QST

August 1970
75 Cents

devoted entirely to

amateur radio

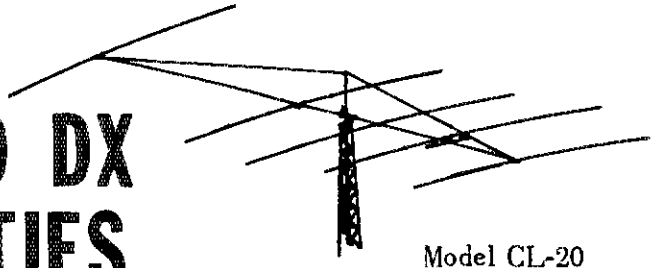
OFFICIAL JOURNAL OF THE ARRL

NEW SINGLE-BAND BEAM FROM MOSLEY

The Classic 20

WITH EXPANDED DX CAPABILITIES

ON 20 METERS



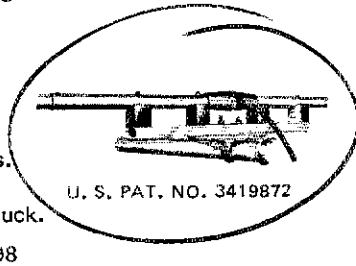
Model CL-20

DON'T LIMIT YOURSELF!

When you install a 20 meter beam, there is only one antenna investment you can afford . . . The NEW CLASSIC 20 with expanded DX capabilities, thanks to the new Classic Feed System "Balanced Capacitive Matching." This new array promises to be the most universally accepted amateur beam ever developed for 20 meters.

TAKE A LOOK AT THE VITAL STATISTICS!

- POWER RATED: 1 KW AM/CW; 2 KW P.E.P. SSB input to the final.
- SWR: 1.5/1 or better.
- MATCHING SYSTEM: Balanced Capacitive.
- FEED POINT IMPEDANCE: 52 ohms.
- NUMBER OF ELEMENTS: 5. Aluminum tubing; 6063-T832.
- MAXIMUM ELEMENT LENGTH: 38 ft. 1½ in.
- BOOM LENGTH: 46 ft.
- RECOMMENDED MAST SIZE: 3 in. OD.
- TURNING RADIUS: 28 ft.
- WIND SURFACE: 18.7 sq. ft.
- WIND LOAD (EIA Std. 80 MPH): 364.45 lbs.
- ASSEMBLED WEIGHT: Approx. 139 lbs.
- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



U. S. PAT. NO. 3419872

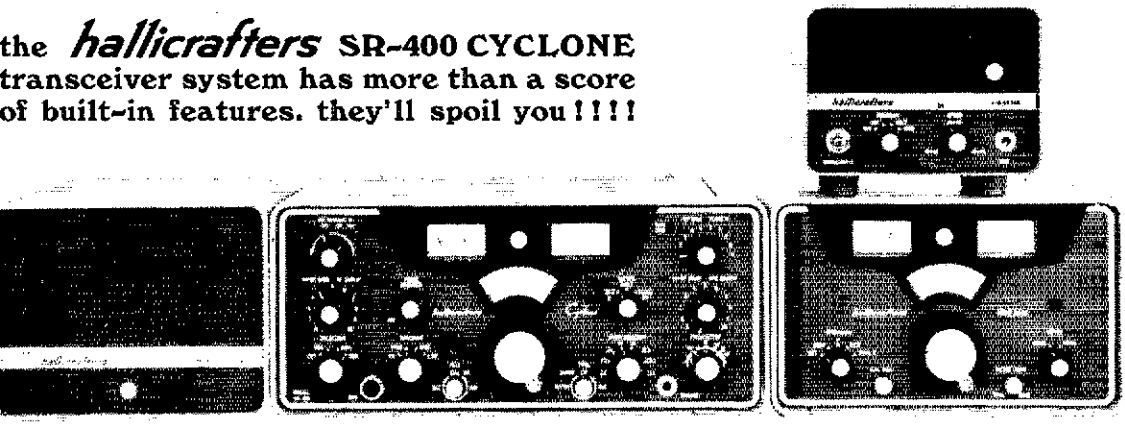
For detailed brochure write . . . Dept. 198

Manufacturing TV Antenna-Accessories
for nearly a Quarter of a Century.
Write for the Free Booklet,
"How to Improve Your TV Picture"
Department 198TV

Mosley Electronics Inc 4610 N. LINDBERGH BLVD., BRIDGETON, MO. 63044

the spoilers.!

the *hallicrafters* SR-400 CYCLONE transceiver system has more than a score of built-in features. they'll spoil you ! ! ! !



this CW and SSB Cyclone system is unmatched by any other on or off the market. just look at the score of features built-into the transceiver alone:

• RIT • AALC • Notch Filter • CW Filter • CW Sidetone • Grid Block Keying • Front Panel Bias Adjust • 1 kHz Readout • Noise Blanker • Switched full metering • Upper/Lower SSB • Phone Patch Output • Xmit and Receiver Antenna Connectors • 6 Pole Xtal Lattice Filter • Semi-Automatic Break-In CW • MOX • VOX • PTT • 100 kHz Xtal Calibrator • Adjustable Pi Network

Accessories include:
PS-500A-AC Power Supply, HA-20 VFO, HA-1A Keyer. see and buy the "the spoilers" today at your local Hallicrafters distributor. go ahead and spoil yourself!

the hallicrafters co.

A Subsidiary of Northrop Corporation

600 HICKS ROAD

ROLLING MEADOWS, ILLINOIS 60008

trading time

...but not for the KWM-2

At 100,000 miles, it's still the liveliest rig on the road.

COLLINS

QST

AUGUST 1970

VOLUME LIV NUMBER 8

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

OFFICES

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

Subscription rate $7.50 per year postpaid, 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.

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

OUR COVER

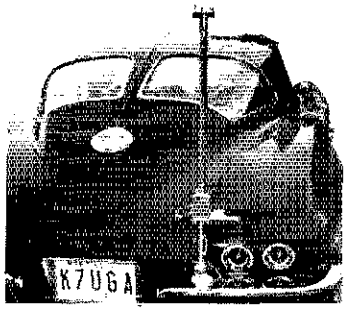
Here's a really different mobile antenna . . . and it works. See page 23 for the details.

—CONTENTS—

NOTHING COMES CLOSER THAN THE SWAN 500CX

The performance of the Swan 500CX in your car may not quite equal your home station, but you will be amazed at how often the difference is very small. Many Swan mobile operators have established enviable DX records. QSL cards on file here at the factory verify solid contacts from all continents, including stations in Antarctica.

Old timers who have fought QRM with old style AM equipment have discovered a new world of mobile communication thanks to the power and punch of the Swan 500CX transceiver. The efficiency of the SSB mode coupled with the convenience of transceiver operation and a power level unmatched in the field represent a combination well worth looking into. So if you haven't heard ZL, DU or JA say "stand by, the mobile station," then put a Swan 500 CX in your car this summer!



The 500CX installs conveniently under the dash of most cars, and the power supply goes under the hood. Add the Swan Model 35 high Q single band mobile antenna, or your choice of either the Swan Model 45 or 55 band switching mobile antenna, and you can enjoy mobile operation to the fullest. Home station performance with a mobile rig? Nothing comes closer than a Swan transceiver.

ACCESSORIES:

Model 500CX	**$565**
Model 14-117 DC Supply	**$130**
Mobile Mounting Kit	**$12**
Model 35 Single Band Antenna, from	**$20.90**
Model 45 5 Band Manual Switching Antenna	**$79.50**
Model 55 5 Band Antenna (Remote control band selection)	**$129.50**

See your Swan dealer today.

SWAN
ELECTRONICS
305 Airport Road
Oceanside, California 92054
A Subsidiary of Cubic Corporation

TEMPO one

AN OLD FRIEND (HENRY RADIO) INTRODUCES A NEW NAME . . . A NEW VALUE . . . A NEW TRANSCEIVER. THE TEMPO *'ONE'* SSB TRANSCEIVER REPRESENTS THE CULMINATING ACHIEVEMENT OF MANY YEARS OF EXPERIENCE IN THE AMATEUR RADIO FIELD. MODERN DESIGN, SUPERB PERFORMANCE, HIGH STYLING, STURDY CONSTRUCTION, OUTSTANDING RELIABILITY, EXCEPTIONAL VALUE — ALL THESE FACTORS COMBINED FOR THE FIRST TIME IN AN AMATEUR SSB TRANSCEIVER MAKE THE TEMPO *'ONE'* THE OBVIOUS CHOICE IN TODAY'S AMATEUR MARKET.

Five Band Coverage: 80 thru 10 meters • Power Input: 300 watts PEP • Selectable Upper and Lower Sideband • Built-in VOX • Built-in Calibrator • ALC • AGC • ½ Microvolt Receive Sensitivity • Receiver Off-set Tuning • All the features you want at an unbelievably low price . . . only **$298.00**

AC/one, 110-220 volt 50/60 cycle power supply . . . $99.00 DC/one, 12 volt DC power supply . . . $107.00

TED HENRY (W6UOU) **BOB HENRY** (WØARA) **WALT HENRY** (W6ZN)

Henry Radio

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

"World's Largest Distributor of Amateur Radio Equipment"

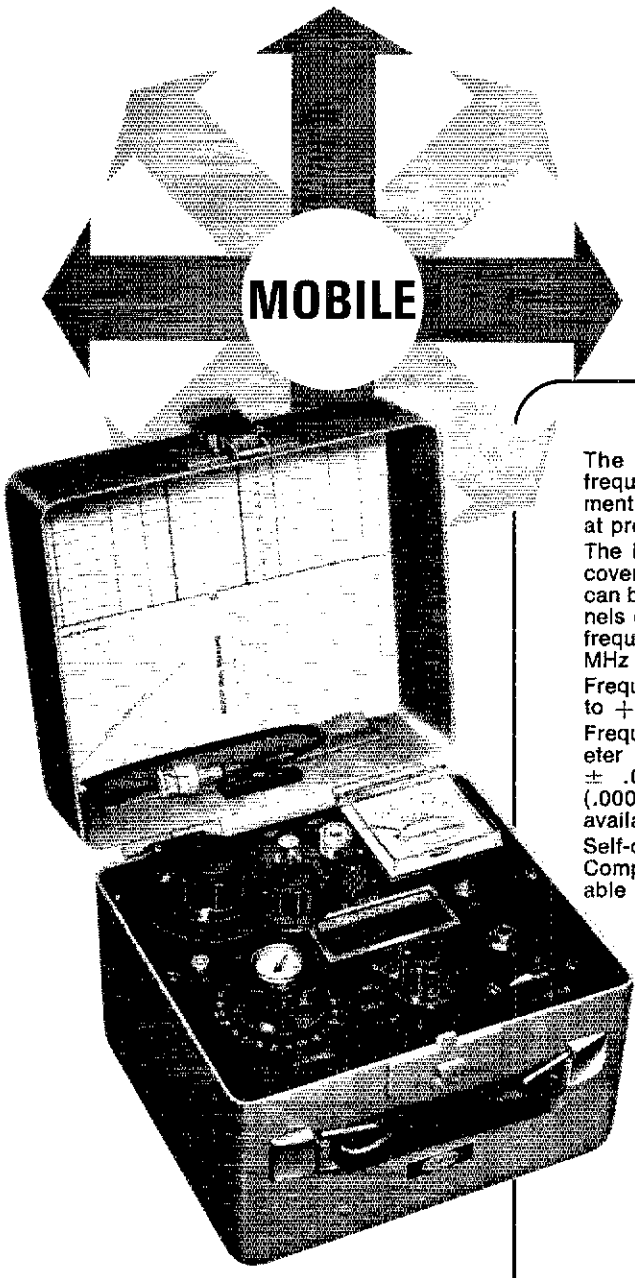
Section Communications Managers of the ARRL

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, OHS 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 C. Penrod	RFD 1	Townsend 19734
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4607 Convent Lane	Philadelphia 19114
Maryland-D.C.	K3LLD	John Munholland	306 Holland Rd.,	Severna Park, Md. 21146
Southern New Jersey	W2YPZ	Charles E. Travers	State Police Drive	West Trenton 08628
Western New York	K2KTK	Richard M. Pitrerase	303 Woodland Rd.	Syracuse 13219
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	W9BUQ	William C. Johnson	2838 Hillside Ave	Indianapolis 46218
Wisconsin	W9NRP	S. M. Pukonny	R. 4, Box 179	Ft. Atkinson 53538
DAKOTA DIVISION				
Minnesota*	KØBE	Bob Schoening	10040 Brookside Ave. ,	Bloomington 55431
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	WAØCPX	Ed Gray		Salem 57058
DELTA DIVISION				
Arkansas*	WA5VWH	Jimmie Lowery	N. Albert Pike	Fort Smith 72901
Louisiana	W5PM	J. Allen Swanson, Jr.	RFD 1, Box 399	Covington 70433
Mississippi	WA5KLY	Clifton C. Comfort	310 E. Washington St.	Kosciusko 39090
Tennessee	K4RUT	Harry A. Phillips	5200 Oak Meadow Ave.	Memphis 38128
GREAT LAKES DIVISION				
Kentucky	W4OYI	George S. Wilson, III	2113 Old Cabin Road	Owensboro 42301
Michigan	K8HKM	Joseph L. Pontek	P. O. Box 288	Holt 48842
Ohio	W8ETU	Richard A. Egbert	6479 Red Fox Road	Reynoldsburg 43068
HUDSON DIVISION				
Eastern New York	K2SJN	Graham G. Berry	50 Parcot Ave.	New Rochelle 10801
N. Y. C. & Long Island	K2DGI	Fred F. Brunjes	22 Ivy Drive	Jericho, L. I. 11753
Northern New Jersey	W2ZZ	Louis J. Amoroso	180 Pleasant Ave.	Bergenfield 07621
MIDWEST DIVISION				
Iowa	KØYVU	Al Culbert	P.O. Box 306	Charles City 50616
Kansas	KØBXF	Robert M. Summers	3048 North 72nd	Kansas City 66109
Missouri	WØBV	Robert J. Peavler	Route 4	Kirksville 63501
Nebraska	KØOAL	V. A. Cashon	334 Pine St., Box 488	Chadron 69337
NEW ENGLAND DIVISION				
Connecticut	W1GVT	John I. McNassor	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Maine	K1TEV	Peter E. Sterling	39 Latham St.	So. Portland 04106
New Hampshire	K1QFS	Donald Morgan	Bayview Drive, P. O. Box 65	Laconia 03246
Rhode Island	K1AAV	John F. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	E. Reginald Murray	3 Hillcrest Drive	Montpelier 05602
Western Massachusetts	W1BVR	Percy C. Noble	P. O. Box 5	Lanesboro, 01237
NORTHWESTERN DIVISION				
Alaska	KL7AEQ	Albert F. Weber	Box 735	College 99735
Idaho	W7ZNN	Donald A. Crisp	3408-8th St. E	Lewiston 83501
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave.	Anaconda 59711
Oregon	K7WWR	Dale T. Justice	1369 N. E. Sunrise Lane	Hillsboro 97123
Washington	W7SWI	Harry W. Lewis	10352 Sandpoint Way, N. E.	Seattle 98125
PACIFIC DIVISION				
East Bay	WB6DHH	Paul J. Parker	2236 Whyte Park Ave.	Walnut Creek 94595
Hawaii	KH6BZF	Lee R. Wical	45-601 Luluku Rd.	Kaneohe 96744
Nevada	W7PBV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	W6KYA	John F. Minke, III	6230 Rio Bonito Drive	Carmichael 95608
San Francisco	K6SRM	Kenneth S. McTaggart	484- 4th St., E.	Sonoma 95476
San Joaquin Valley	W6JPH	Ralph Saroyan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	W6VZT	Albert F. Gaetano	118 Adobe Rd.	Los Gatos 95030
ROANOKE DIVISION				
North Carolina	WA4UQC	Calvin M. Dempsey	1604 West Canal St.	Tarboro 27886
South Carolina	WA4EEP	Mrs. Elizabeth Y. Miller	1509 Highland Ave.	Camden 29020
Virginia	K4GR	Robert J. Slagle	3515 – 25th St., N.,	Arlington 22207
West Virginia	W8IM	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554
ROCKY MOUNTAIN DIVISION				
Colorado	WØSIN	Charles M. Cotterell	330 South Swadley St.	Lakewood 80228
New Mexico	W5NUI	James R. Prine, D. V. M.	P. O. Box 1128	Los Alamos 87544
Utah	W7QWH	Thomas H. Miller	3148 South 3360 East	Salt Lake City 84109
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	W4WLG	Donald W. Bonner	2208 Rodgers Dr.	Huntsville 35811
Canal Zone*	KZ5DA	Edward K. Johnson	Drawer 942	Fort Clayton
Eastern Florida	W4KGJ	John J. Porter	P.O Box 7297,Ludlam Branch	Miami 33155
Georgia	WA4WOU	A.J. Garrison	2529 Blueberry Dr.	Augusta 30906
West Indies	KP4CO	Jose Medina-Hernandez	Box 1480	Mayaguez, P. R. 00709
Western Florida	W4KKH	Frank M. Butler, Jr.	323 Elliott Rd , N. E.	Fort Walton Beach 32548
SOUTHWESTERN DIVISION				
Arizona	W7CAB	Gary M. Hamman	2813 E. Campbell Ave.	Phoenix 85016
Los Angeles	WA6KZU	Harvey D. D. Hetland	2008 Cedar St.	Alhambra 91801
Orange	WA6RGE	Jerry L. Ver Duft	6372 Cymbal St.	Yorba Linda 92686
San Diego	WA6COL	Richard E. Leffler	5119 Manchester Rd.	San Diego 92115
Santa Barbara	WA6OKN	Cecil D. Hinson	1933 Coventry Court	Thousand Oaks 91360
WEST GULF DIVISION				
Northern Texas	W5LR	L. F. Harrison	1314 Holly Glen Drive	Dallas 75232
Oklahoma	W5PMC	Cecil C. Cash	1802 Smith Ave.	Lawton 73501
Southern Texas	W5AIR	G. D. Jerry Sears	5634 Eskridge St.	Houston 77023
CANADIAN DIVISION				
Alberta	VE6FK	Don Sutherland	444-25th Ave., N. E.	Calgary, Alta.
British Columbia	VE7FB	H. E. Savage	4553 West 12th Ave.	Vancouver 8, B. C.
Manitoba	VE4EJ	Keith Witney	47 Peony Ave.	Winnipeg 17
Maritime	VE1NR	William J. Gillis	Shediac Road RR 6	Moncton, N. B
Ontario	VE3DV	Holland H. Shepherd	3016 Cowan Cres.	Ottawa 10
Quebec	VE2OJ	Jim Ibey	1788 Brookdale Ave.	Dorval, P. Q.
Saskatchewan	VE5HP	Gordon C. Pearce	1903 Connaught St.	Regina

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

INTERNATIONAL frequency meter



- **Tests Predetermined Frequencies 25 to 1000 MHz**
- **Extended Range Covers 950 MHz Band**
- **Pin Diode Attenuator for Full Range Coverage as Signal Generator**
- **Measures FM Deviation**

FM-2400CH

The **FM-2400CH** provides an accurate frequency standard for testing and adjustment of mobile transmitters and receivers at predetermined frequencies.

The FM-2400CH with its extended range covers 25 to 1000 MHz. The frequencies can be those of the radio frequency channels of operation and/or the intermediate frequencies of the receiver between 5 MHz and 40 MHz.

Frequency Stability: ± .0005% from +50° to +104°F.

Frequency stability with built-in thermometer and temperature corrected charts: ± .00025% from +25° to +125° (.000125% special 450 MHz crystals available).

Self-contained in small portable case. Complete solid state circuitry. Rechargeable batteries.

FM-2400CH (meter only)	**$595.00**
RF crystals (with temperature correction)	**24.00** ea.
RF crystals (less temperature correction)	**18.00** ea.
IF crystals	catalog price

INTERNATIONAL

CRYSTAL MFG. CO., INC.

10 NO. LEE • OKLA. CITY, OKLA. 73102

WRITE FOR CATALOG!

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 06111.

Past Presidents

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

Officers

President . . . . . ROBERT W. DENNISTON,* WØDX
First Vice-President . . . . CHARLES G. COMPTON,* WØBUO
Vice-Presidents . . . . . ROEMER O. BEST, W5QKF
CARL L. SMITH, WØBWJ
Secretary . . . . . JOHN HUNTOON, W1LVQ
Treasurer . . . . . DAVID H. HOUGHTON

• • • • •

Honorary Vice-Presidents . . . WAYLAND M. GROVES, W5NW
FRANCIS E. HANDY, W1BDI
GILBERT L. CROSSLEY, W3YA

• • • • •

General Manager . . . . . JOHN HUNTOON,* W1LVQ
Communications Manager . . . . . GEORGE HART, W1NJM
Technical Consultant . . . . . GEORGE GRAMMER, W1DF
Assistant General Manager . RICHARD L. BALDWIN, W1IKE
Assistant Secretaries . . . . . PERRY F. WILLIAMS, W1UED
WM. I. DUNKERLEY, JR, WA2INB

225 Main St., Newington, Connecticut 06111

• • • • •

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

Associate Counsel . . . . . ARTHUR K. MEEN, Q.C., VE3RX
Suite 2219, 44 King St. West, Toronto 1, Ontario

DIRECTORS

Canada

NOEL B. EATON* VE3CJ
Box 660, Waterdown, Ontario
Vice-Director: A. George Spencer, ... VE2MS
171 Kipling Ave., Beaconsfield, Quebec

Atlantic Division

HARRY A. McCONAGHY, ... W3EPC
8708 Fenway Dr., Potomac Bethesda, Md. 20034
Vice-Director: Jesse Bieberman W3KT
RD 1, Box 66, Valley Hill Rd., Malvern, Pa. 19355

Central Division

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

Dakota Division

LARRY J. SHIMA . . . . . WØPAN
11417 Goodrich Rd. S., Bloomington, Minn. 55431
Vice Director:

Delta Division

MAX ARNOLD W4WHN
612 Hogan Rd., Nashville, Tenn. 37220
Vice Director: Franklin Cassen W4WBK
926 N. Trezevant St., Memphis, Tenn. 38108

Great Lakes Division

ALBAN A. MICHEL, ... W8WC
359 Bonham Rd., Cincinnati, Ohio 45215
Vice Director: Currin L. Shutt . . . W8FSZ/K8EPT
119 N. Foster St., Lansing, Mich. 48912

Hudson Division

HARRY J. DANNALS* W2TUK
16 Arbor Lane, Dix Hills, N.Y. 11746
Vice Director: Stan Zak K2RJO
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:

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 W6ZRJ
10835 Willowbrook Way, Cupertino, Calif. 95014
Vice-Director: Hugh Cassidy WA6AUD
77 Coleman Dr., San Rafael, Calif. 94901

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
3708 Anderson Ave., SE, Albuquerque, NM 87108

Southeastern Division

H. DALE STRIETER W4DQS
928 Trinidad, Cocoa Beach, Fla. 32931
Vice-Director: Charles J. Bolvin K4KQ
2210 S.W. 27th Lane, Miami, Fla. 33133

Southwestern Division

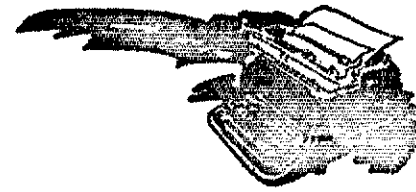
JOHN R. GRIGGS W6KW
8122-B Opal Circle, Huntington Beach, California 92647
Vice-Director: Arnold Dahlman W6UEI
14940 Hartland St., Van Nuys, Calif. 91405

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..."



UNSUNG SALESMEN

ALONG WITH his membership renewal form, an amateur in the midwest recently wrote concerning his efforts to sell a new ham nearby on the importance of belonging to the League. He hadn't quite brought down his quarry, and was calling on us for more ammunition.

There are hundreds, perhaps thousands, more of our members whose dedication to the League qualifies them as "unsung salesmen" – club officers, SCMs and other field officials, code and theory instructors, and just plain interested members – quietly pointing up the importance of unity in the amateur ranks, quietly recruiting new members for ARRL.

It seems to us that this is the principal way membership in our organization should and must grow – one member reaching one non-member, and then another, here and there and everywhere in our two countries. True, the headquarters mails information on the League to all new FCC licensees, but remember – the new licensee finds his mailbox full of literature from all sorts of people eager to sell him something. Who can blame the neophyte if, without personal stimulation from a club or individual member-friends, he should consider his literature from the League as just another attempt to separate him from his money? With his main interest probably in more station equipment, it is not difficult to see how he might decide at least for the moment, he'd rather put those few bucks toward new gear. Unless, that is, an "unsung salesman" can personally point out the benefits his $6.50 investment buys for all of amateur radio as well as himself. It is the enthusiasm of the individual member or club, with a conviction which cannot be matched by the printed word, which can best convince the new prospect.

The newcomer may not connect a "subscription blank for *QST*" with the WIAW code practice he listened to on a borrowed receiver, which eased the path to his ham ticket. He may have no idea that the join-ARRL circular he received and the training film he saw at the local club meeting came from the same place. Schematics are just beginning to make real sense to him; he hasn't yet fully grasped the scope of technical information coming to him in *QST* from the labs in Newington and from other ham workshops. He may spend a few hours in the Sweepstakes, and thereby increase his operating proficiency considerably, and yet not realize that behind it is "more than a magazine." So it's just another ad, and in the wastebasket it might go, unless some member has given him an inkling of the importance of the League to him as an individual ham.

As a newcomer, he is unlikely to grasp the significance of the League's having fought for ham radio frequencies and privileges at every world conference since 1927, or that after both World Wars the League was instrumental in securing a return of suspended privileges. He has never heard of the case of *Wright vs. Vogt*, one of several in which the League successfully established in court the right of amateurs to erect antenna towers as a normal accessory to the use of residential property. He may join his section net or the local CD communications group, and still not be aware that the League has sponsored and encouraged message-handling nets and emergency communications units since its earliest days. Indeed, the new ham probably doesn't realize that the record built up through these operations, in the "public interest, convenience and necessity," is a basic reason our governments continue to provide us with frequencies on which to enjoy our avocation.

That is, he may not be aware of these things unless a ham friend, already a League member, has given him some inkling of the importance of organization to the furtherance of our hobby. Someone who will say, in effect:

"Your Full Membership in the League will strengthen the official voice of amateur radio. The larger and more united amateur radio becomes, the greater will be our productivity, the greater our contributions to the public welfare, and the stronger our position in retaining our operating privileges both domestically and at international conferences. As an ARRL Full Member, you will be supporting this concerted effort to keep amateur radio alive and flourishing and the fascinating scientific avocation it is."

May we have 100,000 unsung salesmen?

League Lines . . .

The League's filing on FCC-proposed repeater regulations (Docket 18803) turned out to be such a massive document that reproduction in QST is simply not practical. However, complimentary copies have been furnished to a large number of VHF repeater groups, especially those who contributed ideas to the ARRL Advisory Committee. For those additional individuals with a casual interest in the subject, the June editorial expressed the essence of the philosophy developed in the League's filing. For those with a more active interest, a limited number of copies of the complete filing are available; we can fill your request more rapidly with a large (10x13 inch) s.a.s.e., 36 cents postage.

Director election time again -- see "Haps" this issue for the call for nominating petitions. Pick your candidate, join with others (minimum ten valid signatures) naming him for the director or vice-director post. A leaflet on basic duties and responsibilities of elected ARRL officials (directors, vices, SCMs) can be obtained from the Secretary on request to Hq., if you have a potential candidate who wants more info.

Jerry Hall's solid-state identifier article in the June issue was a bigger hit with members than we anticipated for such a relatively-sophisticated gadget. Over and above many kudos for the fine job, we've had nearly 200 orders taking advantage of the offer of his follow-up booklet on the matrix design, etc.

Despite heavy opposition from nearly everyone in the radiocommunications field, FCC adopted its new schedule of application and license fees substantially as proposed. The League's (and other) strong protests on behalf of amateurs (page 80 June QST) did not deter the Commission from putting into effect on August 1 the higher rates -- $9 for new, renewed or upgraded operator licenses, or for those modified-and-renewed; $4 for mods only; $25 for special calls; still no fee for RACES, military recreations stations or -- thankfully -- Novices.

The familiar ARRL diamond has long been available in "cut" form for letterpress printing of QSL cards. Now, tnx to a suggestion from W1RGH, we now have "repro" proofs of the Life Member emblem to be used primarily on cards printed offset -- available to any LM on request.

Dave Bell, W6BVN, who produced the RS 59-plus-40 ARRL film, "The Ham's Wide World," is undertaking an additional project in the form of a 15-minute educational training film, tentatively titled "An Introduction to Amateur Radio," for use in school film libraries. Those of you in or close to the educational/vocational field might tip off your local audio-visual people that it will be available later this year from Dave at 1011 N. Cole Ave., Hollywood, CA. 90038.

CB inroads? CB Magazine says Dick Cowan of 59 (and CQ) talked with FCC officials about reallocation of a part of the 2-meter ham band to the Citizens or a special hobbyist radio service. And Wayne Green of 73 Magazine (also publisher of a new CB-oriented monthly entitled "Radio Today") has proposed to FCC the use of fm in the 220 MHz band for a "hobby class" license, with no code nor theory elements, but only a rules and regs exam, "to provide the band that the citizens band operators need."

Here are the correct dates for the 1970 convention of the International Amateur Radio Club; September 18-20, at Geneva. Write IARC, Box 6, 1211 Geneva 20, Switzerland.

