, size 8 3/4" x 12"..... postpaid \$2.00

Complete reference library of maps—set of 4 as listed above..... postpaid \$3.00
See your favorite dealer or order direct.

WRITE FOR FREE BROCHURE!

RADIO AMATEUR callbook INC.
Dept. A, 4844 W. Fullerton Ave.
Chicago, Ill. 60639

BBO 584, W6QAE 285, W6MLF 265, K6CDV 104, WA6KZI 102, W6FD 80, WB6TQS 07, WB6YSG 55, WB6KKG 38, WA6MIC 37, W6BHG 24, WB6SXY 24, WB6WDS 21, W6U5Y 20, K6CL 18, W6DQX 14, K6ASK 12, W6DGH 12, WB6SLG 10, K6UAV 9, W6HUJ 5, WB6OLD 4, W6TN 4, WB6AEL 2, W6AM 2, WB6OUD 2, WB6GGL 1, (Sept.) W6MLF 378, W6MLZ 40, (Aug.) W6MLF 468.

ORANGE—SCM, Roy R. Maxson, W6DEY—WB6CQR has resigned as V.H.F. EC because of the press of other public service activities. WB6TYX has accepted appointment as the new EC and will continue the high level of the 2-meter activities so ably set by WB6CQR and AECs WB6WOO, WB6HJL and WA6VVP. The 2-meter nets are on 145.53 at 0700 and 1030 Sun. local times. A joint meeting of the Orange County and San Fernando DX Clubs was held at the Roger Youth Auditorium, L.A. on Dec. 5. Orange County ARC officers for 1969 are WA6ROF, pres.; WB6RVM, vice-pres.; WB6TBU, secy.; WB6CQR, treas.; W6BNX, act. mgr.; W6HHC, pub. rel.; W6GPR, TVI chmn.; WB6WOO mbr.; WB6UDC, brd. mbr. W6GB is experimenting with FET front end for his receiver. WB6TYZ says school and basketball are cutting into his ham operating time. WA6TAG, EC Desert Area, advises the new AEC is WB6VVI. We welcome to the Orange section, K4BMR. Major General John B. Bestic, retired, ARRL members will remember him as the featured speaker at our recent Southwestern Division Convention in Phoenix. Traffic: (Nov.) W6BNX 451, WA6ROF 135, WB6TYZ 134, W6EY 13, WA6TAG 7, W6BUK 4, W6GB 4, (Oct.) W6BNX 249.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM. The ARC of El Cajon gave its "Amateur of the Year" award to WA6COE. Dick has done an excellent job in club organization and editing the club paper. The FCC has granted the call K6SD, as a club call, to be used during the San Diego 200th Anniversary. WB6KSA is trustee. JA6CJZ was a recent visitor at the home of WB6ZDJ. We understand he had some of our local 2-meter lads believing the long, long skip was in. K6ROR is now the So. Cal. Area Navy MARS Coordinator, with K6HAV assisting him as So. Cal. H.F. net manager and WA6HQM as admin. assistant. The Palomar Radio Club is very active supporting Marine Corps stations in KR6-Land with telephone relay skeds. Those involved are WB6QHP, WB6CTN, WB6IFH and WB6IPJ. At this writing there are a few Early Bird tickets left for the Southwestern Convention to be held in San Diego in Oct. If you'd like to save a few dollars, contact any member of the convention committee. W6LRU still holds code and theory classes at Midway Adult High on Mon. nights for those wishing to prepare for their Advanced or Extra Class tickets. Traffic: (Nov.) K6BPT 9897, W6YDK 4572, W6BGF 315, W6VNO 300, W6FOT 268, W6LRU 250, WB6ZDJ 167, W6SE 86, K6HAV 82, WB6UMT 41, WA6COE 16, WB6UNB 15, WA6KHN 2, (Oct.) K6BPT 9825.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC, K6GV, RM, W6UJ, K7RWI is operating in San Luis Obispo as a portable pending receipt of his 6 call. Aside from active traffic activities, K7RWI is also working on a home-brew 20-meter beam. W6YMD, of Thousand Oaks, has changed his call and QTH to W6GP, of Chatsworth. The Camarillo Mike and Key ARC recently received League affiliation at ceremonies attended by Yours Truly and Director K6IKW. This is a very active club which meets the 2nd Thurs. of each month at the Security Pacific Bank. Active during the recent Phone Sweepstakes were the following: W6GEB, WB6DPV, WB6AQW, WB6LJL, WB6WFP, K6GV is not very active since he started construction of the Simi Masonic temple. WN6ZWM is building his 12th Heathkit. Traffic: K7RWI 160, W6UJ 35, WA6FKY 20.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR
First off I wish to thank the Official Observers of



THE "MINI-BALUN"

Small — light — efficient — weather proofed have your antenna radiate, not your feed line — use for dipoles, doublets, yagls, invert "V" etc. — has ferrite core. Coax fitting takes full legal power, 1 to 1 impedance ra 3 to 30 mcs. Now with built-in lightning reter. NET PPD in U.S.A.—\$9.00

BILADA MFG. CO.

P.O. Box 263 **Manasquan, N.J. 08**

a Great one from NRCI



New 500-Watt 5-Bander from NRCI

You can't buy a more potent package than the new NRCI NCX-500 transceiver. This versatile 5-bander is packed with the performance extras that give you the sharpest signal on the band, plus an enviable collection of QSL's. Check it out!

- 500-Watt PEP input on SSB, grid-block keying on CW and compatible AM operation.
- Receive vernier, with tuning range greater than ± 3 kHz.
- Separate product and AM detection.
- Sidetone monitor, plus built-in code practice oscillator.
- Fast-attack slow-release AGC in all modes.
- Rugged heavy-duty 6LQ6's.
- Crystal-controlled pre-mixing with single VFO for effective frequency stability, plus identical calibration 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.
- Universal mobile mount included.

AC-500 power supply available

Great things are happening at NRCI

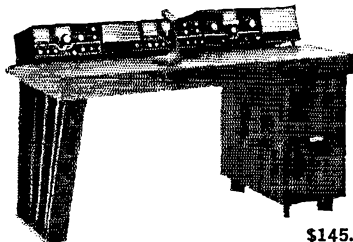
NATIONAL RADIO COMPANY, INC.
NRCI

37 Washington St., Melrose, Mass. 02176
 617-662-7700 TWX: 617-665-5032

"... IN THE DOG HOUSE?"

MOVE IN

WITH DESIGN INDUSTRIES
WIFE-APPROVED
COMMUNICATIONS DESK



\$145.00

... would YOU believe ... SOME hams are permitted into the house ... perhaps even the living room when their station includes a Design Industries Communications Desk or Console?

Send Today For Our Special Wife Pacification Kit
(Descriptive Brochure)

DESIGN INDUSTRIES, INC.

P.O. Box 19406
(214)-528-0150

Dept. T
Dallas, Texas 75219

ETCHED CIRCUIT BOARDS FROM QST

V.F.O.	9-68....	\$2.00
Speech Clipper	9-67....	\$3.85
(1968 Handbook)		
FET Preselector	8-68....	\$2.25
I.C. Keyer	5-68....	\$2.00
Converter 1.8 mhz	10-68....	\$1.75
Solid State Product Det.	12-68....	\$2.00

Sensitized epoxy boards\$3.50/PSF
*Assorted decade counting
unit boards\$2.25-\$3.50
All boards solder plated and drilled.

WATCH FOR CATALOG OF
BOARDS AND KITS

*S.A.S.E. and .25¢ handling charge
Facilities geared for Model Shop and small
lot production work.

STAFFORD ELECTRONICS

427 S. Benbow Rd. Greensboro, N.C. 27401
24 hour service on some circuits

North Texas for the fine job accomplished thus far. Did you realize many amateurs are reminded of their problems by our QOs? Among our QOs are W5QPX, W5MSG and W5PBN. Former QOs include W5BKII, K5AUZ, K5QOV and K5MKB. Our QSL Mgr. for W5, K5, WA5 and WN5 is Hurley O. Saxon K5QVH, P.O. Box 9915, El Paso, Tex. 79989. The Lake Texoma Hamfest was the top attraction in our area with some 275 hams attending. The DARC QCWA breakfast, with W2JE as the speaker, was attended by 75. Your SCM was allowed to run the official ARRL Tape of the Geneva Conference on Your Present Amateur Frequencies Now in Use from 1900 to Date. This tape was given by W1LVQ, of ARRL, and included a Q and A session. W5PML, Oklahoma SCM, is preparing a news item with pictures covering NYL activities. The Garland Amateur Radio Club reports the telephone book is ready and the Buckner project past the planning stage. W5IQ visited the Ft. Worth Kilocycle Club Nov. 21. The club scored 10,390 points in the June Field Day keying 4 transmitters. W5QGZ is a top con-tester, scoring 411 contacts and 71 sections on c.w. during the SS Contest and then making 274 contacts for 43,760 points on phone in 18 hours of operation. His claimed c.w. score is 72,952. The State of Texas RACES group has issued a new roster showing officials of 28 District and Alternate District Radio Officers. North Texas members include WA4TUN/5, W5HVF, W5TFW, K5SZC, W5GHQ, K5BGA, K5DMJ, WA5CMB, W5AVA, WA5CMC and K5CIL. The Texas C.W. Bulletin shows new members WA5TJI, W5FCX and WA5-AUZ. OBS W5ABQ transmits Official Bulletins on 3770 Mc. Tue, at 0245Z. K5LZA, Tex. Tfc. Mgr. files a nice report. Let me say this to all you traffic-handlers. Why not request a copy of the new issues of the Net Directory from Hq. It's loaded on this net business with frequencies, times, names of nets and what have you. Congratulations to W5EYB and W5BNG, our new West Gulf Division Director and Vice-Director respectively. Traffic: K5BNH 1118, WA5TYH 1052, W5-HVF 122, W5FCX 43, W5JSM 16, W5QGZ 9, W5LR 8, W5MSG 2.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: WA5AOB, RM: W5QMJ, PAMS: W5MPX, K5TEY, WA5JGU, K5ZCJ. The Texoma Hamaraina was a big success with more than 200 attending. The technical program was outstanding, especially that by W5HXL and W5JJ on Synthesizers and Transmission lines. A very interesting tape of the Geneva Convention was furnished and played by W5LR, SCM Northern Texas. Open Forum was held by W5NW, vice-pres. and W5IQ, West Gulf Division Director. Your SCM and NYL have returned from Colorado where they visited their son-in-law in the Fort Carson Army Hospital recovering from a broken neck. W5FKL has been visiting in El Paso. The big event of this area will be the 1969 Fort Sill Centennial. The Lawton-Ft. Sill ARC members have special centennial QSL cards and certificates. Congratulations to W5JJ on being elected vice mayor of Warr Acres, and to K5WPP on his Advanced Class license. K5CAY has a telephone relay schedule with KL7FBI. WA5OWO has Thurs. schedule with the USS Glacier at the South Pole. Correction to Dec. QST: WA5RRH is net mgr. of OPON, not WA5RRM. Net reports: OPEN, 5 sessions, 182 QNI, 3 QTC, STN, 25 sessions, 878 QNI, 240 QTC, OPON, 20 sessions, 268 QNI, 72 QTC. The Lawton-Fort Sill ARC Annual Hamfest and Banquet will be held at the National Guard Armory Feb. 9. Traffic: (Nov.) K5TEY 5304.

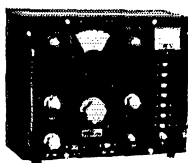


MODEL BTL \$18.95

The Model BTL Twin Lever Key can be used with any electronic keyer. Highly recommended for the squeeze keying technique. Fully adjustable. Large silver contacts. 3 1/2" x 4 1/2" base. Finished black wrinkle and chrome. Weight 2 1/4 lbs. See your dealer, or order direct. Please include postage.

Free Descriptive Folder
BROWN BROS. MACH. CO.

5370 Southwest Ave., St. Louis, Mo. 63131



STANDARD SIGNAL GENERATOR

MODEL SG-83B \$295.00
50 Kc-54 Mc. 1% dial accuracy. 1 Mc. xtal. Calibrated output 0.6 to 160,000 microvolts. Pure sine AM to 50%—no FM. All transistor. Battery or AC powered. Write for complimentary copy of instruction book with schematic.

Clemens Mfg. Co. 630 S. Berry Rd., St. Louis, Mo. 63122

The CAI Reliables In Action...

The Corps of Engineers Calms Disaster Scenes With the Voice of Ready Help



Nature's havoc can cause serious disruptions in communities anywhere, and at any time. The U.S. Army Corps of Engineers, ever alert to these breaches in our daily lives, responds quickly to keep waterways open for safe navigation with radio communications to restore people-to-people contact. CAI is the major supplier of all remote control SSB/AM systems used by the Corps... for its field units and district and division communication centers. If your requirements for radio equipment or systemized ground stations need the calming assurance of dependability... wherever or however they are used... consult CAI communication specialists.

Our *reliables in action* for the Corps, other United States and foreign government agencies, as well as prominent commercial, marine, and aviation users testify to their well earned acceptance. Brochures available on standard or custom systems.

Communication Associates, Inc., 1208 Third Avenue, New Hyde Park, L.I., N.Y. 11040. Telephone: 516-488-2323.

ca i
communication associates, inc.

SINGLE SIDEBAND GROUND STATIONS ■ VHF & UHF GROUND-TO-AIR TRANSMITTERS & RECEIVERS ■
LOW FREQUENCY NON-DIRECTIONAL BEACON TRANSMITTERS ■ REMOTE RECEIVING SYSTEMS ■ HIGH
POWER POINT-TO-POINT SIDEBAND SYSTEMS ■ ADD-ON ACCESSORIES ■ CUSTOM CONTROL CONSOLES

THE FINEST
FROM WESTERN EUROPE!
**MINIATURE SOLID STATE
SSB EXCITER** By Schilling
of West Germany
SUPERIOR QUALITY AND PERFORMANCE
AT MODEST COST.



Three separate crystal oscillators for USB, LSB and AM/FM/CW. Balanced modulator for SSB. FM modulator. Precision KVG crystal filter. Two 9 MHz amplifiers. 9 MHz output. Three stage microphone amplifier with vox output. Silverplated glass-epoxy p. c. board construction 3" x 4".

HS1000C transmitter module \$66.50
HS1000D transceiver module \$77.75
HS1000S vox, anti-trip, T/R \$16.00



**VHF
COMMUNICATIONS**

TOPSFIELD, MASSACHUSETTS 01983

**WHY
YOU SHOULD HAVE
W3KT**

FORWARD YOUR QSLs TO DX STATIONS

- W3KT** has over eight years of experience in operating an outgoing QSL service.
- W3KT** has forwarded well over a million QSLs during that time.
- W3KT** forwarded over 250,000 QSLs in 1968 alone.
- W3KT** personally has 345 countries confirmed.
- W3KT** offers you a **DELUXE** service. All you have to do is to fill in the card.
- W3KT** considers your QSL a personal message, and sends it out **PROMPTLY** by **FIRST CLASS** mail.
- W3KT** keeps up-to-date files of stateside QSL managers. When he sends cards to them he includes an **SASE**, and sends the replies to you via your QSL Bureau.
- W3KT** sends other cards to the proper QSL Bureaus, or, where necessary, direct.
- W3KT** sends out 30 **CARDS PER DOLLAR**, and it is not necessary to send these all at the same time, or if you prefer, he will forward your QSLs at **FOUR CENTS EACH**.
- W3KT** charges **NO MEMBERSHIP FEE**.

TRY THIS SERVICE!

CAN THOUSANDS OF USERS BE WRONG?

W3KT QSL SERVICE

RD 1, Valley Hill Road

Malvern, Pa. 19355

122

WA5JGU 174, WA5RRH 87, WA5KFT 74, WA5IMO 54, W5FKL 44, W5MFX 35, WA5FSN 34, WA5AOB 29, WA5DZP 29, K5SWSL 24, WA5SEC 23, W5QBF 18, WA5LWD 17, K5OOV 16, W5IQ 15, W5PML 12, K5CAY 8, WA5KZA 8. (Oct.) WA5LWD 35, K5CAY 0.

SOUTHERN TEXAS—SCM. G.D. Jerry Sears, W5AIR—**SEC.** K5QQG. P.A.M.: W5KLV. R.M.: W5EZY. Just back from vacation to New Orleans, Oklahoma and Kansas where I enjoyed QSOs with a number of Southern Texas stations while on the road. I enjoyed meeting some of the amateurs in Oklahoma City whom I have worked. K2EIU/5 has been enjoying casual QSOs in the quiet Extra band segments. EC W5TFW advises he is getting ready for a Golden Triangle Club meeting in Beaumont Feb. 7, 1969. Many are looking forward to the Houston Amateur Radio Club "Old Timers Night" meeting in Feb. EC W5KHE is doing a great job with the Twin Cities Public Service Net. He also has training going for Novices. The HARC Hamfest had a good turnout. W5DNE won the field strength contest and K5FRG the transmitter hunt. EC W5ICL has been giving the mobiles a workout with some transmitter hunts on 6 meters with K5BBN doing the hiding. In the W5ES *Bulletin* from El Paso, Editor W5NGW reports they had two bowls of punch, one for the big'uns and one for the little'uns at its Club Christmas Party. Hope you all had a good Christmas and a safe and Happy New Year as we sure want to hear you on the air in 1969. K5WYN was elected NCS of the West Gulf Emergency Net for 1969. Traffic: W5QJA 120, WA5QKE 100, W5EZY 102, W5BGE 92, WA5AUZ 88, W5ABQ 86, K5HZR 81, W5TFW 59, K2EIU/5 42, WA5KIV 37, W7WAH/5 31, W5KLV 24, K5WYN 16, W5QO 13, W5AC 12.

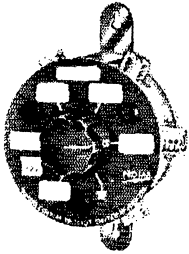
CANADIAN DIVISION

ALBERTA—Acting SCM/SEC. Don Sutherland, VE6FK—The Vulcan, Border and Southern Alberta Radio Clubs hosted an excellent retirement banquet on Nov. 23 for VE6JL and VE6TG. VE6JL was presented with an engraved D104 by the above clubs. The Border Club was presented the fine ARLA President's Award by VE6VF for its outstanding performance on PD. As his first duties as SCM, VE6FK had the pleasure of awarding ARRL Certificates of Merit to VE6TG and VE6JL. The Border Radio Club executives are VE6VE, pres.; VE6ASL, vice-pres.; VE6ANK, secy.-treas. The executives of the SAARC are VE6AM, pres.; VE6ALL, vice-pres.; Dianne Blackmer, secy.; VE6ISO, treas. The newly-elected CARA executives are VE6AWF, pres.; VE6AIN, vice-pres.; VE6AGK, secy.; VE6AVD, treas.; VE6YY, act.; VE6AWM, publicity; VE6AEY, VE6ALS, VE6MX, directors. VE6MX was named CARA "Ham of the Year". VE6ADX, single station multi-operator entry, racked up the outstanding total of 970,240 points in the World-Wide DX Contest. It is with regret we record the passing of VE6VH and VE6AN to Silent Keys. Traffic: VE6FK 17, VE6XC 8, VE6AWF 5, VE6S 4, VE6FV 3, VE6ADS 2, VE6ASL 2, VE6BL 2, VE6KS 2, VE6XF 1.

BRITISH COLUMBIA—SCM. H. E. Savage, VE7FB—The British Columbia Amateur Radio Association awards committee selected VE7QZ for the annual cup award for the part he played in the paraplegic games, the founding of code and theory classes at Person Hospital, helping the handicap pass their examination and the hospital station, VE7PAR. Harry stated that he is accepting the cup on behalf of the members of

TV BROADCAST ENGINEERS

Full color VHF TV Station needs both maintenance men and operators for our TV master control facilities. If you have an FCC First Class Radiotelephone operators license and are interested in joining an outstanding and growing Broadcast organization, phone collect (313)-239-6611 or write our Chief Engineer, WJRT-TV, Box 12, Flint, Michigan 48501.



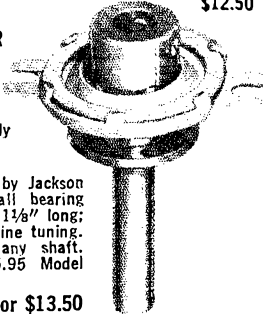
**Waters
Mod. 376
PROTAX
ANTENNA
SWITCH**

Functions as a regular selector switch with 5 side mounted (radial) connectors. Has the additional feature of automatically grounding the entire antenna system when the rig is not in use. Complete with knob, mounting hardware and escutcheon plate. Power handling 1000 w. VSWR less than 1.2:1 up to 150 MHz.

\$12.50

**PRECISION
PLANETARY-VERNIER
for exceptionally
fine tuning**

Shown
approximately
actual size.



Superb craftsmanship by Jackson Bros. of England. Ball bearing drive. 1/4" dia. Shaft 1 1/8" long; 6:1 ratio. Vv FB for fine tuning. Easily adaptable to any shaft. Comparable value \$5.95 Model 4511 DAF.

\$1.50 ea. 10 for \$13.50

**VERSATILE MINIATURE
TRANSFORMER**

Same as used in W2EWL SSB Rig—March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x 3/4" w. x 3/4" d. New and fully shielded.

\$1.49 ea. 3 for \$3.95 10 for \$12.50



actual size

**DIRECT/5:1 REVERSE
Model 4111/RV VERNIER DRIVE**

The newest in the line of fine tuning aids from Jackson Bros. Direct/Slow Reverse (5:1 ratio) Vernier Drive. Easy fixing — requires only one 3/8" hole. High torque, low backlash, smooth and permanent movement, coaxial spindles, 3/4" shaft dia.

\$1.95

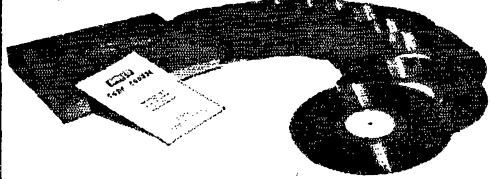
Pass New FCC Exams Easily With

**NEW AMECO ADVANCED AND
EXTRA CLASS LICENSE GUIDES**

New Ameco License Guides contain simple, detailed, easy-to-understand answers for FCC study questions, plus a sample FCC-type exam, using multiple-choice questions.

Advanced Class Guide No. 16-0150¢
Extra Class Guide No. 17-0175¢

Brush up on your theory with the famous Ameco Radio Amateur Theory Course described below.



LEARN CODE & THEORY FAST

No. 1—Junior Code Course. Consists of 10 recordings (alphabet through 7 1/2 WPM). Includes typical FCC type code exams. Free instruction book on learning how to send and receive code the simplest, fastest way; plus charts to check your receiving accuracy. **\$5.95**

No. 100-01 Junior Code Course—78 rpm. Net Each
No. 100-45 Junior Code Course—45 rpm. Net Each \$4.95
No. 100-33 Junior Code Course—33 1/2 rpm. Net Each 3.95

No. 2—Senior Code Course. Includes everything in No. 1 course plus 12 more recordings (alphabet through 18 WPM), plus typical FCC type code exams for General Class and 2nd Class Commercial telegraph licenses.

No. 101-45 Senior Code Course—45 rpm. Net Each \$8.50
No. 101-33 Senior Code Course—33 1/2 rpm. Net Each 7.50

No. 3—Complete Radio Theory Course. A complete, simplified home study theory course in radio covering the novice, technician, conditional and general classes—all under one cover—with over 400 typical FCC type questions to prepare for license examination. No technical background required. **\$3.95**

No. 102-01 Radio Amateur Theory Course—Net Each
No. 4—Advanced Code Course. Prepares novice operators for the amateur general class and second class commercial license tests. Contains 12 recordings (8 through 18 WPM) plus a complete code book; plus typical FCC code examinations for general and commercial tests.

No. 103-45 Advanced Code Course—45 rpm. Net Each \$3.95
No. 103-33 Advanced Code Course—33 1/2 rpm. Net Each 3.95

No. 104-33 Extra Class Code Course. Increases code speed from 13 to 22 WPM in ten lessons. Prepares for Extra Class Code examination. Sample FCC-type examinations given. (33 RPM, 1 LP) **\$3.95**

No. 105-33 General Class Supplementary Code Course. Gives concentrated code practice between 12 and 15 WPM. This serves as additional code practice for the General Class code examination. (33 RPM, 1 LP) **\$3.95**

No. 106-33 Extra Class Supplementary Code Course. Gives concentrated code practice between 19 and 24 WPM. This serves as additional code practice for the Extra Class code examination. (33 RPM, 1 LP) **\$3.95**

**SOLID STATE CODE
PRACTICE OSCILLATOR**

Solid state, 2 transistor, code practice oscillator, built-in speaker. Tone control and headphone jack. C-cell powered. CW monitor optional. Size: 6 1/4" x 3 3/4" x 2 1/2", Wt.: 2 lbs.



	Net	with CW Monitor
OCBK (kit) ...	\$ 7.95	\$ 9.95
OCPW (wired)	\$10.50	\$12.50

Include \$.75 with order for shipping and handling

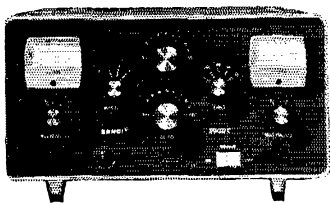
ARROW ELECTRONICS INC

• 900 Rte. 110, Farmingdale, N. Y.
516 — MYrtle 4-6822

• 97 Chambers St., N. Y. • 525 Jericho Tpke., Mineola, N. Y. • 18 Isaac St., Norwalk, Conn. • 225 Rte. 46, Totowa, N. J.
212 — DLgby 9-4411 516 — Pioneer 2-2290 203 — 838-4877 201 — 256-8555

HUNTER

LINEAR AMPLIFIER by Hunter



BANDIT 2000C

- 2000 watts PEP.
- Five bands.
- Kit form.

Write For Details

Hunter Sales, Inc.

Box 1128E University Station
Des Moines, Iowa 50311

RADIO OFFICER TRAINEES

A limited number of openings are available to men willing to train for the interesting and well-paid career of Marine Radio Officer aboard U. S. Flag merchant vessels. An F.C.C. 1st or 2nd Class Commercial Radiotelegraph license is required. These openings will be particularly appealing to younger men who have completed their military obligations. Write to The Radio Officers' Union, AFL-CIO, Room 1315, 225 West 34th Street, New York, N.Y. 10001.

CONVENTION 69
ARRL NATIONAL
DES MOINES, IOWA
JUNE 20, 21, 22
P.O. Box 1051, 50311

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way -- with an **Instructograph Code Teacher**. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready. No QRM. Beats having someone send to you.

ENDORSED BY THOUSANDS!

The **Instructograph Code Teacher** literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System**. Write today for full particulars and convenient rental plans



INSTRUCTOGRAPH COMPANY

5071-Q BROADWAY, CHICAGO, ILL. 60640
4700-Q, Crenshaw Blvd., Los Angeles, Calif. 90043

the Canadian Pacific ARS who also did much work on the above. New officers of the BCARA are VE7EQ, pres.; VE7ABS, secy.-treas. VE7AAA is in the hospital. VE7ABS has been but is now out, VE7OF and VE7ZK have just come out. The Beaver Valley ARC has a fine monthly paper. Burnaby ARC's officers are VE7RR, pres.; VE7BRF, vice-pres.; VE7BVG, secy.-treas. The RTTY-West-Can Net meets on 3810 kc. nightly at 0230Z. VE7LL, who was VE7BHH, will be glad to hear you. The postal strike in Canada broke our record of never missing this report. Even though we did send a report by radio it did not make it. VE7GG has his tower up and we hear that VE7DDI also has raised his tower, but it was a "Laurel and Hardy Comedy." VE7AKA, who came to Vancouver in 1959 and held G3CBO in 1947, builds his own 2-meter gear. Traffic: VE7ZK 162, VE7AC 24, VE7SE 18, VE7GG 15, VE7BLO 14.

MANITOBA—SCM, John Thomas Stacey, VE4JT—This column is being put together not because I have decided to come out from hiding but because I feel that it is the means of bringing to your attention the problems with which I am faced. This section has weakened to the point where action is needed to revive it: One of our major weaknesses is within the AREC where for months I have endeavored to find someone to take up the SEC job but there are no takers. Repeated reminders to AREC members that their appointments have lapsed results in dead silence. No one seems interested in renewal. The only reports I have received in the past four months have come from the traffic nets but unfortunately this material does not fill a column and to those faithful members of MEPN and MTN I offer my apologies for not being able to include their reports in a monthly column. Pressure of work has kept me off the air since last April and I am totally dependent on monthly reports to report activities. VE4UM was active during the Manitoba Amateur Sports Assn. Walkathon in Oct. The station manager for UMARS is VE4IA, who now has his Advanced Class ticket. VE4EI is on RTTY. VE4NE has modified his keyer for left-handed operation. VE4FQ now has his ORS appointment. MTN now meets at 0045Z on 3615 kc. and reports sessions 30 QNI 133 and QTC 50. MEPN had 30 sessions, QNI 579, QTC 6.

ONTARIO—SCM, Roy A. White, VE3BUX—Asst. National Coordinator AREC: VE3YC. SEC: VE3OE. PAMs: VE3AKQ and VE3BLZ. RM's: VE3GI and VE3DPO. VE3EAR went on 40 and 75 with a 10-watt transmitter. Total cost to him was 25¢! 80 meters was open, coast to coast, several times in Nov. The Clinton ARC appeals to the boys to keep that audio gain down and thus avoid unnecessary QRM. RSO is appealing for funds to aid budding blind hams. VE3AW, the chairman of the project, would sure appreciate your donation. After reading the *FM* mag for Oct. and *QST* for Dec. concerning the legality of phone patches, I'm still confused! RTTY buffs will be interested to know that VE6AO is now VE3FQR and lives in Havelock. VE3GMC has a new FTDX-100, as has VE3BEE, and VE3GSN has the 400. VE3FXC is out of the hospital and heading for Mexico. If you are interested in an ARRL appointment, get in touch with your SCM. The London ARC held its 500th session of the "Larc" Net recently. VE3CFR, one of the originators, was NC. VE3NZ recently returned from a trip to DL-Land. Your SCM would really appreciate receiving club bulletins from those not presently sending them in. VE3ACH brought home an HW-100 from the recent convention in Brantford. Congrats also to VE3-

SKYLANE QUADS

Are Now
GUARANTEED

to perform better than
a flattop beam of
equivalent number of elements,
or your money refunded.

30 DAY FREE TRIAL OFFER

SKYLANE PRODUCTS

406 Bon Air Ave. • Temple Terrace, Fla. 336

1¢
EAS

PENNY SALE!

include uses as described in

73 **QST** RADIO ELECTRONICS,
 ELECTRONICS WORLD,



By far the biggest Integrated Circuit Sale in our history. NOBODY! That's right NOBODY under-sells Poly Paks. Imagine — buy 1 Integrated Circuit at our bargain price and get the 2nd one for ONLY 1¢. That's right ONE CENT! NO LIMIT PER ITEM! Every item guaranteed as advertised. All include data on Integrated Circuits, schematics, and or hookups, and as much as 40 circuits. THIS OFFER IS LIMITED!

\$100,000
"EYE SEE"
INTEGRATED
CIRCUIT
BONANZA BY
POLY PAK
FOR 1969

MONEY BACK GUARANTEE!

Fairchild No.	EACH	1c MORE
<input type="checkbox"/> 900	Buffer	1 for 1.49 2 for 1.50
<input type="checkbox"/> 902	R-S Flip Flop	1 for 1.49 2 for 1.50
<input type="checkbox"/> 903	3 In. Gate Nand/Nor	1 for 1.49 2 for 1.50
<input type="checkbox"/> 903-903*	3 Input gate Nand/Nor	1 for 1.49 2 for 1.50
<input type="checkbox"/> 904-904*	Half adder	1 for 1.49 2 for 1.50
<input type="checkbox"/> 910	Dual Two Input Gate	1 for 1.29 2 for 1.30
<input type="checkbox"/> 914	Dual Two Input Gate	1 for 1.29 2 for 1.30
<input type="checkbox"/> 914-914*	Dual Two Input Gate	1 for 1.49 2 for 1.50
<input type="checkbox"/> 915	Dual 3 Input Gate Nand/Nor	1 for 1.49 2 for 1.50
<input type="checkbox"/> 923	JK-Flip Flop	1 for 1.49 2 for 1.50
<input type="checkbox"/> 923-923*	JK Flip Flop	1 for 1.69 2 for 1.70
<input type="checkbox"/> 925	Dual 2 Input Gate, Expander	1 for 1.49 2 for 1.50
<input type="checkbox"/> 927	Quad Inverter	1 for 1.49 2 for 1.50
<input type="checkbox"/> 930	Dual 4 Input Gate Nand/Nor	1 for 1.49 2 for 1.50
<input type="checkbox"/> 933	Dual Input Gate, Expander	1 for 1.49 2 for 1.50
<input type="checkbox"/> 944	Dual 4 Input Power Gate	1 for 1.49 2 for 1.50
<input type="checkbox"/> 945	Clocked Flip Flop	1 for 1.69 2 for 1.70
<input type="checkbox"/> 946	Quad 2 Input Gate Nand/Nor	1 for 1.49 2 for 1.50
<input type="checkbox"/> 948	Clocked Flip Flop	1 for 1.69 2 for 1.70
<input type="checkbox"/> 950	AC Binary	1 for 1.98 2 for 1.99
<input type="checkbox"/> 952	Dual 2 Pininput Inverter Gate	1 for 1.29 2 for 1.30
<input type="checkbox"/> 954	Dual 4 Input and Gate	1 for 1.29 2 for 1.30
<input type="checkbox"/> 955	3 Input and Gate w 2 output	1 for 1.29 2 for 1.30
<input type="checkbox"/> 956	Dual 2 Input Buffer	1 for 1.29 2 for 1.30
<input type="checkbox"/> 957	Dual Rank (hold) Flip Flop	1 for 1.98 2 for 1.99
<input type="checkbox"/> 961	Dual 4 Input Gate w/expander	1 for 1.49 2 for 1.50
<input type="checkbox"/> 962	Triple Gate	1 for 1.49 2 for 1.50
<input type="checkbox"/> 963	Triple Gate	1 for 1.49 2 for 1.50

* Two identical IC's in one package

LINEAR AMPLIFIERS with circuits & data

- 709C HI-GAIN OPERATIONAL\$3.69
- 711C DUAL COMPARATOR\$1.98

SILICON POWER STUD RECTIFIERS

PIV	3A	6A	12A	55A
50	<input type="checkbox"/> .06	<input type="checkbox"/> .16	<input type="checkbox"/> .20	<input type="checkbox"/> .50
100	<input type="checkbox"/> .07	<input type="checkbox"/> .22	<input type="checkbox"/> .25	<input type="checkbox"/> .75
200	<input type="checkbox"/> .09	<input type="checkbox"/> .30	<input type="checkbox"/> .39	<input type="checkbox"/> 1.25
400	<input type="checkbox"/> .16	<input type="checkbox"/> .40	<input type="checkbox"/> .50	<input type="checkbox"/> 1.50
600	<input type="checkbox"/> .20	<input type="checkbox"/> .55	<input type="checkbox"/> .75	<input type="checkbox"/> 1.80
800	<input type="checkbox"/> .30	<input type="checkbox"/> .75	<input type="checkbox"/> .90	<input type="checkbox"/> 2.30
1000	<input type="checkbox"/> .40	<input type="checkbox"/> .90	<input type="checkbox"/> 1.15	<input type="checkbox"/> 2.70

MICROMINIATURE SILICON RECTIFIERS

1. Actual Size

AMP

PIV	Sale	PIV	Sale
50	<input type="checkbox"/> 5¢	600	<input type="checkbox"/> 19¢
100	<input type="checkbox"/> 7¢	800	<input type="checkbox"/> 21¢
200	<input type="checkbox"/> 9¢	1000	<input type="checkbox"/> 32¢
400	<input type="checkbox"/> 12¢	1200	<input type="checkbox"/> 45¢

SCR'S CONTROLLED RECTIFIERS

PRV	3A	7A	20A
50	<input type="checkbox"/> .35	<input type="checkbox"/> .45	<input type="checkbox"/> .70
100	<input type="checkbox"/> .50	<input type="checkbox"/> .65	<input type="checkbox"/> 1.00
200	<input type="checkbox"/> .70	<input type="checkbox"/> .95	<input type="checkbox"/> 1.30
300	<input type="checkbox"/> .90	<input type="checkbox"/> 1.25	<input type="checkbox"/> 1.70
400	<input type="checkbox"/> 1.20	<input type="checkbox"/> 1.60	<input type="checkbox"/> 2.10
500	<input type="checkbox"/> 1.50	<input type="checkbox"/> 2.00	<input type="checkbox"/> 2.50
600	<input type="checkbox"/> 1.80	<input type="checkbox"/> 2.40	<input type="checkbox"/> 3.00

EPOXY SILICON TRANSISTORS

- 3-FK-4046, 1W, 0.5A, npn, 250MC \$1.00
- 3-2N3568, 350MW, 200MC, 200BVC, NPN \$1.00
- 4-2N3563, NPN, 600MC, 200MW \$1.00
- 3-2N3683, NPN, 1000MC, 5MA, 200MW .. \$1.00
- 3-14 WATT, B-5000, npn, 3A \$1.00
- 4-2N4313, PNP, 600MC, 200MW \$1.00
- 4-2N3565, 500HFE, npn, 200MC \$1.00

GLASS FIBER OPTICS 3 Ft. per \$1

Well, these light guides plastic jacket; transmit light from one point to another much as copper wire transmits electrical energy. **Cuts Like Wire**



1 AMP TOP HAT AND EPOXIES

PIV	SALE	PIV	SALE	PIV	SALE
50	<input type="checkbox"/> .05	800	<input type="checkbox"/> .19	1800	<input type="checkbox"/> .87
100	<input type="checkbox"/> .07	1000	<input type="checkbox"/> .31	2000	<input type="checkbox"/> 1.05
200	<input type="checkbox"/> .08	1200	<input type="checkbox"/> .44	3000	<input type="checkbox"/> 1.60
400	<input type="checkbox"/> .11	1400	<input type="checkbox"/> .62	4000	<input type="checkbox"/> 1.90
600	<input type="checkbox"/> .16	1600	<input type="checkbox"/> .72	10000	<input type="checkbox"/> 4.80

Terms: add postage. **Rated:** net 30, cod's 25%
Phone Orders: Wakefield, Mass. (617) 245-3829
Retail: 211 Albion, St., Wakefield, Mass.

GIANT SPRING CATALOG ON: Parts, Rectifiers, 10¢
 Transistors, SCR's, I.C.'s, Equipment, Etc.

POLY PAKS

P.O. BOX 942 M
 LYNNFIELD, MASS.
 01940

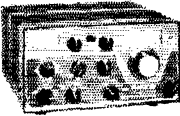
* Handles 2 Amps

2 AMP TOP HAT **6 \$1**
800 PIV RECTIFIERS for

"Your Friendly Supplier"

IN STOCK! OFFERS

THE DRAKE T-4XB TRANSMITTER



The Drake T-4XB offers many fine features . . . Solid state linear permeability tuned VFO with 1 kc read out and 100 cycle stability. 80 thru 15 meters completely and 28.5-29.0 mc of 10 meters with crystals supplied. Transceivers with R-4, R-4A, or R-4B Receivers. VOX or PIT. Operates SSB/AM/CW. Conservative input power rating: SSB & AM-200 watts PEP, CW-200 watts . . . Plus many other features . . .

T-4XB Transmitter **\$449.00**
AC-4 AC Supply **\$99.95**

ALSO IN STOCK \$430.00
R-4B Receiver and other Drake accessories

We also have a large selection of used equipment. Write for Latest Complete List

Evans RADIO

BOX 893 CONCORD NH 03301
PHONE 603-225-3358

EXCELLENT SELECTION—AT EXTREMELY LOW PRICES—48 HOUR DELIVERY



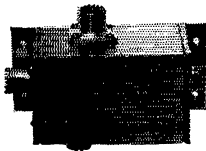
Thousands of frequencies in stock. Types include HC6/U, HC18/U, FT-241, FT-243, FT-171, etc.

SEND 10¢ for catalog with oscillator circuits. Refunded on first order.