A Complete Solid-State Portable for 40 Meters

BY MELVIN LEIBOWITZ, W3KET*

PORTABLE AND QRP operation has always appealed to amateurs, and interest in small, solid-state equipment is now at an all-time high. Some hams just want to experiment with transistors, but others want to make practical use of the QRP equipment in connection with other hobby activities such as camping, "trailering," hiking, and boating. QRP operation, either from home or afield, can offer some of the most thrilling and satisfing experiences to be found in amateur radio. It can also be frustrating and fruitless with poor equipment!

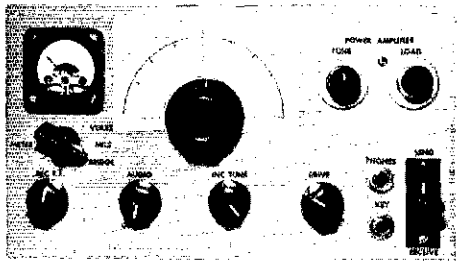
The little transceiver described in this article runs 3 watts input and covers the cw portion of the 40-meter band. It has been in daily use at the author's station for several months and it has always produced several contacts per operating session.

Transmitter

It is not hard to build a good (but simple) solid-state receiver; a matching transmitter is somewhat more difficult. Proponents of the direct-conversion receiver have indicated that this type of unit would be an excellent basis for a simple transceiver.[1,2] The receiver's variable oscillator works on the operating frequency, so you only have to build up the level of the oscillator, insert a key, and away you go.

The idea sounded simple enough, and completing the receiver posed only two minor problems. But the transmitter section was quite another matter! Obtaining a chirp-free note, suppressing harmonics and other spurious outputs, plus finding a suitable tank circuit for the final amplifier were the major problem areas. It was originally hoped that the unit could be used on two bands – 80 and 40 meters – but the complications in the transmitter made a single-band unit a more attractive undertaking. We settled on 40 meters, as this band is open most of the time for QRP contacts and antennas are of reasonable size.

Three watts seemed an ideal power level for the transmitter. Dry batteries give good service at this level, and operating experience has shown that this is enough power to produce consistent and enjoyable contacts. Lantern batteries, D cells, or automobile storage batteries can provide the dc for the transmitter. Few, if any, of the inexpensive power transistors will draw sufficient current at 12 volts



to provide the desired input, so two transistors are operated in parallel in the PA stage. Providing 10 watts of collector dissipation when running 3 watts input may seem wasteful to some, but it has paid off in rugged reliability. The transmitter has been operated key down without a load for five minutes, and we're still using the original set of transistors. For portable use, where strange things can happen to your antenna, this is the best approach. At home where battery drain is not a problem, the transmitter can be run at up to 10 watts input from an auxiliary dc supply.

Transistor Selection

The 2N2102 seems to be the most rugged and efficient of the 5-watt transistors available, and since they cost only a dollar each, they were

A portable/emergency cw station should be designed with certain requirements in mind: compactness, simplicity, durability, and modest power-supply demands. Because of a rebirth in interest for the direct-conversion technique, and owing to a burgeoning of semiconductor device availability, many interesting design ideas are coming to the fore. This two-part transceiver symposium provides plenty of design ideas for simple, low-power gear. Either circuit could easily be adapted for use on any of the remaining high-frequency bands by juggling the tuned-circuit L-C constants accordingly. The specified design criteria has been met in both units, yet each is capable of providing effective long-distance or local communications.

*1401 Philadelphia Pike, Wilmington, DE 19809

1 Hayward and Bingham, "Direct Conversion — A Neglected Technique," *QST*, November, 1968.

2 DeMaw, "The D.C. 80-10 Receiver," *QST*, May, 1969.

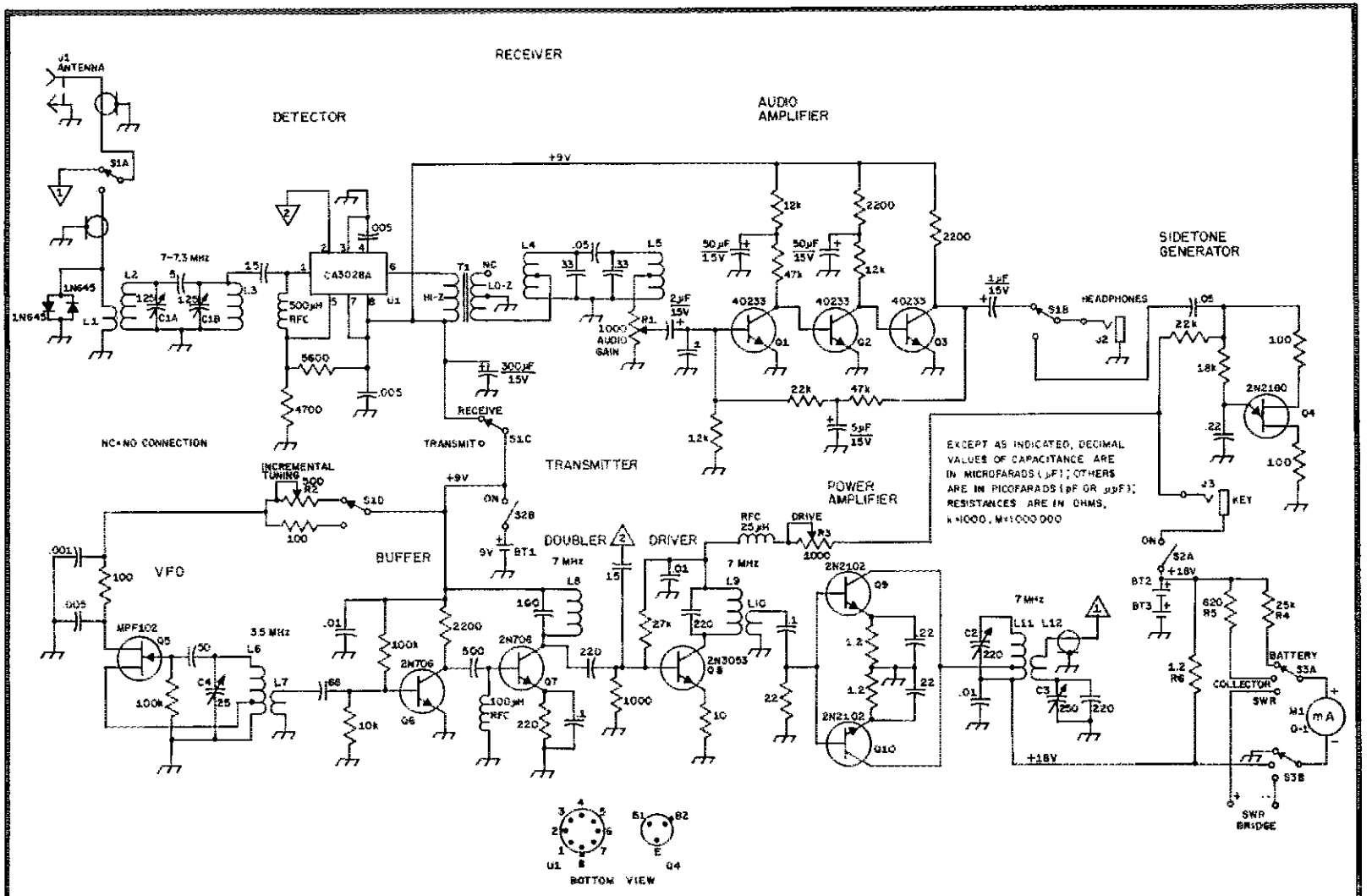

RECEIVER
DETECTOR
AUDIO AMPLIFIER
SIDETONE GENERATOR
TRANSMITTER
POWER AMPLIFIER
VFO
BUFFER
DOUBLER
DRIVER
ANTENNA
CA3028A
2N3053
2N2102
2N2160
MPF102
2N706
LN645
+9V
+18V
RECEIVE
TRANSMIT
KEY
HEADPHONES
INCREMENTAL TUNING
AUDIO GAIN
BATTERY
COLLECTOR
SWR
SWR BRIDGE
NC=NO CONNECTION
BOTTOM VIEW
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF OR µµF); RESISTANCES ARE IN OHMS, k=1000, M=1000 000

Fig. 1 — Schematic of W3KET's transceiver. Resistors are ¼-watt composition. Capacitors with polarity marked are electrolytic with a rating of 15 volts or more; others are ceramic, unless otherwise noted. Component numbers not listed below are for identification purposes on the circuit boards.

BT1 — See text.
BT2, BT3 — 8.75-volt, ½-Ah NiCad (see footnote 3).
C1-C3, incl. — Dual-section variable, 125 pF per section (Poly Paks 92 CU 619).
C4 — Miniature variable.
J1 — Phono type.
J2, J3 — Phone type.
L1 — 3 turns, No. 24 enam. wire wound on the L2 toroid core.
L2 — 30 turns, No. 24 enam. wire on Amidon T-68-2 core.
L3 — 26 turns, No. 24 enam. wire closewound on 3/8-inch dia. phenolic form.
L4, L5 — 88-mH telephone loading coil, center tapped.
L6 — 24 turns, No. 28 enam. wire closewound on a Miller 4500 slug-tuned form. Tap at 8 turns from the ground end.
L7 — 8 turns, No. 28 enam. wire wound over ground end of L6.
L8 — 24 turns, No. 24 enam. wire on Amidon T-68-2 core.
L9 — 25 turns, No. 24 enam. wire on Amidon T-68-2 core.
L10 — 7 turns, No. 24 enam. wire interwound on L9.
L11 — 17 turns, No. 18 wire, 5/8-inch dia., 8 turns per inch. Tap at 2¼ turns from the bottom end (Air Dux 508T or B&W 3006).
L12 — 110 turns, No. 28 enam. wire, wound on ¼ X 1-inch ferrite rod cemented inside the bottom end of L11 (see Fig. 3).
M1 — Milliammeter, miniature type.
R1 — Composition control, audio taper.
R2, R3 — Composition control, linear taper.
R4 — Made up from 10,000-ohm and 15,000-ohm composition resistors connected in series.
R5, R6 — 5-percent tolerance composition.
S1 — 4pdt telephone-type.
S2 — Dpst switch mounted on the rear of R1.
S3 — Ceramic rotary, 2 pole, 3 position.
T1 — 10,000-ohm primary to 2000-ohm ct secondary miniature audio type (Lafayette Radio 99T6124, use one half of secondary).
U1 — RCA integrated circuit.

chosen for the final. A 2N3053 is used in the driver stage. Both driver and final transistors are equipped with small clip-on heat sinks.

We subsequently came into possession of several 9-volt rechargeable batteries.[3] While the transceiver will develop noticeable output with as little as 6 volts, it was decided to connect two of the batteries in series and operate at 18 volts. This results in a final collector current of 400 mA – too much of a drain on the batteries. A control was added in the collector circuit of the driver which is used to set the drive level. The finals should draw collector current of 150 to 200 mA.

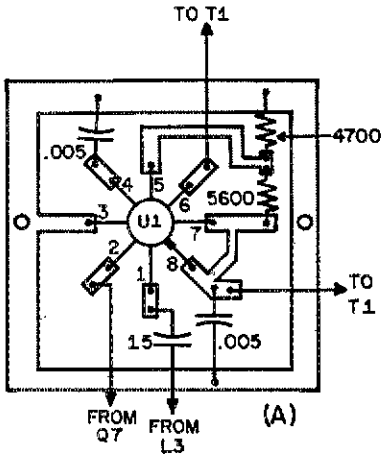
It is a well-known fact (or should be) that considerable buffering is required between the VFO and amplifiers in a transistor transmitter. The poor input-to-output isolation in transistors causes keying chirp because of the changing load on the VFO. Our original design included two untuned buffers, a driver and a final. The note produced by this combination was far from acceptable. An FET was tried in the oscillator, and the note improved to the point where we tried an on-the-air test. An ARRL Official Observer cited us for chirp in the first hour of operation. Other oscillator, buffer, and keying combinations were tried without much success. Then we put the oscillator on 80 meters and changed the second buffer to operate as a doubler – a magic combination. Any of the popular oscillator designs and keying circuits produced a chirp-free signal.

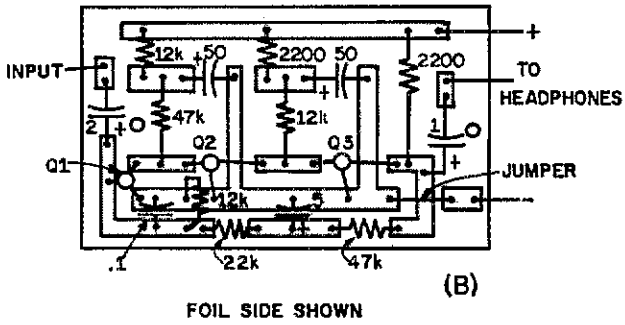
A Hartley oscillator (Fig. 1) is used in the VFO because of its simplicity. The necessity of tuning the doubler stage and having the variable oscillator on a frequency other than the desired band were the problems that made this rig a one-band affair.

Solving one problem usually generates another, however, and such was the case here. A large 3.5-MHz component was found in the output of the transmitter, along with low-frequency parasitics, a self-oscillation in the final on 40 meters, and some odd components on 9 and 11 MHz. The final's emitter resistors were left unbypassed in the original design and it was hoped the degeneration produced would be helpful in stabilizing the stage. But, adding bypasses across these resistors eliminated the 9 and 11 MHz output. The other unwanted outputs seemed to be caused by improper design of the output tank circuit. Many fancy circuits are available to match the low impedance of the transistors to an antenna, but they often require large-value capacitors which must be insulated from ground.

A T network seemed like a good idea, but this circuit requires that the dc voltage to the collectors be shunt fed. Shunt feed usually means low-frequency parasitic trouble. A word about this problem is in order as it usually doesn't occur in vacuum-tube circuits and is often a rough problem for the newcomer to solid state. These parasitics manifest themselves as a wide spectrum of white noise (hash) around and below the operating frequency. They can often be heard on a broadcast receiver

[3] Rechargeable NiCad batteries, type QS-9, are available from Technical Materials Purchasing Company, 769 Inwood Road, Union, NJ 07083, for $2.95 each or 6 for $15.00, postpaid.





FOIL SIDE SHOWN

Fig. 2 — Layout patterns for the audio (A) and detector (B) etched-circuit boards. The patterns are drawn half scale. A 500-μh rf choke is connected between pins 1 and 5 on the detector board after the other parts have been mounted. Upright mounting must be used on the audio board's electrolytic capacitors.

several feet away from a transmitter under test. The desired signal may sound clean, so it is necessary to check far below the operating frequency. Two transistor characteristics combine to cause this trouble. First, transistors have higher gain at lower frequencies than they do at hf. Second, interelement capacitances vary over a wide range with changes in voltage, the result being varactor action that causes spurious outputs. The best way to avoid the proplem is to use a minimum of inductance in the collector circuit. Large chokes are unsatisfactory. Series feed is a good answer as no choke is needed. Bypass capacitors should be the minimum value required. Decoupling on power leads between stages should have at least two capacitors, one effective at the operating frequency and a second large capacitor that is good at low frequencies.

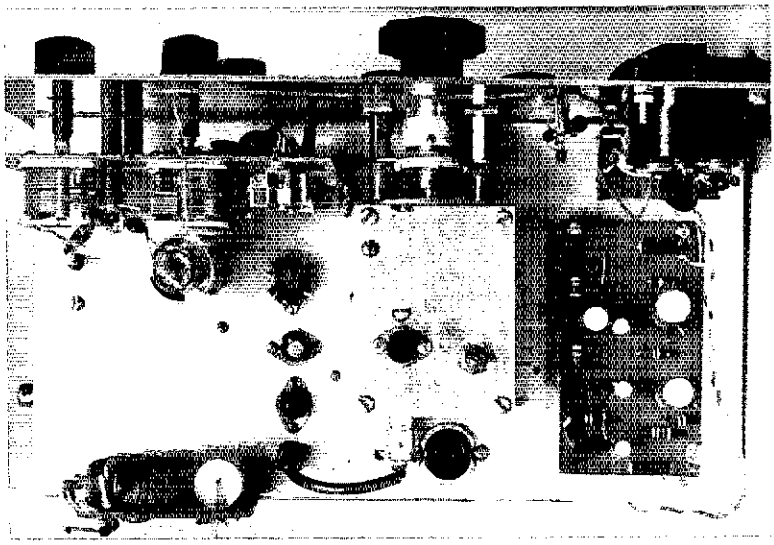
A parallel-tuned tank circuit with a series-tuned resonant link proved to be the best choice as an output network. The collector impedance of the final is matched by tapping down on the coil. Tuning capacitors for this circuit are of reasonable size and the tuned link helps to eliminate the 3.5-MHz output. The collector tap is only 2½ turns up from the ground end of the tank, presenting a very low impedance to any low frequencies. Loading can be varied with the link-tuning capacitor.

A panel meter is included which is switched to read battery voltage, final collector current, plus forward and reflected power (using an external SWR bridge).[4]

The Receiver

The receiver is a combination of circuits taken from the articles cited earlier. An RCA CA3028A

[4] The SWR bridge used was from DeMaw, "The QRP 80-40 C.W. Transmitter," *QST*, June, 1969, Fig. 3.



Top view. The VFO is contained in the extruded-aluminum box at the center. Toroid filter components are mounted on an etched-circuit board fastened to the rear deck, and the audio amplifier, built on another homemade board, is located to the right of the VFO. Sockets are used for all transistors in the transmitter section.

integrated circuit is used as a product detector. This is followed by a sharp audio filter using two 88-mH toroid coils.[5] The filter has a high insertion loss, so the high-gain audio amplifier from the Hayward article was used.[1] Some trouble was experienced with rf getting into the audio amplifier, which was cured by adding a 0.1 μF capacitor from the base of the first audio stage to ground. This capacitor must be placed physically close to the transistor. A 300-μF capacitor was connected across the battery supplying the receiver section to prevent a tendency to oscillate as the internal resistance of the battery rose with extended use. A single-tuned circuit was tried at the input of the receiver, but interference from several broadcast stations caused trouble. Additional selectivity was obtained by replacing the input circuit with a double-tuned, lightly-coupled network with a high-Q input coil wound on a toroid core.

The variable capacitors used in the transmitter and the antenna-input portion of the receiver are all of the same type, two-section units intended for use in transistor radios (available from Poly Paks.[6]). These transistor-radio capacitors are quite small. The shaft is short, but it is tapped for a 2-56 screw. An extension shaft can be made up by drilling a piece of ¼-inch bakelite rod lengthwise so that it will allow a 2-56 screw to be inserted. A long screw is used to hold the extension to the capacitor shaft. Both sections of the capacitor are connected in parallel for C2 and C3, while the sections are used separately for C1A and C1B. The trimmers on the Poly Pak capacitors can be removed as they are not needed — but save the screws because they fit the mounting holes. The final tank capacitor in the transmitter should be mounted on insulated washers.

Incremental tuning for the receiver is a desirable feature in any transceiver. It was accomplished here by varying the oscillator voltage with R2. This control is replaced with a fixed resistor during transmit.

Nuts and Bolts

The unit is not crowded and should be easy for anyone to reproduce, providing he has some building experience. A combination of modular, etched-circuit and chassis construction is used. The chassis measures 5 X 9½ X 2 inches. The panel is 5½ X 10 inches. A layout for the audio board is shown in Fig. 2; this board is 2 X 3½ inches. The techniques for making boards at home was recently covered by DeMaw.[7]

The oscillator is built in a 1 9/16 X 2 5/8-inch box made by the Sarex Corp.[8] This box is made from extruded aluminum sections and is very rigid, yet all sides are removable for easy access to components. The buffer, doubler and driver stages are mounted on the chassis, while the final is assembled on a piece of unetched circuit board measuring 2 X 4½ inches. The VFO drive is a Jackson Brothers ball-drive unit.[9] Sub-miniature 75-ohm coxial cable is used for all interconnections that require shielded leads.

The detector can be constructed using electronic pegboard or an etched-circuit board (the detector is a natural place to try your hand at a board, as the layout is simple). Be sure to use a heat sink when soldering each of the IC leads, as excessive heat can damage the device. All parts except the 500-μH choke are mounted on the top of the board. The choke is mounted underneath the board, and the completed assembly fastened down using short spacers over the mounting bolts, to hold the board off the chassis.

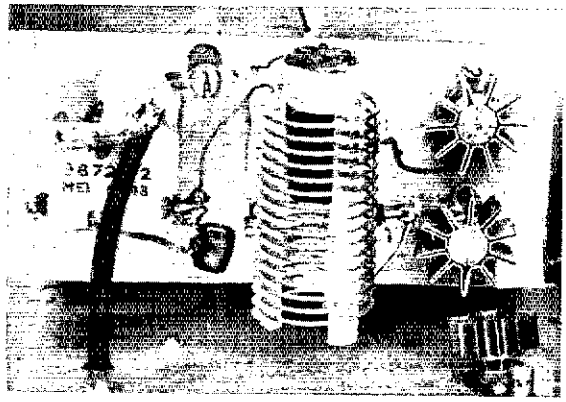


Fig. 3 — Detail of the final amplifier. Heat sinks are used on the driver and final transistors. The final tank is made from commercial coil stock with the output link, which is wound on a ferrite rod, cemented inside. The amplifier assembly is built on a piece of unetched circuit board.

Checking

When your transceiver is complete, check your work for wiring errors. Transistors are very unforgiving. Then, adjust the coverage of the VFO by setting L6. This can be done by listening to the oscillator signal in a separate receiver or using a frequency meter. The oscillator should cover 3500 to 3600 kHz. Set the receiver input-tuning capacitor, C1, so that the plates are fully meshed, and connect an antenna. All being well, you should hear some signals! Peak up the receiver input and you should hear lots of signals. If you are hearing well, receiver adjustment is complete.

To start up the transmitter, disconnect the antenna and replace it with a No. 47 pilot lamp. The lamp will act as a dummy load. Connect a 6- to 9-volt power source to the final amplifier. Switch the meter to read the final collector current. Turn the drive control down to minimum (maximum resistance). Throw the send-receive switch to send and turn on the power. The collector current should be zero with the key open.

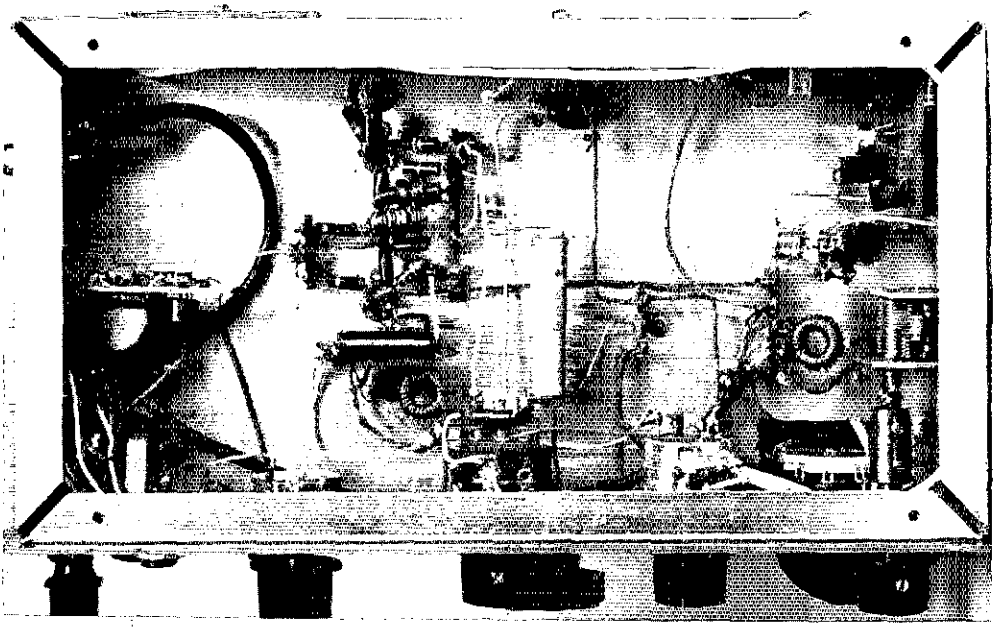
[5] See *QST* Ham Ads for suppliers.

[6] Poly Paks, P.O. Box 942, Lynnfield, MA 01940.

[7] DeMaw, "Etched-Circuit Boards," *QST*, January, 1970.

[8] Sarex Corporation, 1001 Roosevelt Street, Carteret, NJ.

[9] Jackson Brothers components are available from Arrow Electronics, 97 Chambers Street, New York, NY.



The transmitter buffer and amplifiers stages run from the front to the rear at the center. The receiver front-end and detector circuit boards are located on the far right, and the small board at the far left is the sidetone oscillator.

If it is, then close the key and quickly read the collector current. The reading should be low, in the range of 10 to 50 mA. (The full-scale reading on the meter is 500 mA). You may be able to see a dull red glow in the pilot lamp at this time. If so, alternately peak the tuning and loading controls for maximum output. Don't worry if output *cannot be detected at this time, however.*

Adjustment

Adjust the turns on coils L8 and L9 by squeezing them together or spreading them apart until the meter reads maximum collector current. Turn the drive control up until the collector reaches 100 mA. Adjust the final tuning for a dip in collector current – at this point the lamp should start to show some signs of life. Adjust the tuning and loading controls for maximum output. Then raise the collector voltage to between 12 and 18 volts, and repeat the procedure. Before the higher voltage is applied, the drive control should be turned down. With the key down, bring the drive up slowly until 150 to 200 mA of collector current is indicated. The lower the voltage, the more collector current that can be drawn. The best indication of proper operation is the amount of heating of the final transistors – they should get *only slightly warm. If they become hot to the* touch, you are drawing too much collector current.

It is helpful to get the feel of tuning the rig into a pilot lamp a few times before trying it on the air. The lamp should show more than normal brilliancy if all is well. A lamp is not a 50-ohm load, however; so some retuning will be needed when the antenna is connected. Use the forward reading of the SWR bridge as an output meter when working into an antenna.

The final adjustment is to set the incremental tuning control and determine where the transmit and receive frequencies coincide. This can be best done by listening to the transceiver oscillator on *another receiver. Vary the control until you find* the point where the oscillator is on the same frequency in both transmit and receive. Once this point has been found, loosen the knob on the incremental-tuning control and reset the knob so that the pointer is straight up when the receiver is tuned to the transmitter frequency.

A separate battery should be used for the receiver and low-level transmitter stages. Do not try to tap off the battery used to supply the final amplifier or chirp will result. The low-level portion of the transceiver draws 35 mA, so a large battery such as the Eveready 266 or 276 should be used.

QRP operation takes some special operating techniques (plus a good antenna). Calling CQ is generally not very productive but can produce contacts during the morning and afternoon when the band is not too crowded. A better procedure is to look for the stronger signals and give them a call. Most QRP operators soon develop a feel for *what can and cannot be worked.*

This rig fits the old cliche about good things coming in small packages. If you receive only a fraction of the enjoyment that the author has experienced in building and operating the QRP transceiver, your time will have been well spent.

QST

Once More With QRP

A Modern Low-Power CW Package

BY DOUG DEMAW, *W1CER

THIS REVISED version of the "Packaged QRP for 3.5 and 7 MHz" (March 1970 *QST*) offers some operating conveniences that were omitted in the earlier transceiver. It is no secret to the QRP enthusiast that VFO control is often the common denominator required for survival among the higher-power cw stations. This Mark-II model provides for crystal or VFO control, and transmits a chirp-free, clickless signal on both 80 and 40 meters. Dc input power to the PA stage of the transmitter is 2 watts. Output power is on the order of 1 1/2 watts, more than enough to assure plenty of Q5 contacts.

Some circuit changes were made to provide conveniences that were not offered in the earlier transceiver: A sidetone oscillator permits monitoring one's fist; the cw filter is based on the Butterworth concept, and provides two degrees of selectivity; PA collector current and operating voltage is monitored by a panel meter; a bipolar switch is used for keying the transmitter to lessen the chance of clicks.

Though this circuit description is given primarily to supply the builder with useful ideas, the task of duplicating the model shown here is not a difficult one. Circuit-board patterns are offered for some of the modules.

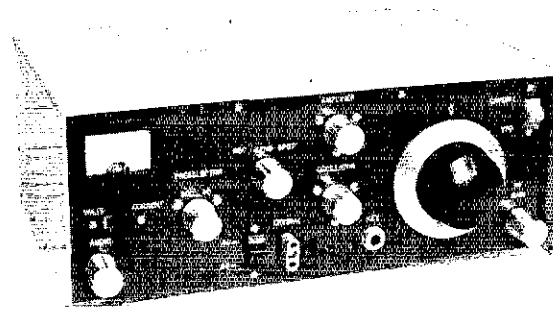
The most critical section of the circuit is the VFO. It was described in June 1970 *QST*. The only circuit change necessary to make it work properly with this transceiver is the installation of a different bias resistor at R1. The value shown in June *QST* is 27,000 ohms. To assure chirp-free operation of the VFO when the transmitter is keyed, R1 should be changed to 15,000 ohms. Some experimentation with the value of R1 may be worthwhile in the interest of obtaining the most stable cw note, and the best value will depend upon the transistor used in the oscillator, and on its individual characteristics.

The Receiver Section

Referring to Fig. 1, the product detector is an RCA 40673 MOSFET. The device has built-in transient suppressors to protect it from static-charge damage, or from excessive levels of rf voltage on its gates. In fact, this MOSFET can be handled as safely as the standard bipolar transistor – without shorting its leads together! Detector Q1 provides good conversion gain, low-noise operation, and good isolation between the input tuned circuit and the VFO.

The rf gain control, R1, is useful when strong local signals are present, preventing the receiver from being severely overloaded. It can be omitted by those wishing to save a few coins.

Input tuned circuit L1C1 is quite selective, but a double-tuned, bottom-coupled circuit (Fig. 2) could be substituted if more selectivity is desired. Output from Q1 is fed to the passive cw filter through T1. When S7 is switched to SHARP a pronounced peak response occurs at 800 Hz. In the remaining position the switch places a 5-μf capacitor in parallel with C9 to broaden the response.