2400C Crystal Drive, Ft. Myers, Fla. 33901

NEW!—VACUUM COAX RELAY

(Nothing Else like this under \$250)

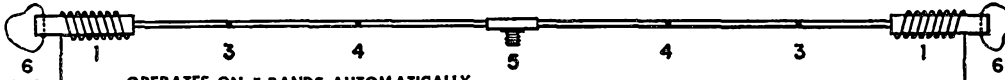


★ Silent—Fast—Long Life
★ Ends Antenna Relay Clatter
REPLACE your present **NOISY** Relay with this silent, long-life relay (contacts in vacuum—over ONE MILLION operations.)
FAST OPERATING—under 10ms
LOW VSWR—under 1.1 at 30mc

POWER CARRYING RATING @ 30mc @ Unity VSWR:
★ **MODEL 23—3KW**, operates on 26.5 VDC @ 30ma **\$ 33.00**
★ **MODEL 25—5KW**, operates on 26.5 VDC @ 1200 ma **\$100.00**
DC POWER SUPPLY 35 VDC @ 1 amp.—\$14.50

Order Direct from us . . . Data Sheet free.
ORGANS & ELECTRONICS P. O. Box 117 Lockport, Ill. 60441

LRL-66 ANTENNA 66' LONG. 80 THRU 10M



OPERATES ON 5 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance
3, 4. Decoupling stubs for 20 & 10 meters

5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

LATTIN RADIO LABORATORIES Box 44 Owensboro, Kentucky 4231

GNO, who has just won her green Judo belt. Windsor ARC executives for '69 include VE3ETM, pres.; VE3-GKA, vice-pres.; VE3AMU, secy.; VE3FVW, treas. The Lakehead ARC has been busy lately with search and rescue efforts. These greetings may be a little late but they are none the less sincere. All the best to you and yours in '69 from your SCM. Traffic: VE3BUR 116.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2-ALE, RM: VE2DR. PAM (h.f.): VE2BWL. The pilot project regarding contests and repeaters is a priority subject. The contest fellows have done something. As usual, the loudest voices haven't been heard from—repeaters and their frequencies are in a mess and need the most help—but nary a word regarding a nominee—maybe they can figure it out alone and figure they must. VE2ALE is proud of a brand-new son, VE2-AVP and his XYL VE2DGV have a new op. In Nov. we attended a well-organized, disciplined and objective meeting of the Laurentian DX Club, VE2DEX, a commercial license holder, has acquired an aircraft, VE2APT, VE2AVP, VE2OK, VE2YG and VE2BSK are only a few we can name who are licensed aircraft pilots—the latter two are airline pilots. Au delà de 40 élèves se sont inscrits aux cours de radio Amateur du Radio Club de Québec. Félicitations aux organisateurs de ces cours: VE2DFR et VE2BUB. VE2BPT est très actif sur le 80 mètres avec son gros kw. VE2ASU, VE2DCW at VE2PJ sont des adeptes du mètres CE; voilà une bande très négligée par les stations du Québec. Traffic: VE2BRD 71, VE2ADE 57, VE2DR 57, VE2BVS 50, VE2ALE 46, VE2AJD 34, VE2EC 16, VE2CP 9, VE2OJ 9.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5-HP—Mexabitions were held in Saskatoon and Regina during Nov. and VE5AA and VE5NN gave the visitors an insight into the operation of ham stations. VE5AA was active at the Hobby Show held Nov. 15 and 16. Saskatchewan hams took part in the communications at Walkathons at Saskatoon and Melfort. The Regina Club, VE5AA, winner of the 1968 Field Day Award, has challenged all and sundry for the trophy in the coming year. A special committee appointed at the 1968 Hamfest for the purpose of looking into the reorganization of the Saskatchewan Amateur Radio League has held two meetings and formulated recommendations to the SARL Board of Directors. On the late evening of Sun., Nov. 24, one of our Saskatchewan hams had the good fortune to sight a brilliant shooting star or "bolide" which it is believed fell to earth in the south central part of Saskatchewan, not far from the International border. Several discussions were held on the 75-meter band between this ham and one of the local experts on the subject. On the evening of Dec. 3, a get-together on 75 meters took place between Saskatchewan Power Corporation ham operators across Saskatchewan. "Operation Friendship", a project of the Edmonton Junior Chamber of Commerce, involving ham radio operators, promises to spread good will amongst Canadian hams. Word has been received of a request for radio equipment and broadcasting supplies from an organization sponsoring radio communications for Community Education. Known as Kemomadiwin, the project is to try and improve the lot of the native Indian population in Northern Ontario. Traffic: VE5GL 81, VE5BO 29, VE5PY 12, VE5RJ 10, VE5LQ 8, VE5CF 5, VE5QS 5, VE5KZ 4, VE5SC 3, VE5UT 3, VE5BD 2, VE5EQ 2, VE5GW 2, VE5LK 2, VE5RE 2, VE5TS 2, VE5HX 1, VE5KE 1, VE5KI 1, VE5PZ 1, VE5XG 1, VE5XL 1, VE5YR 1. **QET**

"MEET ME in ST. LOUIE"
at
HAM RADIO CENTER
8342 Olive Blvd. St. Louis, Mo. 63132
Amateur Radio Equipment Sales & Service
(314)-993-6079 Bill, W0QDF

Power rating 2 Kw. P.E.P. or over on 80, 40, 1. On 20 and 10 1 Kw. P.E.P. Transmitter input

HOWARD W. SAMS

BOOKS FOR THE AMATEUR

Advanced & Extra-Class Amateur License Handbook
by Howard S. Pyle, W7OE. Provides all the information you need to obtain your advanced—or extra-class license. Makes preparation for these top licenses far easier for present holders of lower licenses. Includes sample questions for each exam. 192 pages.
20649, only.....\$3.95

General-Class Amateur License Handbook
by Howard S. Pyle, W7OE. A complete guide, including typical FCC test questions and answers, to help you prepare for the Technician, Conditional, or General-Class radio exam. 144 pages. 20639, only.....\$3.25

Building Your Amateur Radio Novice Station
by Howard S. Pyle, W7OE. Provides complete, easy-to-follow construction details for building an inexpensive transmitter and receiver, plus several valuable accessory items, for Novice or General Class operation. 128 pages. 20050, only.....\$3.75

International Code Training System
by International Teaching Systems, Inc. Special programmed charts and 33 1/3-rpm recordings help you receive at 2-3 wpm in just a few minutes. You'll be receiving and sending up to 22 wpm with less than an hour of recorded instruction. 96 pages; 6 record sides.
20138, only.....\$7.50

Famous Editors & Engineers Books

17TH EDITION OF THE FAMOUS Radio Handbook

Tells how to design, build, and operate latest types of amateur transmitters, receivers, transceivers, and amplifiers. Provides extensive, simplified theory on practically every phase of radio. All original data, up-to-date, complete, 848 pages.
EE-167, only.....\$12.95



The VHF Amateur
by Robert M. Brown, K2ZSQ/W9HBF. Completely updated handbook incorporating the finest material on vital vhf subjects from the rare back issues of the famous VHF Magazine, plus new data of great interest to both old and new vhf men. 160 pages.
EE-65060, only.....\$4.50

Commercial Radiotelephone License Q&A Study Guide
by Woodrow Smith & Robert Welborn. Invaluable preparation for the exams. Questions cover first four elements of the radiotelephone license exam. Answers are detailed and comprehensive. 272 pages.
EE-031, only.....\$6.95

Single Sideband: Theory and Practice
by Harry D. Hooton, W6TYH. The one-source guide to ssb, covering origin and principles, derivation of ssb signals, carrier-suppression techniques, sideband selection, and a complete analysis of ssb equipment. 388 pages. EE-350, only.....\$6.95

Transistor Radio Handbook
by Donald L. Stoner, W6TNS & Lester A. Earnshaw, ZL1AAX. Covers the use of transistorized communications equipment for amateur and commercial applications. Provides simplified theory, plus practical construction projects for solid-state equipment. 180 pages.
EE-044, only.....\$5.00

Amateur Radio Incentive Licensing Study Guide
by Robert M. Brown, K2ZSQ/W9HBF and Tom Kneitel, K2AES. Fully explains the new incentive licensing which affects both newcomers and old-timers. Covers all the new FCC Regulations and band allocations. Includes sample exams for Novice, Technician, Conditional, and General-Class licensing. 160 pages.
EE-050, only.....\$2.75

Amateur Radio Construction Projects

by Charles Carlingella, W6NJV. Shows how to build novice transmitters, converters, all-band phone-cw transmitter, and others. Provides detailed, easy-to-follow building and operating instructions. 136 pages.
20045, only.....\$3.25

Ham Antenna Construction Projects (2nd Ed.)

by J. A. Stanley. Practical guide to custom-building your own antennas; describes all types of arrays, installation, tuning up and testing; shows you how to make the best use of antenna power. 160 pages.
20654, only.....\$3.95

101 Easy Ham Radio Projects

by Robert M. Brown & Tom Kneitel. A selection of easy-to-build, inexpensive circuits for a variety of worthwhile ham devices. Provides brief descriptions, construction hints, diagrams, and parts lists; includes substitution guide appendix. 160 pages. 20674, only.....\$3.95

Transistor Transmitters for the Amateur

by Donald L. Stoner, W6TNS. Shows how to build solid-state crystal checker/calibrator, low-power cw transmitter and eight other transistorized projects. 128 pages.
20450, only.....\$3.25

Amateur Radio Antennas (2nd Ed.)

by Harry D. Hooton, W6TYH. Provides full details on theory, design, construction, and application of antennas. Tells how to select the best antenna system for optimum performance. 176 pages. 20611, only.....\$3.95

Practical Ham Radio Projects

by Charles Carlingella, W6NJV. Includes circuit diagrams, parts lists, and detailed instructions for building 12 unique and useful ham shack devices at the lowest possible cost (no item exceeds \$50). 128 pages.
20042, only.....\$2.95

Transistorized Amateur Radio Projects

by Charles Carlingella, W6NJV. Presents a complete selection of transistorized ham radio construction projects for the beginner as well as advanced amateur. Includes several printed-circuit board projects and the negatives for etching them. 140 pages.
20570, only.....\$3.50

So You Want to Be a Ham (4th Ed.)

by Robert Hertzberg, W2DJJ. Completely revised to include information on the incentive licensing. This is the book to have to learn about amateur radio, ham equipment, operating procedures, and how to pass the FCC exam. 192 pages. 20607, only.....\$4.50

ABC's of Ham Radio (3rd Ed.)

by Howard S. Pyle, W7OE. Enlarged and updated to include all the study material required to obtain the novice-class license. Covers latest FCC regulations, including new incentive licensing provisions. 144 pages.
20638, only.....\$2.95

Amateur Radio Mobile Handbook

by Charles Carlingella, W6NJV. Provides complete information for going mobile. Explains circuitry and construction of commercially built mobile amateur equipment. Shows how to build mobile converters, transmitters, transceivers, and modulators, etc. 176 pages.
20035, only.....\$3.50

HOWARD W. SAMS & CO., INC.

Order from any Electronic Parts Distributor, or mail to Howard W. Sams & Co., Inc., Dept. QS-29
4300 W. 62nd St., Indianapolis, Ind. 46268

Send the following books: Nos. _____
\$ _____ enclosed

Send FREE 1969 Sams Book Catalog

Name _____
PLEASE PRINT

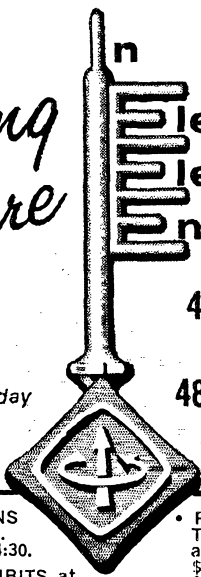
Address _____

City _____ State _____ Zip _____

IEEE '69 INTERNATIONAL
CONVENTION & EXHIBITION
MARCH 24-27, 1969

*Unlocking
the Future*

Monday through Thursday



**Electrical
Electronics
Engineering**

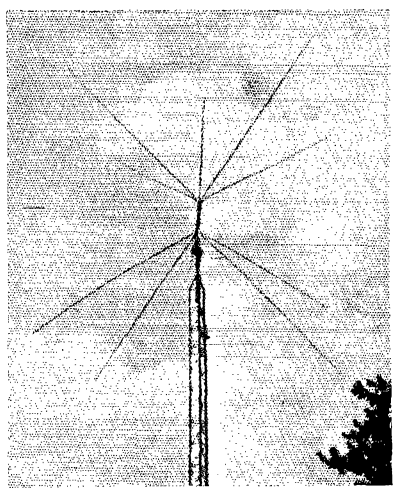
4 FLOORS OF EXHIBITS
NEW YORK COLISEUM
48 TECHNICAL SESSIONS
NEW YORK HILTON

- 48 TECHNICAL SESSIONS at the New York Hilton. Hours: 10:00-12:30; 2:00-4:30.
- FOUR FLOORS OF EXHIBITS at the N. Y. Coliseum including over 600 firms. Hours: 10 a.m.-8 p.m. 4 Days.
- GALA ANNUAL BANQUET—Wednesday 7:15 p.m. N. Y. Hilton Grand Ballroom — \$18.00.
- FREE SHUTTLE BUSES between the Hilton and the Coliseum — every few minutes.
- REGISTRATION — Good all days — Technical Sessions and exhibits. In and out privileges. — IEEE Members \$3.00. Non-members \$6.00. Ladies \$1.00. High School Students \$3.00 if accompanied by an adult — One student per adult; Thursday only — limit of 3 students per adult.
- REG-IDENT CARD speeds request for exhibitors' literature. Ask for one when registering.
- ESCALATORS/EXPRESS ELEVATORS to the Fourth Floor.

THE MACO QUAD

*"The Quad That Will Stay
Up In The Air"*

FOR 10-15-20 METERS



A FEW FEATURES

- Low SWR
- No Spiders
- No Loading Coils
- One Feedline

**COMPLETE WITH ALL
HARDWARE!**

SEE IT AT



stellar industries
DIV. OF STELLAR I, Inc.
SALES AND SERVICE

10 GRAHAM ROAD WEST
ITHACA, N.Y. 14850
TELEPHONE: AREA CODE 607 273-9333
WRITE DEPARTMENT Q FOR SPECS

LAFAYETTE RADIO ELECTRONICS

Value Leader In Amateur Gear Since 1923

LAFAYETTE 400 SERIES 6 AND 10 METER AMATEUR TRANSCEIVERS



Featuring
Built-in
VFO

124⁹⁵ Sensational Low Prices!
99-2575WX | 99-2579WX **109⁹⁵**
HA-410 For 28-29.7 MHz. | HA-460 For 50-52 MHz.

- 2E26 Final—20 Watts DC
- Nuvistor RF Amplifier
- Built in 117 VAC and 12 VDC Power Supplies

LAFAYETTE MOBILE LINEAR AMPLIFIERS FOR 15 THROUGH 2 METERS

- Built-in 12 VDC Toroid Power Supply
- Built-in RF Switching
- Built-in Metering Circuit for Exciter or Linear RF Power Output

40-0106WX HA-250 for 15 to 6 meters.....79.95
40-0108WX HA-260 for 2 Meters.....99.95



As
Low
As **79⁹⁵**

Made in U.S.A.

LAFAYETTE STANDING WAVE AND FIELD STRENGTH METER

Only **9⁹⁵**

- Measures SWR to 1 Kilowatt
- Reads Field Strength
- Accurate, Easy to Read

Stock No. 99-2537

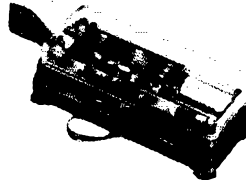


LAFAYETTE SEMI-AUTOMATIC BUG

Only
10⁹⁵

- 7 Adjustments for Speed and Comfort
- Speed Adjustable from 10 WPM.
- Efficient Design

Stock No. 99-2552

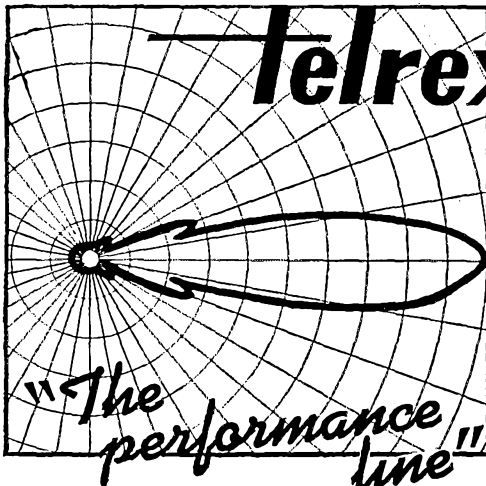


Consult
Our 1969
Catalog #690

FREE!
1969 CATALOG 690

OVER 500 PAGES

Lafayette Radio Electronics Corp., Dept. 34029
Write: P.O. Box 10, Syosset, L.I., N.Y. 11791



telrex "Beamed-Power" ANTENNAS, "BALUNS" I. V. KITS and ROTATOR SYSTEMS!

Most Technically-Perfected, Finest Communication Arrays in the World! Precision-Tuned-Matched and "Balun" Fed for "Balanced-Pattern" to assure "TOP-MAN-ON-THE-FREQUENCY" Results

Enjoy World renowned TELREX performance, value and durability! Send for PL68 tech. data and pricing catalog, describing professionally engineered communication antenna systems, rotator-selsyn-indicator-systems, "Baluns", I.V. Kits, Towers, "Mono-Pole", "Big-Berthas", accessories, etc. etc.

— with a MATERIAL DIFFERENCE!

Use, is one of the most dependable testimonials of endorsement, and Telrex products are in use in 139 Lands



ASBURY PARK, NEW JERSEY 07712, U.S.A.



HERE'S OUR \$15.00 REPLACEMENT for your "HUNDRED DOLLAR KEYS"

- ★ INTEGRATED CIRCUITRY
- ★ COMPLETELY WIRED AND GUARANTEED
- ★ SELF COMPLETING
- ★ LOW POWER CONSUMPTION: 3 VOLTS AT 50 MA.
- ★ COST \$15.00 POSTPAID • FIRST CLASS WORLD WIDE

—SEE ARTICLE PAGE 22, APRIL 1968 QST—

FOR ADDITIONAL INFORMATION, WRITE
DIGI-KEY P.O. BOX 27146, MINNEAPOLIS, MINN. 55427

RADIO TELETYPE EQUIPMENT

Teletype Models 35, 33, 32, 29, 28 ASR, 28 KSR, 28 LPR, 28 LARP, 28 LND, 28 LBXD1, 11, 15, 19, Page Printers, Repetitors, Reperforators, Trans-Dist. polar relays, tape winders, cabinets, Collins Receivers, 51J-3, 51J-4, R-388, R-390A, R-220, SP600JX, Frequency Shift Converters, D.C. Power Supplies.

ALLTRONICS-HOWARD CO.

Box 19, Boston, Mass. 02101 Tel: 617-742-0048

ENGINEERING

AMATEUR STATION and EQUIPMENT

Design, Development, Construction
for INDIVIDUALS and MANUFACTURERS

Carl N. Brooks, P.E.
Consulting Engineer

P.O. Box 4367B Inglewood, Calif. 90309

LEARN CODE THE EASY WAY!



REELS and CASSETTES

Speeds:

- A—3 wpm to 6 wpm
- B—5 wpm to 8 wpm
- C—6 wpm to 10 wpm
- D—10 wpm to 16 wpm
- E—16 wpm to 25 wpm

Up to 40 wpm on request.

Prepare for a career in telegraphy, merchant marine, aviation, army, navy, air force, or ham operator.

PERFECT CODE TRANSMITTED FROM YOUR TAPE RECORDER. LEARN OR IMPROVE — EVEN WHILE IN YOUR CAR.

SEND CHECK OR MONEY ORDER
(Fla. residents add 4% sales tax)
State speed(s) desired.

Reels \$4.95-Any two \$ 8.95
Cassettes \$5.95-Any two \$10.95



TAPECO 6290 S.W. Third Street • FORT LAUDERDALE, FLORIDA

BARRY ELECTRONICS

Eimac AIR SYSTEM SOCKET SK-500 (for 4-1000A tube) \$32.50. \$22.00 while they last.
Eimac SK1400A Socket (for 4CX3000A) \$107.
 Special price \$50.00 (limited supply).
Meters: 3 1/2" Round Western Electric. 0-2 Amps DC. \$3.95; 2 1/2" Round Westinghouse or Hickok. 0-10 Amps DC. \$2.95.
Hammarlund SP-600 Super-Pro. (540 KCS. thru 54 Mcs.). Rack-Mount. Very good condition. \$275.00.
Collins 75A-2 Excel. condition. Brand new P.T.O. \$195.00.
Johnson Thunderbolt 2KW. P.E.P. Amplifier. Factory-Wired. Excel. cond. 115 or 230 VAC. Now only \$275.00.
HQ-200 General Coverage AM, CW, SSB Receiver (540 KCS. thru 30 Mcs. Also calibrated Ham-band-spread on 10 through 80 meters. 110 or 220 VAC (50-60 Hz). Brand new \$229.50. Prepaid/48 States.
Waters Model 361 Codax Automatic Keyer. With built-in key. Very good cond. \$65.00.
Drake W4 RF Wattmeter. 2 Scales. (200 and 2000 Watts.) Brand new. \$49.50.
Drake MN-4 Matching Network. \$90.00. (Brand New)
Sencore prepaid 48 States: FE149 Senior Field Effect Meter \$149.50; FE16 High Accuracy Field Effect Meter \$84.50; MU150 Emission and mutual conductance tube tester @ \$219.50; SM152 UHF Sweep and Marker Generator. \$349.50.
Allen Bradley ceramic by-pass capacitor. .001 mfd. Stud mounting. 25¢.
SILICON EPOXY RECTIFIERS — 1,000 P.I.V. @ 1.2 AMPS — 30¢ each.
Plate Ximr: Pri: 207 to 253 VAC. 50/60 Hz. Single Phase. Sec: 14,000 V.C.T. (2.67 KVA). \$125.00.

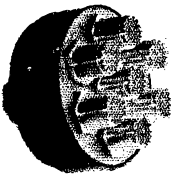
Westrex Cavity for 2C39A/3CX100A5. Operates straight through as 1296 Mc. amplifier or can triple to 1296 Mcs. from 432 Mcs. Exciter. With test notes from ARRL. (\$300. value) only \$24.95.
National NCX-3 Transceiver with NCX-A Power Supply and Speaker. \$225.00. (Vy. Good Cond.)
Hallcrafters SR-42A 2 Meter Transceiver (117 VAC or 12 VDC). Only \$115.95. (Vy. Good)
Utica 650 6 Meter Transceiver. With V-650A VFO. 115 VAC or 12 VDC. \$99.00 for both units. (Vy. Good)
RG-8/U Coax Cable @ 12¢ per ft.
RG-58C/U Coax Cable @ 04¢ per ft.
Swan 250 6 Meter SSB Transceiver. with VOX & Xtal Calibrator. **Swan 117XC AC Pwr Supply & Speaker** and Matching **Swan Mark VI-2 KW.** PEP 6 Meter Linear Amplifier, with built-in power supply. The entire package only \$595.00.

SPECIAL! Jennings Vacuum-Variable Capacitors:
Ucsl-250 (4 to 250 Mmfd @ 3 KV.) Compact! 2 1/2" Diam. Overall Length with tuning shaft 4 1/4". \$49.00.
Ucsxf-1000 (12 to 1000 Mmfd @ 10 KV.) \$175.00. Special . . . a few of our Ucsxf-1000 test only at half voltage, we offer these at \$125.00.
Ucsxf-1200 (15 to 1200 Mmfd @ 7.5 KV) \$175.00. Special . . . a few of our Ucsxf-1200 test only at half voltage, we offer these at \$125.00.
Ucsxf-2000 (50 to 2000 Mmfd @ 7.5 KV) \$195.00. Special . . . a few of our Ucsxf-2000 test only at half voltage, we offer these at \$135.00.

On order, indicate qty, item and inc. check or m.o. Heavy items go via truck or REA collect (unless indicated prepaid 48 states). Lighter items go P.P. Include postage, overages refunded). Prices subject to change, stock depletion.

BARRY ELECTRONICS • 512 BROADWAY, N. Y., N. Y. 10012 (Tel.: WALKER 5-7000 (A.C. 212) DEPT. Q-2)

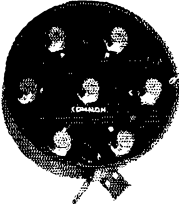
LET DOW-KEY HELP SOLVE YOUR ANTENNA SWITCHING PROBLEMS . . .



SP6T
MANUAL
78-0604



SPDT
REMOTE 115V ac
60-262842

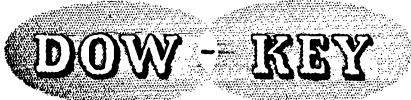


SP6T
REMOTE 115V ac
71-260401

SERIES 78 The series 78 coaxial switches are manually operated with true coaxial switching members (not wafer switches). They are offered in 2, 3, 4 & 6 position (illustrated) types, plus a transfer or crossover and DPDT. The useful frequency range is 0-1 Ghz except 500 Mhz using UHF connectors. The unused positions are open circuited or non-shorting. Also available with other type connectors such as N, BNC, TNC or C.

SERIES 60 The series 60 are remote operated, of rugged construction and designed for low-level to 1 KW use. The unit illustrated is equipped with a special high isolation connector ("G" type) at the normally closed or receive position. This "G" connector increases the isolation to greater than -100db at frequencies up to 500 Mhz, although it reduces the power rating through this connector to 20 watts. This is also available with other type connectors such as BNC, N, TNC, C or solder terminals.

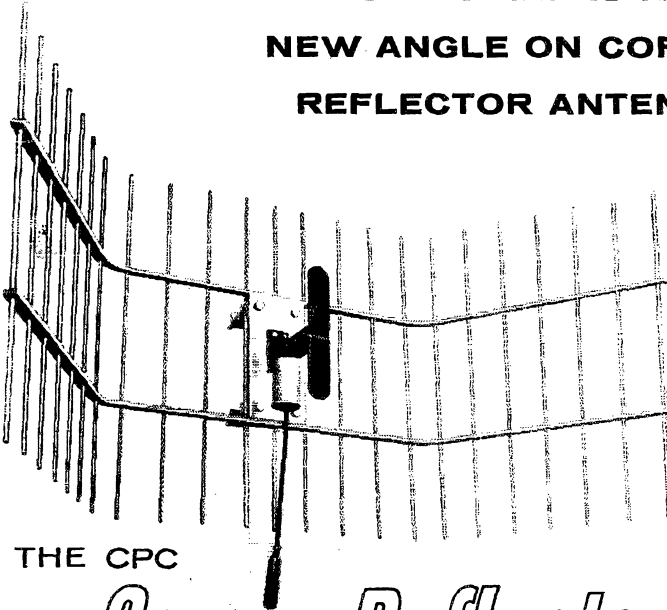
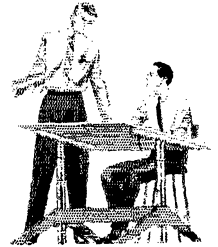
SERIES 71 High power 6 position switches commonly used for switching antennas, transmitters or receivers at frequencies up to 500 Mhz. The unit is weatherproof and can be mast mounted. The illustrated unit has the unused input shorted to ground. It is also available with a wide range of connectors, different coil voltages and non-shorting contacts or resistor terminations. Each of the six inputs has its own actuating coil for alternate or simultaneous switching.



ORDERING INFORMATION:
 Contact your local electronics distributor or Dow-Key COMPANY sales representative, or write direct to the factory.

2260 INDUSTRIAL LANE • BROOMFIELD, COLORADO 80020
 TELEPHONE AREA CODE 303/466-7303 • P. O. BOX 348

CPC ENGINEERS HAD A NEW ANGLE ON CORNER REFLECTOR ANTENNAS



Combining maximum strength with optimum electrical performance, this 10.0 db gain antenna meets the increasing demand for rugged durability at minimum weight. Cat. No. 465-509, has a reflector 55 in. by 29 in., yet weighs only 20 lbs. Its rated wind velocity is 150 mph. The radiating element material is brass, reflector screen components are of high strength aluminum alloys, and mounting accessories are fabricated of hot galvanized steel. This CPC Corner Reflector Antenna is ideally suited for use in multiple corner arrays.

THE CPC

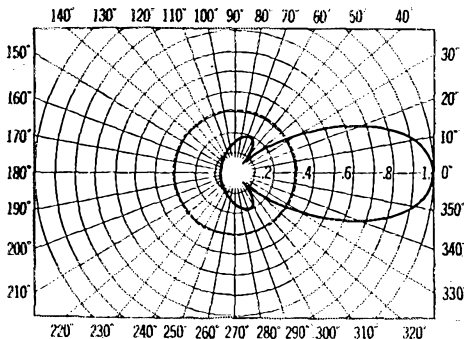
Corner Reflector Antenna

Cat. No. 465-509

Frequency Range 406-470 Mc

Electrical Specifications

NOMINAL INPUT IMPEDANCE	50 ohms
FORWARD GAIN	10.0 db at 450 Mc
FRONT-TO-BACK RATIO	25.0 db
MAXIMUM POWER INPUT	250 watts
TERMINATION	Type N Female with metal weather shield and Type N Male with Neoprene housing
VSWR	1.5:1
BANDWIDTH	406-470 Mc
LIGHTNING PROTECTION	Direct Ground



Horizontal field strength pattern; a dipole pattern is shown for reference.

Note: dbd gain indicated
as per EIA RS-329

Mechanical Specifications

REFLECTOR	55" wide by 29" high
REFLECTOR MATERIAL	6061-T6 aluminum
RADIATING ELEMENT MATERIAL	Brass
RADIATING ELEMENT SIZE	13-1/4" long by 2" wide
RATED WIND VELOCITY	in excess of 150 MPH with no ice 85 MPH with 1/2" radial ice
LATERAL THRUST AT RATED WIND	164 lbs. no ice 180 lbs. with rated ice load
WEIGHT	20 lbs.



Communication Products Company
DIVISION OF

PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

Marlboro, New Jersey 07746 - Tel. (201) 462-1880
Los Angeles, California 90065 - Tel. (213) 245-1143

LET YOUR ANTENNA DO THE RADIATING

ONLY
\$12.95

AMAT. NET

A 4 PURPOSE BALUN

USE A W2AU BALUN

WITH BUILT-IN SEALED TYPE LIGHTNING ARRESTER

HANDLES FULL LEGAL POWER

LETS YOUR ANTENNA DO THE RADIATING, NOT YOUR COAX

ONLY
\$12.95

AMAT. NET

A 4 PURPOSE BALUN

THE BALUN THAT HAS BEEN PROVEN AND ACCEPTED. NOW BEING USED BY THE U.S. NAVY, COAST GUARD, AIR FORCE, ARMY, FCC, CIA, RCA, NBC, FAA AND CANADIAN DEFENSE DEPT. AND BY THOUSANDS OF HAMS IN THE USA AND THROUGHOUT THE WORLD.

—ANOTHER FIRST—

We developed the original 4 Purpose Balun. NOW WE BRING YOU THE ULTIMATE—Meets military specs—Need we say more! Our 1:1 model adapts to all coax fed antennas such as dipoles, inverted Vees, Yagis, Quads and Multi-bands. Our 4:1 model adapts to Folded Dipoles and Windoms antennas.



Backed by 50 years of electronic knowhow

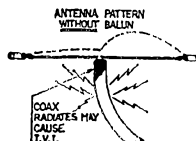
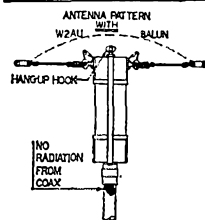
Baluns "that don't break down" when instructions are adhered to.

Available at all leading dealers. If not, order direct.

IT'S WHAT'S INSIDE THAT COUNTS

UNADILLA RADIATION PRODUCTS, Mfrs. of Baluns & Quads, Unadilla, New York 13849

W2AU BALUN LETS ENTIRE ANTENNA RADIATE!



STOP WASTING YOUR SIGNAL! REMEMBER, YOUR ANTENNA IS THE MOST IMPORTANT PIECE OF GEAR YOU OWN.

1. Built-in lightning arrester
2. No Center insulator needed
3. Hang-up hook, perfect for inverted Vees

4. Broad banded—2.8 to 40 MC. Takes legal power limit. Two models;

1:1-50 ohm coax to 50 ohm-balanced antenna;

4:1-75 ohm coax to 300 ohm-balanced antenna or folded dipole.

A Must for inverted Vees, doublets, multi-band antenna quads, Yagis etc.

\$ FOR \$
YOUR BEST
BALUN BUY

HELPS TVI PROBLEMS
IMPROVES F/B RATIO
BY REDUCING LINE PICKUP

NATCH!



I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$6.50 (in the U. S. and Canada, \$7.00 elsewhere). Sign me up for a year's membership and twelve big issues of QST!

My name Call.....

Street

City State..... Zip.....

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 2-69

PICKERING RADIO CO.
Post Office, Box 29
Portsmouth, R. I. 02871



YOUR TAPE RECORDER IS READY TO TEACH CODE!

That's right! Your tape recorder is ready to help your code study. The CODEMASTER tapes give you professional instruction via your own tape machine. Now generated by digital computer, the CODEMASTER tapes are unsurpassed for timing accuracy. Whether you're just starting, going for your Amateur Extra, or somewhere in between, the CODEMASTER tapes are your best code-learning buy! Find your CODEMASTER tape below!



CM-1: For the beginner. A complete course of instruction is on the tape. Practice material at 5, 7, 9 WPM. Prepares you for Novice exam. Includes code groups and punctuation.

CM-1½: An intermediate tape, especially for General Class exam study. No instruction; just practice. ½ hr 11 WPM; 1 hr 14 WPM; ½ hr at 17 WPM. Includes coded groups and straight text.

CM-2: For Extra-Class license study. Mostly straight text; some code groups. 1 hour at 20 WPM; ½ hour each at 25 and 30 WPM. For real QRO, play this tape at twice speed!

CODEMASTER tapes are 2-track monaural; available in two sizes: 7-inch reel (3¼ IPS) and 3¼-inch reel (1½ IPS). Will play on any but full-track machine. SPECIFY both type and size of tape you want. Any tape, \$5.95 postpaid USA 4th class. Any two tapes, \$11.00; all three, \$15.00 PPD. Immediate delivery. CODEMASTER tapes are made only by Pickering Radio Company, P. O. Box 29, Portsmouth, R. I. 02871. Satisfaction guaranteed.

CQ de W2KUW BEST OFFER!!

Paid for any piece of aircraft or ground radio units, also test equipment. All types of tubes. Particularly looking for 4-250 • 4-400 • 833A • 304TL • 4CX1000A • 4CX5000A et al. 17L • 51X • 390A • ARM • GRM • GRC • UPM • URM • USM units.
TED DAMES CO., 308 Hickory St., Arlinton, N.J. 07032



**HAM'S
CARIBBEAN RETREAT!**
Go foreign Antigua, W.I.
Hotel Beachcomber
73, Bill Wyer, VP2AZ/Ex-VE3BP,
G2ZB-DXCC
Box 10, Antigua, W.I.
Caribbean DXpedition Headquarters

LRL-124 BROADBAND REACTANCE BALANCED ANTENNA for 75/80 meters

124' 14-2 copperweld polyeth. ins. wire with clamping blocks so ends can hang down to install in 100' length or less, 25'-40' center height. 2 KW P.E.P.

Price: \$35.00 ppd Cont. USA



Low SWR 3.5-4mc 2:1 or less
Vertical shorted stub to be grounded, also is DC ground for ant. Center block has coax connector for PL-259 male plug. Use RG-8/U or 58/U feeder.

LATTIN RADIO LABORATORIES

Box 44

Owensboro, Ky. 42301

YOUR SERVICE AND QUALITY LEADER

INTEGRATED CIRCUITS



NEON LIGHT of NIXIE TUBE DRIVERS.
An NPN, TO-18, Si Transistor with a V_{ceo} of 120 3/\$1.00

MOUNTING HDWE KITS
These kits are used to mount our SCR's, zeners, & rectifiers etc.
6 x 32 stud (3 and 12 amp rect., 7 amp SCR) 6 sets/\$1.00
¼ x 28 stud (40 amp rect., 20 amp SCR) 4 sets/\$1.00

TRIACS 1 AMP Rectifiers
Epoxy or Controlled Avalanche

TO-66
5 AMPS

PRV	AMP
100	.90
200	1.40
300	1.75
400	2.25
500	2.60

PRV	AMP
100	.07
200	.09
400	.12
600	.18
800	.22
1000	.35

Send For Our Latest Catalog Featuring Transistors and Rectifiers \$20 if no order enclosed.

POST OFFICE
BOX 74A
SOMERVILLE,
MASS. 02143
Telephone
(617)547-4005

UNIUNCTIONS

Similar to 2N2419 Rbb of 5-7, stand off ratio of .6 and I_p of 12, with data sheet \$1.50

ZENERS

1 Watt 6.8-68V \$4.40
10 Watt 6-200V \$7.75

N-CHANNEL PLASTIC TO-18 FET'S.
Low noise, low leakage, gate current, gain to 9000µ mhos. \$1.00

CADMIUM SELENIDE PHOTO CONDUCTIVE CELLS. Dark resistance of 500 megohms, Sensitivity of 1-4.99 µa/ft candle with data sheet \$1.00

500 Hfe PLASTIC TRANSISTORS (NPN) TO-18. S1 unit sim to 2N3565. 4/\$1.00

LINEAR CIRCUITS

FM IF AMPLIFIERS \$.90
702C WIDE BAND DC AMPL \$2.20
709C OPERATIONAL AMP. \$2.75
710C HI SPEED DIFF. \$2.75
COMPARATOR \$2.20
711C DUAL COMPARATOR \$2.75

Silicon Power Rectifiers

PRV	3A	12A	40A
100	.09	.30	.75
200	.16	.50	1.25
400	.20	.70	1.50
600	.30	1.00	1.80
800	.40	1.25	
1000	.55	1.50	

9030 8 BIT MEMORIES \$4.95

DIGITAL RTL CIRCUITS
2,914 QUAD 2 INPUT GATE \$1.25
900 BUFFER \$1.25
925 DUAL 2 INPUT GATE EXPANDER \$1.25
923 JK FLIP FLOP \$1.25

AVALANCHE MODE TRANSISTORS, used for TRIGGERING SCR'S & TRIACS with diagrams. 3/\$1.00

Silicon Control Rectifiers TO-66 pack Studs

PRV	3A	7A	20A	70A
50	.35	.45	.70	
100	.50	.65	1.00	4.00
200	.70	.95	1.30	8.00
300	.90	1.25	1.70	
400	1.20	1.60	2.10	12.00
500	1.50	2.00	2.50	
600	1.80	2.40	3.00	16.00
700	2.20	2.80	5.00	

Terms: FOB Cambridge, Mass. Send check or Money Order. Rated companies 30 days net. Include Postage, Average Wt. per package ½ lb. No COD's. Minimum Order \$3.00

QUALITY MERCHANDISE — QUALITY SERVICE

... SO WHY PAY MORE FOR THE BEST!

MERCHANDISE IN STOCK — PROMPT DELIVERY
NATIONALLY ADVERTISED BRANDS, THE LATEST MODELS

INSTANT SHIPMENT on all cash orders of new equipment. TRIGGER ELECTRONICS has the most complete inventory of amateur radio equipment and accessories in stock, for your convenience. Shipment is usually made the same day your order is received!

TRADE-INS: We allow much more on trade. (Clean recent vintage equipment.)

\$5.00 DOWN STARTS ANY BUDGET TIME PAYMENT! Order your goodies from this ad!

MIDWEST BANK CHARGE CARDS HONORED

another
important
TRIGGER service:
**WE BUY USED HAM
GEAR FOR CASH**
PROMPT SERVICE...
PROMPT CASH!

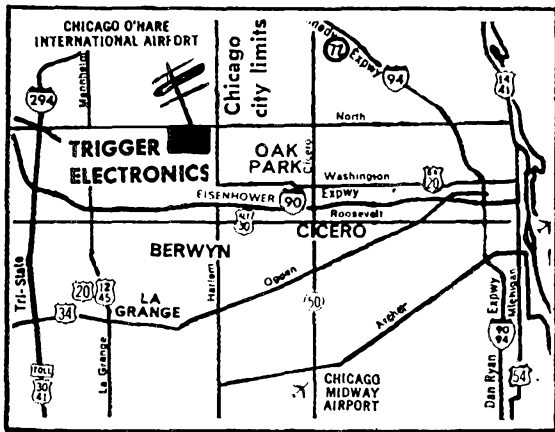
TRIGGER ELECTRONICS An Exclusive Ham Store.

ALL PHONES: (AREA 312) 771-8616

STORE HOURS
(CENTRAL TIME)

WEEKDAYS 10:00 A.M. - 8:00 P.M.
SATURDAYS 9:00 A.M. - 3:00 P.M.

TRIGGER ELECTRONICS is conveniently located near the west city limits of Chicago on the main street of North Avenue (State Route #64), 3 blocks west of Harlem Avenue (State Route #43). Just 10 miles due west of downtown Chicago, or 20 minutes southeast of O'Hare Airport. Plenty of free parking. Come in and browse. See the latest in ham gear attractively displayed.