A homemade aluminum cabinet houses the Mark-II version of the QRP transceiver. Green spray enamel paint is used to decorate the front panel. White press-on decals identify the controls. A National vernier dial is used as the main-tuning control, but other mechanisms can be substituted, such as those found on surplus TU-6 tuning units. The top half of the cabinet is plain aluminum, and was given a grained finish by abrading the surface with emery cloth. It was then soaked in a mild lye bath to obtain a satin finish, and later sprayed with clear lacquer.

This second-generation QRP "machine" was designed and built in answer to the many requests for a VFO-controlled version of the transceiver described in March 1970 QST. Some "extras" have been added to the new package in the interest of operating convenience. This 2-watter has a UJT sidetone oscillator, voltage and current metering, two cw selectivity choices, and uses a dual-gate MOSFET in the receiver front end. Receiver offset tuning is included as an option for those who desire it.

*Technical Editor

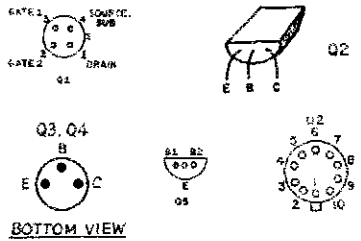
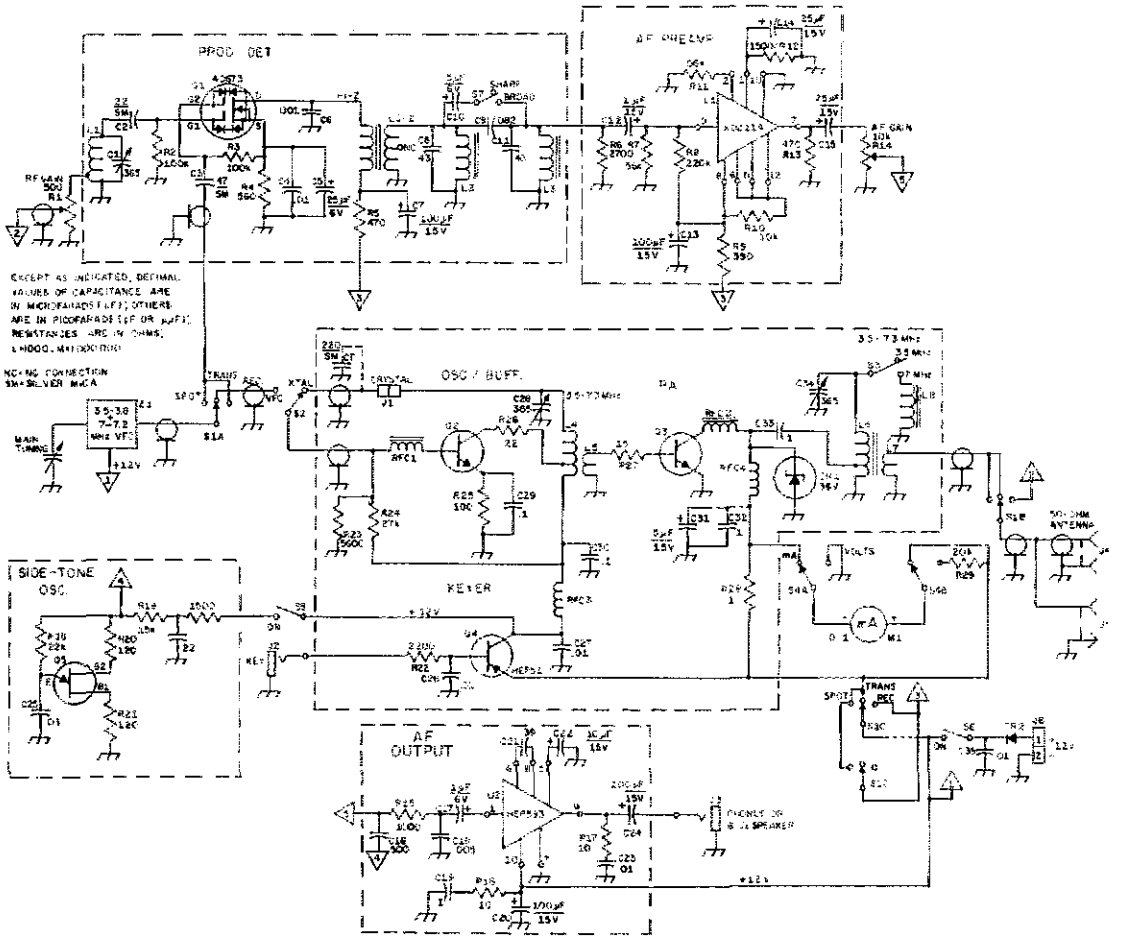


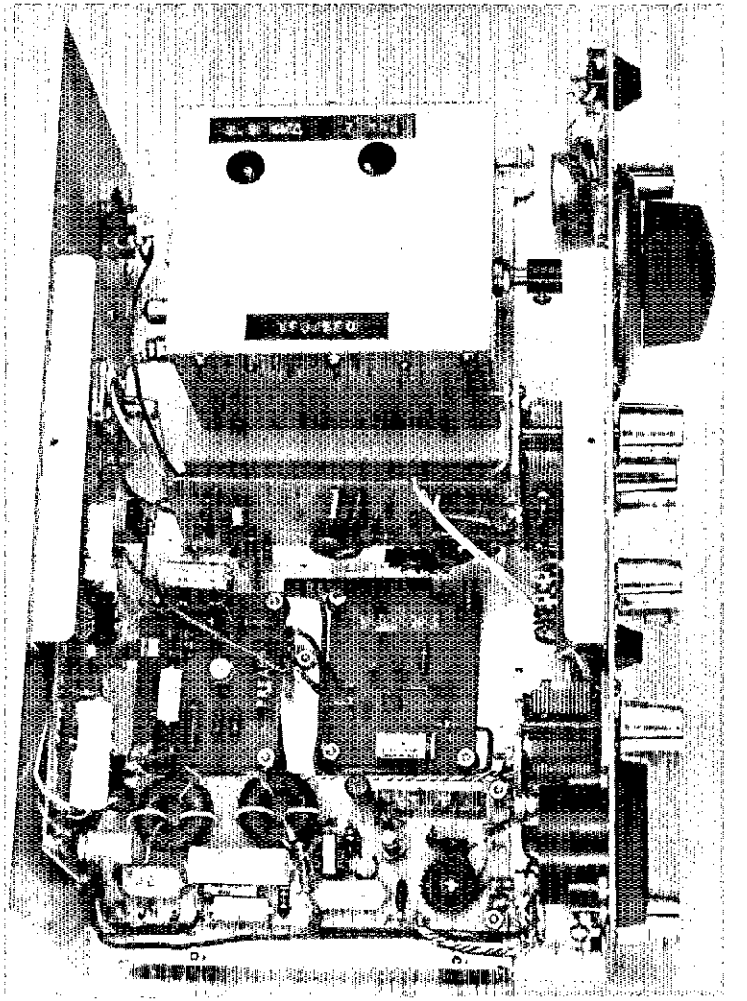
Fig. 1 — Schematic diagram of the transceiver. Numbered components not appearing in the parts list are so designated for circuit-board identification and text discussion purposes. Fixed-value resistors are ¼-watt carbon unless otherwise noted. Fixed-value capacitors are disk ceramic or mica unless otherwise specified. Polarized capacitors are electrolytic. VFO assembly Z1 was described in June 1970 *QST*.

C1, C28, C34 — 365-pF variable (J.W. Miller 2111 or similar).
C8, C9, C11 — See text for alternate values. (Cornell-Dubilier DMF dipped polyester or equivalent type.)
Cf — Feedback capacitor, silver mica (see text).
CR1 — 36-volt, 1-watt Zener (IOR 1N4753 or similar).
CR2 — 2-ampere, 50-volt silicon (IOR 20A05 or equiv.).
J1 — Crystal socket.
J2, J3 — Open-circuit phone jack.
J4 — SO-239-type coax chassis connector.
J5 — RCA phono jack, single-hole mount.
J6 — Two-terminal connector (Amphenol 75PC1M audio connector used in this model).
L1, L6 — 7-μH toroidal inductor. 34 turns No. 24 formvar-insulated copper wire, single-layer-wound on Amidon T-68-2 core. (Tap L6 four turns from ground end.)
L2, L3 — 88-mH telephone-type toroid inductor (see *QST* Ham Ads for suppliers). Join either pair of adjacent wires, and use remaining pair of wires for circuit connection.



L4 — 7-μH toroidal inductor. 40 turns No. 26 formvar-insulated copper wire on Amidon T-50-2 core. Tap 6 turns from B+ end.
L5 — 5 turns No. 26 insulated wire wound over L4 near tapped end. Use layer of insulating tape between L4 and L5.
L7 — 6 turns No. 24 insulated wire wound over tapped end of L6. Use insulating tape between L6 and L7.
L8-Same as L1.
M1 — 0 to 1-mA meter (Simpson Model 2121 used here). Other 1-mA meters suitable if R28 is chosen for their internal resistances.
Q1 — RCA 40673 dual-gate MOSFET.
Q2 — Motorola MPS6514 or equivalent type.
Q3 — 2N3553. Possible substitutes are RCA 2N2102 or Motorola 2N4427.
Q4 — Motorola HEP-51 transistor or equiv.
Q5 — Motorola HEP-310 unijunction transistor.
R1 — 500-ohm, linear-taper carbon control.
R14 — 10,000-ohm, audio-taper carbon control.
R18, R28 — See text.
R29 — 20,000 ohms, ½-watt 5-percent. (Provides 20 volts full-scale reading when used with 1-mA meter.)
RFC1, RFC2 — Three Amidon ferrite beads on 3/8-inch length of No. 22 wire. Place close to transistor.
RFC3, RFC4 — 25μH rf choke (James Millen J-300-25 or equiv.).
S1 — 4-pole, 3-position, non-shortining, single-section phenolic wafer switch (Mallory 3243J or similar).
S2, S5 — Spdt slide switch.
S3 — Spst slide switch.
S4 — Dpdt slide switch.
S6 — Spst switch (part of R14 control).
S7 — Same as S3.
T1 — 10,000-ohm pri. to 2000-ohm sec. miniature audio trans. (Lafayette Radio TR-98 driver or equivalent).
U1 — RCA IC furnished with KC4000 audio kit module. (See substitute circuit of Fig. 3.)
U2 — 1-watt transformerless audio IC (Motorola HEP-593 or MC1554).

VFO assembly Z1 is at the top-center of the photo. Directly below the VFO is the transmitter board, vertically mounted. The two toroids for the PA stage are stacked atop one another at the far right of the board. Fiber insulating board is placed between the toroids, and on the top of the stack. A 4-40 bolt holds the coils in place. A heat sink is used on PA stage Q3 (lower right of transmitter board). The preamp and sidetone-oscillator boards are side by side under the transmitter strip. Seen at the bottom of the photo is the product-detector/cw-filter module. Input coil L1 is at the lower right, and is bolted in place using a fiber washer as a retainer. Audio module U2 is on the rear wall of the box. U2 also requires a heat sink. Aluminum angle brackets are visible on the front and rear lips of the chassis, and at each end of the chassis bottom surface. These brackets are used as anchor points when screwing the top cover in place with No. 6 sheet-metal screws. The circuit boards are spaced away from the chassis by installing rubber grommets between the two surfaces. Miniature coax cable should be used to connect all rf and af points in the circuit that require lead lengths in excess of two inches. The shield braid should be grounded at each end of the cable. Similarly, the ground foil of each circuit board should be connected to the chassis, using the shortest possible lead length. Switches S5 and S7 are located on the rear apron of the chassis, below the audio output module.



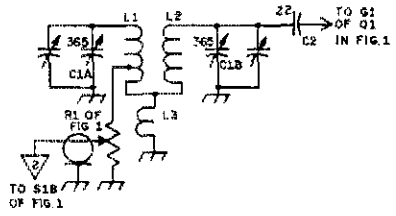


Fig. 2 — Method for improving the front-end selectivity of the receiver. L1 and L2 are the same as L1 of Fig. 1. L3 should be determined empirically for the selectivity desired. The dimensions for L3 should be approximately as follows: 3 turns No. 24 enam. wire, 1/4-inch dia., 1/4 inch long. More turns will increase the coupling and decrease the selectivity, and vice versa. C2 is a two-gang broadcast variable.

The capacitor values for C8, C9, and C11 (Fig. 1) are not standard. These Butterworth values can be made up by paralleling standard values which are available, or C8 and C11 can be 0.47-μF units, and C9 can be a 0.1-μF capacitor. There will be little apparent difference in the performance if these values are juggled.

Audio preamplifier U1 is an RCA kit module, KC4000. In RCA's recommended hookup C12 of Fig. 1 is a 25-μF unit. It was found that this value, in combination with R7, set up a long time constant. This introduced a troublesome delay in recovery time when switching from transmit to receive. The problem was cured by using a 1-μF capacitor at C12. Those wishing to use bipolar transistors in place of U1 can employ the circuit of Fig. 3.

Audio output stage U2 is almost identical to the one used in the March *QST* package. Only minor changes are made in the circuit board pattern, so if you have the old module it can be modified quite easily to accomodate the circuit changes. It delivers 1 watt of output into an 8-ohm load when driven by a 40-mV audio signal. It operates constantly. During transmit it amplifies the sidetone monitor signal to speaker volume. Strong signals will drive U2's current as high as 180 mA, but the resting current is low – approximately 30 mA. When high-impedance phones are connected to J3 there is little increase over the resting current, no matter how loud the signal, because of the mismatch condition. The audio output will still be ample. This suggests the use of 2000-ohm phones when using a dry-cell pack if one wishes to prolong battery life.

An effort was made to match the receiver's performance to that of the transmitter. There is little point in calling a weak station that is probably running considerable power, and is hundreds of miles distant (unless he too is a QRPer), when the transmitter output is only 1 or 2 watts. Chances are you'll never raise him. So, the audio amplifier portion of this unit is a bit marginal for that reason. Any cw signal that is 2 μV or greater in level will produce a readable beat note during normal band conditions. In lab tests, without atmospheric noise and QRM present, a 0.3-μV signal was perfectly discernable while using the speaker.

Transmitter

The circuit of this transmitter differs markedly from the earlier unit.[1] The input to Q2 is switched to allow VFO or crystal operation. Capacitor C_f is in the feedback circuit, and should be chosen experimentally for best results. In the author's circuit a value of 220 pF worked best, but the builder should try different values (between 100 and 1000 pF) to obtain the best cw note, and to prevent Q3 from being driven too hard when crystals are used. Q3 should not draw more than 200 mA at collector-current dip. Off-resonance current should not be allowed to exceed 250 mA. VFO operation results in slightly lower drive, so no problem should exist in that mode. C_f may not be needed if a low-beta transistor is used at Q2. *Always remove the crystal from J1 during VFO operation.*

Tuned collector circuit L4-C28 covers both bands. C28 is set near maximum capacitance at 3.5 MHz, and is adjusted for near-minimum plate meshing at 7 MHz. Transistor switch Q4 turns the collector supply of Q2 on and off when its base is keyed at J2. The unijunction sidetone oscillator, Q5, is also keyed by Q4, and its output is routed at low level to U2 for amplification to loudspeaker volume. The pitch of the monitor signal is 1000 Hz, but if one wishes a lower tone the values of R18 and C25 can be changed.

1 "The QRP 80-40 CW Transmitter," *QST*, June 1969.

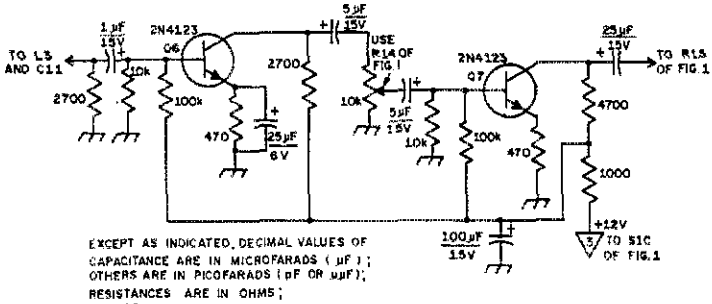


Fig. 3 — Suggested circuit for those wishing to substitute two bipolar transistors for the IC circuit shown in Fig. 1. Note that the audio gain control has been moved from the spot it occupies in Fig. 1. Component values here are not critical, so almost any audio npn transistor will work in this circuit. Q6 and Q7 can be 2N2925, MPS-A10, 2N4123, etc.

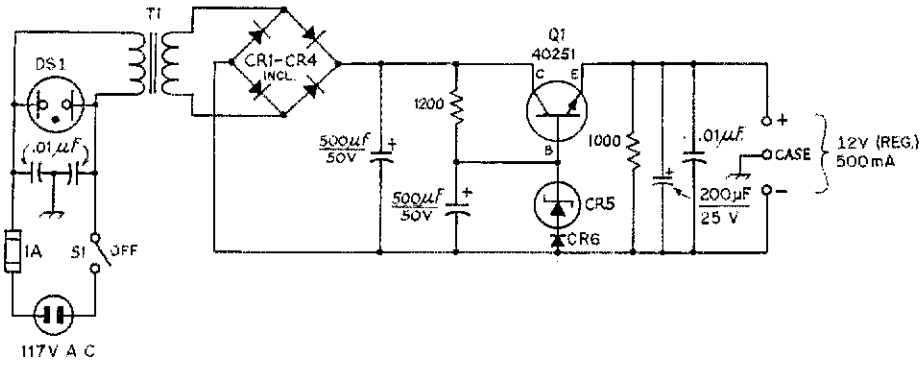


Fig. 4 — Recommended power supply for ac operation of the transceiver. T1 is a 24-volt, 1-ampere transformer. CR1-CR4, inclusive, 2-ampere, 50-PRV silicon diodes. Zener diodes CR5 is a 12-volt, 1-watt type. CR6 is used in series with CR5 to raise the power supply's output to 12 volts, compensating for the drop across the junction of Q1. It can be a 500-mA silicon diode of any PRV greater than 50 volts. Pass transistor, Q1, should be mounted on a heat sink. Panel lamp I1 is a 117-volt ac neon type. Dc output is extremely well filtered, and regulation is good up to approximately 600 mA. (Originally described in the 1969 ARRL *Handbook*.)

The PA stage, Q3, operates Class C. It uses a toroidal tank inductor, as does Q1 and Q2.[2] Resonance on 80 meters occurs when C34 is almost fully meshed. For operation on 40 meters, L8, another toroid coil, is shunted across L6 to lower the inductance. The normal 40-meter setting for C34 is with its plates about 1/3 meshed. A 36-volt, 1-watt Zener diode, CR1, prevents excessive collector rf voltage if the operator mistakenly keys the transmitter when no load is present at J4, or when the SWR is high. Either condition could easily destroy Q3.

Meter M1 monitors the collector current of Q3, and reads the supply voltage when S4 is switched to VOLTAGE. A 0 to 1-mA Simpson meter is used in this unit, but other brands can also be employed. The Simpson meter requires a 0.1-ohm shunt to give a full-scale current of 400 mA (a times 400 factor). A 20,000-ohm series resistor, R29, provides a full-scale reading of 20 volts (a times 20 factor). If other meters are used at M1, R28 must be selected to give a 400-mA full-scale reading in accordance with the meter's internal resistance. R1 here is 28-inch length of No. 26 enameled wire, wound on the body of a 100,000-ohm, 1-watt resistor. The pigtails are used as anchor points for the winding.

Antenna jacks J4 and J5 are in parallel. One is an SO-239-type coax fitting. The other is a phono jack. The writer used the two types to permit greater flexibility when making connections to accessory equipment. A polarity-guarding diode, CR2, prevents damage to the semiconductors should the operator mistakenly cross-connect the supply leads. Only positive voltage will flow through CR2.

The transmitter is protected from vhf and low-frequency instability. Ferrite beads are used as vhf chokes at Q2 and Q3 to tame the stages. Also, the dc leads are bypassed and filtered to prevent low-frequency oscillations.[3]

Operation

The band switch for the VFO is accessible through a 1-inch hole in the side of the transceiver cabinet. It should be set for the desired band, then C1 is tuned for a peak response in signal. The peak is sharp, so tune carefully. There will be a marked increase in volume as the BFO is tuned across a signal, and this will occur at the filter's 800-Hz peak. Best results will be had after learning how to tune for this peak in audio response.

Transmitter tune-up is straightforward. It would be wise to practice tuning into a 50-ohm dummy load. Note the settings of the controls for both bands. This will make the tune-up chore a bit easier at future times. With the VFO set for the desired band, close the key and adjust C28 for maximum collector current at Q3, as noted on M1. Then quickly tune C34 for a dip in current. Make certain that C28 and C34 are set as outlined earlier in the article. If not, a false peak or dip can result, indicating that the oscillator or PA are doubling, rather than operating straight-through.

When crystal-control operation is planned, spotting can be achieved by throwing S1 to the SPOT position, then tuning the main dial until the signal is heard in the phones or speaker. In the SPOT position the transmitter and receiver are both activated, but the antenna is disconnected from the receiver.

The power supply for this equipment should be able to deliver at least 500 mA of current. A

[2] Toroid cores and ferrite beads are available from Amidon Associates, 12033 Otsego Street, N. Hollywood, CA 91607.

[3] "Some Tips on Solid-State VFO Design," *QST*, May 1970.

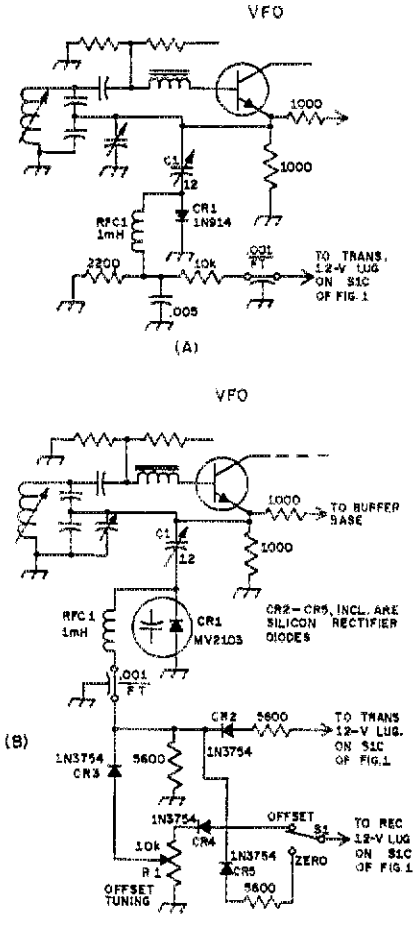


Fig. 5 — Two methods for obtaining frequency offset with the QRP transceiver. At A, the 12 volts from the transmitter bus causes CR1 to saturate, placing C1 effectively in the circuit. C1 is set to obtain the required offset during transmit — usually a few hundred Hz to as much as 1 kHz.

At B, a system for tuning above and below the frequency of the QRP trnasmitter. CR1 in this instance would be a variable-capacitance diode such as the Motorola Epicap diode, MV2103. (See text.)

500-mA, 12-volt (regulated) ac-operated supply will serve nicely for home-station work, Fig. 4. In the field one can use two 6-volt lantern batteries in series, a 12-volt motorcycle battery, a car battery, or 10 size-D flashlight cells in series. Those with large cash reserves may choose to use a 12-volt rechargeable Nicad battery pack.

Concluding Remarks

The type of cabinet used to house the transceiver is pretty much a matter of choice. This unit is larger than necessary, and the package could certainly be made much smaller in the interest of miniaturization. The author likes to leave plenty of room for circuit additions. Also, equipment that is very small is often difficult to operate because of crowded panel space. This cabinet is fashioned from two U-shaped pieces of heavy-gauge aluminum. It is 12 inches wide, 8 inches deep, and 4 1/2 inches high. The speaker could have been mounted inside the case, but it was decided to house it in the outboard accessory box which contains the SWR bridge and Transmatch.[4]

Templates for the major circuit boards can be obtained from The ARRL by sending 50 cents and a self-addressed stamped envelope. The template package includes the VFO, product detector/filter, audio output, and transmitter boards.

Something should be said about obtaining a frequency offset between the transmit and receive modes. The circuit of Fig. 1 does not include this provision, but two methods are illustrated in Fig. 5. The most simple approach is seen at A in Fig. 5. Diode CR1 acts as a switch to place trimmer C1 in the VFO circuit when the mode switch is set for transmitting. The amount of offset is determined by the setting of C1, and this will place the transmitter output frequency below that of the received signal when the incoming signal is tuned in so that the cw note is on the high-frequency side of zero beat. The circuit at B is somewhat more elaborate, and allows the operator to tune the receiver above and below the incoming signal. Diode CR1, in this instance, is a variable-capacitance type (Varicap or Epicap). During transmit a fixed value of reverse bias is applied to CR1, and an identical bias voltage is applied when S1 is in the ZERO position. However, when S1 is thrown to the OFFSET mode, control R1 permits varying the reverse bias on CR1 from zero to 12 volts — above and below the value set by the fixed-value dividers used for transmit (or for zeroing the receiver to the transmitter's frequency). The remainder of the diodes are used for isolating the various branches of the circuit from one another, to prevent the paralleling of unwanted resistances. Without some form of frequency offset it is difficult to communicate with stations using transceivers not equipped with offset tuning. If crystal-control operation is planned, the offset feature can be omitted. In fact, the author has only encountered one situation in some 30 QSOs where the offset feature was needed.

There may be a tendency for the receiver to exhibit an audio fringe howl at high volume settings. If this condition becomes manifest try paralleling a 5600-ohm resistor across the primary winding of T1. Values of resistance as high as 10,000 ohms can often be used to cure this malady.

The SWR, as seen by the transceiver, should be kept as low as possible to assure good loading and efficiency. An SWR meter suitable for this QRP setup was described in *QST*, June 1969, page 16. Remember, when working with QRP equipment the effects of decibels garnered here and there are cumulative, and *important*. A proper impedance match between the transmitter and the antenna counts toward that end. QRP

[4] The accessory box will be described in September 1970 *QST*.

The MABAV Mobile Antenna

Mobile enthusiasts take note: The MABAV (Mobile All-Band-Amateur V) is the result of a search for high-efficiency mobile antenna. We're sure you'll agree that this is a "different" antenna system.

BY WILLIAM BRIDGES,* K1KLM

AFTER A year or so of operation with my MABAL mobile antenna, it became apparent to me, and from hams who were interested in the antenna, that the antenna loop was much too large. However, it wasn't possible to reduce the size of the loop without a sharp decrease in the antenna's efficiency. Therefore, a new design was undertaken and the MABAV, the antenna described in this article, was the result.

Careful analysis of the design problems involved in a conventional base-loaded, and shortened, mobile antenna indicated that the only area open for improvement would be in the coil itself. That, and the placement of the antenna on the vehicle, were the two important points in the design of this antenna. The MABAV has circumvented these design problems, first, by placing the antenna at the optimum location on the car, where it can radiate freely. Second, by making the loading coil physically large, of tubing, and by keeping the Q as high as possible. All of these improvements have resulted in an extremely efficient, compact, mobile antenna with several features.

Frequency Coverage: Eighty through 10 meters. Bandwidth on 80 meters is 70 kHz, with an SWR of less than 1.5:1 for minus 5 kHz to plus 10 kHz from the tuned frequency. All other bands are essentially flat within their limits.

Polarization: Omnidirectional and vertical on 80 and 40 meters. Mostly horizontal on 20, 15, and 10 meters. No change in signal strength while driving in circles on 80 and 40 meters (large parking lot).

Input Impedance: 50-ohms, unbalanced.

Height: Approximately 20 inches from the top of the car to the top of the antenna.

Efficiency: More efficient than the conventional reference mobile antenna due to an increase in conductor size and current-carrying capabilities.

Tuning: Either manual band switching or remote-control band switching is possible.

Power capability: One kW with ease (corona disks are required on the ends of the elements).

Results of Tests: Many tests have been conducted over a period of a year, all on an empirical basis, using a reference antenna and the MABAV. The tests were made by switching rapidly between the two systems. These tests included ground-wave checks, mobile to mobile, and mobile to fixed station. In addition, tests were made on sky-wave contacts, both DX and Stateside. The MABAV was consistently as good or better than the reference antenna. In no case did the reference antenna outperform the MABAV.