CLEAN AS A WHISTLE LIKE-NEW BARGAIN SPECIALS FOR FEBRUARY

KWM-2.....\$795	SWAN 250 W/CAL..\$279	CLEGG 66ER.....\$179
CC-2 CASE..... 60	SWAN 406B NEW.. 60	CLEGG 22ER NEW.. 229
312B-5..... 275	SBE 33..... 189	HRO500..... 1350
3510-2 MOUNT..... 90	SBE 34..... 279	LF10..... 279
516F-2 AC..... 119	S82 LA LINEAR.. 199	GUNSET 3 2MTR.. 149
516E-2 28VDC... 329	GALAXY V MK 3... 359	HO170A VHF..... 287
30L-1..... 390	GALAXY DC SUP... 67	HO180AC MINT... 339
DRAKE R4..... 279	HA650 6MTR TSVR 77	HEATH HX20..... 129
DRAKE R4A..... 359	HT44 & AC..... 329	HEATH HW12..... 77
DRAKE R4B..... 359	5X105..... 79	HEATH HW32..... 87
DRAKE T4X..... 359	5X146..... 229	SB300 RECEIVER.. 199
DRAKE TR1..... 379	WR200..... 87	SB301 RECEIVER.. 279
DRAKE AC8..... 77	SR420..... 149	SB401 XMTR..... 289
DRAKE 2B..... 199	SR46A..... 139	RANGER..... 99
DRAKE 2NT..... 129	HA26 VFO..... 34	WATERS 369..... 99

Special!

LIMITED QUANTITY NEW ETCO KITS
722 VFO W/AC SUPPLY \$35
723 60 WATT CW \$40
751 AC SUPPLY \$60

prices subject to change without notice

Write today! Send for FREE Catalog!

TRIGGER Attn: W9IVJ

QST 269

7361 North Avenue

River Forest, Ill. 60305

Amount

RUSH the FOLLOWING:

Enclosed

Send free catalog.

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____



TRIGGER Electronics
7361 NORTH AVE. • RIVER FOREST, ILLINOIS 60305
(WEST SUBURBAN CHICAGO)



Where the
HAM IS KING!

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 post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

HAM-AUCTION, Feb. 16, 14th Annual by Toledo Mobile Radio Ass'n, at the Lucas County Recreation Center, 2901 Key St., Maumee, O., 5:00 Registration, open table sales, map and further info, write Ron WB8TA, 1939 Cone, Toledo, O. 43606.

"SEE your picture and a thumbnail sketch of your life in wireless along with that of your old buddies in Spark Gap Times magazine published by the Old Old Timers Club. Charter membership is offered to all pre-World War I operators, regular membership to any operator licensed 40 years or more ago. Be a recognized pioneer, join the Old Old Timers by writing the Secretary W3ZC, Bert E. Gamble, 402 Beck Building, Shreveport, Louisiana 71101."

ROCHESTER N.Y. is again Hamfest, VHF meet and Flea Market headquarters for one of the largest events in the East. May 9, 10 and 11th.

INVITATION: New York Radio Club invites New York Area hams and SWLs to its regular monthly meetings the second Monday of each month at the Hotel George Washington, Lexington Ave. and 23rd St. at 8 PM, W2ATF, New York Radio Club, Our Feb., April, May and June meetings will be held on the 2nd Monday of the month. Our Annual Auction will be held on March 14, 1969 at the George Washington. (All our meetings are held there).

OCWA—Quarter Century Wireless Association is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information to J. Gironda, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10543.

FANTASTIC—1969 New England ARRL Convention, May 24 & 25, Swampscott, Massachusetts. Save money! Early bird registration \$10 including Saturday dinner, dance and night club entertainment. Be a winner! Every major manufacturer will exhibit, plus top speakers from science & industry. Tickets: W1KCO, John McCormick, Berkeley Street, Taunton, Massachusetts.

DAYTON Hamvention April 26, 1968: Wampler Arena Center, Dayton, Ohio. Sponsored by Dayton Amateur Radio Association. Informative sessions, exhibits, hidden transmitter hunt, and ladies program for the XYL. Watch the Ham Ads for information, or write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

A.W.A. Historical Radio Meet for old time amateur and commercial operators, historians and collectors. Smithsonian, Washington, D.C. Oct. 5th. Write W2OY for details.

CHRISTIAN Ham Fellowship is now organized for Christian fellowship and witness among licensed amateurs. Free gospel tract sample and details on the organization on request. Christian Ham Callbooks listing members \$1 donation. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104. Tel. NOrmandy 8-8262.

RTTY Channel filters, octal mounted, 2125/2975, \$5.95 pair. Special filters for 17L-2. BASE for information, 88 Mt. Toledo, unca, Ohio 43002. Horton Zachry, WA6JGI, P.O. Box 845, Apple Valley, California 92307.

QSL Cards?? America's Finest!!! Personalized made-to-order!!! Samples 25¢. Deluxe and regular \$50 (refundcd). Sakers, WB6ED, Box 218, Holland, Mich. 49423.

CARDPRINT—QSLs that your proud to send, bring greater return. Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252.

QSLs "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLs stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md. 21733.

QSLs—SMS Samples 25¢. Malgo Press, Box 375, M. O. Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples, Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLs, SWLS, Rubber stamps, address labels, and envelopes. Quality with service. Samples 25¢ (refundable). R. A. Larsen Press, Box 45, Fairport, N. Y. 14450.

QSLs. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2378, Eugene, Oregon 97402.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. Personal attention. Imaginative new designs. Send 25¢. Receive catalog, samples, and 50¢ refund coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.

QSLs by Jansen, K2HVN, Samples 25¢. 860 Atlantic St., Lindsenhurst, N.Y. 11757.

RUBBER Stamps \$1.15 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLs SWLS Hundred \$2.00, samples dime. Garra, 414 Mahoning St., Lehighton, Penna. 18235.

QSL 300 for \$4.35, samples 10¢. W9SKR, George Vesely, Rte #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLs, Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, WA4FJE/W3COP, 205 Fernald, Edgewater, Fla. 32032.

RUBBER Stamps. Return mail delivery, postpaid. Basic price, \$1.00 first line, 60¢ each additional line. Request type style chart. Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

QSLs, Neat, quick, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSLs Kromkite glossy 2 & 3 colors, attractive, distinctive. Choice of colors, 100—\$3.00 up. Samples 15¢. Agent for Cal-D-Cals, K2VOB Press, 457 Chancellor Ave., Newark, N.J. 07112.

QSLs, finest YLRL's. OMs samples 10¢. W2DJH Pres, Warrensburg, N.Y. 12885.

QSL cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

QSLs, SWLS, XYL-OMS (Sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, sedate, fabulous, comic, DX-attractive, prototypical snazzy, unparagoned cards (Wow!), John Patterson carries on in the spirit of the late Warren Rogers, K0AAB, adding his own. Patterson Printing, 961 Arcade St., St. Paul, Minn. 55108.

QSLs, Radio Press, 15008 Orchid Ave., Poway, Calif. 92064.

3-D QSLs—The modern concept that makes all others old-fashioned. Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLs, SWLS, WPE, Samples 15¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLs, samples, 10¢. Fred Leyden, WINZI, 454 Proctor Ave., Revere, Massachusetts 02151.

RUBBER Stamps, 3-line address \$1.50, J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08848.

QSLs-100 3-color glossy \$3.50; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLs by KIFF: \$2.00 for 100. Others at reasonable prices. Samples 25¢ (deductible). KIFF QSLs, Box 33, Melrose Highlands, Mass. 02177.

PICTURE QSL cards of your shack, etc. from your photograph, 500, \$12.00, 1000 \$15.25. Also unusual non-picture designs. Generous sample pack, 20¢. Half pound of samples 50¢. Raum's, 4154 Fifth St., Philadelphia 19140.

ORIGINAL EZ-IN double holders display 20 cards each in plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free samples to Dealers or Clubs. J'epaco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLs, Free samples, Cut Catalog 25¢. Raised lettering QSLs. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLs by Jansen, K2HVN, custom made, rainbows, pictures, maps, large variety backgrounds. Special offer, 300 glossy, \$5.00. Samples 25¢. 860 Atlantic St., Lindsenhurst, N.Y. 11757.

3 Line engraved badgers, any color, \$1.25. Special rates to clubs. Fallert's Enraving, 121 N.C. St., Hamilton, Ohio 45013.

PICTURE of yourself, rig, etc. on QSLs made from your photograph, 250—\$7.50; 1000—\$14.00 postpaid. Samples free. Picture Cards, 129 Copeland, LaCrosse, Wis. 54601.

QSLs, 100, \$1.25 and up. Postpaid. Samples, dime. Holland, R3 Box 649, Duluth, Minn. 55803.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 10¢. Alkanprint, Box 5494, Minneapolis, Minn. 55408.

NAMEPLATES: Call, full name, \$1.10. Adhesive of pin back. Many styles, colors. Quantity discounts. Catalog for stamp. Each Engraving, Pike Place, RFD-4 Mahopac, New York 10541.

CANADIANS! The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. It will pay you to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel. 416-789-1239).

BEAUTIFUL Heath Marauder, HX-10 CW/AM/SSB/FSK transmitter, Excellent condition, \$200. WB2HYK, 216-69 68th Avenue, Bayside, N.Y. 11364.

WELCOME To Maritime Mobile service net. 14313 Khz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry, KDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

SELL swap and buy ancient radio set and parts magazines. Iaverty, 118 N. Wycomb, Landsdowne, Penna.

DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash, and freight. Ritco Electronics, Box 156-0567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

MANUALS for surplus electronics. List 15¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HAM'S Spanish-English manual \$3.00 Ppd., Gabriel, K4BZY, 1429 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Editions 11, 12; WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

TUBES, 88 mh uncasted, 5/\$2.50. Postpaid, Humphrey, WA6FKN, Box 34, Dixon, Calif.

COLLINS S/LINE, Mint: 7533, 3253, 312B4, 30L1, 62S1 (VHF) all complete with many extras, manuals, etc. Cash only. \$1600 f.o.b. WA1WA, 21 Lancaster Terr., Hampton, Va. 23666.

TUBES: Best equipment, transmitters or receivers. Any and all prices sought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 OSTs needed for personal collection. Price secondary, Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred, 12% of cost, some in stock. Professionally wired. Ian Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Elec. tronics, 912 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

WANTED: Tubes and all aircraft and ground radios. Units like 171 SIX, 618T or S, R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mhz toroids, five for \$2.00 postpaid, Elliott Buchanan & Assoc., Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass, caps and bridging resistors, 10 for \$3.75. Postpaid USA. With diode purchase, 125 MF. at 350 volt electrolytic capacitors, \$0.6 each. Postpaid USA, no limit. East Coast Electronics, 123 St. Boniface Rd., Cheektowaka, N.Y. 14225.

BRAND NEW factory-sealed cartons. Hallicrafters SR-160, \$250.00; P-150-10C, \$90.00; MR-160 Mobile Mount for SR-160, \$12.50. All above F.o.b., H D H Sales Co., 170 Lockwood Avenue, Stamford, Conn. 06902.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

WANTED: Model #28 Teletype equipment, R-388, R-390A, cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

SELL, trade, or buy Call Books, handbooks, magazines, and old radio sets and parts. Erv Kasmussen, 164 Lowell, Redwood City, California 94062.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts 017-598-2530 for the gear u want at the prices u want to pay.

RADIO Communication Handbook, Exciting new 832 page Handbook from RSGB, \$11.95 from Comtec, Box 592, Amherst, N.H. 03031.

ESTATE Liquidation, SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

3000 V @ 3mf brand new GE Pyranon oil capacitors; \$3.00 each. Can mail, 3-lbs. each shipping weight. FOB P. Wandglt, RD #1, Unadilla, New York 113849.

TELETYPE Gears, shifts, keytops, typebars, motors, forks, typeboxes, typewheels, punchlocks; nonoverliners, CR-LFS TRS, TDs, KSRs, ASRs, FSCs, toroids, fresh paper, testsets, SRT subchassis. Buy, too! Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

FREE: Lesson Book "Mathematics for Electronics". Please include 20¢ postage. Free lists: Tech manuals, textbooks, lessons, etc. Jim Cooper, POB 73, Paramus, N.J. 07652.

SELL: New Yaesu FT-DX-400 Transceiver, W8AO, 2912 River-view Blvd., Silver Lake, Ohio 44224.

OFFER \$10 for May 1913 Elec. Experimenter, \$3, Oct. 1914; \$2 May 1919; \$5 1919 issues Radio Amtr. News; \$10 any 1908 Modern Electrics; \$10 good amtr. Callbooks 1927-26. Less for later dates, or poor condition. For historical library, none sold. Wayne Nelson, W4AA, Concord, North Carolina 28025.

NOVICE Crystals: 40-15M, \$1.33, 80M, \$1.83; Free list. Nat Stinnette, Umatilla, Fla. 32784.

TR-4 \$495.00; AC-4 \$84.00; DC-3 \$115.00; R4-B \$370.00; 14-XB \$330.00; MS-4 \$80.00; RV-4 \$80.00; 44-3 \$30.00; W-4 \$44.00. Factory sealed boxes, fully guaranteed, Mel Palmer, K4LGR, Box 10021; Greensboro, N.C. 27404. Tel: 919-299-8767.

POLICE-FIRE Radio Station Directories, All areas. Call signs! Frequencies! Communications. Box 56-T, Commacks, N.Y. 11725.

PROP Pitch rotor, WW2, small, excellent, \$45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

NORTHERN California hams: best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1305 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

WANTED: HQ180AX, HO170(VHF), HRO500, 51J, 51G-1, 105B. Lesson course on electronics, and textbooks. State condition and price. John Waskowitz, 541 Marcy Ave., Brooklyn, N.Y. 11206.

SELL: Microwave test set "X" band frequency meter, Signal Generator, power meter, TS-147A with manual, \$85.00. RTTY page-printer paper, 3 ply, \$7.50/case. WVB2PLY, Box 207, Princeton Jct., N.J. 08550. Tel: (609)-452-9038.

TOUCHTONE desk telephone wanted. Robert Young, 319 Wyatt Rd., Harrisburg, Pa., 17104.

WANTED: Loudenboomer Antenna Rotator and control box in good condition. WZGON, 114 Phylis Court Elmont, N.Y. 11003 Tel: 516 HU 8-3555.

HAM Transformers rewound, Jess, W4CJJ, 411 Gunby Ave., Orlando, Florida. 32801.

PL-172 Tube wanted, Please state price and condition. K4RRG, 3120 Shannon Dr., Winston-Salem, N.C. 27106.

WANTED: Hallicrafters S-30 radio compass, and early Hallicrafters receivers without modifications. Condition and best price. First offer please. Howard Hoagland, Junior, North Sierra Bonita Avenue, Los Angeles, California. 90036.

SELL: Johnson KW Matchbox, Model 250-3, mint condition, \$100.00 F.o.b. W2CMD.

ATTENTION! Southwestern Hams! Congratulations! You now have your own volume discount ham store! Never before heard-of cash savings on new Drake, Swan, Hallicrafters, Galaxy, National and BTI equipment. Also save on Tri-Ex, Mosley, Hy-Gain. Get our quote before you buy. Write or phone today. Valley Discount Ham Shack, 4109 N. 39th Street, Phoenix, Arizona, 85018. Tel: (602)-955-4850.

WANTED: Electronics Instructor, General indispensable. Theory and workshops. Science Camp, Lake Placid, N.Y. Write Epstein, Apt. 4H, 44 Westend Ave., N.Y. 10024.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, Drake, Swan and all others. Also \$20,000.00 inventory used gear! Chuck, W8UCG-Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TEST Equipment wanted: Any equipment made by Hewlett-Packard, Tektronix, General Radio, Stoddart, Measurements, Bonton. Also Military types with URM(-), USM(-), TS(-), SG(-) and similar nomenclatures. Waveguide and coaxial components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040.

COLLINS Station purchased new six months ago 7553B with additional ten meter crystals, 112B4, 1253, 516F2 brand new, wired, ready to go SB-200, SB-610, SB-630, Henry 2K, 3 years old, in mint condx. For prices and info call or write Mel Marsley, 2242 Stevens Ave., Kalamazoo, Michigan 49001. Phone: F. I. 28838.

SELL-URR389, 390, 390A, 51J4, 75A4, 7553A, NC101X (a classic), HRO-7, HRO-50T1, others; and other gear. List for SASE: W2ADD, 129 Midland Ave., Glen Ridge, New Jersey 07028.

JEHOVAH'S Witnesses desiring Christian Association on International Dealer. Needs list for Swan and all others. Mac O'Dell, 4138 Wisner, Sarinaw, Mich. 48601.

SELL: Hallicrafters SX-71 new w/speaker \$110.00 D. Sporty, 3800 Arlington Ave., Riverdale, N.Y. 10471.

SELL: 5" wide band Precision Instrument Corporation, Model S-55 "scope" new scope tube \$19.00. Paco Model R.F. signal generator, \$35.00. Eico Model 944 Flyback and Yoke Tester, \$30.00; Eico Model 715 Transmatch SWR complete antenna checker, \$42.00. Mercury Model 120 Tube Tester. Checks all latest tubes, \$40.00. All perfect and ready to go. Contact W3NV, 8258 Brittany Place, Pittsburgh, Penna. 15237.

COUNSELLOR: Penna. Brother-Sister Camp seeks ham radioman with a General License. David Blumstein, 1410 E. 24th St., Brooklyn, N.Y. 11210.

AUCTIONFEST: Broward ARC, March 1. Turn your used equipment into cash. Bargains unlimited. Location: Chaminda High School, 500 North 51 Ave., Hollywood, Florida. Doors open at 8:00 AM. Auction begins 9:00 AM. R. W. McCarty, W4RM, Sec'y.

WRL's Used gear has trial-guarantee-terms! HW-22, \$89.95; Swan 350, \$279.95; Galaxy 300, \$139.95; V, \$249.95; VMK2, \$299.95; HX500, \$269.95; HT-37, \$199.95; NCL2000, \$449.95; SB903, \$229.95; NC-155, \$119.95; RME6900, \$149.95; Collins 312B5, \$199.95. Hundreds more. Free "blue book" list. WRL, Box 919, Council Bluffs, Iowa 51501.

COLLINS S/Line. 32-S-3, 75-S-3, 516 F-2. Speaker, mike, guaranteed in perfect condition. First check \$895.00 takes all. RTTY Model 19 and Model 14 typing reparator: \$350.00. W0ZB, 12331 Conway St. Louis, Mo. 63141.

WRITE. Phone or visit us for new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry linear, BTI linear, towers rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Henry Radio, Butler, Missouri 64730.

WANTED: 5YPI, 5th CRT, J. H. Brewer, 2405 Headland Drive, East Point, Ga. 30344.

SWAN 350, with AC and 14X d.c. power supplies, selectable sidebands, Mint condx, late model \$365.00. No hauling! 1/1 Lt John Stelke, 310 South MacArthur, Panama City, Fla. 32401. Tel: 785-5119

SWAN 350 recently brought up-to-date at factory. Has VOX, calibrator, switchable sidebands, 117-C pwr/supp., and D.C. (412) pwr/supp. \$475.00 each, plus shipping costs. Donald Johnston, W7IHL, Rte. 2, Box 2128, Coos Bay, Oregon 97420.

1 Motor-driven Superior electric powerstat, like new; prim. voltage 115V. Output voltage 0-135V, max. output, 6.1 KVA; max. output 45 amps. Time travel 1/4 seconds. Asking \$100. You make offer. Will ship collect if unable to pick up. Geo. W. Whitney, W1YUQ, P.O. Box 426, Stamford, Conn. 06904.

SELL: DX-60A, in mint condx, best offer takes it. Write for details, WB2FWQ, Skip Everett, WB2FWQ, Box 234, Ghent, N.Y. 12075.

TR-4 with AC supply; year old; excellent condition. \$385.00. A. Woolfries, Box 563, Council Bluffs, Iowa 51501.

NCX-3 Transceiver, AC power supply, SWR mtr., Tri-Band antenna (80-40-20), mike, \$215.00. W5GTL, Box 37, Lake Jackson, Texas 77566.

DRAKE 2B, in exclnt condx, \$150.00; Ship at my expense. Tsien, WB2QAL, Tufts University, Medford, Mass. 02155.

SELL: B&W 51SB, \$85.00 and 1962 Valiant 1, factory wired, \$150.00. Want: T4X or TR-4, Herbert Jackson, W8AKM, R #2, Box 323, Roncovec, West Virginia 24970.

FOR Sale: DX-40 with VF-1, \$40.00; Bud Crystal calibrator, \$10.00; Eico 710 grid dip meter, \$25.00. Ralph Look, K0KCH, AM45067, Wichita, Kans. 67211.

WANTED: Pair of 4-400As. State price and condition pls. W6WY.

BEGINNERS: Globe HG-303 75W transmitter with relay, filters, crystals; \$55. Lafayette HA-225 receiver and speaker, \$65.00; Eico 722 VFO, \$30.00. Manuals, WB2ZQE, 31 Eaton, Swasset, 1-11, N.Y. 11791. Tel: (516)-931-2966.

COLLINS KWM-2 and 516F-2, \$800; 312B-5, \$250.00; 30L-1, \$350.00. W6BUMJ, 53 W. Fern, Fullerton, Calif. 92632.

HEATH HW-32, HP-23, SB-600, \$135.00; Twoer, \$35; Adventurer, \$20.00; HP-23, \$20.00. All in exclnt condx. WA2-YWG, 60-29 1/2 Drive, Maspeth, N.Y. 11378.

R-390-A/JRR wanted. State make, SN, condx, price. Malinowsky, 169 East 32nd St., 6, Paterson, N.J. 07514.

SB101 with 400 hz filter, SB600, AC power supply, HN-31, HM-15 and SB610. All mint condx. \$425.00. W. H. Wiley, W6OWD, P.O. Box 659, El Granada, Calif. 94018. Tel: (415)-726-4109.

FOR Sale: HT-37 xmtr, \$250.00; HQ-170A receiver, \$250.00; Eico 720 xmtr, \$40.00; Saturn Six halo with transformer, \$10.00. All equipment is in exclnt condx. Write Tom Adner, WB2GSK, 2 Garden Road, Scarsdale, N.Y. 10583, or call (914)-723-3041.

NCX-3 with power supply. Transceiver, exclnt condx. \$195.00. Ralph Hawkins, 313 Knollwood Dr., DeKalb, Ill. 60115.

ELECTRONIC Surplus materials, large selection professional test equipment for sale. Now available: Hammarlund SP-600 rxs., exclnt condx, \$350.00 each; Stark VF-9/VIVMS, \$95.00 ea. Write for free catalog. Dealer inqs. invited from U.S.A. and Canada. United Electronics Co., 6150 Sherbrooke St., W. Montreal 461, Que. P., Canada. Tel: 1514-489-5661.

HT-44, SX-117, AC supply, \$600, or your best offer or will trade toward 7553 and 3253, W0RYM, 3931 18th Ave. N.W. Rochester, Minn. 55901. Phone 282-8887, a.c. 507.

SELL: Heath Apache, Transmitter, \$90.00; Lafayette HA-225 receiver, \$60; can with manuals, all and ant. relay, \$140.00. Mirsh, ship, WA0FTD, 53 Oklahoma Ave., S.W., Cedar Rapids, Iowa 52404.

FOR Sale: Two element Tri-band quad, never used; still in factory carton, fiberglass spreaders, \$60.00; 46 ft. steel mast, telescoping, 3 sections, \$12.00; HR-10 rcvr, v.v. and condx w/xtal calibrator, \$75.00. WA2VOZ, 451 Elk St., Albany, N.Y. 12206.

NCX-3 Transceiver with A.C. power supply, in exclnt condx. \$195.00. Ralph Hawkins, 313 Knollwood Drive, DeKalb, Illinois 60115.

SELL: Globe Highbander 6 and 2 meter transmitter, \$65.00, or trade for linear components. Kenneth Stephenson, WA5-SGW, Rte 9, Fayetteville, Arkansas 72701.

FOR Sale: SM-101 Transceiver, HP-13 D.C. power supply and SHA-100-1 mobile mount, \$400.00 or your best offer. K6UNQ, Robin F. Hill, 1238 W. Cameron, West Covina, California 91790.

LINEAR Builders: 100 mfd. 3000 VDC condensers, \$30 each. Basil J. Weaver, 1821-A Ave. M., Lubbock, Texas 79401.

FINANCIAL Obligations force me to sell: National NC-303 receiver, coverage 2M thru 160 M, plus citizen band 2 and 6 meter converters housed in separate cabinet for remote switching. National NC-100 kc. freq. calibrator. Total cost \$614.20; s.p. \$500.00. Knight T-150 xmtr s.p. \$120.00 (6M thru 80M); Heath Seneca VHF-1, 2 and 6 M, s.p. \$150.00. Equipment in fine condx. Manuals included. Used on occasional week-ends. Will ship. T.o.b. Philadelphia, Charles Jacobs, K3PMU, 8720 Ditman St., Philadelphia, Penna. 19136.

WANTED: 2 and 6 meter gear. W3MSN, 5400 Boulder Oxon Hill, Maryland, 20021.

DX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and confirmations. Required over two years to prepare. Most complete and up-to-date source of DX Awards available. \$3.95 postage paid (\$4.95 foreign). The McMahon Co. (W6IZE), 1055 So. Oak Knoll, Pasadena, Ca. 91106.

PLATE Transformers: 3600-0-3600 VAC at 1500 MA CCS with 120/240 VAC 60 cps primary. 14"H, 11"W, 10"D. Net Weight 90 lbs. \$49.95 FOB El Paso. Peter W. Dahl, 5325 Annette Ave., El Paso, Texas 79924.

WANTED: Eldico SB100F Exciter. First Best offer. W1-DBS, John Savonis, 410 Blake Road, New Britain, Conn. 06053.

FOR Sale: Thordanson Transformer 2500 Volts 500 MILS; Matching Choke—2 Pyranol condensers \$75.00; Johnson 275 Watt Matchbox; Heath reflected power meter \$50.00; HW-32A with xtal calibrator \$85.00. J. B. Roberts, 70 North 4 Street, Bangor, Pennsylvania 18013.

WANTED: Early wireless receivers and transmitters prior to 1926 for private collection. Jack Swanson, W5PM, RFD 1, Box 399, Covington, Louisiana 70433.

TWO-Meter Transceiver, Polytrons PC-2. Tunable receiver, internal transmitter VFO. Very sensitive and stable, 115 VAC and 12 VDC. Microphone, cables, and manual. Like new. \$150 FOB St. Louis. G. Grothen, 90 Florissant Park, Florissant, Missouri 63031.

VHF Gear: Three Clegg 22'ers, \$160 for one, 10 per cent off for two or all three. 6 Meter Gonset Communicator H1, \$130. No personal checks. Barrie C. Hicrn, K5SGP, 1500 Cross Lake Blvd., Shreveport, Louisiana 71109.

MODEL 15 Teletype and FF-1 Demodulator; sell as unit, \$50, no shipping sur. Heathkit HG-10 VFO, \$25. E. Stroyny, 3713 Orchard Dr., Midland, Mich. 48640. Tel. 517-835-3665.

SELL: HE-45A complete \$50.00. Hallicrafters HT-40, 6-80 Meters with relay \$45.00; Heath 6V, Mobile Supply, \$7.00. James Hegdus, WA2PHY, 202 Route 156, Trenton 20, N.J. 08620.

NATIONAL NCX-5 Mk-II, crystal calibrator, NCXA power supply; Heathkit HQ-10 scope; Knight-kit SWR Bridge, No. 100, erophone, key, and cables. All in mint condition! Best offer over \$450 takes it. Barry Watzman, WA4PCC, 300 ManDorm Rm. 310B, R.P.L. Troy, N.Y. 12181.

FOR Sale: K-10 150w sst transmitter, \$100.00. 130-174 MHz mobile antenna, never mounted. Antenna Specialists Co. (Gain), \$20.00. 6M 829B transmitter, \$18.00. Ham Nuts transistorized keyer, \$20.00. Hewlett Packard 410B V1VM, manual, \$150.00. Gonset 6M Converter, \$14.00. 6MKW Linear 4CX-300A's, PS, \$60.00. Motorola FMT-50D transmitter, \$19.00. RCA 6M FM CMV-3E1 60W transmitter, manual, no accessories, \$40.00. Sears 1/2" saw, 1/3 hp motor, \$80.00. 6M transmitter, \$5.00. 6M transistorized transmitter and modulator, no board new \$17.00. 4CX1000A guaranteed, \$38.00. 4125A'S new \$9.00. Hi-Gain 20M beam need 1 insulator model 203R, \$40.00. You pay shipping. Loyd Woodham, Route 3, Albertville, Alabama 35950.

SB-34 SBE 4 band transceiver, brand new factory sealed box: \$25.00. No trades! John West, P.O. Box 176, Grandview, Missouri 64030.

CRYSTALS Airmailed: MARS, Marine, SSB, Nets, C.D. etc. Notice .05% crystals \$1.50. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction 3500 to 8600 \$1.90. (Five or more this range \$1.75 each), (ten or more, same frequency \$1.45) 1700 to 2699 and 8601 to 20,000 \$2.95, overtones supplied above 10,000, 10,001 to 13,500 fundamental \$2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6u metal miniatures above 2000. Crystals, singles, and groups for ARRL-QST, Handbook, SSB Manual, old and new issues. Be specific. Write for order-bulletin. Crystals since 1933. Airmailing 10¢/crystal, surface 6¢. C-W Crystals, Marsfield, Missouri, 65706.

FOR Sale: 2K-3, spare 3-500Z, \$600. 75A-4 No. 3126, 2.1 filter, 7360/6U8-A mixers, \$350. Match-Box 1KW, \$115. KWM-2 (Reflection Tuning), \$16-P-2 \$700. 325-2, 516F-2, \$425. James Craig, W1FBG, 29 Sherburne Avenue, Portsmouth, N.H. 03801. Tel: 603-436-9062.

FOR Sale: Heath Apache, Mohawk, SB-10, all operating now; \$275 complete. Or will sell separately, you make offer! Need space. Write small transceiver. Rev. Neumann, 2507 Madison Ave., Norfolk, Nebraska 68701.

MODEL 2b teletype complete with FSK AFSK converter, in excellent condition. \$80.00. Also Knight 100A Receiver, Good. \$55.00. Ben Baker, WA0BHM, Rt. 2, Trenton, Nebraska 69044.

SELL: Heath SB200 Linear, like new, \$195.00. You pay shipping! K4FHG, 2001 Thomas Avenue, Anniston, Alabama 36201.

FOR Sale: DX-100, \$45.00, Drake 2-C, \$165.00. K7EPP/Ø, Box 293, Spearfish, S.D. 57783.

SELL: 21-MC Coil for HRO-50 or 60—\$20.00, W9CAS, 5625 W. B'Klyn Place, Milw. Wise. 53216.

WANTED: Johnson SB adaptor, E. Steward, 4 Middle St., 13M, Bridgeton, N.J. 08302.

ARC's for 160-80 with power supply \$50.00. W. Shook, Rte. No. 1, Lafayette, Ohio 45854.

WANTED: Instruction manuals for Morrow MBR-6 receiver, and MB-560A transmitter. R. O. Cobb, K5CGI; USCG Forsta, NPO 557; Patrick AB, Fla. 32925.

SACRIFICE: Johnson Invader 200, \$200; Hallicrafters SX-101A, \$150. Both in excellent condition. Package for \$315. Brad McGann, 214 Kingswood Dr., Williamsburg, Va. 23185.

NCX5 Mark II with Calibrator and NCXa supply, \$390.00; Swan 500 Transceiver \$325.00; Drake R4B Receiver and MS4 speaker \$290.00. All Perfect condition! Drake 1A receiver, very clean \$90; Swan 140, good \$80.00. Philip Schwelber, W9GCG 4536N50 St., Milwaukee, Wisconsin 53218.

SR-110 (6 meter xcvr). HP-23A P.S.; SB-600, \$370.00 firm. Used less than 20 hours. Factory aligned. Tom Holland, 4252 Toledo Ave. So., Minneapolis, Minnesota 55416.

COLLINS KWM-2 with Collins AC supply; RME VHF 126 Converter 55 MC to 240 MC; TS-175-V frequency Meter 85 MC to 100 MC; Gonset G5B 101 Linear Amplifier. All fine condition. Make offer. W5OSG 914 W. Mistietoe Ave., San Antonio, Texas 78201.

WANTED: Eimac Socket. Can use any one of the following SK Series: 800-B, 810, 890, 820, 830. Also need 813 tubes and oil, or electrolytic capacitance and choke for gallon amplifier. K8UZX, P.O. Box 2, Washington, W. Va. 26181.

SELL: Johnson Viking KW Matchbox \$100, Excellent condition. WA4YDT's Estate, 2523 Woodfin, Chattanooga, Tenn. 37415.

R-388 Receiver with product detector, excellent \$425.00; Also, R-392 Receiver, excellent, with power supply and manual, will trade for SBE-34, or T-4X. K5DFZ, W. F. Hamilton, 5502 Valerie St., Houston, Texas 77036. Phone 713-666-0487.

FOR Sale: Yaesu FT-100 all band transistorized ssb/am/cw transceiver, mint condition w/mike. Hustler mobile antenna w/all except FM resonator. Will ship \$320 takes all. Franklin, 38 Raffaele, Kinchloe AFB, Michigan 49788.

SB-200 Linear, perfect condx, \$200, Terry R. Appleton, W4-GSM, P.O. Box 1383, Newport News, Va. 23601.

SELLING Out: Hallcrafters 32A, 1222A Signal Generator, Vibroplex North Electric 40 line automatic Dial Telephone System, Half-century QSTs. W8EF, 795 Lakeshore, Grosse Pointe, Mich. 48236.

SBE-34. Transceiver. Complete with all cables and manuals. Less than 6 months old, only 10 hours operating time. Best offer over \$300.00. WA2TJD, 61-48 224th St., Bayside, N. Y. 11364.

SELL: National NCX-3 with NCX-A P.S. Xcvr, one of the last manufactured and in mint condition, \$175.00. Prefer N.Y.C. area sale, but will ship. Contact: George Hawrysko, WB2GWU, 220 Highland Blvd., Brooklyn, N.Y. 11207. Phone 212-277-4001. Bet. 6-9 PM.

EICO 753, transceiver, factory wired, with 751 AC supply. Mint condition: \$155. I'll pay shipping. Shupe, W91DR, 200 Park, Hartland, Wis. 53029.

SHE-34 with Mike, SWR Bridge \$300, or make offer, 74, 40, 20 meter Hustler Antennas \$25; Knight VTYM (KG-625) \$30. Mechanical filters, F455-FA21, or F455-Y21 \$20. Dean Gearhart, 48 East Jefferson, Naperville, Ill. 60540.

IMMEDIATE Sale: Complete station, ready for air! Swan 500 Transceiver, P/S VOX, D-104 make; 1 year old, perfect condition. Cost \$675. Asking \$500. WA4EPH, 314 Jamestown, Williamsburg, Virginia 23185. Tel: (229-3561).

WANTED: T4XB and 75S-3B. State Price and condition. Roger Batista, WB2ZBM, 1219 Taylor Ave., Bronx, N.Y.C. 10472.

LAFAYETTE HA-225 Receiver 80 to 6 meters, \$70 or best offer. Bruce, WB2ZAG, 80-42 250th Street, Bellerose, New York 11426.

AVAILABLE Now: Mainline TT/L-2 with/without scope indicator-ST-3 Solid State terminal unit. Other terminal units-filters-accessories. J-J Electronics, Communications Specialist, Canterbury, Conn. 06331.

COLLINS: 32S-1 SSB-CW transmitter. You may obtain this outstanding equipment complete with manual for only \$400. \$16 P-2 power supply, with speaker installed available for \$60. Mechanical filter 455 FA 05, 500 cycle bandpass, hardly used. \$50. Teletype 3 1/2 inch strip printer with mahogany desk. \$30. BC 221 frequency meter with original calibration book, meets specs. \$70. Prop pitch motor \$30. Other quality items. Ronald Hyer, WA7WQM, 1355 Martha Street, Livermore, California 94550.

SELL factory sealed 4Z150A, Eimac Air System Socket, Rotron Sentinel Fan all \$20. WOEL (WOHNA).

SELL: Collins 75A3, \$225; 32V2 with spare 4D32, \$125; HQ-129X, \$75. All in excellent condition. Pick up only. W2-GPF, 213 Bartlett Ave., Liverpool, N.Y. 13088.

SELL/Trade: Amplifiers, xmtrs, power supplies, antennas, transmatch, etc. Free list. Need scope. HW-16X Novice and test gear, W3PQK, 615 Market St., South Williamsport, Pa. 17707.

WANTED: R388 (5113), state condition and price. R. Farthings, K6FFR, 547 Emporia, Valley Center, Kansas 67147.

WANT the two calibrated, plastic dials of the tuning units 17 and 18 of the model HQ-150 receiver. Must be in good condition. W9AGZ.

SALE: Heathkit Twoer, Mobile Power Supply, and Mobile Halo Ant. \$55. Firm: ARC-5 7.0-9.1 Mhz. Transmitter, \$10. Michael Wachur, WB2YRM, 134 Concord Road, Yonkers, N.Y. 10710. Tel: 914-337-2266.

HAMMARLUND HQ-180AC W/S200 speaker 3 years old, excellent condition: no scratches or marks. Used very little! \$350.00 F.O.B. Shelton, Wm. E. Dubbs, WA0TET, Shelton, Nebr. R.F.D. 2, 68876.

WANTED for cash or trade ham gear. Metalworking, screw cutting Bench Lathe, 9 to 12 inch swing, Drill Press, also 2 HP, electric motor, single phase 220V. W1JCJ, 24 Flower Hill Rd., New Milford, Conn. 06776. 203-354-2169 evenings.

FOR Sale: QST's. All issues from Jan. 1925 to 1968, very good condition. Mark Brooks, R. 1, Fremont, Indiana 46737. COLLINS KWMZ \$695.00; HBAC \$50.00; 312B5 \$255.00; Waters Dummyload Wattmeter Model 334 \$95.00; Dumont 370 AR Scope \$65.00; 3-400Z \$18.00; TO Keyer Vibroplex \$40.00; Wanted: Drake R4-B-MN2000. Also, consider Color TV in trade. WA4LXX, F. E. Coble, 251 Collier Ave., Nashville, Tenn. 37211.

NYL key, "Make room in corner for new baby"; Collins 75S3 \$350; Collins 312B-4 \$125; Clegg 2er, \$150; Swan 350, \$275; Swan 117XC, \$75; Swan 14-117, \$85; Roberts 900 tape recorder, \$125. All excellent condition. W5IAO, 1501 Stafford St., Gretna, La. 70053.

SELL—HWIZA, Mobile supply, mike, calibrator, Exc. condx, less than 1 yr. old; \$150.00. W1MIJ, C. Getter, 58 Felch Rd., Natick Ma. 01760.

MOBILE Triband, SE-160, ADCOM P.S., Shure MIC, Webster Topside, Resonators, Cables, \$300.00, Eli Sturges, 3650 Crepe Myrtle, Dallas, Texas 75233.

WANTED: 5-Band transceiver with a.c. supply and speaker; in mint cond! Immediate cash to best offer. WA7DDL, F. H. Parsons, Rte #2, Davenport, Washington 99122.

SELL: Borg-Warner 8-track portable crt. player, 2 weeks old inc. 2 cartridges, (trade!) \$32.00; Lafayette HA150, 1 watt, 2 channel, portable, c.b. xcvr, perfect condx, inc. leather carrying case, \$35.00. Johnson KW Matchbox 250-30-3 with meter, directional coupler, manual; exclnt condx. \$100 or swap. WA2CKM.

CP1—Famous center-dipole insulator. Send OSL or write Critical Products Industry, Box 423, Wakefield, R.I. 02880.

SWAN 500, 117 XC supply and VOX, less than year old, on air less than 5 hours; warranty cards never filled out. Looks and works same as new. Quitting ham radio. First check or money order for \$500 takes all. WA9OYA, Box 145, Francisco, Ind. 47534. Tel: 782-3861.

FM, 150 MC, narrow band, 1 watt, solid-state Handi-Talkies, Miniquip Model 26M, originally \$615.00 each, Meets FCC commercial specs. Four available at \$60 each. W4GRC, 210 Elm St., S.W., Vienna, Va. 22180.

HT-32, \$190.00; SX-101A, \$185.00; W2AU balun 1:1, \$8.00; B&W 551A coax switch, \$5.00. A. Ekblad, W2HI, 161 Evans St., New Hyde Park, N.Y. 11040. Tel: (516)-FL4-3122.