* 547 Bishop Drive, Orange, Conn. 06477 Yale University Observatory

Antenna Details

Fig. 1 shows the circuit of the MABAV. The heart of the antenna is its coil. This consists of 22 1/2 turns of 3/16-inch diameter copper tubing, silver-plated, and with a coil diameter of 6 7/8 inches. An aluminum plate is mounted on top of the coil, and above this is the mounting for the two 54-inch whips. The tuning vane, which is a coat hanger bent in the form shown, is covered with aluminum foil. The vane is mounted on the rotor bar of an ARC-5 tuning capacitor (plates removed) which is driven by a piece of rod and a right-angle drive. The vane can be controlled from inside the car, and is used only on 80 meters in order to cover a 75-kHz range with good matching characteristics. The flat side of the foil is moved from a few inches from the coil to within 1/2 inch of the coil for the

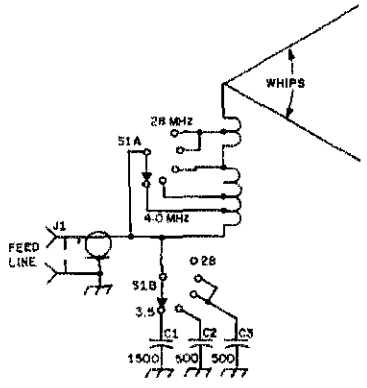
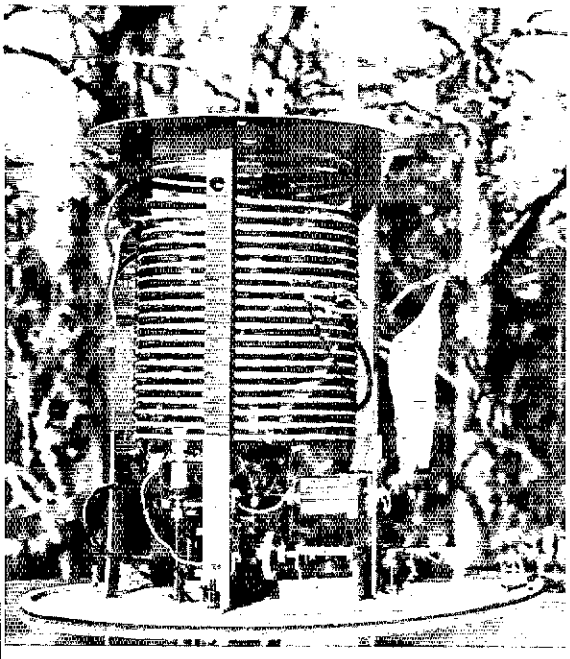
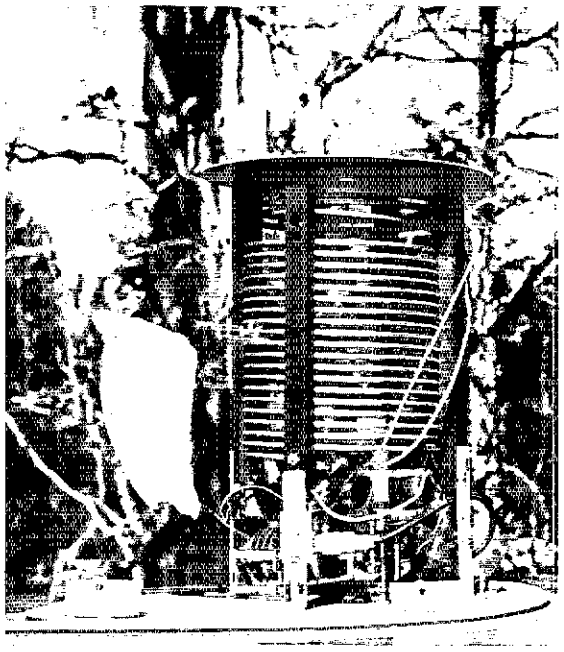


Fig. 1 — Electrical circuit of the MABAV.

J1 — Coax chassis fitting, type SO-239.
C1 — 1500-pF capacitor, TV doorknob type.
C2,C3 — 500-pF capacitor, TV doorknob type.
L1 — 22 1/2 turns, 3/16-inch-dia. copper tubing, 3/16-inch spacing between turns, 6 7/8 inches outside diameter. Top two turns spaced two turn diameters from the remainder of the coil. Taps, starting from the top,: 15 meters, 1 3/8 turns,; 20 meters, 3 3/4 turns,; 40 meters, 10 1/8 turns,; 75 meters is 1/2 turn from bottom of coil (this will determine the 75-kHz tuning range).
S1A,S1B — 2-pole, 5-position wafer-type switch, high-voltage type.



The doorknob TV capacitors are mounted on one of the supporting arms for the coil risers. Note that the last coil turn at the top is secured to the top plate.



This shows the coil and mounting features of the MABAV antenna. The tuning vane is mounted on the rotor of an old variable capacitor.

frequency coverage specified. TV doorknob-type fixed-value capacitors are switched in series with the base of the coil to provide matching on each of the bands.

Fabrication Of The Dome

The dome, used to cover the coil assembly, is made from fiber glass. In our case, a waste basket was used as the basis for the dome. The form for the dome's top was made from layers of plywood that were nailed together, then coated with plaster of paris. After the plaster had dried, the form was sanded smooth to provide a contour that would fit the waste basket. The top form was then clamped to the bottom of the waste basket with turnbuckles, inside the basket (see Fig. 2). The entire form was then coated with Vaseline to keep the fiber glass cloth from sticking to the form. Fiber glass cloth and epoxy are available from most marine supply house's. The cloth is stretched around the form and then coated with epoxy and allowed to dry. When dried, another layer of cloth and epoxy is applied. In our unit, three layers of cloth and epoxy were used, which provided a dome about 1/4-inch thick. The dried form was sanded and painted to match the color of the car roof. Two holes are installed in the top of the dome to accommodate the whips, along with rubber grommets to prevent moisture from getting into the assembly. The form is secured to the bottom plate, Fig. 3, by means of five screws.

Mounting Details

The bottom plate for the form is secured to the roof of the car with self-tapping screws and a coax chassis fitting, type SO-239. The inner portion of the SO-239 fitting is removed and the shell of the fitting is used to secure the bottom plate to the roof. The opening in the fitting allows enough room for the coax, switch, and tuning vane rods. This fitting is mounted directly over the dome light

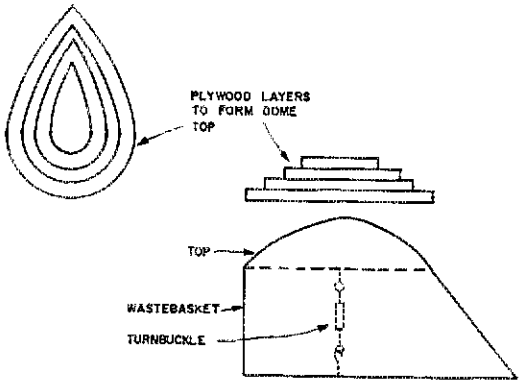
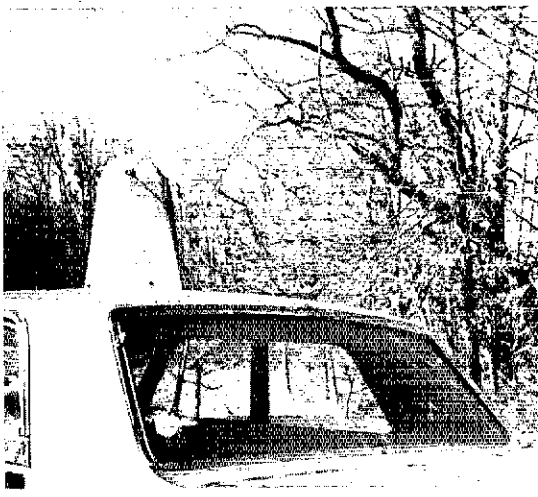


Fig. 2 — The top of the dome is made from laminated sections of plywood, covered with plaster of paris, and then sanded smooth.

in the car. RG-58/U is used to feed the antenna. The coax was snaked from the dome light opening, down through driver's side windshield support panel. The support-panel covering should be removed to get at the cable as it is snaked down below the dashboard.

Refer to Fig. 3A for the details of the coil construction. Spacing between the coil turns is 3/16 inch. Risers, to support the coil, are made from 3/4-inch-square Phenolic. The risers are slotted to hold the tubing. An aluminum plate, 9 7/8 inches in diameter, and 1/8-inch thick, is mounted on top the risers. On top of the plate are the two supports for the whips. The two supports are made from pieces of aluminum, each 2 1/2-inches long and 1/2-inch square. They are tapped at the top to take 3/8-24 threads for the whips. The supports are mounted so that the angle between the whips is 90 degrees.

The tap information given in Fig. 1 is for my car and might be different on another vehicle. It is suggested that temporary taps be made when checking out your system, soldering them on the coil *after* the correct settings are found. Tuning can be accomplished by feeding some power into the antenna and moving the tap back and forth on the turn while observing a field-strength meter and an SWR bridge, the bridge for reading minimum reflected power, and the field-strength meter observed for maximum intensity.



Here is the antenna ready for use.

The antenna has proved itself to be a real "winner". It is a pleasure to start out for work in the morning, talk to a few "locals" on 75 meters then switch to 40 meters and report in to ESCARS, and then jump to 21 MHz and work some DX, all in a half hour's driving time.

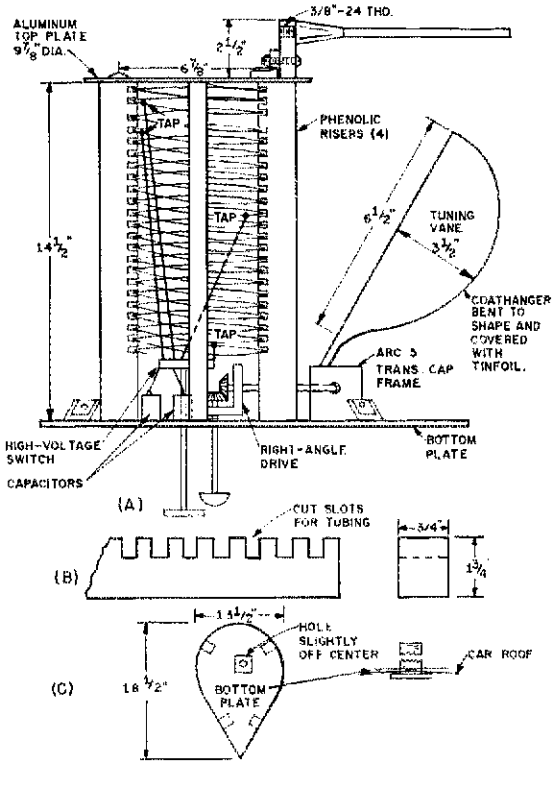


Fig. 3 – At A, constructional details of the coil and switch section. At B, method of making the risers, and at C, details of the bottom plate.

NEW BOOKS

1970 Popular Tube/Transistor Substitution Guide, by the Tab Editorial Staff. Published by Tab Books, Blue Ridge Summit, Pa. Catalogue number 525. 5½ by 8½ inches, 224 pages, leatherette cover. Price, $4.95 (paperback, $2.95)

The *1970 Popular Tube/Transistor Substitution Guide* contains eight chapters of replacement information. The unique feature of this new guide is that both transistor and tube material are presented in one manual.

Chapter 1 lists a cross-reference of American receiving tubes showing, first, what is considered to be the best substitute, and then listing several others. Only readily-available, directly-replaceable tubes are mentioned. Chapter 2 shows popular industrial tubes, and again the best substitutes are listed separately. A foreign/American interchangeability list is covered in section 3. Chapter 4 contains base diagrams keyed to the previously-listed tubes.

The transistor material begins with Section 5, showing the popular American types along with many readily-available substitutes. American replacements for foreigh transistors (which are commonly used in imported electronic gear) are covered in Chapter 6. The seventh chapter covers obsolete general-purpose transistors along with the currently-popular version. All of the transistors mentioned have their base diagrams shown in the last section for easy identification of leads.

Designed primarily for the TV/radio repairman, this book should be just as useful in the ham shack when searching for parts used in older *QST* and *Handbook* projects. The format of this guide seems to be well planned, and we are unable to find any fault worth mentioning. – *W1FBY*

Short Antennas for the Lower Frequencies

In Two Parts

Part I — Loading and the Use of Traps

BY YARDLEY BEERS, PH.D., W9JI

GREATER INTEREST in the use of lower frequencies is likely to result from the advent of the Five-Band DXCC Award and the imminent decline of the sunspot number in the years ahead. Unfortunately, few amateurs have space to put up half-wave antennas for these lower-frequency bands, and practical considerations require them to restrict their antenna lengths to whatever space is available. Then, some form of loading must be included to compensate for the fact that the antenna is not self-resonant. One of the purposes of this article is to review the types of loading that may be used and to discuss how the loading should be adjusted.

The problem is complicated by the fact that modern equipment provides for rapid band switching, and this feature cannot be exploited to the fullest advantage unless antennas are designed for multiband operation. In modern antenna design, this requirement is satisfied by the use of "traps," which consist of parallel-tuned circuits connected in series with the antenna at appropriate places. These are widely used in the three-band commercially-built Yagi antennas used on 14, 21, and 28 MHz. With these, the user has little occasion to delve into the details of the traps. No doubt, many amateurs consider traps as black boxes that work by magic. Actually, traps are easy to understand and to adjust, and can be conveniently incorporated in wire antennas which might be used at lower frequencies.

For simplicity, most of the present discussion is based on vertical (grounded monopole) antennas, since the number of traps and different wire lengths is only one-half that pertaining to a dipole antenna in a corresponding situation. It should be remembered, however, that the properties of a vertical antenna mounted on a perfectly-conducting earth are very closely related to those of a dipole of twice the length in free space. The input resistance and reactance of the vertical are just one-half those of the dipole, and the radiation pattern of the vertical is similar to one-half that of the dipole, but rotated ninety degrees. By use of this correspondence, any statements made here for vertical antennas can be adapted to horizontal dipoles; conversely, some of the reference material used by the author was presented originally in terms of horizontal dipoles.

*Chief, Radio Standards Physics Div., NBS, 740 Willowbrook Rd., Boulder, CO 80302.

With the lower-frequency bands coming into greater prominence, this article is particularly timely. Part I reviews the characteristics of short antennas and discusses means for tuning them to resonance, including the applications of parallel LC circuits or "traps," on a generalized basis.

Some Preliminary Remarks on Traps

A vertical antenna with a trap is shown in Fig. 1. In the design procedure commonly employed for two-band operation, the length of the lower section, H_2, is made one-quarter wavelength at the higher frequency of operation, f_2, and the parallel-resonant frequency of the trap LC, if disconnected from the antenna, is made to be at f_2. At this frequency, the trap impedance ideally is infinite — or, in practice, is a very high pure resistance — so that the performance of the lower section is little affected by the presence of the outer section H_1. At the lower frequency, f_1, ideally the trap is so far off resonance as to act as a short circuit, and if this were so the total length, H, could be made one-quarter wavelength at f_1, and the antenna would act as a quarter-wavelength one at both f_1 and f_2. More realistically, the impedance of the trap at f_1 cannot be completely neglected. Since it offers inductive reactance at f_1, it is necessary to compensate by reducing the length of the upper section H_1 such that the total length H is somewhat less than a quarter wavelength at f_1. The reduction in length depends upon the L/C ratio of the trap. In practical cases H may be ten or fifteen percent less than a quarter wavelength at f_1. Also, to be completely realistic, it must be recognized that actually at f_2 a small current does flow in the upper portion H_1 although it may be difficult to detect its effect experimentally.

The common procedure of making the lower section H_2 one-quarter wavelength at the upper frequency is a matter of convenience. This situation is easy to analyze theoretically, and the f_1 and f_2 resonances can be adjusted nearly independently. Fundamentally, other values of H_2 can be used, but the situation where H_2 has other values has not been studied fully. It is conceivable that some other value of H_2 might give better performance, but it is likely that with other values of H_2 the adjustment procedure might be more tedious since any change is likely to affect both reson-

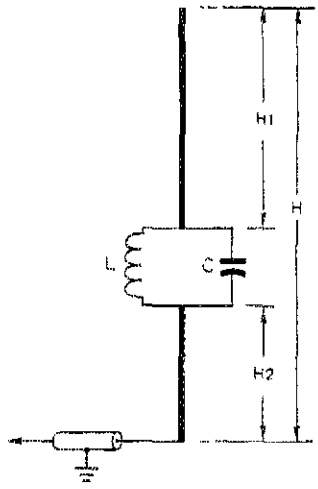


Fig. 1 — Vertical antenna with trap.

ances. In some cases the upper portion, H_1, can be expected to have appreciable current flowing in it at f_2. Later in the article an antenna will be described with which H_2 is only 0.15 wavelength at f_2.

The type of trap which has been referred to in the previous two paragraphs we shall call a "high-frequency trap" since its resonant frequency more or less coincides with the higher frequency of operation. There exists another type of trap,[1] which logically we shall call a "low-frequency trap" since its resonant frequency is made very close to the lower frequency f_1. Crudely, its operation may be described as follows: At the upper frequency f_2, the trap presents a very low impedance, mostly a capacitive reactance, so that if the total length H is made slightly longer than a quarter wavelength at the upper frequency f_2 the antenna behaves very nearly like a quarter-wave antenna at f_2. At f_1 the antenna is very highly reactive, but because of the rapid variation of the reactance of the trap near its resonance there exists an adjustment whereby it can be made to just tune out the reactance of the antenna at f_1 and bring it into resonance at this frequency.

With the low-frequency trap there may also be a wide variation in the length of the lower section H_2. In fact, in the author's antenna H_2 is made equal to zero. This may or may not be optimum electrically, but mechanically it is very advantageous since heavy trap components may be located directly on the ground.

In this discussion the presence of only one trap has been assumed. In principle any number of traps, including a mixture of high- and low-frequency traps, may be employed.

[1] Since preparing this manuscript the author has become aware of the scheme developed at the E. F. Johnson Company for two-band operation of mobile antennas (See *ARRL Antenna Book*, 4th ed., p. 303). The low-frequency trap might be considered as a special case of the Johnson system in which the length of the antenna is made adjustable while the inductor in series with the capacitor is made zero.

Before these ideas are explained in greater detail it is necessary to review how the input impedance of a vertical antenna varies with length and how the impedance and reactance of a parallel-tuned circuit vary with frequency. Then the two sets of ideas may be merged in a detailed discussion of how a trap works.

Input Impedance of a Monopole Antenna

The radiation resistance and series reactance of a monopole antenna mounted on perfectly-conducting earth are plotted[2] as a function of length in Fig. 2. This figure is given here mainly to show the general trends, rather than to provide precise data. Actually, both quantities depend upon the diameter of the conductor. The data of Fig. 2 pertain to the case where the length-to-diameter ratio is held constant at 320. The effect of varying the diameter is most conspicuous when H is near 1/2 wavelength, when both the resistance and reactance are lowered by increasing the diameter.

It is to be noted that as the length is increased from zero, the resistance increases approximately in proportion to the square of the length, while the reactance starts with a large capacitive value and decreases to zero near a length of 1/4 wavelength. For further increases in length the resistance increases, reaching a maximum of more than 1000

[2] See, for example, S. A. Schelkunoff and H. T. Friis, *Antennas Theory and Practice* John Wiley and Sons, Inc., New York, 1952, Chapter 13.

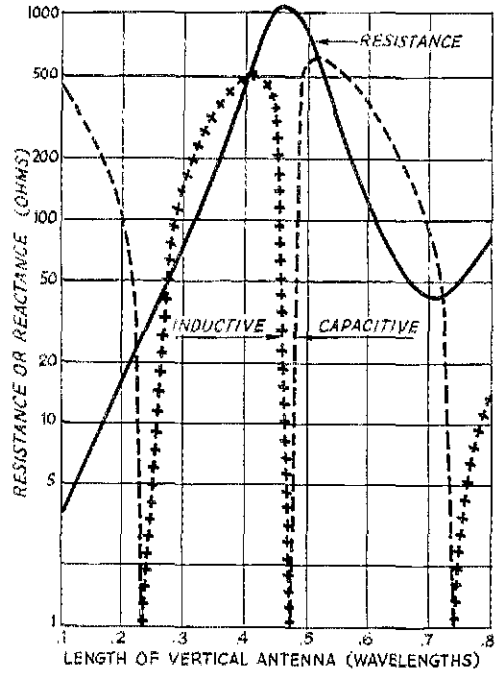


Fig. 2 — Radiation resistance and reactance of a base-fed vertical antenna over perfectly-conducting ground. These curves are for length-to-diameter radio of 320. (The curves have been adapted from Figs. 13.21 and 13.22 of Reference No. 1 for K_a = 800 by dividing the values given there by 2.)

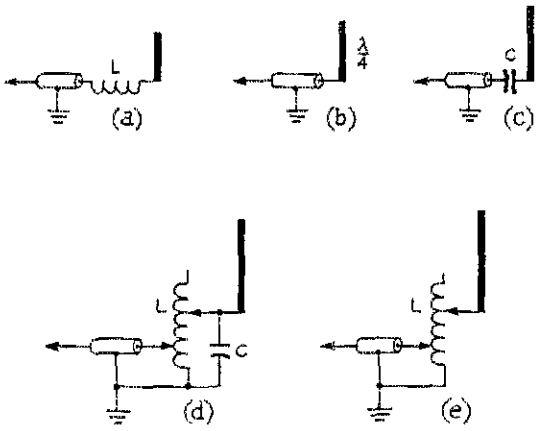


Fig. 3 — Matching networks for single-band operation of base-fed vertical antennas.

ohms near 1/2 wavelength, while the reactance becomes inductive, reaches a maximum close to 1/2 wavelength, and then suddenly goes to zero. For further increases, the resistance goes through minima whenever the length is close to an odd quarter wavelength, maxima when close to an integral number of half wavelengths. Succeeding minima are larger and larger while succeeding maxima are smaller and smaller. With each half wavelength variation in length the reactance curve repeats, approximately. The fact that reactance zeroes do not occur at exactly integral numbers of half wavelengths is due to end effects.

Radiation Patterns

To digress from the main theme for a moment, it is useful to note that if a vertical antenna is mounted on perfectly-conducting earth, the radiation pattern has a single maximum at zero degrees with respect to the horizontal until the length becomes slightly more than 1/2 wavelength. As the length is increased the lobe becomes sharper, corresponding to increased gain in the horizontal direction. When the length becomes more than about 5/8 wavelength, the major lobe starts to rise in angle, and minor lobes start to appear at lower elevations. For the greatest low-angle gain a length of 5/8 wavelength represents the optimum. This length corresponds to a center-fed horizontal antenna 1 1/4 wavelengths long — the so-called "extended double Zepp."

The effect of an imperfectly-conducting earth is to cause the single maximum of short verticals to occur somewhat above zero degrees, and as the length is increased this maximum is pulled down to lower angles until a length of 5/8 wavelength is reached.[3] Again, a length of 5/8 wavelength is optimum for producing low-angle radiation. For further details upon this matter and many others concerning vertical antennas, see the recent series of articles by Lee.[4]

Incidentally, in the author's experience, a 5/8-wavelength vertical is a spectacular improvement over the more familiar quarter-wavelength one.[5] Indeed, at times it seems to almost rival his three-element Yagi — which, however, is not very high above the ground.

Single-Band Operation

Now that we have reviewed the properties of vertical antennas, we are ready to discuss the simplest case, single-band operation. It is assumed that the antenna will be fed at the ground with 50-ohm coaxial cable. In general, it is necessary to tune out the reactance and to transform the resistance of the antenna to 50 ohms. For the moment, we shall suppose that the components necessary to do this are all located at the base. Of course, if the antenna is about 1/4 wavelength long the reactance can be made zero and the resistance will be a fair match to 50 ohms without any network.

In most practical situations, for vertical antennas of less than about 0.3 wavelength and dipole antennas for lengths up to about 0.55 wavelength, it is usually only necessary to tune out the reactance. In usual circumstances, line losses are unimportant[6] with standing-wave ratios up to 3 to 1, although with some modern transmitters it may

[3] Another important effect of increasing the height is that the radiation efficiency — which may be less than 25 percent with short (less than 1/4 wavelength) antennas having mediocre grounding systems — is improved. See *ARRL Antenna Book*, section on grounded antennas, Chapter 2, for details.

[4] Lee, "Vertical Antennas," *CQ*, in 12 parts, June 1968 through May 1969. See expecially Part 1 in June 1968 issue, p. 16, and Part 2 in the July 1968 issue, p. 25.

[5] This can be explained by the marked increase in efficiency at heights of the order of 1/2 wavelength together with the sharper lobe pattern (see Footnote 3).

[6] Beers, "Match or Not To Match," *QST*, September 1958, p. 14.

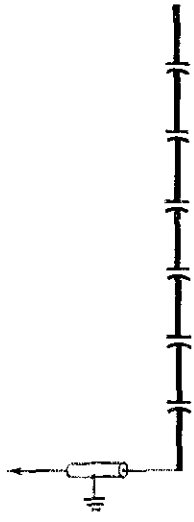


Fig. 4 — Oversize vertical antenna with distributed capacitive loading.

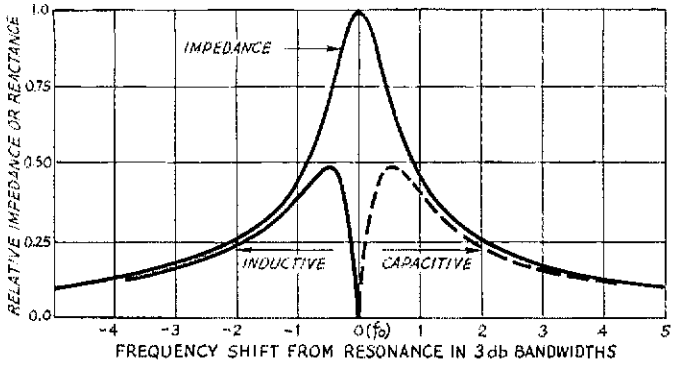


Fig. 5 — Total impedance and reactance of a parallel *LCR* circuit as a function of frequency. The impedance and reactance are given relative to the shunt impedance at resonance. The frequency is measured in terms of 3-dB bandwidths from resonance. In preparing these curves it has been assumed, as an approximation, that the Q of the circuit is large compared to 1 ($Q = 10$).

be necessary to hold the SWR down to 2 to 1 to bring it within range of adjustment of the transmitter's output network. SWRs within these limits usually can be achieved by merely tuning out the reactance. For verticals under 1/4 wavelength, it is only necessary to connect in a single inductance as suggested by Fig. 3A; those between 0.25 and 0.3 wavelength can be resonated by a single capacitor as suggested by Fig. 3C.

For longer lengths it is necessary to step down the antenna resistance. The simplest of many possible methods is shown in Fig. 3D, which is adjusted to give a net capacitive reactance for lengths between 1/4 and 1/2 wavelength. For lengths slightly greater than 1/2 wavelength (including 5/8 wavelength) the capacitor may be omitted as suggested by Fig. 3E, since the reactance of the antenna is capacitive. Networks 3D and 3E may be used with shorter lengths by those who wish to match the resistance as well as the reactance. Also, these networks provide a low impedance for dc and low frequencies, which may aid in lightning protection and in suppressing spurious responses.

Location of the Loading

Fig. 3 has suggested that the loading is to be located at the base. By no means is this the only possible location. One other possibility is to place it in the middle of the antenna — what is commonly called "center loading," but which will be called "body loading" here since with the related dipole antennas the corresponding positions do not fall in the middle but intermediate between the center and the ends.

With antennas shorter than 1/4 wavelength body loading has some advantage since it causes a more favorable current distribution and higher radiation resistance and efficiency. Not all of the theoretical gain in efficiency is realized, since a bigger loading coil is needed, and this has a larger loss resistance. With such antennas, the portion between the loading and the end acts like a capacitance which, of course, is smaller than that of the whole antenna. The portion between the loading coil and the base acts like an inductance. For antennas between 1/4 and 5/8 wavelength it is likely that greater efficiency is obtained with base loading, since the current loop is located higher, where it is further from absorbing material.

Nor is it necessary to locate the loading all in one place. As is well known, resonant antennas with physical lengths less than 1/4 wavelength may be made by winding a helix on an insulating rod, thus distributing the loading over the entire length.

An interesting version of antennas with distributed loading has been described by "Dud" Charman, G6CJ.[7] (His article describes dipole antennas, but for uniformity of style here his results are expressed in terms of the associated vertical monopoles.) The total physical length is considerably more than a quarter wavelength, and the antenna is broken into small sections connected in series with capacitors as indicated in Fig. 4. With proper adjustment, the electrical length is one-quarter wavelength in the sense that there is only one current node (at the upper end) and only one voltage node (at the lower end). The advantages of this over a conventional quarter-wave antenna are greater gain and greater bandwidth. The input impedance is higher than with a conventional antenna. One example he gives is of a 14-MHz antenna 50 feet long (as compared to the conventional 16.5 feet) broken up into sections 5 feet 6 inches long joined by 50-pF capacitors. This is said to have a gain of 2.1 dB over the conventional antenna and a radiation resistance of 100 ohms instead of 35.

Properties of a Parallel-Tuned Circuit

The total impedance and the reactance vs. frequency of a circuit consisting of an inductor and a capacitor in parallel are shown in Fig. 5. These graphs are plotted as "universal" curves that can be used with any such circuit whose reactance and resonant frequency, f_o and Q are known. The reactance and impedance are given on a relative scale; the shunt impedance is considered unity exactly at resonance, at which point it is purely resistive and equal to the reactance of either the capacitor or the inductor multiplied by the Q. The horizontal scale is in terms of frequency shift from resonance measured in 3-dB bandwidths. The 3-dB bandwidth is found by dividing the resonant frequency f_o by Q. (In calculating the numbers for Fig. 5 the assumption was made that Q is large compared to unity, an approximation which is

[7] Charman, "Loaded Wire Aerials," *RSGB Bulletin*, July 1961, p. 10.

valid under conditions which are usually encountered.)

There are several important features to be noted in Fig. 5. The maximum inductive and capacitive reactances occur at frequencies that are respectively below and above the resonant frequency f_o by only one-half the 3-dB bandwidth. These are the frequencies at which the total impedance has dropped to 0.7 of the maximum value, and where, of course, the response is 3 dB down from maximum. Within this range of frequency it is possible to obtain, somewhere or other, any value of reactance which is obtainable at all with the particular tuned circuit. Each value of reactance, except the maxima, also is obtainable at a second frequency outside this range. Far from resonance the reactance is small.

The maximum reactance magnitudes are one-half the impedance at resonance which, for a fixed capacitance and f_o is proportional to the Q of the tuned circuit. If the circuit is of very low Q and is to be used as an antenna trap, the reactance may never rise to a sufficiently high value to tune the antenna to resonance at one of its frequencies. On the other hand, if the Q is very high, the bandwidth of both the trap and the antenna as a whole becomes very small. Also, with a high Q the adjustment of the trap is very critical.