WANTED: For HRO-60 narrow band FM adapter. Give condition, serial number and price. Edgar Chatterton, W5WA, 107 Professional Building, Wichita Falls, Texas 76301.

HEATHKIT: SB-200 in mint condx. Also Hy-Gover TH-3 Triband beam. WA1DLM, Jim Wisneski, 81 Hoover Avenue, Bristol, Conn. 06010.

SELL: HALLCRAFTERS S-38E rcvr gud condx: \$30.00 or first best offer. Bob Green, 39 Merrywood Lane, Short Hills, N.J. 07078.

SELL: Tristo 54 ft. self-supporting tower with erection fixture and Ham-M model 2 element beam, T-4-33, 21 ft. mast, switching relay, coax and wiring, less than 3 years old. First best offer over \$600. Want Hy-Tower, WB6LPN, Tom Cordich, 15741 Aravaca Drive, Paramount, Calif. 90723. Tel: 531-7945.

R&W 5100 transmitter, Hammarlund HQ-150, with spkr; RME DB23 Preselector; Heathkit SWR meter. Original owner, excellent condx. All \$250. W3FYW, 9 Diane Drive, Malvern, Penna. 19355.

NCX-3, NCX-A, excellent, \$200; HQ-129X, good, \$75.00; RME VHF-152 converter 10-6-2M, \$10.00; HT-6 AM/CW 25 watts, inoperative, make offer; Volt/hmeter, mikes, keys. Mrs. Thomas R. Silvernail, RFD Boston Corners, Millerton, N.Y. 12546. Tel: (518)-329-6675.

SELL: Hallcrafters SX-101; Heath DX-60; Heath HG-10 VFO. All in excellent condx. Total price: \$200. Make reasonable offer. W. J. Shertenlieb, WA2AUS, 44 Quaker Ave., Dover, N.J. 07801. Tel: (201)-366-8728.

VACATION Special: 40-meter rig, built for portable operation. 1 watt, mod. modified ARC-5 rig, \$250.00. Johnson mobile xmtr 50 watts, 80-10 meters. Manual, \$18.00. R287/ARC-5, V.H.F. rcvr 100-150 MHz tunable. Filament xfmr mounted. Instructions, \$15.00. All items postpaid 48 states (cont. USA). John Belvel, WB6MNS, 440 N. Mentor (#11), Pasadena, Calif. 91106.

CLEANING Shack of excess VHF/UHF microwave gear including Bird, Measurements, Johnson, Gonset, list for stamp. W4API, Box 4095, Arlington, Virginia 22204.

'SCOPE Brand new Sencore oscilloscope/Vectorscope, Model PS-148. Never used, in sealed box. Cost \$220.00. Make offer. Write: Robert Simon, 1694 Linden Place, No. Merrick, N.Y. 11566. Tel: (516)-538-3250.

HEATH: SB-300 and SB-400. Best offer over \$400.00 takes both. KINCH/5, 710 Clif, El Paso, Texas 79902.

PREPARE For new FCC exams! You need Posi-Check. Multiple choice questions, diagrams, explained answers, IBM sheets for self-testing. Same form as FCC exams, General Class, \$3.25; Advanced Class, \$3.50; Extra Class, \$3.75. 295 to 300 questions or diagrams in each. Each complete for a specific exam. Exam questions duplicated if they apply. Third class postage prepaid. Add 26¢ per copy, for first class mail; 54¢ for air mail. Send check or money order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

KWM-2, excellent condition, with Waters refection tuning: \$695. PM-2 power supply, \$75. CC-1 suitcase, \$60. W2DFS, Ralph Amdurksy, 45 Barry Rd., Rochester, N.Y. 14617. Phone: 716-266-3312.

SELL-OST, 1924 to ? and other equipment. SASA for list. W9FAG, 60617.

DRAKE 2-B with O-mult \$190. WRL SB-175 dsb-cw-am xmtr \$50. WA0DCE, James Nordin, 747 Ricnow, Iowa City, Iowa 52240.

FOR Sale: Swan 500 with A.C. power supply. Little over one year old. Good condition. \$400 or make offer. WA31ID. 2405 Greendale Road, Wilmington, Delaware, 19803.

FINE Stainless, Brass, threaded, Washer Hardware, Antenna accessories. List for stamp. Straesser, W8BLR, 29816 Briarbank, Southfield, Mich. 48075.

FOR Sale: HRO-60 with 80, 20, 15, 10M coils: \$165.00. HiGO VFO \$27.50. Heath Sixer (immature) \$40.00. All with books. Call or write: Jerry Griffin K6LHN, 2235 N. Pershing, Stockton, Calif. 95204. (464-9975)

WANTED: RF section Henry 2KD2, WB6RZB, 6140 Capistrano, Woodland Hills, Calif. 91364.

CLEGG 66'er, mint condition and 5-element beam, \$165. Heath DX-20, \$12. Will ship postpaid. K0ALL, Box 721, Fargo, North Dakota 58103.

GONSET GSB-100 SSB, AM CW transmitter \$160.00. W1-EOW, Richard Morin, 121 Fort Meadow Drive, Hudson, Mass. 01749.

HO 170-A-VHF \$285; HW32A with mobile power supply, and Hustler antenna. \$135; Valiant 1 \$85; Clegg 99'er, \$75; Bob. WAZKAB, Box 297, Shoreham, L.I., N.Y. Tel: 516-744-3119.

FOR Sale: HW12A, HW22, HW32A, \$80.00 each. HR10, \$50.00. J3UN, 131 Florence Dr., Harrisburg, Pa. 17112.

DX-100, JT-30, DK-60C2 Relay: \$100.00. Want good SB-200, 88 Woodrow Court, Sharon, Pennsylvania 16146.

WANTED: FBX National Receiver Coils AB40, FBAA, FBF, or any others. W2QST, 630 Highland Road, Ithaca, New York 14850.

WANTED: Collins KWM-2, 32S-1, 32S-3, 30L-1. Must be in first class condition, with manuals. WA6JWK/4, 2304 N. Florida St., Arlington, Virginia, 22207.

COMPLETE Heath station; Perfect DX-60A with 3 Novice crystals, HR-10B, Xtal calibrator, automatic relay, all cables and instructions, VOM; 10 Volume technical library, key, 24-hour world clock, both Callbooks, other extras. \$160 plus shipping. W2FESB, 799 Newwood Dr., East Meadow, N.Y. 11554; (516) 491-1194.

SP-400 w/p.s.: \$60; RTTY test set 1-193C (like new) \$20; Wilcox M57D1 limiter/amplifier \$20; T4-FRG xmt. \$30. Reasonable offers considered. Stephen Eye, W8CGL, 3236 East Scarborough Road, Cleveland Heights, Ohio 44118 (216) 321-3542.

HALLICRAFTERS SR-150, DC Supply, Mobile rack, \$300.00. Heath HT-20, HR-20, DC and AC supplies, \$200.00. All units excellent, W5NJD, 2320 South "O", Fort Smith, Arkansas 72901.

SELL: Heathkit SB620 Scanner, like new, with manual and cables: \$99. Steve Mann, W1EGT, 18 Chipmunk Lane, Darien, Conn. 06820.

DRAKE TR-4 SN23021, AC-4, MS-4, Turner 350 mike \$550. New condition, manual, Will ship. TR-44 \$25. WB6KJD, 380 Toyon Rd., Sierra Madre, Calif. 91024.

HQ-180-XE New condition, both appearance and performance. Broadcast through 30Mc. Triple conversion. Optional crystal controlled single frequency channels for WWV, CHU, net frequencies, etc. May be inspected after phone appointment. \$250 or best offer. No shipments. Cash only. W6DTF 327-3626, Palo Alto, Calif. 94303.

SELL: Immature HQ170A with Ameco 6M preamp, \$245; SB-300 with CW filter, \$215; SX-99, \$62; AT-1, \$15; Mount SB-401 with crystal pack, ten hours, \$275. W1ZPB, Mount Hermon, Mass. 01354, 413-498-2729.

SELL Swan 500, AC/PS, 444T w/mobile ant. \$450.00. Best. W6GZP, 2519 Parker, Berkeley, Calif. 94704.

COLLINS 62S-1 excellent mint condx: \$575.00 Henry WB2-CNA-201-327-9090. Wants HO-10 Monitorscope, Henry Blakeley, WB2CNA, Deerhaven Rd., Mahwah, New Jersey 07430.

WANTED: Boehme SC RTTY Converter, Harold Eisley, W3-NET, P.O. Box 6, Wallons Island, Va. 23337.

ORIGINAL BTI 2000 & Watts output linear, 2 years old, 50 HR FIL time, and perfect, \$590. K8IKB, 419-423-5890.

SELL: Hallcrafters HT-37, good condition. \$160. Sorry, no shipping. WB6WRX, 13072 Woodlawn Ave., Tustin, Calif. 92680. (714) 838-7483.

WANTED: Heathkit HA-14 Linear and HP24 Power supply. State price in first letter. WB8VIN, Yellin, 315 Rogers, Brooklyn, N.Y. 11225. (212) PR85673.

COLLINS 32S-3 & 516F-2. New condx. Ser No. 13233 \$650. Phone 842-2854, Thompson: 8 Edgewood Road, Rumson, N.J. 07760.

DRAKE 2B and 2BO. \$175.00; Johnson Ranser \$75.00; BC 779 Super-Pro \$100.00; BC-342 \$50.00; Cannot Ship; W2HG, 1387 Potter Blvd, Bayshore L.I., N.Y. 11706.

SELL: Galaxy III, AC supply, VOX Calibrator \$275. Drake 2C \$175. Heath HX20, homebrew supply \$125. Bob Birdson, 5675 Deerfield Trail, College Park, Georgia 30337.

OST: ARRL's Hardbound version 1961-68, each year's vol is available from ARRL for \$12.50. Set is in perfect condx: \$100. H. Sweet Rd 2 Box 223, Apt. 23, Kingston, N.Y. 12401.

GALAXY Station: Galaxy V MK2, xtal calibrator, VOX, 300 cycle filter, remote VFO, deluxe console, AC400 supply. No Trades: \$450.00 + P.O. James R. Belt, 1006 N. 76th St., Omaha, Nebr. 68114. Tel: (402) 397-5720.

FOR Sale: Drake TR-4 Xvr, \$450; AC-4 power supply, \$70, RV-4 remote VFO, \$70. All A-1 condition. Complete package, \$545. F.O.B. K6CH, 1204 N. Alamo St., Anaheim, Calif. 92801. Phone: 714-774-3710.

HEATHKIT'S Marauder \$158; Warrior Linear \$135; Eico's 220 Transmitter and 730 Modulator \$100; 720 VFO \$35; 706 CPO \$5; Lafayette HA225 Rcvr \$75. All in Great condx. F.O.B. K4JJO, Box 5042, Raleigh, N.C. 27607.

MOTOROLA Twin V-30 watt FM mobile rigs on 52.525 mc. with cables, control heads, and mic. Two units gud condx: \$100 cash, or best offer. P. Brown, K3QAY, 2740 Euclid Blvd., Westerville, Pa. 16510.

WANTED: Crosley Pup, Radiola Senior, Aeriola Senior, or Kodel P-11. Also need SW-3 coils. Will trade 10 yrs. OST, tech manuals, such as AN/TRC, AR-13, or cash. Send S.A.S.E. for tech manual list. Inquiries answered. L. W. Elias-W4DBT, c/o F. R. Owen, 823 Oaklawn Ave., Winston Salem, N.C. 27104.

DRAKE 14X, AC supply, xtals 160—all 10 included \$390. 3B, 2BO, Calibrator, xtals 820—all 10 \$200. All units excellent practically mint condition. One owner. All manuals and cartons. Shure 444 mike, brand new \$22. WAYD, L. Daniel, 7155 Birch Bark Dr., Nashville, TN 37211.

TWO Meter FET converter kit. Silverplated glass-epoxy p.c. board. All major components, including five transistors, crystal \$129.95. VHF Communications, Topsfield, Massachusetts, 01983.

GOTHAM antennas also available thru: Jack's Tower, 7207 Forest Hills Road, Highway 173, Rockford, Illinois; Vans Electronics, 407 Tustin Ave., Orange, Calif.; John Chrzczonowski, 3109 Saratoga Avenue, Cleveland, Ohio; Lester Reyer, 2565 N. Atlantic Ave., Daytona Beach, Fla. Other exclusive territories available. See Gotham ad on this issue.

DISCOUNT Prices: New equipment-factory sealed cartons-Vol warranty. Swan SW-500C (Reg. \$250) \$399; Galaxy V Mark 3 (Reg. \$420) \$319; Drake H-4B (Reg. \$420) \$387; T4XB (Reg. \$450) \$405; L-4B (Reg. \$750) \$675; New CR Ham-M \$99.95. Tri-Lex W-51 self-supporting tower (Reg. \$363) \$299.95 Prepaid; Hammarlund HQ-180A (4480 Reg. \$431); HQ-110A (Reg. \$259) \$233; New Hy-Gain IH6DXC \$139; Mosley Classic JX-3112; New Gonset GSB-201 2 KW PEP linear \$279; New NCX-500 \$381; Swan SW-250C \$378. Big Discounts on all brands, all models. Send for quote on any type of equipment. Midwest Electronic, 1317 E. 19th, Lubbock, Texas. 806-762-8759. Discount Headquarters for Ham Gear.

DRAKE: 2C receiver, one owner: \$175.00 firm. Wayne Barbel, Kingswood Drive, Salisbury, Maryland, 24801.

SELECTABLE Side Band HW32A, including AC supply, SB-600, speaker and GH12 Mike, \$160.00. New Eimac 4CX-1000A \$125.00, 4-250R \$30. Plate transformer 2000V 1 amp. Wt. at \$35.00. \$35.00. Mirrow-516-HA1-0836. Rf 3, Huntington, New York, 11743.

MINT Condx: Swan 500, 117 sc supply, 11 (eleven) months old, 405 X, M.A. calibrator, vox, \$425.00. KVM-1, AC & DC supply, Mobile Mount, Good condx, \$300.00 FOB Buyer. Nick Angelucci, W3GTS, Linden Circle, Kennett Square, Pa. 19348. Phone: 215-444-3368.

TOROIDS, 44 & 88 mby., unpotted, center-tapped, \$5/20. Postpaid, Model 2BASR complete \$800, model 32KSR complete \$350. (trade?) 2BR1 dual gear shift \$100. KW matchbox with SWR \$120. Hallcrafters SX101A \$175. Simpson 260 VOM \$30. 11/16" perf tape \$3/box. Page printer paper \$5.50/case. Wanted: Back covers for RF unit of Measurements Corp. model 80 signal generator, Collins CLO 70E15 PTO for S1J, Hi-band and UHF FM equipment. Stamp for list. Van W2DLI, 302Z Passaic Ave., Stirling, N.J. 07980.

SELL: 75A4 Ser. No. 5429 \$375.00, 32V2 converted to V3. Extra 4D32 \$120.00 DX-60 \$65.00 HG-10 VFO \$20.00. Both for \$70.00, FOB W7YOF, 720 Tudor Pl., Tucson, Arizona, 85710.

FALL '67 USA Callbook, perfect 3. '67 DX Callbook \$2 postpaid. Biley-Peterson 7 mc. CW xtals \$1. each. '64-'67 QSTs-COs 10 cents each, W2JBL, 123 Davis Ave., Hackensack, N.J. 07601.

COLLINS 75A-3, vernier knob, 800 & 2.1 mechanical filters, product detector, calibrator, \$200. Collins 75A-4, vernier, 500, 2.1, 3 filters, with Ham-Scan Heath padanaper, \$400. All in best condition. Contact: First Class Radioteletype engineer, M. Montgomery, 2717 Clifton Ave., Cincinnati, Ohio 45220.

HEATH SB-301 Receiver with matching SB-600 speaker. Perfect condition, \$225.00 Jim Seybold, 3541 Emerson Street, Franklin Park, Illinois 60131 Tel: (312) 678-7660.

SELL: Heath-Apache and SB-10 \$150.00; Heath HG-10B FVO \$20.00 will ship collect. Thomas Mann, W8TWR; Box 669; Lewisburg, West Virginia: 24901.

FOR Sale: Heath Marauder HX-10. Exclnt. condx. and with extra set of new finals. \$200.00 DB23 Preselector \$20.00, W9-ALP, 4522 So. Kedvale Avenue, Chicago, Illinois 60632.

DIGITAL Clock, 141 transistors, 6-digit nixie readout, fine wood cabinet. Must see to appreciate. Make offer. (213)-375-5504.

NC-300: asking \$150; Johnson 6N2 transmitter and VFO asking \$125; Dumont 208B 5 inch scope asking \$55. All in good condition with manuals. Les Kalmus K2SHL 201 East 18 St. Brooklyn, NY 11226.

DRAFTED: Sell Hallcrafters SX-122 mint condx \$175, K9URJ, 7201 S. Euclid, Chicago, Ill. 60649.

SB-301, Near New, perfect with CW filter, no speaker \$225. W4YFO, U.S. Naval Hospital, Beaufort, South Carolina 29902.

CAPACITORS for your Linear, 140ufd at 450vdcw, Brand New Surplus Aluminum Cans, cleaning house, 10 for \$9.50 or all 80 pcs. for \$60.00. K4IHP, Atlanta.

SELL: 75A-2 with 3 kh mechanical filter and just replaced 80 per cent of tubes. Valiant 1 in good condition. Make offer on one or both. You pay shipping. W0QQO, KSU Amateur Radio Club, Kansas State University, Manhattan, Kansas 66502.

R-4A mint, \$285. HT-32B, mint, \$295. 75A3, 3.1 and 6.0, commercial products detector, speaker \$265. 32V1, \$110. DX-100, \$80. For the serious and experienced amateur: 4-1000A linear, RF complete, enclosed cabinet, 2 tubes and all parts supplied, very conservative, \$200. New Eimac 4-1000A in harness, \$60. Eimac 4-400A, new, \$15; used, \$10. New TR-44 rotor and 30V cable \$65. Valiant 1 fixed VFO \$65. TR-44 power 70. J balaun \$55. RTTY plus case 1/8" tape, \$25. Robert Collins, WA1ZIJ, RFD 2 Box 106, Ellsworth, Maine 04605. Tel: 207-667-2859.

SELL: HT-37 \$270 perfect condition, DB-23 preselector \$20, Autronic key and W8FYO paddle \$60. Lachterman, 3 Archer Ln, Scarsdale, N.Y.

SELL: Vanguard Model 303, solid state, 6 meter converter, output 10 meters, \$10.00 W. Rau, Henderson, Minn. 56044.

DON and Bob specials. Hammarlund HQ-215 \$475.00; Galaxy R-530 \$625.00; Tri-ex W-51 Tower, prepaid, 1T6DXX, Ham-M \$389.95; Sony 250A station recorder, \$109.95; Galaxy V/MK3 A-0 Speaker, VOK, calibrator \$499.95; Write for discount quote on new gear. New guaranteed surplus: Jennings Vacuum variable UCS-50010KV \$30.00; Telex HMY-2000 Stethoscope Headset \$3.95; 3/4" x 5 1/2" brown ceramic insulator 40 cents; 6V10A Transformer \$3.95; 12V10A Transformer \$4.95; Aerovox 250-MFD/450V. \$2.95; 325/450V. \$2.95; GE all-weather electrical tape .99 cents; 1-82" beam indicator with driver and transformer \$5.95; NB 5000HM Military headset complete with band cord, cushions \$8.95. Write for list. Warranty Collins repair station plus repair on other major lines. Don, K5AAD; Bob, WA5UUK. Madison Electronics, 1508 McKinney, Houston Texas. 77002. (713) CA4-2668.

HEATH HW-12A xcvr with xtal cal. SB-600 spkr with HP-23A pwr supply, \$115.00. Mint condition with manuals. Cash and carry. Lefor, 39 Pond Road, Ridgefield, Conn. 06877. Tel: (203) 438-6241.

NC-109 with Q-Multiplier; matching speaker; crystal calibrator; gud condx; \$115. R. Yodice, Star Rte. Box 91, Shokan, N.Y. 12481.