It should be said for emphasis, but at the expense of repetition, that the major variation in reactance occurs in a very small frequency range. For example, at 14 MHz with a modest value of 100 for the Q, a complete variation in reactance is obtained within a band of 140 MHz surrounding resonance, and with higher Qs the range of frequency becomes proportionately smaller. However, we are speaking here of the bandwidth of the trap itself and not of the antenna as a whole. The bandwidth of the antenna under favorable circumstances may be considerably wider than that of the isolated trap since the radiation resistance lowers the *overall Q*.

The Principle of Operation of a Trap

Now that we have reviewed the various bits of background material, we shall bring them together in a generalized discussion of the operation of a trap. Using a different design approach from that described earlier, assume that the trap position is arbitrarily chosen, and that the *total* length H is selected to be close to self-resonance on one of the two bands on which the antenna is to be used. On this band the reactance required to produce exact resonance is very small. It is obtainable by having the trap far off resonance for this band, and operation does not depend very critically upon the adjustment of the trap. However, on the second band the antenna is far from self-resonance, and a large magnitude of reactance is required in the trap to bring the antenna into resonance. From what has just been said in the previous paragraphs, it should be evident that this condition is obtained when the resonant frequency of the trap is close to, but not exactly at, the desired frequency of operation.

In the case of a high-frequency trap, the total length H is close to the self-resonant length for the lower frequency f_1. The antenna is much too long to be self-resonant at the higher frequency f_2, and resonance there can be obtained by having the trap produce a significant amount of capacitive reactance. Then from the point of view of Fig. 5 f_2 is just slightly to the right of f_o (f_o slightly less than f_2), while f_1 is far off scale to the left. Strictly speaking, at f_1 the trap produces a small amount of inductive reactance; therefore, to produce exact resonance at f_1 the length H should be slightly shorter than the self-resonant length. The detailed explanation of a low-frequency trap is entirely analagous, except that every statement must be reversed. For example, f_1 is slightly to the left of f_o in Fig. 5, while f_2 is off scale to the right.

As is to be expected, the performance of a trapped antenna on either band is inferior to that obtained when the same antenna is loaded for single-band operation only. Either the efficiency, the bandwidth, or both, is poorer.[8] However, if the self-resonant frequency is not too far from lowest operating frequency, as is usually the case with antennas with high-frequency traps, the deterioration of performance is quite small and can be tolerated as the price of multiband operation.

In other cases, expecially with antennas having low-frequency traps, the deterioration in performance may be significant, and the user must make a decision as to what is the best compromise for his purposes. Largely by changing the L/C ratio of the trap, he can make the performance on one band nearly up to that obtained with monoband loading while having marginal performance, allowing at least local operation, on the other band; or he can make the performance equal on both bands but on each somewhat less than with monoband loading. Fortunately, with vertical antennas with low-frequency traps the principal loading can be located at the base, and often being conveniently accessible, can be made plug-in. Traps with different L/C ratios or monoband loads can be plugged in with changing needs.

The effect of the L/C ratio may be illustrated by reference to the antenna with the high-frequency trap. At one extreme, where the capacitance is left out entirely, resonance can be obtained only by adjusting the inductance for resonance at the lower frequency f_1 (it is assumed that the length H is slightly shorter than the self-resonant length), and the antenna becomes totally ineffective at f_2. At the other extreme, in which the inductor is left out, resonance can be obtained only at f_2 by adjusting the capacitor, and the antenna becomes ineffective at f_1. Thus decreasing the L/C ratio tends to make performance at f_2 improve and that at f_1 decrease.

If practical considerations make it impossible to make the length H reasonably close to self-resonance at one of the frequencies, the adjustment of the trap is likely to become very critical, and in most cases it is necessary to bring the antenna close

(Continued on page 55)

[8] As compared with monoband loading, using a single reactance the reduction in efficiency is almost entirely the result of extra power losses caused by the circulation of current in the traps; the loss can be reduced by using high-Q components, but at the possible expense of reducing the bandwidth of the antenna.

A Different Way to Get On 50-MHz Sideband

This route to 50-MHz ssb operation will very likely never be followed exactly by anyone other than its originator, K2UUR, but he has some tricks that may be helpful to others looking for inexpensive ways to do the job.

Bob and his son, WB2NHV, had good results with low-power ssb on the lower bands, so they wanted to try the mode on 50. They got there with a Central Electronics 10B and the remains of an old 220-MHz transmitter. The 220 rig had a 6CL6 oscillator-tripler, with 8-MHz crystals, a 5763 tripler to 72 MHz, a 7558 doubler to 144, another 7558 amplifier, and a 3E29 final stage. These tubes are still used in the sideband lashup, with only the functions being different.

The first two stages remain as before. The first 7558 is now a mixer, combining 72 MHz from the first two stages with 21 MHz from the 10B. Though some might not think of doing it this way, heterodyning down works just as well as up, except that the resultant frequency change is in the opposite direction to the movement of the injection frequency. The 8-MHz rock in the exciter and 21.0-MHz in the 10B give output on 51 MHz. Sideband energy on 21.45 moves the operating frequency down to 50.55. To go to the low end, Bob uses a 7943-kHz crystal in the oscillator-tripler most of the time, covering 50.037 to 50.489 MHz.

The circuitry involved in all this is basic *Handbook* or *VHF Manual* stuff, so it is not spelled out in detail here. Some points to watch are stressed, however. One is the possibility of unwanted frequencies in the output, resulting from the second stage doubling as well as tripling. This may cause energy on 48 MHz to ride through the mixer and amplifier stages, along with the intended 50-MHz stuff. This was cured by insertion of 48-MHz traps in the tripler plate and mixer cathode circuits, as shown in Fig. 1.

Neutralization requirements for linear operation are critical. It was necessary to neutralize the 7558 driver stage and the 3E29 amplifier. The latter was most stable with cross-over neutralization on one side of the dual tetrode only!

Probably any tube of the dual-tetrode family would work well in this arrangement, though almost certainly there would be differences in neutralization and perhaps in circuit constants. The 3E29 is well-suited to the sideband application. Having been designed for use as a pulse modulator in radar service, with 3000 volts and 4 amperes peak values for the plates, it operates well with up to 900 volts dc in ssb service.

The editor of this piece suggests the possibility of reversing the roles of the grid and cathode of the 7558 mixer from those shown in Fig. 1. With the greater tolerance to be expected of the cathode, before flat-topping sets in, it might be well to try putting the ssb injection on the cathode and the 72-MHz signal on the grid. This has not been tried with this lineup, but in the heterodyne unit[1] built for going from 50 to 144 MHz at W1HDQ, we found that ssb on the cathode and unvarying injection on the grids of a pushpull mixer resulted in much greater undistorted mixer output than the other way around.

K2UUR used an adjustable bias supply capable of up to 100 volts negative for the 3E29 grids. This was set to give a 3E29 plate current of 35 mA with no signal input in the transmitting position. In changing to receiving a second bias voltage of 50 or more is cut in.

In using the 10B as a sideband source, the 21-MHz output could be used without swamping. If the more common 100-watt-plus ssb rigs are used, provision must be made to swamp out all over a few watts of the exciter power. — *W1HDQ*

[1] *QST*, August, 1964, and *The Radio Amateur's VHF Manual*, Chapter 6.

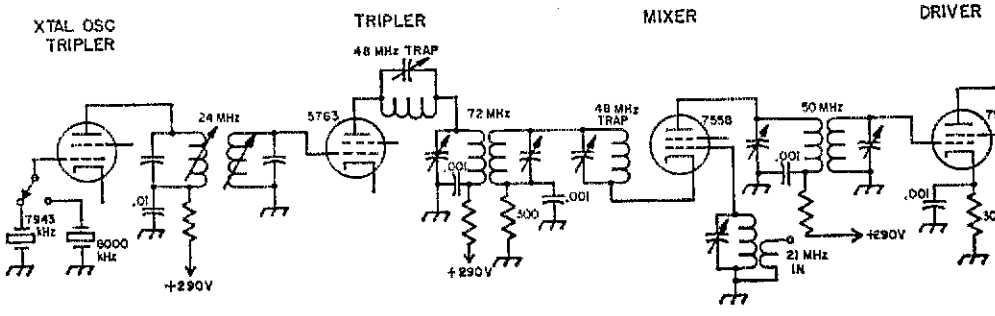


Fig. 1—Partial schematic diagram showing the use of a low-power 21-MHz ssb source and the oscillator and multiplier of former 220-MHz rig, to put a 50-MHz ssb signal on the air at K2UUR.

• *Beginner and Novice*

More Questions and Answers

From our mail bag it would appear that some questions are asked more often than others. Here's a batch that should cause some discussions at the local club or on the air.

BY LEWIS G. McCOY,* W1ICP

I AM ON *the verge of buying a new house that has aluminum siding. The siding is painted on both sides, but the actual contact between the pieces is not consistent. What effect will this metal sheathing have on a vertical antenna mounted alongside the house, and how about static and TVI?*

This and other varieties of the same type question keep popping up. It isn't an easy question to answer because of several factors. First, on antennas and what effects nearby metal masses would have. Let's assume you mounted a vertical antenna a few feet from a metal-sided structure and that you managed to match the antenna so that all your power was being put into the antenna. Certainly the metal structure would tend to act as a shield in the direction of the building. And, at the very least, would distort the normally-expected pattern from a vertical that was in the clear. However, this shouldn't be taken to mean that the antenna wouldn't radiate or "work out." It will work, but how well it will work can be anybody's guess.

If the vertical were mounted on a metal roof it could actually be an advantage to have the metal surface below the antenna, because the surface would act as a ground plane. On the other hand, the performance of a horizontal antenna that was suspended over a mass of metal could be adversely affected. However, just how much effect there would be is impossible to determine. The only approach to a problem like this is to put up the antenna and try it.

As to static and TVI, the bonding of the metal pieces to one another can be important. It is unlikely that static would be a problem, but TVI could occur, and could result from the poor connections between the metal surfaces. In the presence of a strong rf field, arcing can occur between poorly-bonded pieces of metal. The metal surfaces could act as non-linear rectifiers and may actually generate harmonics. However, whether or not this type of harmonic generation can cause TVI will depend on the bands in use, and the strength of the TV signal. Normally, interference doesn't occur unless the band in use is 20 meters or higher, and the TV signal could be classed as a fringe-area signal.

[EDITOR'S NOTE: Aluminum siding installers tell us that many local building codes require that all houses using metal siding, must have the siding grounded (at ground potential).]

Dear OMs: What in heck is a "shorting" and a "non-shorting" switch? I have looked through all my books and can't find the answer.

Not too common a question, but one that many builders might like to have answered. What is referred to here is usually one of the wafer-type switches on which a rotating arm makes contact with the various stationary contacts around the wafer. In the shorting type, the arm of switch, as it is rotated, leaves one contact and goes on to the next one, but actually touches *both* contacts (shorts) before it completely leaves the previous contact (see Fig. 1 at A). This type of switch is used in many applications where it is desirous to not completely open a circuit, or to keep a load on a circuit as it is switched through the various steps.

The non-shorting variety is si ıply a wafer-type switch whose arm leaves one contact and actually opens the circuit until it reaches the next contact (see Fig. 1 at B).

Here's another question in the same category as the previous one: *Why do they use a jumper between pins 3 and 7 of the octal-type voltage-regulator (VR) tubes?*

Believe it or not, we asked several hams, who are all equipment builders, and none of them knew why. The answer to the question is that the jumper serves as a protective connection. A good example is where a regulated voltage from a VR tube is

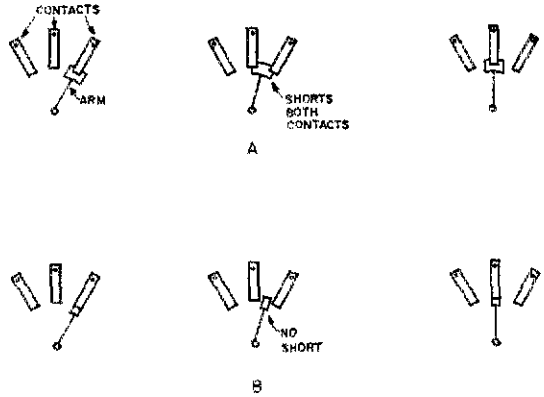


Fig. 1 — At A, the shorting type wafer and at B, the non-shorting type.

*Novice Editor

applied to the screen of a tube and for some reason the plate voltage fails or isn't turned on. Without the plate voltage, but with screen voltage, the tube could easily be ruined. The jumper in the VR tube can be used as "fuse" or safety-lock to prevent this from happening (see Fig. 2). As you can see, the B-plus line must flow through the jumper.

Back in December 1969 *QST* one of the questions asked was: *My SWR bridge shows more reflected reading than forward reading. What gives?* In the answer, it was pointed out that with the common Monimatch-type SWR bridge, the unit was frequency sensitive, and that vhf parasitics or harmonics could cause a higher reflected than forward reading.

A lot of mail came in taking us to task, and rightly so, because there were several other things that could make an SWR bridge give erroneous readings. In the first place, always make sure that the bridge is connected into the line correctly. In other words, make sure the transmitter end goes to the transmitter and the antenna end to the antenna. If the bridge is connected backwards the readings will be backwards too.

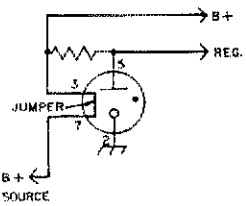


Fig. 2 — This drawing shows the shorting connection through the VR-type regulator tubes, octal base types.

Also, a shorted or open coaxial line on the antenna side of the bridge will cause the reflected and forward readings to be almost the same. This wouldn't be an erroneous reading because a shorted or open feed line would produce an almost infinite standing wave ratio, and of course this is exactly what the SWR bridge is indicating. The important thing to keep in mind, assuming the bridge is connected correctly, and there are no parasitics or harmonics getting into the unit to mess up the readings, is that an SWR bridge cannot show more reflected reading than forward. After all, an antenna is not a power generator, it is a load, and as such will take power from the source.

I am using a 60-foot random-length, end-fed wire for my antenna. On 80 meters I have no problems, but on 40, 20 and 15 meters I have lots of rf around the shack. I am using a Transmatch and everything tunes up OK, and matches, but I am always getting "bit" by the rf. Oh yes, I have a good earth ground on the Transmatch. Anything I can do about the problem?

Without going into a lot of detailed antenna theory, there is a simple approach for curing the problem. Any end-fed wire that is 1/4-wavelength long, or an *odd* multiple of 1/4 wavelength, can be classed as a low-impedance-feed antenna and will be high-current, low-voltage feed. On the other hand, any antenna that is 1/2-wavelength long, or a multiple of 1/2 wavelength, and is end fed, will be a high-impedance antenna at the fed end, and will be high-voltage, low-current feed. In the case of the 60-foot antenna, it would be low-impedance feed on 80 meters, because it is 1/4-wavelength long, but would be high impedance on the other bands. On 40 meters it would be 1/2 wavelength long, on 20, two half wavelengths, and on 15, almost three half-wavelengths long.

Given below in Table I are some lengths that work out to odd 1/4 wavelengths. Using a Transmatch, it may be possible in any given installation to pick a length that is neither voltage or current fed, thus getting rid of the rf problem. Another way would be to put up two wires to cover the bands, and just switch in whichever antenna is needed. As an example, 60 feet for 80 and 10 meters, and 80 feet for 40, 20, and 15 meters.

TABLE I

Band	*Odd Multiples of 1/4 λ*			
	1 (ft.)	3 (ft.)	5 (ft.)	7 (ft.)
80	60	180	-	-
40	30	90	150	-
20	16	48	80	112
15	11	33	55	77

In keeping with good safety practices I have always used an earth ground on all my equipment, and in this case a water-pipe ground. The other day I happened to disconnect one of the units from the earth ground and got a slight shock when touching the case of this unit and another that was still connected to the earth ground. After making many voltage tests between various pieces of equipment and the earth ground between them and the power company's neutral lead. I get several different voltage readings I don't know what to think! Isn't the power company's neutral lead supposed to be at earth-ground potential? So what is happening?

When the power company brings the ac lines into a building, they connect to, or install an earth ground at the entrance. The neutral, or ground side of the line, also comes from this grounding point. Unfortunately, what is ground at one point, may not be the same ground at another point. If that sounds confusing, it is. To explain it more clearly, let's suppose that the power company ground is made at the power entrance to the building, and that your ham shack is some 30 feet away, and near a window. You install a ground rod at the window and bring in a lead. Then connect all of your equipment to this new ground. However, let's say that due to poor soil conditions, there is an actual resistive difference between the two grounds of 200 ohms. (Actually, you can note some very startling differences in resistances between two grounds). If you plug a piece of gear into the ac line, and depending on the way the piece of gear is

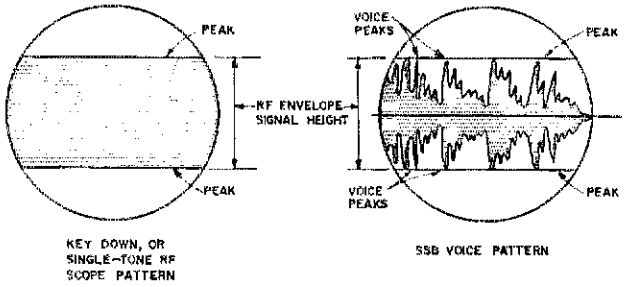


Fig. 3 — This shows that the same peak exists for any given single-tone input versus PEP.

wired, the chassis of the unit is at ground potential, and the potential is the same as the power company's ground. If you were to put a voltmeter between the chassis and your own ground-rod connection, you would observe a voltage difference simply because the two grounds are 200 ohms apart. There are a lot of other little clinkers that can get into the act to make these voltage differences. However, what is important is that *all* of the chassis should be kept at the same ground reference, and that is why it is a good idea to bond all chassis together and connect them to a common ground – preferably a good ground that you have installed yourself.

Just a word about ground rods: some hams use "TV" ground rods. In our experience, these rods aren't worth bothering with. If you are going to install a ground rod, get your rod from an electrical supply house and ask for the type that is used for electrical entrances. These rods are 5/8-inch diameter, are of heavily galvanized steel, and are 10 feet long. Take a sledge hammer and drive the rod into the soil down as straight as possible. Then bring a heavy conductor from the pipe, No. 6 copper wire preferably, into your station for the common ground connection.

In modern wiring, the power outlets are installed with three-wire receptacles. Two of the wires are for the regular hot and neutral conductors, and the third wire is a common ground lead. The piece of equipment that is plugged into such a receptacle has a three-prong plug. Two of the prongs are for the hot and neutral leads, and the third plug is connected to the exposed metal frame (chassis) of the equipment. This method removes the chance of accidental shocks from contacting the exposed metal parts of the unit should it be "hot" with a dangerous voltage.

I just passed my "General" and would like to buy a transceiver. However, I hear all kinda comments and arguments about dc input and PEP. I wish you could tell me, for example, does 100 watts dc input equal 200-watts PEP? And if not, why not?

Well, this question is a real toughie to answer in simple terms – but we'll try. Let's suppose we put an oscilloscope on the output of our transmitter and tune up for 100 watts, key down, (cw) dc input. For our 100-watts input, we'll have a certain height to the rf signal appearing on the scope (see Fig. 3). If we mark the top and bottom of this signal (these marks can be called the "peak" of the rf envelope) we are looking at the rf envelope. Now, if we switch to ssb and speak into the microphone, we'll see the voice peaks shoot up and down on the scope. Next, if we adjust the mike gain so that these peaks reach our marks, and go no higher, this is the *peak envelope power*, or PEP. It doesn't take much reasoning to see that if we meet these conditions, our PEP is the same as our key-down input, or 100 watts. Unfortunately, life isn't quite that simple.

If you look over the specs that manufacturers give their transceivers, you'll find a wide difference in input ratings. For example, you might see a particular transceiver rated at 300-watts cw and 500-watts PEP for ssb. This doesn't change the above definition of dc input versus PEP input one bit. For 300-watts cw input you would still have 300-watts PEP input under the conditions of tuning we've just described. So how come the 500-watt rating for PEP?

In using some types of tubes in a linear amplifier, there are certain conditions that must be met if one doesn't want to burn out the tubes. In using the amplifier we have an expression called the "duty cycle." The duty cycle can be defined as the time that a tube is not resting, but is working. In our example, let's assume that we tune up to the cw rating of 300-watts input. Under the key-down condition, we should be able to run 300 watts for relatively long periods of time without damaging the tubes, and this could be classed as a *long* duty cycle. However, if we tuned up to the 500-watt level under the same long duty cycle, we might quickly burn out the tubes by exceeding their maximum plate-dissipation ratings. But, if we switch to ssb, and talk into the mike, because of the characteristics of speech and its intermittent nature we would be running the tubes on a very short duty cycle. Under these conditions we can get more *peak* power input and output from the amplifier without harming the tubes. It has been estimated that the duty cycle on ssb without speech processing is only about 15 to 20 percent of that used for key-down cw. Keep in mind that this *does not* change the original definition of cw versus ssb input that we set down earlier. It follows, then, that *if we could* close the key under the short ssb duty cycle, and measure our dc input, the input would be 500 watts – the same as for the ssb condition.

One of the big arguments revolves around the 1-kW level when discussing ratings. Does 1-kW dc input equal 2-kW PEP? You can easily see from our example that you cannot run 1-kW dc input and

get 2-kW PEP input. Looking at our scope example, and talking in terms of *output* rather than input, in order to get the same rf envelope height as during the peaks on ssb you would have to run the same key-down input.

Of course, following this line of thought, and to be perfectly honest, the question would arise as to how 2-kW PEP would be legal. The answer to this is really quite simple. PEP is the *peak* power, while the *average* power is usually half that, or even less than half. In other words, 2-kW PEP is really an average power of 1 kW. If one plans to run the legal limit, he must monitor both the plate voltage and plate current of the final amplifier. In running 2-kW PEP, the *highest* plate current reading, under speech conditions, times the plate voltage, should not exceed 1kW. You will be getting your 2-kW PEP because the plate-current meter isn't fast enough in its action to show the instantaneous peak current. (Also, be sure to include the driving power of the exciter when calculating that 1-kW input). From the above description it should become *very* apparent that any amateur operating on ssb should use an oscilloscope to be able to see *exactly* what is taking place.

This should answer the basic question that was posed at the beginning. However, we haven't treated the problem of distortion and linearity in amplifiers. It is recommended that the reader study the chapters on ssb in *The Radio Amateur's Handbook* for a more detailed discussion of the subject.

I just bought a new set of headphones because my old ones broke down. However, I can hear quite a bit of hum from my receiver. What's wrong with my receiver and how do I fix it?

(Upon checking a few of these questions we found that the hams had bought hi-fi headphones!). However, for the benefit of the newcomer, hi-fi phones have a very wide frequency response, running from 25 to 15,000 Hz. The answer to the question is that there is probably nothing wrong with the receiver, you just have phones that will respond to the existing 60-Hz hum better than the old ones did. Buy some communications-type headphones. Their frequency response is for communications, not entertainment.

If my antenna wire touches tree branches and leaves will it hurt my signal?

Rule No. 1 in antenna installations is to always try and get your antenna completely in the clear. Anytime an uninsulated antenna wire touches an object, particularly one that is grounded, you'll have some deterioration of the signal. If you *have* to run the wire through trees use an insulated wire. This isn't to be construed that we recommend running antenna wires over or on branches and so forth, but if you do, use insulated wire even though the close proximity of the limbs to the antenna will probably change its resonant frequency.

I am going to put up a half-wave antenna for 80 meters. I want to have the maximum radiation east and west, but I can't put the ends up north and south, I'll actually be about 30 degrees off from north to south. Will I still work our OK east and west:" Oh yes, the antenna will be 30 feet high.

If you look up the free-space pattern of a half-wave dipole you'll find that it shows a figure-8 pattern with maximum radiation broadside to the plane of the wire. That is maximum radiation from the sides, with minimum from the ends. However, and this is very important, that is for a *free-space pattern*. Any pattern of radiation is affected by the earth below it. In order to obtain the free-space pattern, a dipole must be at least a half-wavelength above ground. On 80 meters this means that the entire dipole must be at least 130 feet above ground.

Of course the question really is, what is the radiation pattern when the antenna is low to the ground, say, 30 feet? Actually, such an antenna could be classed as an omnidirectional antenna; it will radiate equally well in all directions! (This is also more or less true for the popular inverted-V dipoles). With dipoles, in the average ham installation, you really don't start to get directivity until you reach 20 meters, where a half wave is only 30 feet or so above ground. For this reason, it is kind of foolish to build a 40-meter beam antenna and then mount it 30 or 40 feet above ground – it just isn't worth the effort.

Are trap antenna systems as efficient as a full-sized system? If not, roughly how much worse are they?

It is very difficult to put exact figures into any antenna comparisons because there are many different factors that must be considered. However, generally speaking, a trap antenna can never be as efficient as a full-size antenna for the same frequency. Any trap will have some losses. How much loss depends on the trap construction, size of the wire used in the trap, dielectric material used in the trap, an so forth.

A better comparison could be made in discussing trap beams versus monoband beams. The gain of a beam antenna depends on a few factors, but one of the most important of these is element spacing. In a monoband beam, you can design the beam for optimum spacing of the elements. However, in many trap beams, you must compromise on spacing in order to get multiband coverage.

If you are going to purchase a commercial trap-beam antenna there are certain things you should look for. Are the elements spaced for optimum gain? Are additional elements installed for optimizing spacing? Has any attempt been made at matching the feed point to the feed line? And, if so, how is it accomplished? Are the traps constructed to minimize losses? These are just a few of the things you can ask the manufacturer of a trap beam.

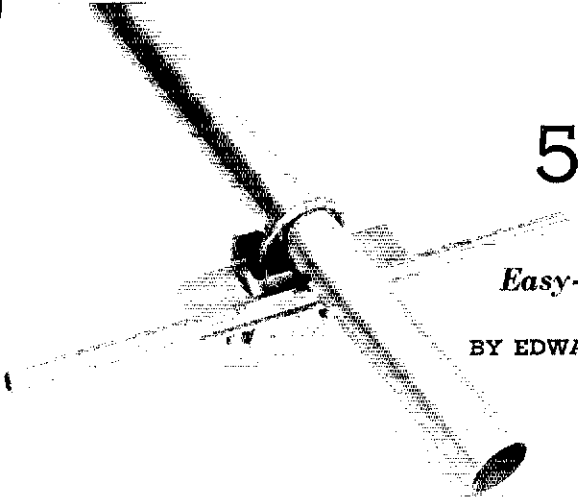
ARE YOU LICENSED?

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

5-Over-5 for Six

Easy-to-Build Stacked 50-MHz Array

BY EDWARD L. LINDE,* WB2GXF, EX-KØGEX, K9YRX



Model showing the method of mounting the elements in the 50-MHz array. An aluminum plate is shown, but suitable angle stock will provide an even stronger assembly. Elements are ½- or ⅜-inch hard-drawn aluminum tubing.

In order to make more effective use of the 6-meter band I decided to build a new antenna to replace my trusty 12-year-old 4-element Yagi. Several features I wanted to include were 50-ohm feed, balanced radiator, increased gain, and lower radiation angle than I'd had with the 4-element job. An all-coaxial phasing system looked attractive, for both electrical and mechanical reasons.

The result was two 5-element Yagis, stacked one above the other, a half-wavelength apart. Element lengths and spacings are given in Fig. 1. With the phasing system used the spacing could be increased to 12 feet, for slightly more gain, but 10 feet was all that could be handled conveniently in this installation. The mechanical design is simple and readily duplicated. Principal details can be seen from the drawings and the photograph of the mockup, which shows how elements are mounted to the boom.

Mechanical Details

The folded-dipole driven elements allow some range of adjustment of the feed impedance of the system, through the use of small fed portions whose spacing from the unbroken larger portion can be varied. The fed portions are ⅛-inch aluminum rod or hard-drawn wire, with the outer ends bent 90 degrees and threaded to permit fastening them in place with nuts, once the optimum spacing from the larger portion is found. The unbroken portion of the dipole is ½-inch (outside diameter) hard-drawn aluminum tubing, mounted to the boom by means of an aluminum plate and a U-clamp, as shown in the mockup.

The fed portion is fastened to the lower side of the boom, using TV antenna insulators (Channel Master parts) found in a local TV parts store for 15 cents each. Should it be impossible to find suitable insulators ready-made, the spacing between the large and small portions of the dipole can be maintained with blocks or pillars of insulating material. If rod or hard-drawn wire is used, it will be stiff enough to require little or no bracing. Softer wire may need several insulators mounted at intervals along the dipole. In bending the outer ends of the fed portion, take the bending slow and easy, and don't try to bend at a sharp angle. Hard stiff materials break easily, a fact that was learned by sad experience!

The basic idea of the folded dipole driven elements in this system is to develop approximately 400 ohms impedance in each bay, which is then fed with 93-ohm coax and a half-wave balun, as shown in Fig. 2. The impedance at the center of the phasing system thus becomes approximately 50 ohms, and can be fed directly with 50-ohm coaxial cable. Adjustment of the spacing, *S* in Fig. 2, gives some range of impedance variation. For the system shown, two inches center-to-center gave a good match to the 50-ohm main transmission line.

The phasing harness and baluns are made of RG62/AU 93-ohm coax, each piece (4 required) having a shield length of 77¾ inches. The line and balun should be taped to the boom near to the driven element, to prevent flexing of the leads, and the inevitable breakage that would result. The phasing line is then run along the boom and down or up the vertical support, to a coaxial T fitting at the midpoint, for connection to the main line. The phasing lines and baluns should be taped to the booms and vertical support at frequent intervals. With the booms supported at their approximate balance points, the spacing

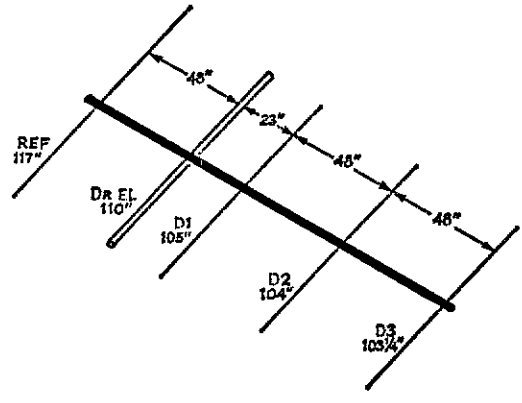


Fig. 1—Element lengths and spacings for the WB2GXF 5-over-5 for 50 MHz.

* 46 Ridgeview Road, Poughkeepsie, New York 12603.

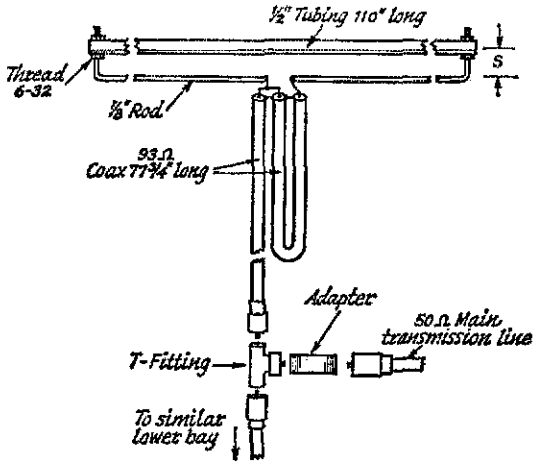


Fig. 2—Details of the driven elements and phasing system used in the 50-MHz stacked array. The folded dipole is set up so that its feed impedance is approximately 400 ohms. Two half-wave baluns and half-wave phasing sections step down to about 100 ohms. The two bays thus connected in parallel may be fed with 50-ohm coax directly.

between bays will be about 10 feet, or one-half wavelength.

Greater spacing, up to about 12 feet or ⅝ wavelength, will give somewhat more gain. If this can be handled mechanically, either of the phasing lines can be made an electrical half-wavelength longer (77¾ inches) and the bays will still be fed in phase.

Adjustment and Use

With the dimensions given, checking with a bridge inserted between the coaxial T and the main line showed an SWR under 1.3 to 1 from 51.2 MHz to the low end, with the best match, about 1.1 to 1, in the most-used part of the band from 50.1 to 50.3 MHz. Such a test should preferably be made with the array in the position in which it is to be used. The best alternative is to prop up the array at ground level, with the booms pointing straight up. Varying the spacing between the fed and unbroken portions of the folded-dipole driven elements will provide a range of matching adjustment, if the SWR turns out to be higher than you like. The two bays should have the same spacing for each check, if this is done.

The old 4-element array was left up when the 5-over-5 was erected, to provide comparisons. Both were at the 50-foot level. Signal reports show up to 10 dB better performance with the new array, on some paths where radiation angle apparently is a critical factor.

(Editor's note: Stacked 50-MHz arrays will show more than their theoretical improvement over single bays on some propagation paths, and less on others. The stacked system is likely to work well on the circuits where it is needed most, and is usually a very good investment for the DX-oriented 6-meter man.) QST

August 1945

. . . Editor Warner dwells at some length on the width of the ham bands. Since highly stable oscillators are now in use, it is no longer correct to visualize the space taken up by a given station as a certain percentage of the operating frequency. Instead, it is a matter of how many cycles wide is the band. All the previously made complicated charts used before are now in the ash can.

. . . Dave Middleton, W2OEN, Ass't Editor gives us an entertaining and informative article concerning a four day voyage on a USMS training Ship. Here he finds out a great deal about marine radio operating, as well as life at sea. Good stuff.

. . . It is now official that the old five meter band has become 50-54 Mc. This action was not expected till later in the fall, but the FCC took up the matter and quickly reached its decision, effective at once. They also announced a flock of other allocations, mostly for television and f.m.

. . . McMurdo Silver concludes his two part treatise on Vacuum Tube Voltmeters. These two constitute a really comprehensive and deep study of this device. It is a classic of its day.

. . . Herbert H. Tripp, VE5AEU recounts his thrilling adventure aboard a merchant marine ship, the freighter "Goodleigh". Torpedoed and sunk, he was finally picked up by a British destroyer-safe.

August 1920

. . . The Bureau of Standards Fading tests have been completed and the ARRL tests begins. These are to be much more comprehensive. S. Kruse is expected to present an analysis of the Bureau tests in an early issue.

. . . Prof. Hazeltine, consultant to the U.S. Navy and later to be well remembered for his famous "Neutrodyne" receiver, was largely responsible for the development of the SE-1420 receiver. For perhaps the first time, unused turns in the inductances were shorted out, instead of being disconnected. The tuning coils were wound with "Litz" comprised of 20 strands of No. 38 insulated wire. Great selectivity and freedom from local interference are claimed. Either crystal or audion detector may be used. Guess they didn't quite trust vacuum tubes in those days.

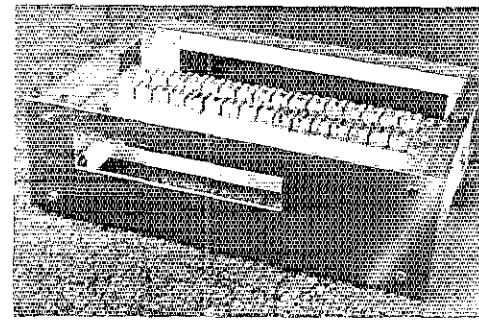
. . . A drawing shows a "grid leak". The grid leak drip pan has not yet been invented. (We have a few of these in stock).

. . . A whole page of pictures depicts old WCC at Cape Cod, together with a short descriptive article. One picture shows the rotary gap in operation. There appear to be 16 studs, a bit of information I have been searching for. If driven at 1800 rpm, this would account for the rather low note so fondly remembered by O.T.s.

. . . Conn. Tel. and Tel. introduces a new type variable condenser, comprising two brass plates with a mica sheet for dielectric. — *W1ANA*

A Dual-Function Chassis for ICs

While integrated circuits offer many advantages, they do present mounting problems. The author has combined a breadboard technique with low price, good looks, and simple construction. The result is a finished product that goes together like a breadboard.



BY JOHN GOEGL,* WA2LJK

AFTER TRYING several printed-circuit ideas for mounting ICs in experimental equipment, I decided that a completely new approach was necessary. What I needed was a breadboard layout having the appearance of a finished product. The dual-function chassis shown in the sketches and photographs serves both as a breadboard and a chassis, thereby reducing the overall cost of the project while allowing changes or repairs to be made easily. Anyone who has ever removed an IC from a circuit board will appreciate the advantages of sockets!

*2228 Hobart Street, Union, NJ 07083.

IC sockets are available commercially, ranging in price from 40 cents to a dollar each. The problem is how to build a chassis for conveniently mounting them. My mechanical construction is shown in the photos, however this scheme can be altered to meet different requirements. The aluminum angle stock can be purchased at most hardware stores.

In addition to the more obvious benefits mentioned above, several other features make the dual-function chassis desirable. First, inexpensive, untested, or grab-bag ICs may be tested right in the unit. If you have a critical circuit requiring IC selection, this approach is ideal. Another important advantage is the ability to apply power (after making a modification) with the ICs removed. If an

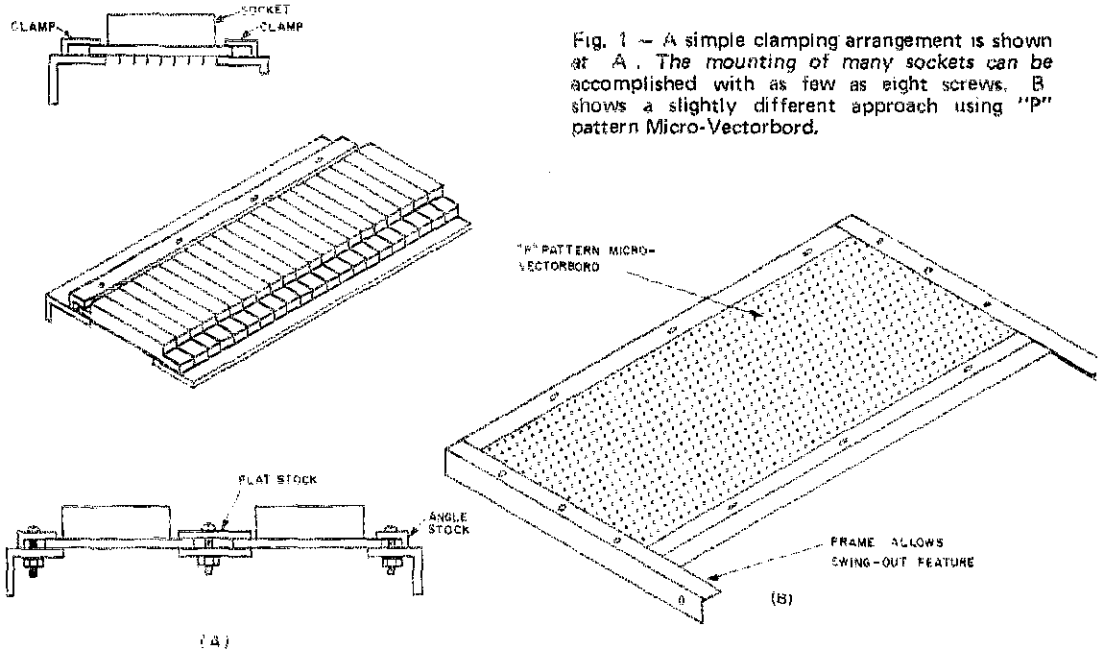
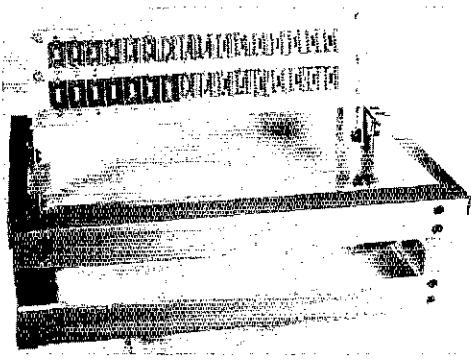


Fig. 1 — A simple clamping arrangement is shown at A. The mounting of many sockets can be accomplished with as few as eight screws. B shows a slightly different approach using "P" pattern Micro-Vectorbord.

Shown here is the rear view of the author's frequency counter in its early stages. The swing-out mounting allows easy access to components and wiring.



error is discovered, it can be corrected before reinstalling the integrated circuits. This can't be done easily with printed-circuit boards! In the time required for layout and construction of PC boards, a dual-function chassis can be built, wired, and tested. The job will be finished when the breadboard is completed. QST

• Technical Topics

A New Series of JFETs

The radio amateur who works with field-effect transistors should be interested in the new line of JFETs recently released by Motorola. The new plastic-cased devices are similar to the popular MPF-102, but are graded more tightly with respect to their individual characteristics. This feature makes it less difficult to predict the performance of a given circuit which uses them. When replacing a JFET in a proven circuit, these transistors lessen the need for empirical manipulation when striving for like performance.

The new JFET series is numbered 2N5668 through 2N5670. The semiconductors are of the N-channel depletion-mode variety, and are principally for use as vhf amplifiers, though all other applications that call for JFETs should find these transistors suitable.

These transistors are in the low-cost bracket, and should be available from any authorized Motorola distributor. — *WICER.*

Type	C_{out} (max)	C_{in} (max)	V_{DG}	$V_{GS(r)}$	I_D (max)	$I_{G(f)}$ (max)	P_D (max)	*umhos* (min)
2N5668	2	5	25	25	20 mA	10 mA	310 mW	1500
2N5669	2	5	25	25	20 mA	10 mA	310 mW	2000
2N5670	2	5	25	25	20 mA	10 mA	310 mW	3000

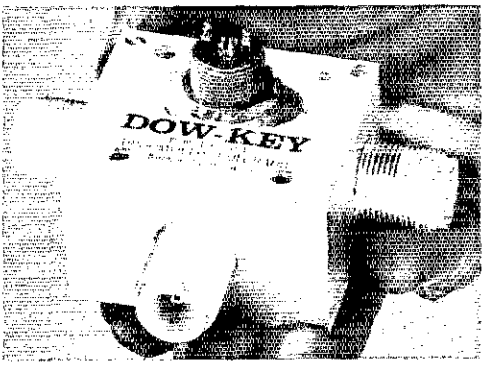
Noise figure at 100 MHz is 2.5dB maximum. Maximum transconductance for the three JFETs, respectively, is 6500, 6500, and 7500 umhos.

• New Apparatus

Compact Vacuum Coaxial Relays

VHF AND uhf enthusiasts interested in moonbounce and similar transmitting and receiving activities might find occasion to use this high-grade, high-power coaxial vacuum relay. Vacuum relays are more reliable than the standard non-vacuum types in that contact arcing is not as likely, nor is there the problem of corroded contacts. This unit is built especially for vhf and uhf service and has been carefully engineered to present the same impedance as the line with which it is to be used.

The photograph shows the relative physical size of the relay. Dow-Key Company rates their device for 3000 watts at frequencies up to 30 MHz and for 1000 watts at 400 MHz. The four styles of contact arrangements available are spdt, dpdt, transfer, and bypass. A 26-volt coil is standard, but

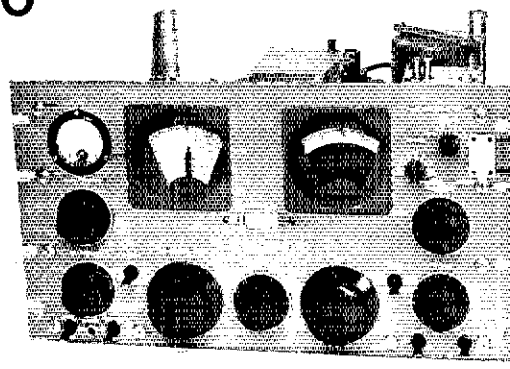


6, 12, 48, 110-volt dc and 115-volt ac coils are available on request. BNC, TNC, C, SC, N, or HN connectors are standard.

These relays are individually priced for each application and may be purchased directly from the Dow-Key Company, 2260 Industrial Lane, Broomfield, Colorado 80020. — *WIFBY*

Updating the SP-600

BY DOUGLAS A. BLAKESLEE,* WIKLK



Modified SP-600. The new panel switches are Cutler-Hammer type 8373K27C. A switch mounted in place of the TUNING LOCK cuts the HFO off when an external oscillator is used.

MODIFYING a piece of surplus equipment to get operation up to current standards is a popular amateur pastime. With the sophisticated gear now on the surplus market, a ham can often come up with outstanding performance for a relatively-small monetary investment. This article covers reworking the SP-600 receiver, but the circuits used may be adapted for use with any receiver of similar vintage.

The R-274 receiver series (sold commercially as the SP-600 by Hammarlund and the SX-73 by Hallicrafters[1]) has been released in quantity by the military services to MARS and surplus outlets. These receivers, which were used in intercept, point-to-point and mobile communications by the Army and Air Force, have largely been replaced by the R-390A. As the available supply has increased, the price has dropped to the point where a 274 is an attractive buy as a general-coverage receiver. It is a single-dial type covering 0.54 to 54 MHz in 6 bands, providing a close-to-ideal tuning rate for vhf (with converters, of course).[2] The objectives of the modifications made to the receiver are to improve the ssb/cw performance and to generally make the receiver suitable for amateur service.

Circuit Changes

As originally designed, the SP-600 is a poor performer on ssb. It has a lot of amplification in the i-f stages and a low-gain audio stage. The BFO is amplified, but it is still not unusual to get ten times the voltage out of the i-f that you get from the BFO — the inverse of the ratio needed for linear detection. If the rf gain control is backed off to reduce the i-f output so the detector can operate in a linear manner, there isn't enough audio gain to amplify the detected signal to loudspeaker volume. Obviously, changes are necessary in the levels and gains of the receiver's "rear end" stages.

A product detector was added in place of the original 6AL5 diode detector, V14. Needing a high-transconductance triode for this stage, we chose the 6J4 because it has a 7-pin base and would fit in the 6AL5 socket. Other similar triodes made for TV front ends would work as well. The new detector circuit is shown in Fig. 1.

It was necessary to separate the plate circuits of V11 and V12 — they were originally fed B-plus through a common choke — so that the output of the BFO buffer could be routed to the cathode of the product detector. The output of the i-f driver, V11, is far in excess of what any detector can handle with the available BFO voltage. Raising the BFO level was not the answer, as the increased 455-kHz signal leaked into the i-f, producing lockup. The product detector input was capacitively coupled to the grid of V11, where the i-f level was about right for proper detector operation.

Even with the gain picked up in the product detector, audio output was still insufficient. The first audio amplifier in the SP-600 uses one section of a 12AU7, with the other half of the tube functioning as a cathode follower on the output of the i-f. This output stage was not being used, so a 12AX7 (Fig. 2A) was substituted for the 12AU7, and both halves were wired as audio amplifiers. This combination gave sufficient output to drive the 6V6 final audio stage. With high gain in the audio stages, decoupling of each stage was necessary to prevent oscillation in the audio range.

With a 600-ohm audio output, a transformer is necessary to match 4-ohm speakers. These transformers are not easy to find surplus, and are very expensive new. The author found that the standard public address 70-volt line transformer could be wired to give the proper impedance ratio. The transformer's 8-watt tap is connected to the receiver output, and the 4-ohm speaker to the 8-ohm tap (Fig. 4B).

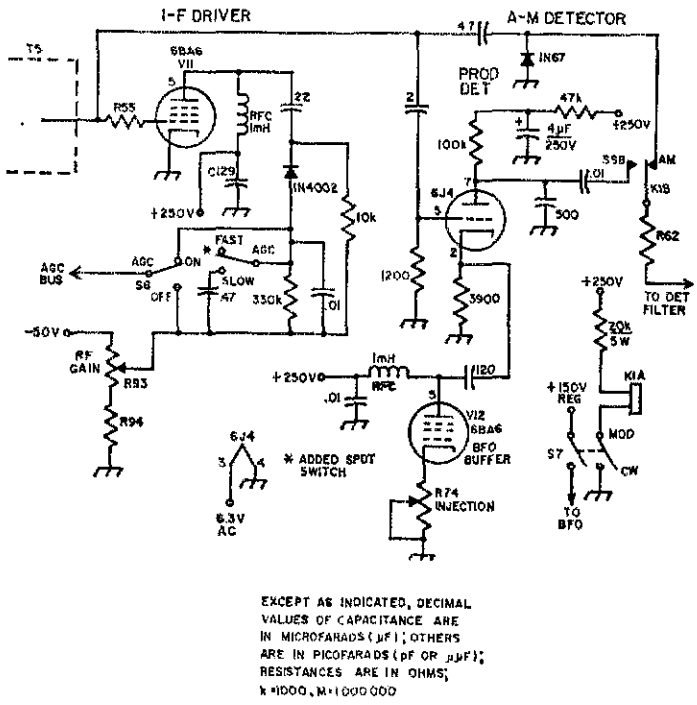
With a general-coverage receiver it is desirable to be able to copy a-m, so a diode detector was included. To keep the output level in the same range as the product detector, this stage was also fed from the grid of V11. Reed relay K_1, operated by the MOD/CW switch, connects the appropriate detector to the first audio amplifier.

With proper levels, it should have been possible to use the agc for ssb and cw operation. The agc system in the SP-600 was not designed for

* Assistant Technical Editor, *QST*

[1] The SP-600 and SX-73 both carry the R-274 military nomenclature, but the two have many differences in circuitry and mechanical construction. The modifications described in this article cannot be used directly in the SX-73 without changes in its BFO and i-f levels.

[2] See *ARRL VHF Manual*, pp. 38-40.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k=1000, M=1 000 000

Fig. 1—Modification to the detector and agc sections. Original components are marked with instruction book reference numbers. Resistors are ½-watt composition, except as indicated. Capacitors are paper or ceramic, except those with polarity indicated, which are electrolytic. K1 is a miniature reed relay, 2500-ohm coil (Magnecraft W104MX-4).

this sort of service, however, and a rework was required. The original circuit had too slow an attack time and too fast a decay. Even manual control with the rf gain control was difficult because of the long time constant on the gain control line, caused by C137. This 2-μF capacitor is switched in when the BFO is turned on. It charges and discharges so slowly that the manual gain control has a time lag that is most annoying when operating.

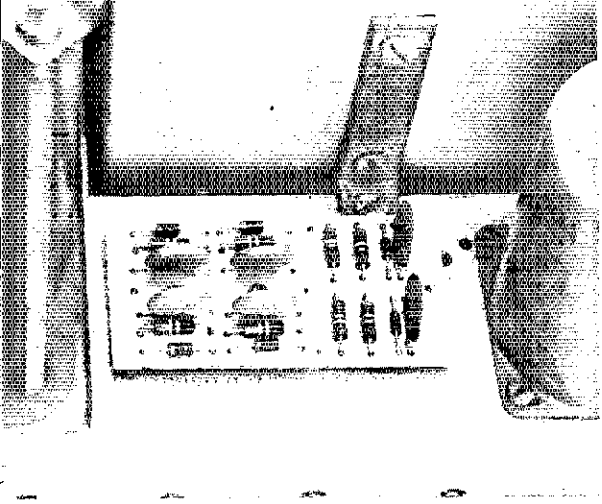
The agc circuit was rebuilt completely. The 6AL5 that was removed to make room for the product detector also had served as the agc rectifier, so a silicon diode was used in its place. A front-panel switch was added to select a fast or slow agc discharge time constant. The series resistors were removed from the agc line to improve the attack time. The rf gain circuit was modified so that manual gain could be used either with agc or alone. The original switch, S8, continues to select manual or automatic gain control. With the components shown in Fig. 1, agc action will start at about 1-μV signal input. With four 6BA6 stages being controlled, agc action is very smooth.

The old detector also provided operating voltage to the S meter, so a modified S-meter circuit was added. See Fig. 3. The new metering arrangement indicates the voltage swings produced on the screen of an i-f tube by the agc control voltage applied to the grid of the stage. The original meter zero control, R69, is rewired but still performs the zeroing function.

The rectifier tubes in the power supply were replaced with the silicon diode assembly detailed in Fig. 2B. Purchasing one of the commercial silicon replacements for the 5R4 would save the work of making up this assembly. Using solid-state rectifiers will raise the B-plus voltage, which is not desirable. The lead from capacitor C161A was removed from the input side of choke L51 and connected to the input of choke L52. Effectively, this changes the power supply from capacitor input to choke input, reducing the B-plus voltage to about the same point it was before the silicon rectifiers were added.

Making the Modifications

The military versions of the SP-600 were given a liberal spraying with moisture-fungus proofing (MFP) during manufacture, which coats all the solder connections and makes it difficult to remove and add parts. It also covers the wiring, which after a few years of being heated and cooled, converts the once-flexible insulation into a hard substance that cracks easily. If the wiring in your receiver has reached this advanced state of deterioration, be very careful as you work on the unit. During the modifications described in this article, the insulation on several leads cracked and fell off, making an arduous extra job of rewiring. This SP-600 was in poor condition when purchased, but the units that have come through MARS channels are in much better shape. Look over the bottom side of any prospective purchase



The solid-state rectifier assembly, made up on an etched board, is mounted between the power and audio output transformers

before handing over your money. A better unit should not have the problems with wire and component failure that the author experienced.

The best way to make the changes to the detector and audio amplifier stages is to cut the unused parts away from tube sockets V14 and V16 then carefully disconnect the filament connections and remove these sockets. Bolt in two new tube sockets — starting with a new socket makes rewiring so much easier! Reconnect the filaments and add the other parts shown in Fig. 1.

Additional wiring points are needed, so 5-lug terminal strips should be added under one of the mounting screws of the phono-input strip for the extra audio stage, on one end of C129 for the age circuit, and on one end of the new tube socket at V14 for the product detector. The old age filter components, when removed from E16, leave a number of free terminals which can be used for the plate circuit components associated with V11 and V12. The reed relay, K1, should be cemented to the top of C128, the only open space in the area.

To make some of the wiring changes on the switches, it is necessary to remove the front panel. All of the switches on our unit were on their last legs, so we changed the lot while the panel was off. The meter range switch, S11, is a momentary type. It wasn't being used, so this switch was replaced by a standard spst type which selects a fast or slow age time constant. The S meter itself was broken beyond repair, so it was replaced by a surplus 0-1 mA unit.

The 0.01-μF paper bypass capacitors in our SP-600 failed at an alarming rate. Before the modifications were attempted, three had failed and one went while we were working on the set. Three of these four capacitors were located up in the rf amplifier/mixer subassembly, which it is a four-hour job to take out and replace. This deck is impossible to troubleshoot, also, as you cannot get to the bottom side while it is "hot." With the last capacitor failure, the author changed the bypasses in this section, and then all the rest in other parts of the receiver for good measure. (After a while a fellow gets a little tired of a smoking receiver.) The input coax fitting was changed to an SO-239 from the original two-pin receptacle provided.

While the rf deck was apart, the sliding contacts on the main tuning capacitor were given a good shot of contact cleaner. Before modification the receiver had a tendency to jump frequency about one kilohertz every few minutes. The cleaning job solved the problem. The work was done all at once, so it wasn't possible to determine the exact culprits.

For those unlucky enough to have to remove the rf deck, a little explanation is in order, as the instruction book isn't any help. The best procedure is first to take all the screws out of the rf deck itself and the tuning-capacitor cover. Remove the cover and the top of the mixer coil housing, which is on the side of the tuning unit subchassis. Unsolder all seven power leads that go from the mixer coils to the rf deck, making a note of the color code and terminal connections so these leads can be reconnected later. Using a 150-watt iron with a long-nose tip, unsolder all of the leads coming from the main tuning capacitor sections to the rf deck. There are four

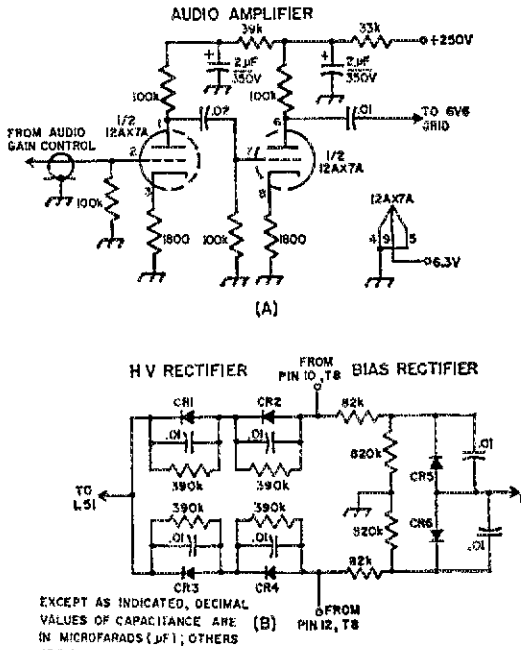


Fig. 2 — Additions to the (A) audio amplifier and (B) power supply. Resistors are ½-watt composition, and capacitors are ceramic, except those with polarity indicated, which are electrolytic. Diodes CR_1-CR_6 are 800-volt PIV, 500-mA silicons.

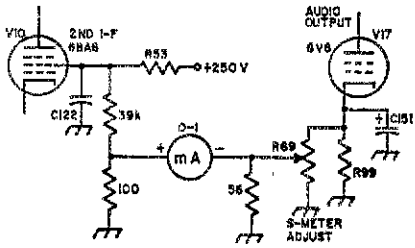
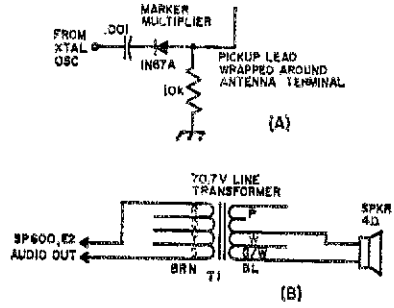


Fig. 3—Circuit of the S meter. Parts marked with reference numbers are original components in the receiver. Resistors are ½-watt composition.



PRIMARY		SECONDARY	
COLOR	WATTS	COLOR	TAP
RED	8	PURPLE	16 Ω
ORANGE	4	WHITE	8 Ω
YELLOW	2	GREEN/ WHITE	4 Ω
GREEN	1		
BROWN	COMMON	BLACK	COMMON

Fig. 4—(A) Diode multiplier for the crystal oscillator. (B) Connection of a line transformer to match 600 to 4 ohms. T_1 is a public address 8-watt speaker transformer (Knight 54 A 1422 or Inglot T-8). Note that not all manufacturers use the line-transformer color code shown.

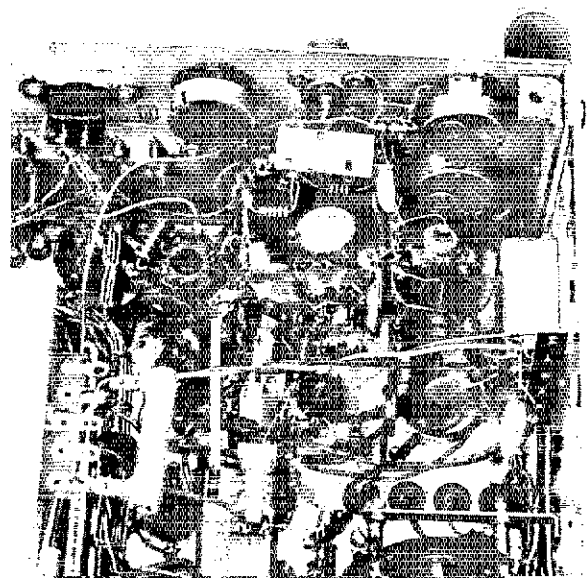
leads per section. When all these leads are loose, pull up on the deck and lift it out. To replace it, turn the band switch to a position half way between two-band settings, gently slip the rf deck back in place, and rotate the band switch to a band setting. Then, resolder all leads.