"HOSS Trader Ed" says if you don't buy your ham gear from him you might pay too much. Write or telephone the "Hoss" for excellent cash quotes and trades anywhere in the U.S.A. New equipment with factory warranty: SB-34, \$329.00; Galaxy V/Mk 111 with CAL-35 calibrator, regular \$439.95, cash price \$349.00; Hy-Gain FH6-DX, regular \$149.00, cash price \$99.00; new early model Swan 500-C, \$409.00, "package deal", new National NCX-500 transceiver and microphone, \$349.00; new Rohn 50 ft. foldover tower prepaid, \$195.00; new Mosley TA-33 beam and demo Ham-M rotor, \$185.00; used equipment—Ham-M rotor, \$75.00; Drake 2A's, \$129.00; SX-117, HT-44, supply \$39.00; TR-4, \$410.00; T4-XB, \$339.00; R4-B, \$329.00; Swan 100 C, \$395.00. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas 72042. Phone a.c. (501)-946-2820.

TOPAZ Transistorized 300XL (300 watts) mobile power supply. Input: 12 VDC output: 275, 600, 700, 800 VDC bias: -50 to -90. Cost \$119.95. Sells for \$90. Beautiful! WA0A1Y, 4941 Tracy, Kansas City, Mo. 64110.

WANTED: Converter, RME HF 20-10. WA1HXW. 27 Shore Dr., Waterford, Conn. 06385.

FOR Sale: Heath transmitter, HX-10 Marauder, in gud condx. \$200 or your best offer. Money order or certified check only. Will ship. D. M. Ouellette, W9ZYM, P.O. Box 5404, Titusville, Fla. 32780.

HALLICRAFTERS PS-150-12, \$50.00. Will swap for PS-150-120 (a.c.) WA6LZH. Tel: a.c. (415)-832-2680.

SELL: Central Electronics 100V and 600L linear and Drake 2B. Perfect condx. Will crate and insure. You pay shipping charges collect. Total \$750.00. Conrad Eiger, KP4AWV, 1000 Ashford Ave., Santurce, Puerto Rico 00907.

EICO 720 xmr, Lafayette HE-80 rcvr, relays, xtals, \$100. WB2ZUB, 107 Ketchum's Road, Syosset, L.I., N.Y. 11791. Tel: OV1-3856.

NEED Parts for Hallicrafters SX-25, especially tuning capacitors and coils. John Altieri, WA1IVE, Georgia Tech. Atlanta, Ga. 30332. Box 30110.

FOR Sale: Drake 2-NT xmr, \$100, and 2-C rcvr \$200, both for \$250 great condx. Knight R-55A rcvr, \$40.00. Heath Lunch-box Twoer (2 mtrs), and Cloverleaf Ant., \$35.00. Tel: 433-1351. Tony Podrasky, WN2EAA, 212 8th St., Hicksville, N.Y. 11801.

SELL: Knight Star Roamer five-band receiver, needs alignment, \$25.00. Knight T-60 transmitter, excellent condx, \$40.00. Both with manuals. Will ship. Jim B. Campiche, Box 535, Long Beach, Wash. 98631.

REASONABLE Way to get on S/S band. NCX-200, power supply, calibrator, \$300 or you make offer. WA1GKU, Margolis, 31 Warren St., New London, Conn. 06320.

GONSET Communicator IV—2 meters, gud condx, \$200 postpaid. Charles Simmons, Box 552, Plattsburgh, N.Y. 12901.

TELEPHONE Switchboard power supply for sale or trade. Lorain products "sub cycle" RT-unit. Exclnt condx. Bill Schrempf, 429 Sharp, Spokane, Washington 99202.

SWAN 350, 117XC, accessory unit. Excellent condition, 1 year old, \$375.00. Bruce Baker, WB2ZIN, 50 Carriage Lane, Roslyn Heights, N.Y. 11577.

FOR Sale: HT-44, \$250.00; SX-117, \$250.00; SR-150, \$375.00; MR-150 \$200.00; P-150-DC, \$60.00; P-150-AC, \$60.00. All are in mint condition. Dick Bellew, P.O. Box 1835, El Dorado, Arkansas 71730.

I Quit! Complete Galaxy station, plus extras. Best offer. K9RGH, 9600 S. W. Highway, Oak Lawn, Ill. 60453.

SELL Fast: Hammarlund HQ-170AC with 24-hr. clock in mint condx, \$180.00; Lafayette HE-45(a) 6-meter transceiver gud condx, \$50.00; Globe transmitter HG-303 80-10m., 75W. mint. Ask, \$39.00; Matching VFO Globe V-10 80-6 m. 110V.A.C. self-contained, new, used only 3 hours. Asking \$29.00. Same day answer on all inquiries. Write R. Alan Hill, 129 No. Arlington Ave., East Orange, New Jersey, 07017.

THERMOGRAPHED Business cards, \$5.95 per thousand. Can customize for hams. QSL with order brings \$1.00 discount. Samples, 10¢. Babb, WA8FIC, 10 Camden Place, Parkersburg, W. Va. 26101.

PORTABLE Power plant, 1250 watts (1800 surge). Shielded ignition. Like new condx, \$100 F.o.b. St. Louis, Mo. G. Grothen, 90 Florissant Park, Florissant, Missouri 63031.



THE LEAGUE IS YOU!

Working together, the members of ARRL have for fifty years provided the base of support from which our great public-service hobby has grown and maintained the precious privileges that many amateurs now take for granted.

Through membership in the League and affiliated clubs, many people pool their knowledge, their skills, their energy, and a small part of their material resources to help one another. The result is top-notch training programs and publications, top-efficiency traffic nets, community communications programs—and an amateur radio service which is useful to our country and deserving of its privileges.

Newcomers gain from the experience of the old timers, and old timers gain from the enthusiasm of the beginners. The more we work together in the League, the greater will be our collective achievements—and our security.

Each and every radio amateur is vital to the League, and the League is vital to each and every radio amateur. Join now with over 100,000 League members so that we can all share more fully in these mutual benefits.

League membership with QST \$6.50 in the U.S. and Canada, \$7 elsewhere. Additional family members at the same U.S. or Canadian address, \$1.

If you are already a member, help strengthen your League by spreading this word to others!

THE AMERICAN RADIO RELAY LEAGUE, INC.
Newington, Conn. 06111

Designed for



Application



NO-STRING DIAL

No strings; no pulleys; no back lash; no flimsy assembly. The No. 10037 is a sturdy mechanically engineered "Designed for Application" dial assembly which completely eliminates the annoyances of string-driven pointers, eliminates all indicator stutter or wobble and provides positive pointer travel and resetability. The pointer is driven positively by a flexible but non-elastic molded gear driven rack which cannot slip, break or fall off a pulley. The geared flexible rack rides in a multi-slot extruded aluminum channel. This girder-like extruded piece provides mechanical rigidity to the assembly. Furnished complete with panel trim bezel and flexible coupling for output shaft.

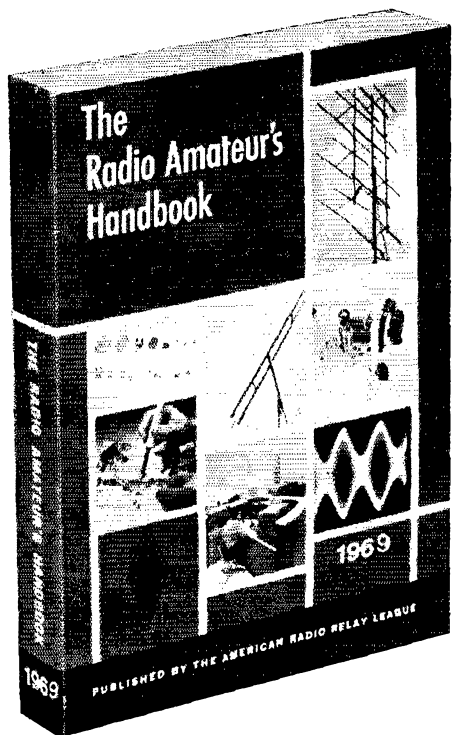
**JAMES MILLEN
MFG. CO., INC.**

MAIN OFFICE AND FACTORY
**MALDEN
MASSACHUSETTS**



Index of Advertisers

Alltronics-Howard Co.	130
AMECO a Division of Aerotron, Inc.	5
American Radio Relay League, Inc.	
<i>Binders</i>	104
<i>Handbook</i>	143
<i>Membership</i>	133
<i>National Convention</i>	134
Arrow Electronics Inc.	123
Barry Electronics	131
Bilada Manufacturing Company	118
Brooks, P. E., Carl N.	130
Brown Brothers Machine Company	120
Clemens Manufacturing Company	120
Collins Radio Company	2
Communication Associates, Inc.	132
Communication Products	132
Cubex Company	118
C'neh Craft	102
Dames Co., Theodoere E.	134
Design Industries Inc.	120
Digi-Key	130
Dow-Key Co., Inc., The	131
ETMAC a division of varian	95, 96
Electrophysics Corp.	108
Electro-Voice Inc.	98
Evans Radio	126
Galaxy Electronics	101
Goodheart Co., Inc. R. E.	106
Gotham	99
Hallerasters Company, The	1
Han Radio Center	126
Hammarlund Mfg. Co., Inc.	4
Harrison Radio	144
Hatry Electronics	106
Heath Co., The	Cov. III, 111
Henry Radio Stores	107, 111
Hotel Bearhumber	134
Hunter Sales Inc.	124
Institute of Electrical & Electronics Engineers	128
Instructograph Company, Inc.	124
International Crystal Mfg. Co., Inc.	7
Jan Crystals	126
Lafayette Radio Corp.	129
Lampkin Labs., Inc.	112
Lattin Radio Labs.	128, 134
M & M Electronics	112
Military Electronics Corp/Space Electronics Corp.	110
Millen Mfg. Co., Inc., James	142
Mini-Products	112
Mosley Electronics, Inc.	Cov. II
National Radio Company, Inc.	119
Organs & Electronics	126
Paxitronix Incorporated	114
Pickering Radio Company	134
Poly Paks	125
Radio Amateur Callbook, Inc.	118
Radio Officers Union	124
RCA Electronics Components	Cov. IV
RCA Institutes Inc.	115
RF Communication Associates, Inc.	109
Satch & Co., Herbert	114
Sarus & Co., Howard W.	127
Signal/One	117
Skylane Products	124
Solid State Sales	134
Spectronics	113
Stafford Electronics	120
Stellar Industries	128
Swan Electronics Corp.	102
Tapeco	130
Telrex Communication Engineering Labs.	109
Tri-Ex Tower Corporation	108
Trigger Electronics	135
Unadilla Radiation Products	133
Van Sickle Radio Supply	118
Vanguard Electronics Labs	116
VHF Communications	122
Vibroplex Company Inc., The	114
W3KT QSL Service	122
Waters Manufacturing Co.	122
WJRT-TV	122
World Radio Laboratories	100



1969 EDITION



THE STANDARD reference work and text for everyone—radio amateurs, students, experimenters, engineers, lab men, technicians.

Continuing *THE HANDBOOK* tradition of presenting, annually, the soundest and best aspects of current practice, the *1969 EDITION* offers much new material and revision. It contains additional solid state theory and practice in the areas of receiving, power supplies, single sideband, accessories and is even more up to date than its much-revised 1968 predecessor. Every important aspect of amateur radio is covered: transmitting; receiving; A.M.; C.W.; SSB; RTTY; VHF and VHF FM Repeaters; mobile; propagation; antennas; semiconductors; vacuum tubes; station assembly and operation. The complete Handbook of Amateur Radio Communication!

\$4.00 U.S.A. and Possessions, \$4.50
Canada, \$5.50 Elsewhere. Cloth-
bound Edition, \$6.50 U.S.A. Posses-
sions and Canada, \$7.00 Elsewhere.

The **AMERICAN RADIO
RELAY LEAGUE, INC.**
NEWINGTON, CONN., U.S.A. 06111

RUSH...RUSH...RUSH TO
"HAM HEADQUARTERS, U.S.A."®

**WASHINGTON'S
BIRTHDAY
GIANT RIOT SALE**

AT ALL HARRISON STORES

SAVE! SAVE! SAVE!



COME IN, AND
TAKE YOUR PICK OF

100 BRAND NEW
RECEIVERS & TRANSMITTERS
at and even below Regular Franchised
Distributor's Cost
Most Makes! Lots of Models!
All Fully Guaranteed!

COME IN AND CHOOSE FROM

101 FULLY GUARANTEED
TOP CONDITION TRADE-INS

in the world famous Harrison Trade-in Center. At
prices chopped 'way down' for this super sale!

ALL DAY

WASHINGTON'S BIRTHDAY
SATURDAY, February 22nd!

(Sorry, we cannot give any
information by phone or mail.)

COME, AND BE SURPRISED!

Doors open 8:30 to 6:15

TRADE-INS WELCOMED
BRING 'EM ALONG

ONLY ONE SPECIAL SALE
ITEM TO A CUSTOMER
Thousands of other items
specially reduced for this sale
NO DEALERS ADMITTED!

CASH & CARRY

(It will pay you to
empty the Piggy Bank
for this one!)

AMPLE PARKING

Harrison

"Ham Headquarters, U.S.A."®

NEW YORK CITY
8 BARCLAY ST.

At Broadway opposite
Woolworth Bldg.

JAMAICA, L.I.
139-20 HILLSIDE AVE.

2 Blocks East of
Queens Blvd.

FARMINGDALE, L.I.
RTE. 110 AT SMITH ST.

2 miles South of **LIE**
Exit 49S

STACK THESE UP AGAINST THE OTHERS...

This Complete Heathkit SB-Series 80 thru 6M Mobile And Fixed Rig Costs Only \$1936.70

A bit impractical to install in one place perhaps, but so is spending nearly \$2000 on new equipment and not getting the maximum amount of operating versatility and performance. For the price of a few pieces of gear from most others, you can buy every piece of SB-Series gear Heathkit makes, plus both mobile and fixed power supplies. Many hams don't have \$2000 handy though, and that's why Heathkit sells each of these pieces separately. We believe that you should still be able to get a stack of gear without spending a pile of money. For performance, versatility and top dollar value, the others just don't stack up.

The HP-13 — mobile power supply for the SB-101 & SB-110A. All solid-state construction. 7 lbs. **\$64.95**

The HP-23A — fixed power supply for the SB-101 & SB-110A. Overload and short circuit protection. 19 lbs. **\$49.95**

The SB-600 — 8 ohm fixed station speaker to match all SB and HW-Series gear. 6 lbs. **\$18.95**

The SB-610 — Signal Monitor for transmitted & received AM, CW, SSB & RTTY signals, 160-6M. 14 lbs. **\$74.95**

The SB-620 — "Scanalyzer" for monitoring band activity up to 500 kHz each side and bench testing transmitters. 15 lbs. **\$119.95**

The SB-630 — Station Console with 24 hr. digital clock. SWR meter, resettable timer, etc. 10 lbs. **\$74.95**

The SB-640 — External LMO for the SB-101. The 640/101 combination will operate in five different modes. 9 lbs. **\$99.00**

The SB-101 — world's finest 80-10 M transceiver. 180 watts PEP SSB input. 170 watts CW. 23 lbs. **\$370.00**

The SB-301 — world's finest AM, CW, SSB & RTTY receiver. 80-10 M +15 MHz WWV coverage. 0.3 uV sensitivity. 25 lbs. **\$260.00**

The SB-401 — world's finest 80-10 M transmitter. 180 watts PEP SSB input. 170 watts CW. 36 lbs. **\$285.00**

The SB-200 — world's greatest 80-10 M linear value. 1200 watts PEP SSB input. 1 kw on CW. 41 lbs. **\$220.00**

The SB-110A — the best 6 M rig anywhere. 180 watts PEP SSB input. 150 watts CW. 23 lbs. **\$299.00**

TOTAL \$1936.70

NEW Free 1969 Heathkit Catalog

Now with over 300 kits described for stereo /hi-fi, color TV, electronic organs, amateur radio, marine, educational, CB, home & hobby. Mail coupon or write Heath Co., Benton Harbor, Michigan 49022.



HEATH COMPANY, Dept. 9-2
Benton Harbor, Michigan 49022
In Canada, Daystrom Ltd.

Enclosed is \$ _____ plus shipping.

Please send model (s) _____

Please send FREE Heathkit Catalog.

Please send Credit Application.

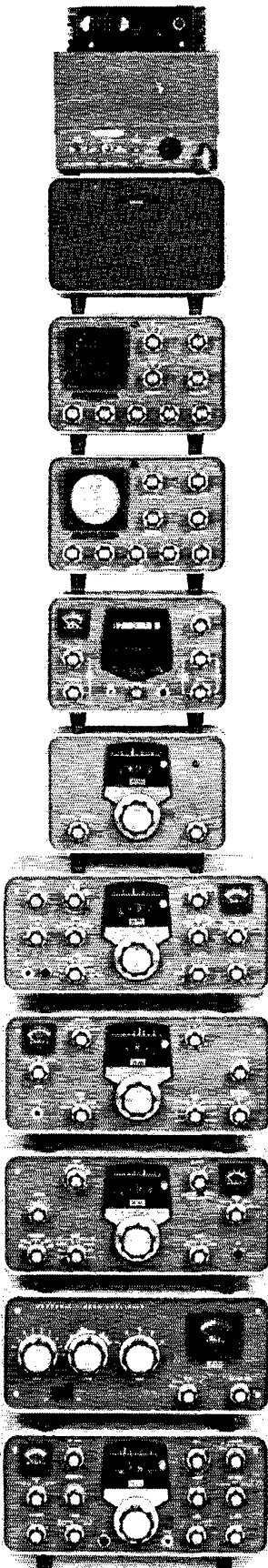
Name _____

Address _____

City _____ State _____ Zip _____

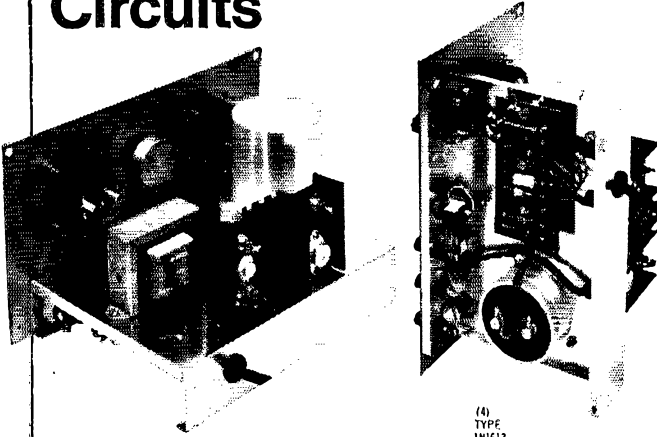
Prices & specifications subject to change without notice.

AM-206

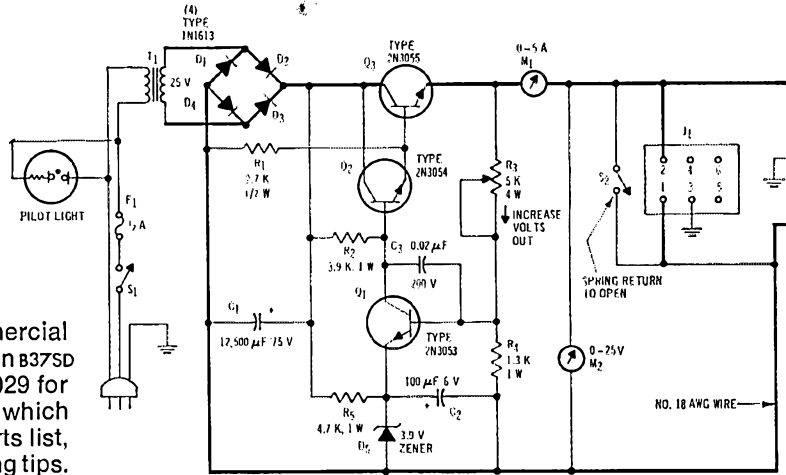


Solid-State Projects for the shack

Power for your Transistor Circuits



End the "power roadblock" for your projects with this low-voltage high-current power supply. It uses RCA-2N3053, -2N3054 and -2N3055 silicon n-p-n power transistors to provide 5 to 25 V at currents from a few mA's to 3 Amps—ideal to simplify breadboard experimentation. Devices listed are available from your authorized RCA Industrial Semiconductor Distributor.



Write RCA, Commercial Engineering, Section B375P Harrison, N.J. 07029 for June '67 "Ham Tips" which includes full parts list, schematic and building tips.

GET THESE FOR YOUR "LIBRARY"

Your RCA Industrial Semiconductor Distributor stocks the RCA Transistor Manual which lists devices, shack projects and has technical information. For a sample copy of "Ham Tips" and information on how to subscribe, write to "Ham Tips", RCA, Harrison, New Jersey 07029.