Another problem area was the BFO. The pitch control caused severe electrical noise in the receiver when it was rotated. This condition got steadily worse until the BFO would stop oscillating at certain pitch settings, and then it quit working entirely. Everything external to the BFO can was checked and found to be OK. So, the author was left with the task of removing the BFO can assembly to see what had gone wrong. This job is even worse, if possible, than taking out the rf deck. The instruction book isn't any help here either. You must first remove the mounting plate holding the filter chokes. Drop this whole assembly down, which will give access to the mounting bolts that secure the crystal oscillator assembly. Unsolder the five power leads from the crystal oscillator, remove the mountings screws, loosen the two shaft couplings on the front panel controls, and pull the assembly out. Then remove all leads and the two mounting screws from the bottom of the BFO can, loosen the shaft coupling and slide it forward, and then pull the can out.

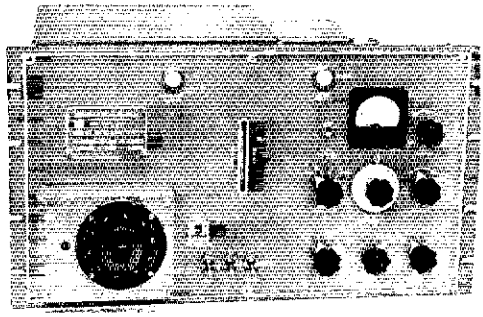
The problem in this unit was that the coil form on the pitch control had broken loose and had rotated until the leads had broken. This was caused by the bottom tab on the spring mounting plate having broken, allowing the coil to be pulled forward until it broke loose from its mount. It is not a good idea to try to solder this spring, as heat will destroy the spring temper. A piece of heavy wire was put in the tab hole and the spring cemented to it. Both coil forms were given a coat of cement around their bases to insure that neither would break loose again.

Oscillators

Two objections to the SP-600 are its lack of calibration accuracy and its rate of tuning on the high hf bands. There isn't much that can be done about the calibration accuracy of the receiver itself, but the crystal oscillator used for fixed-frequency operation of the receiver can be modified to a secondary frequency standard and band-edge marker. The small changes necessary to accomplish this can be made without having to remove the subassembly. But, if you have to get to the BFO can, you have to take the xtal oscillator out anyway.



Underside of the receiver showing the area of modification. The product detector, diode detector, and audio amplifier are at the center. The relay which selects the detectors is cemented on top of the large "bathtub" capacitor (lower center), and the terminal strip mounted vertically on the right holds the agc rectifier and filter components.



A surplus Northern Radio 115 VFO can provide better stability and bandspread when used with the SP-600 (see text).

The connection to the HFO (high frequency oscillator) is no longer needed, so it is removed and a diode multiplier (Fig. 4A) connected to the crystal oscillator output pin. This terminal has B plus on it, so make your connections with the receiver turned off. The output lead from the multiplier is run over to the receiver antenna jack. The switch in the oscillator subassembly originally turned the receiver HFO on and off. This power lead, coming to terminal 2 of E13, just below capacitor C161, is cut loose and taped. The HFO can be made operational at all times by jumpering terminals 2 and 3 on E13, or if operation with an external oscillator is contemplated, an HFO switch which shorts terminals 2 and 3 can be mounted on the front panel in place of the dial lock shaft.

The author used 1- and 10-MHz crystals which gave useful markers over the entire receiver tuning range. The crystal frequency control is used to bring the crystals into zero beat with WWV, and the crystal selector switch turns the oscillator on and off, as well as selecting the desired crystal.

A popular trick to improve the tuning rate of this receiver is to use an external hf oscillator. The input to the HFO used by the crystal oscillator can be run to a jack and used for external oscillator input. Connected as described above, a rear-deck switch is wired to disable the receiver HFO. There is one highly-stable master oscillator designed for use with the SP-600, the Northern Radio Model 115, which is available on the surplus market. This unit has an oven-heated master oscillator with multiplier circuits giving output on any desired frequency from 2 to 30 MHz. It also has a 455-kHz oscillator for use as an extra-stable BFO. Of course, any home-built oscillator with a good tuning rate will do the job.[3] When using an external oscillator, the main tuning dial functions as a preselector.

A BC-221 frequency meter was tried as an external HFO, and it worked out well, improving the tuning rate and stability. The SP-600 is single conversion below 7.4 MHz and double conversion above this frequency, so the external HFO should be set 455 kHz above the desired frequency when tuning below 7.4 MHz, and 3955 kHz above when using the higher ranges.

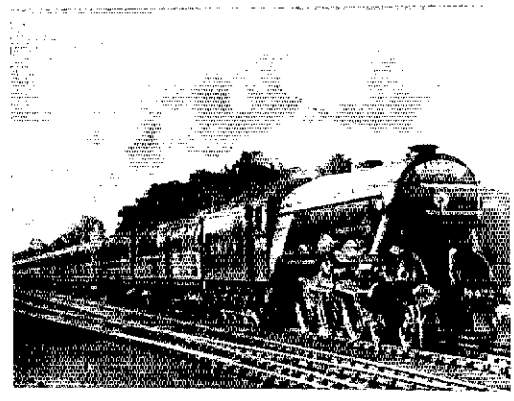
Results

After all the modifications had been made, the receiver was given a complete realignment. The front end was originally aligned for 100-ohm input impedance, so the input trimmers must be reset for 50 ohms. Realigned, the leakage signal of our signal generator, less than 0.1 μV, could easily be found without prior knowledge of the exact frequency. The high gain in the two rf stages does mean cross modulation at the first mixer on very strong signals. The rf selectivity of the 600 is much better than found in an average receiver, so you don't have to tune very far away from a strong signal to have it stop bothering you. Overall, these changes and repairs have given the receiver a new lease on life, and made it a pleasure to use. QST

[3] The general purpose VFO described in the 1969 and 1970 editions of *The Radio Amateur's Handbook*, page 191, can be used with appropriate coil changes.

Strays

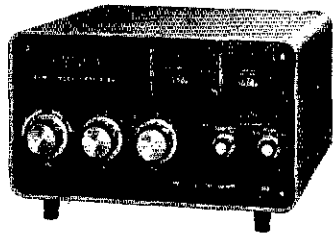
From mid June to early August WX5RRX will be operated from the Flying Scotsman, the famous steam-powered locomotive and nine car train. An 1800-mile exhibition tour—from Slaton, Texas to Greenbay, Wisconsin—will give many amateurs an opportunity to work this station aboard the historic British train. The coordinator of the station is A. L. Julian, WB4CYR, 6921 Fort Hunt Road, Alexandria, VA. 22307.



Recent Equipment

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

Heath SB-220 Linear Amplifier



NO AMATEUR product in recent history has been preceded by so many rumors and so much on-the-air discussion. For a while it seemed that every ham with a W8 call sign had the "inside dope" on what the "big linear" from Benton Harbor would contain. No doubt, it was with a sigh of relief that the Heath Sales Department wrote "Here (at last)" into their introductory advertising on the SB-220.

Was it worth the wait? Based on tests of the amplifier in the ARRL Lab, the answer is an unqualified "yes." It met or exceeded all of the manufacturer's specifications. Main features of the unit are its small physical size, excellent forced-air cooling system, good operating efficiency, and, of course, low price. A completely self-contained kilowatt intended for table-top operation, the SB-220 has a total weight of 50 pounds. A good portion of the weight is in the transformer, so this component is shipped in a separate container to prevent damage to other parts. Power input is rated at 1 kW on cw and RTTY, and 2 kW PEP can be run on ssb.

The amplifier covers the 80- to 10-meter bands. Band switching is accomplished from a single front-panel knob. The two other large knobs that can be seen in the front-view photograph are the output pi-section tuning and loading controls. Two panel meters are used; one reads plate current (0-1 A), and the other is a multifunction meter which can be switched to read grid current (0-350 mA), relative rf output, or high voltage (0-3500 V). Rocker switches are used to turn the '220 on and to select either the cw/RTTY or ssb operating modes. Cabinet styling follows Heath's SB series motif, a dark green panel and gray outer cabinet.

Amplifier Circuit

A simplified diagram of the amplifier is shown in Fig. 1. A low-Q pi-section network matches the 50-ohm output of the exciter to the 3-500Z cathodes. The use of a tuned input circuit has the additional advantage of reducing intermodulation distortion products generated in the amplifier.

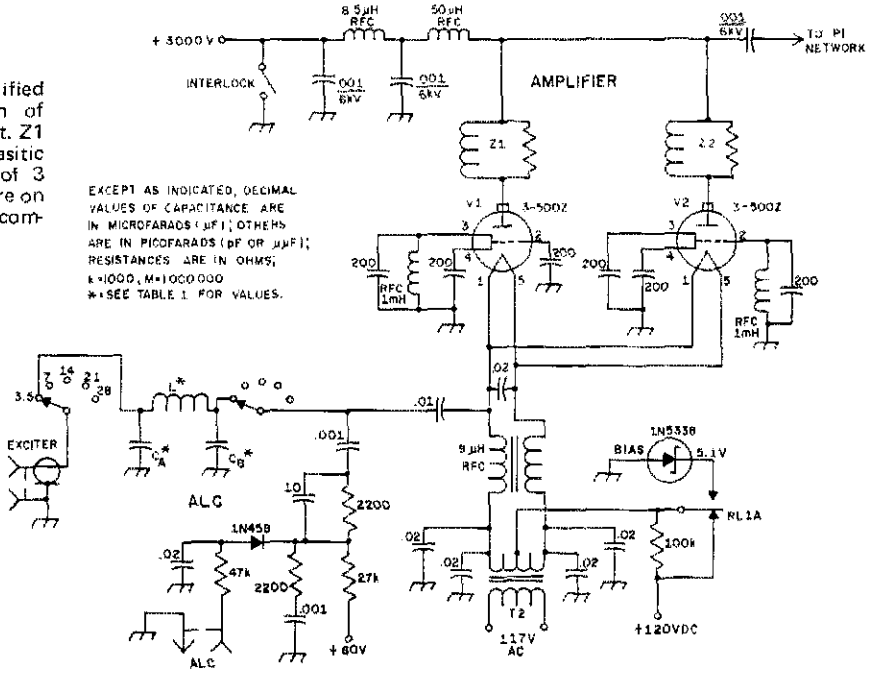


Fig. 1 — Simplified schematic diagram of the amplifier circuit. Z1 and Z2 are parasitic chokes consisting of 3 turns of No. 18 wire on a 100-ohm, 2-watt composition resistor.

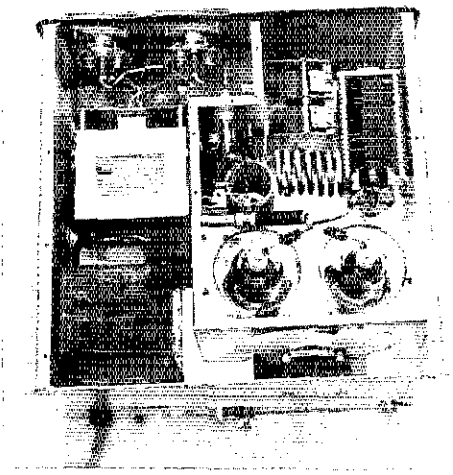


Fig. 2 – Top view of the amplifier. The power supply is located along the left wall of the unit. The filter capacitor stack is under the plate with the high-voltage warning label. The interlock can be seen at the center. This switch consists of a spring strap which shorts against a metal pillar attached to the high-voltage feedthrough insulator (see text). Cooling is accomplished by the large fan just below the 3-500Zs.

Values of the inductors and capacitors used on the different bands are shown in Table 1. It is interesting to note that the inductors are fixed value – no initial tune up of the input network is required. If the drive level exceeds a preset threshold, a sample of the drive signal is rectified to provide a dc age control voltage for the exciter. The grids of the 3-500Zs are operated close to ground potential. A low-value impedance, consisting of a 1-mH rf choke shunted by a total capacitance of 600 pF introduces negative feedback which acts to further reduce intermodulation distortion.

During standby periods the PA tubes are cut off by a 120-V dc potential applied through the contacts of RL1 to the center tap of the filament transformer. In transmit (RL1 keyed), the cathode return for the 3-500Z is through a Zener diode which establishes an operating bias of 5 volts. This bias reduces the operating resting plate current, which, in turn, cuts the amount of heat generated by the final tubes. Also, a slight increase in efficiency is realized. Heat can be a problem in any big linear amplifier. The SB-220 uses a large fan blowing air directly on the two tubes, in a manner similar to that which was pioneered by W1DX and W1LLF in an amplifier design for *The Radio Amateur's Handbook* some years ago.[1] This method of cooling seems quite efficient – the Heath amplifier is the first rig this writer has seen that you could put a hand on the cabinet, over the final tubes, and not have fried fingers if the amplifier had been running for a while at full input.

TABLE 1

Band	C_a	C_b	L
10	115 pF	44 pF	0.58 uH
15	150 pF	115 pF	0.6 uH
20	220 pF	180 pF	0.93 uH
40	470 pF	400 pF	1.65 uH
80	1150 pF	1080 pF	2.95 uH

The amplifier section is contained in a shielded box which is further enclosed by the cabinet. Double shielding is a good idea on an amplifier operating at the 2kW PEP power level, as TVI is always a potential problem. The output network is a pi design which is tuned with a 250-pF variable capacitor. Output loading is accomplished with an 880-pF variable, which has an additional 500-pF fixed capacitor switched in parallel on the 80-meter band. The efficiency of the Heath linear amplifier is impressive, being better than 60 percent, even on 10 meters. Add 60 to 80 watts of feedthough from the exciter, and you have enough watts to "tickle" any antenna.

Power Supply

A voltage-doubler power supply provides 2500 volts with the function switch set for cw and 3300 volts for SSB. These voltage readings are obtained with no drive applied. At full legal input, the voltage drops to 2100 and 2900 volts, respectively. The power-supply filter capacitors are contained in a stack, each individual capacitor being held in slots between two large insulating blocks. This type of high-density packaging results in a 2-kW amplifier that is no larger or heavier than the 100-watt exciters of a few years ago. Another interesting feature of the power supply is the safety interlock.

[1] *The ARRL Radio Amateur's Handbook*, 42nd edition, Chapter 6.

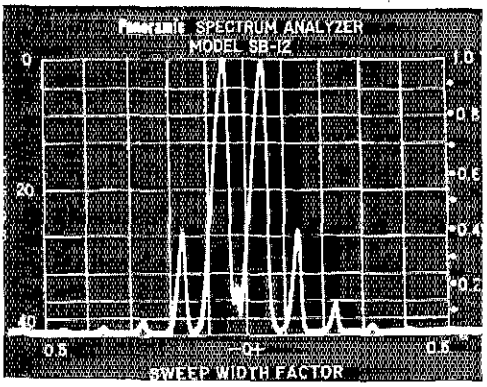


Fig. 3 – Spectrum analysis of the SB-220 output when the amplifier was being tested with a two-tone signal at 2 kW PEP. With this presentation, subtract 6 dB from the indicated level of distortion products for the true reading.

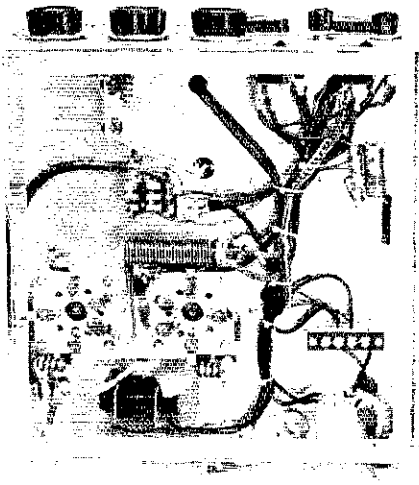


Fig. 4 — Bottom view. Connections to the rocker switches are made with appliance-style quick-connect terminals, saving a soldering job. Another innovation borrowed from the appliance industry is the use of plastic Tye-Wraps in place of waxed string for cabling. Interconnections to change the amplifier from 115-V to 220-V ac operation are made on the terminal strip at the upper left.

SB-220 Linear Amplifier

Height: 8¼ inches.
Width: 14 7/8 inches.
Depth: 14½ inches.
Weight: 50 pounds.
Price Class: $350.00
Manufacturer: Heath Company, Benton Harbor, MI 49022.

It consists of a metal spacer which is mounted on the high-voltage feedthrough insulator, and a piece of spring copper strap. The copper strap is attached to the shielding wall in such a way that it normally shorts out the high-voltage connection. See Fig. 2. A small insulated post, which is mounted on the top cover, holds the shorting strap away from the high voltage. Whenever the top cover is removed, the strap pops up, insuring the power-supply capacitors are discharged by placing a direct short to ground on the plus B lead.

Ac power requirements are 120 volts at 20 amperes, or 240 volts at 10 amperes. Either a 50- or 60-Hz source will do. With an amplifier of this size, 220-volt operation is recommended. The power supply is protected by a circuit breaker in either side of the incoming ac line. A relay, RL1, switches the amplifier in and out of the antenna line. Thus, if the amplifier is turned off, the exciter can operate directly into the antenna. A short to ground on the keying lead from the exciter turns RL1 on. This relay is powered by the alc bias supply.

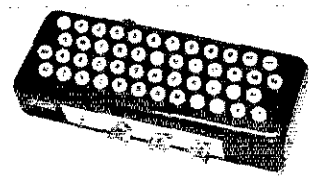
The SB-220 takes about 15 hours to assemble and test. As always, the excellent Heath step-by-step instructions allow anyone who can handle a soldering iron and screw driver to do the job. Special care should be used in the assembly of the high-voltage power supply. A mistake here could be disastrous. The resistance checks outlined in the assembly manual should be followed without fail before the unit is first "fired up."

The amplifier was run through a series of tests on the 80- to 10-meter bands at both 1000 and 2000 watts input. Fig. 3 shows a spectrum analysis of the SB-220 output, using a two-tone test at 2000 watts PEP input. Output measured 1380 watts PEP. Operators will have to watch the amplifier's operating level carefully to insure the maximum legal amateur power input is not inadvertently exceeded. All things considered, it looks like Heath has another winner — a rig that will especially appeal to hams who enjoy assembling their own gear. — *WIKLK & WINPG.*

The Pickering KB-1 Keyboard Keyer

WITHIN THE last decade, a new concept in cw keying has come about, through the use of keyboard-controlled electronic keyers. The keyboard is arranged somewhat like those of a typewriter, and computer techniques are used to generate Morse code letters and numbers. Frequently-used letter combinations, such as SK and AR, along with punctuation, are also included. The code is sent by depressing the keys in the desired sequence and at the proper time.

The Pickering model KB-1 is one such keyer which has recently been introduced. This unit has no moving parts whatsoever, other than the keyboard contacts. Solid-state circuits are used throughout, including the output keying stages.



The instrument will key either positive or negative voltages at speeds from approximately 10 to 85 words per minute. An effective weight control is provided which adjusts the dot-to-space ratio from less than 40 percent to more than 60 percent. (Many operators feel that 50 to 52 percent is the ideal range for slow and medium code speeds.) A

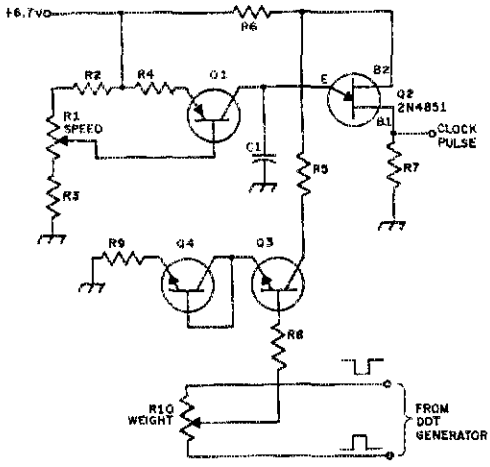


Fig. 1 – Clock or time-base circuit of the KB-1 keyer. The weight control, R10, is incorporated as a part of the timing circuit, providing adjustment of the dot weighting from less than 40 percent to greater than 60 percent. Through other keyer circuits the space between dashes is made identical to that between dots. The weight-control setting has negligible effect on the speed of the code.

sidetone oscillator, less monitoring speaker, is also built in.

The physical dimensions of the keyer are determined primarily by the space required to arrange the keys for comfortable operation, rather than by the sizes and number of circuit components. As shown in one of the photographs, the keyer opens into two separate interconnected assemblies – the keyboard, and the keyer proper (including regulated power supply). An etched-circuit board in each assembly provides for the *mounting and interconnecting of all small components.*

The Keyboard

The keyboard assembly contains 48 buttons. The KB-1 is not a typewriter. According to the manufacturer it is not designed to feel like one. Each keyboard button is operated with a light pressure and requires a very small displacement. The keys have a "spongy" feeling as if they are supported by a piece of firm rubber. The stiff support and the nearly-unnoticeable movement of the buttons when sending code produces a "touch" unlike that of any teleprinter keyboard or any typewriter, manual or electric, that this writer has used.

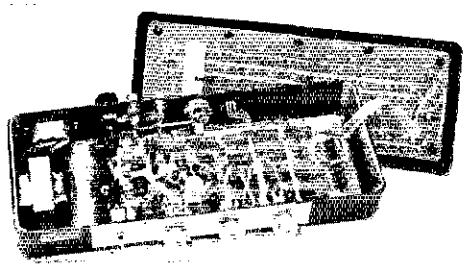
If one is a touch typist, there are, as explained later, a few typing habits that must be overcome. It is for this reason that the different "touch" of the KB-1 keyer may be appreciated. With a little practice, one is able to alternate between a normal typewriter and the code keyboard, without conscious effort being required to operate either one properly.

The KB-1 has no "memory," other than for the character it is in the process of sending. A continuously-running clock is used. When the keyer is idling, a character is started by the first clock pulse which occurs after any key has been depressed. A momentary closure of the keyboard contacts is all that is required, and the keyer will automatically send flawless code for the button pressed, followed by the proper letter spacing. Manipulation of other keyboard buttons during the time that the first character is being sent will have no effect on the keyer's operation. Only after completion of the first character may a second character be initiated. In this manner, a single key held closed continuously will cause the keyer to emit a string of appropriate code characters, interspersed with the proper letter spacing.

In operation, to obtain smoothly-flowing code, an operator's fingers must move from one key to another at varying speeds, according to the duration of each character being sent. One must learn to move his fingers off the keys quickly for short-duration characters such as *E* and *I*, or double letters may be transmitted. The easiest technique to follow is one of initiating the first character, moving immediately to the next key and waiting there until that character has begun, then moving to the third, and so on. Typing with rhythmic strokes, while preferred for ordinary typing, produces code with erratic spacing from the keyer, and it is for this reason that finger movements must be made at varying speeds. Word spacing with the KB-1 must, in part, be supplied by the operator, although the continuously-running clock aids in providing the proper amount of time between code groups for perfectly-proportioned spacing.

To adapt to the KB-1 keyboard, the "transition time" for this writer, who for years has been touch typing on various keyboards, was approximately two hours. (This is far less time than was required to unlearn "bug" operation in favor of an electronic keyer!)

Electrically, the keyboard contains a solid-state matrix. The keyer assembly contains a shift-register memory consisting of seven flip-flops, and the



The Pickering KB-1 keyer opened for inspection. The keyer is built as two interconnected assemblies – the keyboard and the keyer proper. Front-panel controls are OFF/ON/TUNE, (monitor) VOLUME, SPEED, and WEIGHT. The keyboard assembly contains a solid-state matrix, and the keyer itself contains twelve integrated circuits and twelve transistors.

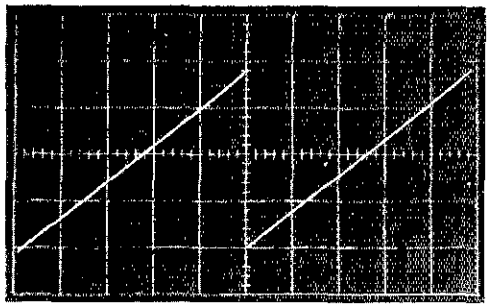


Fig. 2 — Voltage waveform across the timing capacitor, C1, with 50-percent dot weighting. The oscilloscope trace was synchronized with the leading edge of the dot for this photo, so the duration of the sawtooth cycle at the left represents the length of the dot, while the duration of the cycle at the right represents the length of the space between dots.

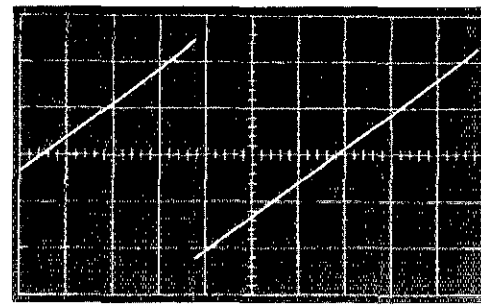


Fig. 3 — Voltage waveform across C1 with minimum dot weighting. The duration of the sawtooth cycle at the left represents the dot length, while that at the right represents the space length. As may be seen from the reticle lines in this photo the dot weighting is near 38 percent.

matrix provides appropriately-coded logic levels to this register for whatever character is initiated. Transistors are used in the matrix. Each transistor can perform the function of two matrix diodes — the base-emitter junction as one and the base-collector junction as the other. This scheme reduces the "parts count" for the matrix semiconductors from the number of individual diodes that would otherwise be required. In addition, because of the basing configuration of a transistor, the mounting of matrix "diodes" on the circuit board with the proper polarity is simplified.

The Keyer Assembly

The basic scheme used in forming the code characters in the KB-1 keyer is quite like that of a keyboard keyer featured as a construction article in an earlier issue of *QST*.[1] For any given character, a logic bit is loaded into one or more of seven flip-flops which form a shift register. These bits, after being simultaneously loaded into the proper flip-flops, are then shifted serially down the register. The last bit in the chain is the first to be sensed during the shifting of information down the register. Both the number and positions of these bits during initial loading determine the code which is to be sent.

A logic bit is loaded into the register for each dash contained in the character, and in addition, a final bit signifies the end of the character. Thus, logic bits loaded into the last six of the seven register flip-flops would send a numeric zero — five dashes, with the sixth bit indicating that the character has ended. Bits loaded into the last two flip-flops would send the letter T — a single dash. Dots in a code character are formed by "skipping" register flip-flops during the loading process. To send a letter N, for example, bits are loaded into the last and third-from-last flip-flops. The presence of a bit in the last position causes a dash to be sent. After the dash and its succeeding space have ended, but before the end of the character has been signified, the absence of a bit in the next flip-flop position causes a dot to be sent, completing the N. Following this dot, the keyer's logic circuits recognize the final bit as an indication that the character has ended, and nothing more is immediately sent. A letter-space is automatically included before any succeeding character can be started. Loading of the next character into the register may be done during the space following the character which was just completed.

The keyer's clock or time-base generator incorporates a very effective scheme for controlling the weight of the code elements. This circuit is shown in Fig. 1. Q2, a unijunction transistor (UJT), is the key component in the circuit. Q1 and its associated resistors act as a constant-current source for charging the timing capacitor, C1. When the capacitor charge reaches the peak-point voltage of Q2, its emitter becomes forward biased, and C1 is discharged through the base-one- (B1) emitter junction. The capacitor-discharge current develops a fast-rise-time positive-going pulse, available at B1. This much of the circuit is a commonly-used UJT relaxation oscillator, and the resulting voltage waveform across C1 is a linear sawtooth signal, as shown in Fig. 2. The frequency of oscillation is adjustable with the speed control; for any given setting the output pulses are evenly spaced in time.

However, additional input signals to the circuit are developed from the outputs of the keyer's dot generator, through Q3 and the weight control. Because of the characteristics of a UJT, Q2 acts as a form of level detector, and these added signals modify or alter the timing between successive clock pulses. With the weight control set for equal-duration dots and spaces, the dc level applied at B2 of Q2 is constant at approximately 5.6 volts. But then as the weight control is repositioned this dc level is changed, being different for dots than it is for spaces. With the control at the extreme for lighter dots, the level during a dot is near 4.5 volts; but, during the space between dots it is increased to nearly 6.4 volts. The effect of these alternating levels is to advance the timing pulse which ends the dot, and to retard the pulse which starts the next dot. This results in shorter dots with longer spaces

[1] Bryant, "Touchcoder II," *QST*, July, 1969.

Pickering Radio Company KB-1
Electronic Keyboard Keyer

Height: 2 1/2 inches.
Width: 10 inches.
Depth: 8 inches.
Weight: 2 1/4 pounds.
Power Requirements: 100 to 125 volts ac, 60 Hz, 9 watts.
Price Class: $265.
Manufacturer: Pickering Radio Co., P.O. Box 29, Portsmouth, RI 02871.

between them. Under these conditions, the waveform across C1 becomes a train of uneven sawtooth signals, as shown in Fig. 3. Swinging the weight control to the opposite extreme reverses these two voltage conditions, making long dots and short spaces. With dashes being formed in the keyer by "filling in" the spaces between successive dots, the spacing between dashes is always identical to that between dots.

The weight control in the keyer tested here had an adjustment range producing dot weights from 38 to 62 percent. Over such a wide range there is normally a tendency in this type of circuit for the weight control to affect the frequency of oscillation, or, in this case, the speed of the code. Q4 (wired as a diode) and R9, in the Q3 emitter circuit, reduce this tendency. By ear, we were able to detect no difference in code speed when swinging the weight control from one extreme to the other. Using laboratory test equipment, a five-percent speed change was measured, it being higher at either extreme of the weight control and lowest at its center position. The speed control setting has no effect on the weighting.

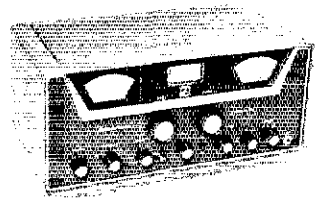
The KB-1 is supplied with a detachable power cord, plugs for attachment to the necessary interconnecting cables for other station equipment, and an instruction manual. The unit is durably constructed, being housed in a black-anodized aluminum enclosure having smoothed edges and corners.

In amateur circles there are two schools of thought regarding keyboard keyers. Some amateurs may think, "Who needs 'em? They don't permit one to use his manual dexterity for sending perfect code." And then others may say, "Perfect code, no matter how it's obtained, is worth the effort." In this regard, the KB-1 is one of the few keying devices which will permit the operator to lean back in his swivel chair, place his feet on the operating table, and, holding the keyer in his lap, send perfect code all the while. – *K1PLP.*

The Hallicrafters SX-122A Receiver

A SCION of a famous equipment family, the Hallicrafters SX-122A carries on a thirty-year tradition of general-coverage receivers intended for amateur use. Its predecessors, including the SX-24, SX-43, SX-71 and SX-100, have been the faithful "ears" for many a ham operator. This type of receiver is still a good choice for the advanced SWL, the beginning amateur who wants to listen outside the ham bands, or the vhfer who needs several MHz of continuous coverage. The details of this kind of receiver have been repeated a number of times in this section of QST, [1,2,3,4] so this review will be confined to the improvements and novel features contained in the '122.

Tuning from 540 kHz to 34 MHz in four bands, a double-conversion scheme, with i-fs on 1650 and 50 kHz, is used to achieve the required cw and ssb selectivity while keeping image responses to a minimum. The single-crystal filter, a standard for so long in medium-priced receivers, has been replaced by two variable-bandwidth *LC* filters. One of these networks (which might be a good choice for a simple homemade receiver) is shown in Fig. 1A. The filter input and output are tapped down on the 50-kHz coils. Selectivity of 0.5, 2.5 or



5 kHz is obtained by changing the coupling between, and the resistance in series with, the two coils. As the 60-dB-down bandwidth is 9 kHz in the 2.5-kHz selectivity position, this system doesn't offer the steep-sided bandpass characteristic of individual multipole crystal filters, but the *LC* filter does offer a big advantage in cost reduction.

On the higher frequencies, stability can be a problem with general-coverage receivers, as the hf oscillator is required to operate up to 35 MHz. To keep drift to a minimum in the '122, extensive temperature compensation, ceramic coil forms, ceramic trimmer capacitors, and a regulated supply voltage are used. The oscillator stability achieved is sufficient to allow the reception of ssb signals on 10 meters without the need for continuous retuning.

One novel feature of the SX-122A is the S-meter circuit, which is part of the 1650-kHz i-f amplifier. This circuit is of interest because the sensitivity of the meter is adjustable, and because an expensive microammeter is not required. As can

[1] Recent Equipment, "The Hallicrafters SX-96," *QST*, June, 1955.
[2] Recent Equipment, "The Hallicrafters SX-100," *QST* December, 1955.
[3] Recent Equipment, "The Hammarlund HQ-145," *QST*, June, 1959.
[4] Recent Equipment, "The Hammarlund HQ-180," *QST*, June, 1960.

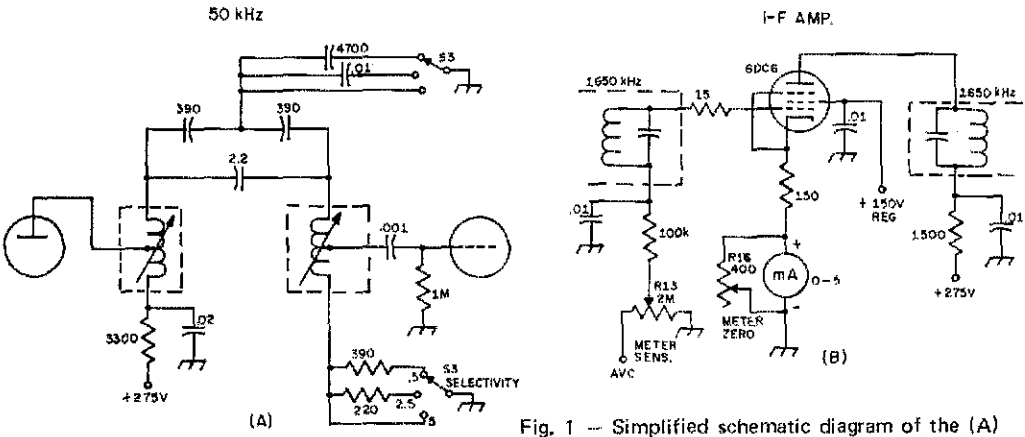


Fig. 1 — Simplified schematic diagram of the (A) i-f bandpass transformer and (B) S-meter used in the SX-122A.

Hallicrafters SX-122A Receiver

Height: 8 1/2 inches.
Width: 19 inches.
Depth: 11 inches.
Weight: 30 pounds.
Price Class: $325.
Manufacturer: Hallicrafters Company, Subsidiary of Northrop Corporation, 600 Hicks Road, Rolling Meadows, IL 60008.

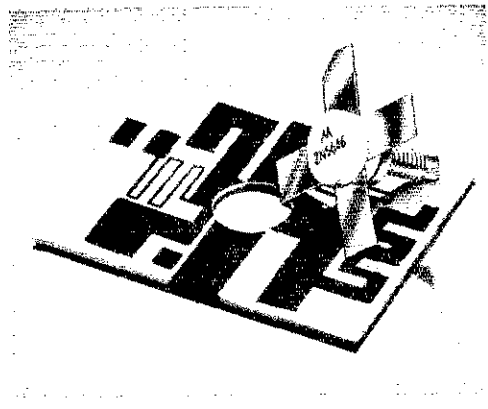
be seen in Fig. 1B, a control in the tube's cathode return sets the zero point on the meter, while a second control in series with the age line is used to adjust the meter sensitivity. To insure that the zero adjustment remains constant, regulated voltage is required on the screen of the stage. The SX-122 performs significantly better than do comparable receivers of solid-state design in the presence of strong signals. This freedom from cross-modulation and overload is perhaps the only major advantage left to receivers using tubes. — *WIKLK*

• Technical Topics

A New Breed Of RF Power Transistors

Of interest to the ham experimenter who works with rf power transistors is the new BET line (balanced-emitter transistor), announced recently by Mortorola. The accompanying photograph shows the physical style of the new units, and it is readily apparent that low lead inductance is one of the highlights of the device. But, of greater significance, the balanced-emitter structure makes the transistors practically immune to mismatch damage. In fact, in many instances, the output of the transmitter can be short circuited without destroying the transistor PA stage.

Each BET transistor is composed of several monolithic bipolar transistors - parallel connected — with a low-value nichrome resistor in series with each emitter. The emitter resistors are joined together at the emitter terminal of the composite transistor, thus providing a single-terminal case connection. The bases and collectors are connected in parallel, and come out to a single case terminal for each element. If the current should increase in any one of the transistors on the chip, the rise in voltage across its emitter resistor will decrease the base-emitter voltage, in turn limiting the current flow. Since all of the emitter resistors are effectively in parallel, the total emitter resistance is very low, therefore degeneration is not a problem.



BET transistors are available for operation at 12 or 28 volts, and come in many power ranges. They can be used for a-m, cw, fm, and ssb, provided the proper type is selected for given application. The present numbering runs from 2N5589 through 2N5646, and they provide efficient operation up to 470 MHz. They are available with dissipation ratings (P_D) as high as 60 watts.

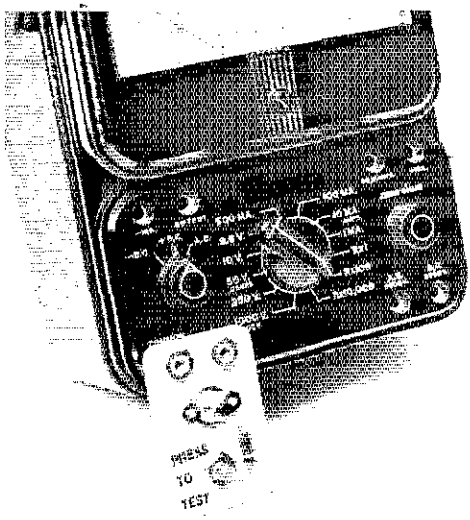
More complete information on these transistors can be obtained by writing: Supervisor, Technical Information Center, Motorola Semiconductor Products, Inc., Box 20924, Phoenix, Arizona 85036.—*WICER*

Hints and Kinks For the Experimenter

A SIMPLE TRANSISTOR CHECKER

A quick and easy check of bipolar transistors can be made with an ohmmeter, using the device shown in the photo. The check will reveal whether the transistor is an npn or a pnp type, determine if it is germanium or silicon, and show that it is shorted, open, or "good." The checker may be used with either a VOM or a VTVM type of ohmmeter.

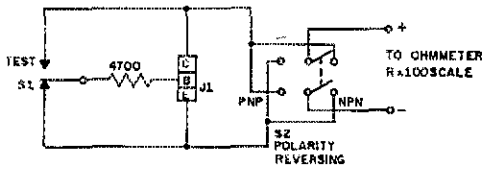
The voltage polarity at the ohmmeter terminals must be known, and connected as shown in the schematic. If the polarity is reversible by a switch on the ohmmeter itself, S2 may be eliminated from the checker.



This checker was constructed on an etched circuit board, with banana plugs spaced to mate directly with the ohmmeter terminals of the VOM. A polarity-reversing switch is contained on the meter, so none is required on the plug-in tester.

To check a transistor, simply plug it into the test socket, or else use clip-lead connections. Set the ohmmeter on the R x 100 scale, and set the polarity-reversing switch for the highest meter reading in ohms. This reading will be in the order of megohms for a good small transistor. The polarity setting now indicates the type of transistor, pnp or npn. To test the forward-biased condition of the transistor, depress S1, and again note the resistance. A good small silicon transistor will read in the range between 800 and 1000 ohms, germanium between 150 and 250 ohms. Power transistors will generally provide slightly lower readings than these.

If you're uncertain as to whether the transistor is a bipolar or an FET, this difference can also be



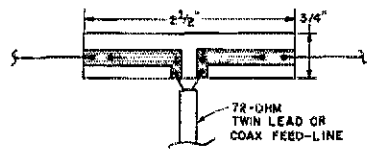
The transistor checker. J1 — Transistor socket. S1 — Spst momentary push. S2 — Dpdt slide or toggle; not required if voltage polarity may be reversed at ohmmeter.

detected. First of all, the "forward conduction" test of an FET will give a reading of several thousand ohms. With the transistor still connected for the test, reverse the polarity of the voltage as applied from the ohmmeter. The meter will normally read between 2000 and 10,000 ohms for a silicon transistor, and between 600 and 1000 ohms for germanium. Again depress the test switch. If the transistor is bipolar, the reading will go to megohms; an FET will give an almost unchanged reading.

For a simple device, this one is quite handy for checking those surplus or junk-box transistors. — *K1PLP.*

PRINTED-CIRCUIT DIPOLE INSULATOR

A small piece of circuit-board material, cut and etched as shown, makes a good center insulator for dipole antennas. Since it is very light in weight, it doesn't add much to the antenna's sag. The diagram shows the dimensions I found to be adequate. If a center support is available, like a mast, a hole can be drilled through an etched



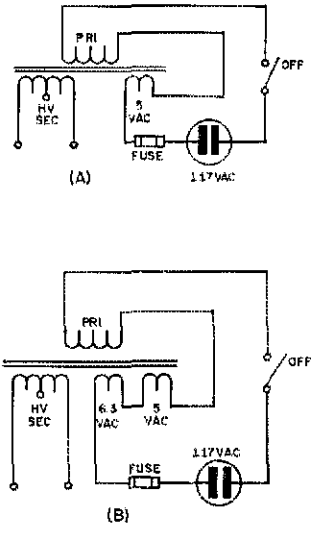
portion of the insulator for attaching a rope. Use two holes for the feedline and the antenna wire. By threading the wire through the two holes, then soldering them, a good electrical and mechanical connection can be made. — *Walter S. King, W7QCV.*

EARPHONE CUSHIONS

Nylon and foam rubber telephone covers, available in supermarkets, make excellent earphone cushions. One particular type that is available in this part of the country is manufactured by Ell Dee Products, Peace Dale, RI – *John H. Joseph, K3ISR.*

CHANGING THE OUTPUT VOLTAGE ON TV TRANSFORMERS

When using an old TV transformer in home-made equipment, the voltage may be somewhat higher than desired because of the increased efficiency of silicon-diode rectifiers, as compared with vacuum-tube rectifiers. Since there is usually a 5-volt winding not now being used, it can be wired into the primary circuit to either boost or buck the line voltage by 5 volts. The same thing can be done with an unused 6.3-volt winding. First, measure the secondary voltage of the power transformer with the 117-volt primary connected to the ac line. Then, connect the 5-volt winding in series with the primary. The output voltage will be approximately five percent higher or lower than before and if other than the desired condition exists, just reverse the 5-volt connections.



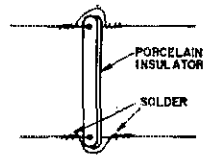
(A) The 5-volt winding in series with the primary. (B) The 5- and 6-volt windings in series for added bucking or boosting.

Voltage boosting and bucking can be carried further by using the 6.3-volt winding with the 5-volt winding. First, after connecting the 5 and 6.3-volt windings in series, check the voltage to insure the two voltages are adding to approximately twelve volts. If the windings are bucking each other, the measured voltage will be about 1.3 volts and one winding should be reversed. The twelve-volt winding may now be used for bucking or boosting, as outlined above. – *Peter Stevenson, W4DUL.*

[EDITOR'S NOTE: When bucking or boosting the primary to change the secondary voltage, it should be noted that all secondary voltages change. If the builder is using filament or bias windings on the transformer for supplying operating voltage to the equipment, these voltages should be checked to insure they don't vary above or below the desired value.]

SPREADERS FOR OPEN-WIRE LINE

Getting suitable spreaders for open-wire feed lines is not always easy in this day of coax. One possible source is a radio shop carrying Japanese components. They have available a 3-inch porcelain insulator which is light enough to make good open-wire spreaders. A box containing ten pieces sells for about $1.



A few wire wraps on each side of the insulator will hold it in place. Be sure the joint is well soldered.

The insulator should be attached to the line as shown in the sketch. It is important to solder the wire wraps, as this can be a source of noise when the wire has weathered a bit. – *WIKLK*

JFET PROTECTION FOR THE "SIMPLE CRYSTAL TESTER-CALIBRATOR"

After building the crystal tester described on page 20 of February *QST* and testing several dozen crystals, I found the JFET burned out by excessive gate current caused by an empty crystal holder with its plates internally shorted. When this drain-to-gate short occurred, the gate was in series with the lamp and rf choke, and it was heavily forward biased to conduct more than the maximum 10-mA gate current. While replacing the JFET, I put a .02-uF ceramic capacitor between the crystal socket and the gate to block the battery voltage from the gate. It doesn't matter whether the capacitor is on the drain side or the gate side of the socket. Other capacitances work just as well provided they are large enough to have a low impedance at the lowest frequency. The capacitor reduces feedback slightly and the drain current is increased only a fraction of a milliampere over that of the original circuit. Operation is essentially unchanged for my crystals whose frequencies fall between 100 kHz and 16 MHz. Additionally, the circuit now behaves the same with a dead short at the socket as it does with no crystal at all.

To avoid installing several types of sockets, or constructing adapters, I use two short clip leads as a universal adapter because there is no danger if they touch each other. If the circuit is grounded to the case, a larger capacitor at each end of the crystal socket would prevent a dc short caused by either clip lead contacting the case. – *Alan E. Van Antwerp, WA8LKV*

CANTENNA OIL

Builders of the Heath dummy load might have problems locating the proper oil. One-gallon cans of insulating oil, packaged by General Electric, are available from most G. E. distributors.. – *James R. Stewart, K2PKK*

Technical Correspondence

VERTICAL DIRECTIVITY OF HORIZONTAL ANTENNAS

Technical Editor, *QST*:

Maximum radiation of horizontal dipoles and beams takes place at the vertical angle at which the direct sky-wave signal receives in-phase support from the indirect ground-reflected wave. We assume that the ground reflection takes place from a flat, regular surface, at a distance along the earth which is equal to the height of the antenna times the cotangent of the vertical angle of radiation.

The effect of the ground-reflected wave from horizontal antennas is shown in *The ARRL Antenna Book* for several antenna heights between 1/8 and 2 wavelengths.[1] At heights above 1/2 wavelength, several lobes appear.

When the antenna height is taken in feet and the frequency in MHz is used, the formula for the sine of the lowest angle of maximum radiation θ simplifies to:

$$\sin \theta = \frac{246}{H_{ft} \times F_{MHz}}$$

Suppose that the operating frequency is 14.3 MHz, and that the antenna or beam is elevated to 60 feet. At what vertical angle will the direct and indirect ground-reflected waves be in phase to provide maximum radiation? Instead of using the above formula, the chart of Fig. 1 may be used. Find the product of the antenna height and the frequency. In the present case, 60 x 14.3 = 858. Enter the chart at the left with this product. Move to the right to intercept the curve, and drop down to the bottom of the chart and read approximately 17 degrees. (The computed value is 16.66 degrees.)

It should be noted that the environment of the antenna is assumed to be free from the effects of other antennas and nearby objects, and that a flat ground-reflecting area is present. If the earth were a perfect conductor, the ground-reflected wave would double the intensity of the direct wave. In practice, this gain is reduced by the loss which takes place during reflection.

The gain obtained through use of beams occurs in the azimuth plane. Unless beams are stacked, they provide no additional gain in the vertical plane. — *Lewis B. Gilmer, W4VXD, Communication Engineering, Onemo, VA 23130.*

[1] Chapter 2, "Antenna Fundamentals," Figs. 2-26 through 2-37, *The A.R.R.L. Antenna Book.*

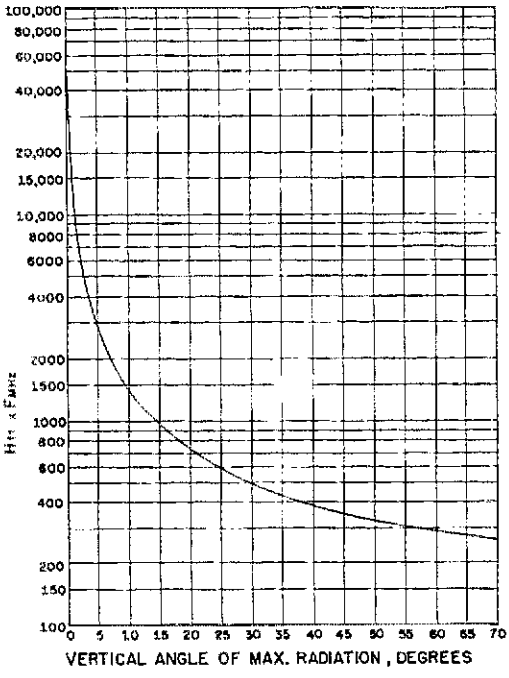


Fig. 1 — Horizontal-antenna wave angle versus product of antenna height and operating frequency.

SEMIAUTOMATIC (BUG) KEYING WITH MICRO-TO KEYER

Technical Editor, *QST*:

In the past I had been searching for an electronic solid-state keyer circuit that could be used as a fully-automatic keyer or semiautomatic "bug." To get such a keyer, I made a modification to my Micro-TO keyer.[2]

Fig. 2 is a partial schematic of the keyer before modification. In the original circuit (not shown in Fig. 2), S2 was located in the collector circuit of Q4. It is removed completely. Fig. 3 shows the circuit modification. S3 is used as the automatic or semiautomatic mode selector. In the automatic position, the dash circuit is conventional; in the semiautomatic position, the output gate is keyed directly by the paddle, thereby giving semiautomatic operation.

Now the Micro-TO keyer meets all my requirements. My ham friends who are bug lovers now feel at home in my station. — *Edward Sauve, VE3GSX, 114 Woodridge Crescent, Apt. 13, Ottawa 14, Ont.*

[2] Opal, "The Micro-TO Keyer," *QST*, August, 1967. Also *The Radio Amateur's Handbook*, ARRL, editions of 1968, 1969 and 1970, "Code Transmission" chapter.

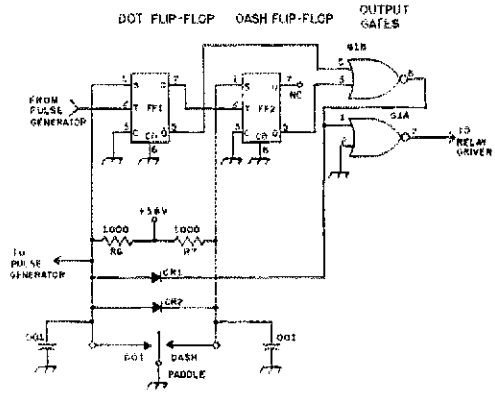


Fig. 2 — Partial schematic of Micro-TO keyer before modification. See earlier references for parts identification.

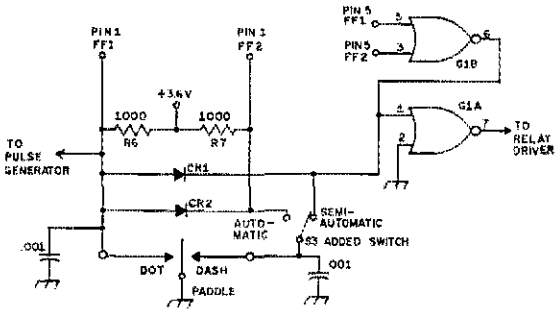


Fig. 3 — Modification to Micro-TO keyer to obtain automatic dots and manual dashes. S2, the original *TUNE* switch, is removed from the keyer, and, after modification, tuning is done in the semiautomatic position. S3 — Spdt toggle or rotary.

ON GRINDING CRYSTALS

Technical Editor, *QST*:

After having read *QST*'s September 1969 article on grinding crystals,[3] and having had some experience in this field, I wanted to pass along a few extra constructive notes along these lines.

First, one should be aware that a frequency-determining factor in the study of the "piezoelectric effect" is, in addition to the type, cut, and thickness of the quartz, the amount of pressure impressed on the quartz and the metal plates. Adapting this to crystal grinding, all is not lost, should you overshoot your target frequency by a few cycles. Experiment with a weaker spring tension to lower the frequency. (Note that different manufacturers of crystals use springs of different tensions.) In the reverse, should you find that you are near the target frequency, increasing the spring tension will increase the frequency and may satisfy the frequency requirements without further grinding.

A method of monitoring the crystal activity is a "must" when trying the different spring tensions. A policy of mine is to find a spring of a weaker tension prior to beginning the grinding. Just at the point of approaching the target frequency, a spring of a heavier tension is used to feel out and possibly hit the target frequency without any further grinding required. A reliable method of determining how close the target frequency will actually be, once installed in the crystal holder, is to use an old FT-243 holder with the front plate secured by a heavy binder clip or modified clothespin, instead of the normal front-plate screws.

There is still another important factor that should yet be considered, and that is heat. A change in frequency may result, depending on the amount of heat surrounding a crystal. Depending on the *particular cut* of quartz, a crystal frequency may increase *or* decrease, by as much as five percent of the frequency, when the temperature is raised. Applying this to grinding techniques, one should take into consideration the amount of heat in which the crystal is to function. For an example, if a crystal is to be used in an oven, one may not want to be "dead on" the desired target frequency with a "cold" crystal.[4]

[3] Rosenbery, "Grinding Technique for Surplus Crystals," *QST*, September, 1969.

[4] Frequency-versus-temperature performance of a crystal in an oscillator stage is discussed in the article by Hoff, "The Mainline FS-1 Secondary Frequency Standard," *QST*, November, 1968. — *Editor.*

One last thought, should there be a requirement for a somewhat variable crystal. Try an old FT-243 holder with a thumb screw attached through the front plate, so as to vary the spring tension on the crystal. The thumb-screw effect has worked quite well where ready-made crystals were not available. — *F. Charles Belchner, K5KZA, ex-9G1FQ, USAID-PWD, APO San Francisco 96352.*

GALAXY V TRANSCEIVER MODIFICATION FOR THE BLIND

Technical Editor, *QST*:

In Mr. Schwaneke's article, "Equipment Modification for the Blind,"[5] he describes a change to the Galaxy V transceiver to provide foot-switch transfer from receive to transmit on cw. He neglected to provide for the 1000-Hz frequency shift of the carrier in the transmit mode. This shift is normally accomplished by the function switch in the Galaxy V. It can still be provided with the function switch remaining in the cw position by utilizing an extra contact on the PTT relay. Mr. Schwaneke's modification to S3A should first be made as described in his article. In addition, a shielded cable should be run from the S3A side of the LF crystal (X2) to pin 14 of relay K1, as shown in Fig. 4A.

For even simpler operation on cw, the VOX 35B may be used for semibreak-in. Modifications must be made to the VOX board and to the key jack on the Galaxy V to accomplish this, as shown in Fig. 4B. The VOX board has one unused contact (marked *f*). This pin may be used to provide triggering voltage for the VOX in the cw mode. The cathode of a 1N34 diode is connected to the base of Q2; the anode is connected to pin *f*. A 4700-ohm 1/2-watt resistor is connected from pin *f* to the base of Q5. Next, a new key jack is installed in the Galaxy V and wired as shown. Plug in the key for semibreak-in operation; unplug the key for ssb. — *Robert Patten, W4OZF, 2311 W. Nassau Dr., Miramar, FL 33023.*

[5] Schwaneke, "Equipment Modification for the Blind," *QST*, February, 1970.

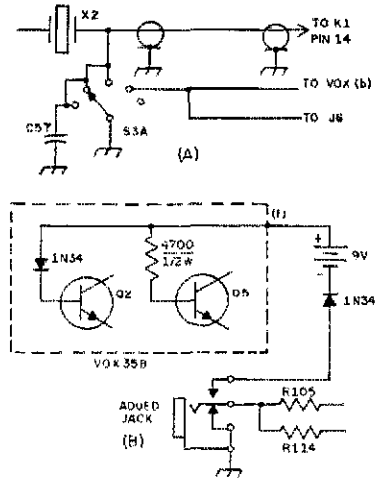


Fig. 4 — Modifications to the Galaxy V transceiver for cw operation by the blind. The partial circuit at *A* provides for foot-switch changeover from transmit to receive, while that at *B* provides for cw-tone VOX control.

The Operational Amplifier

In Two Parts

Part I — A New Component for Building Your Own

BY JULIAN M. PIKE.* WAØTCU

In the minds of most amateurs, an amplifier would be thought of as a system built from discrete components. However, progress in solid-state electronics has brought forth tiny systems in single tiny packages which might well be thought of as components in themselves. A wide range of these now exist, including rf and audio amplifiers, logic elements for computers, pulse dividers, and many other interesting devices. We will explore in this article some basic notions about "operational amplifiers," which may be used as components in practical uses around the shack.

An operational amplifier, for our purposes, is a high-gain device capable of response from dc to rf. The name originates from usage in electronic computers to perform mathematical operations. "High gain" may handily refer to voltage gains of 100,000 or better, and the dc response makes this device especially interesting. Such capability requires some care in circuit design, of course, but most are quite easily tamed. One may find "op amps" on the market made from discrete components and packaged in a cubic inch or less. There are also complete amplifiers available as integrated circuits (ICs) built of many transistors on a single silicon chip and enclosed in a transistor-sized case, Fig. 1. Some are hybrids made of both ICs and discrete components. Their cost has been high, but you get a lot of performance per dollar, and prices for some models with less stringent specifications are now low enough for serious consideration.

Many manufacturers now make op amps. The Fairchild μA709 is, in some respects, the granddaddy of them all. It is now made with performance variations, but usually a pin-for-pin replacement, by a number of firms. It would be impossible to list even a sampling of the large number of types available. The large number is a result of maximization in performance for a particular type with respect to temperature, frequency, output, power gain, or certain errors. These specs are trade-offs with respect to price, of course, which may range from a couple dollars to well over one hundred. Most manufacturers distribute through franchised dealers, but both the 702 and 709 types have been recently advertised in *QST* at a little over $2 each. This is somewhat less than usual single-lot prices from distributors, and we will aim most of our circuit notes toward these two types.

*National Center for Atmospheric Research, Boulder, Colorado 80302

Principles

Let's look at a typical symbolic diagram for an op amp, Fig. 2. The triangle is a standard symbol for "amplifier". Note that both positive and negative supply voltages *with respect to ground* must usually be used. There is advantage to this, however, since the output can swing through both positive and negative polarities, depending on whether the input is positive or negative. The amplifier also has two inputs, inverting (sometimes labeled −) and noninverting (+). A positive signal with respect to ground applied to the inverting input produces a negative output with respect to ground, and vice versa. A positive signal applied to the noninverting input produces a positive output and vice versa. Additional connections to an op amp might be provided for external frequency compensation and trim adjustment. The latter permits adjustment to zero output with zero input.

An amplifier which has two inputs as shown is known as a "differential" amplifier. For example, suppose a small positive voltage were applied to the noninverting input. It would be amplified to some positive output. In an ideal amplifier, the same small positive voltage applied to the inverting input would produce a *negative output* exactly equal to the former positive output. Thus, if one applies the same voltage to both inputs simultaneously, the output becomes zero. A voltage such as this is technically known as the "common-mode voltage". As a further example, let us suppose that + 2.000 volts is applied to the noninverting input and + 2.001 volts is applied to the inverting input. The common-mode voltage of 2.000 volts gives zero net output, but the extra + .001 volt at the inverting input

Have a look at a device that, like other types of integrated circuits, will find an increasing number of applications in amateur gear. The article also shows some practical circuits that will give experimenters a start in the right direction.

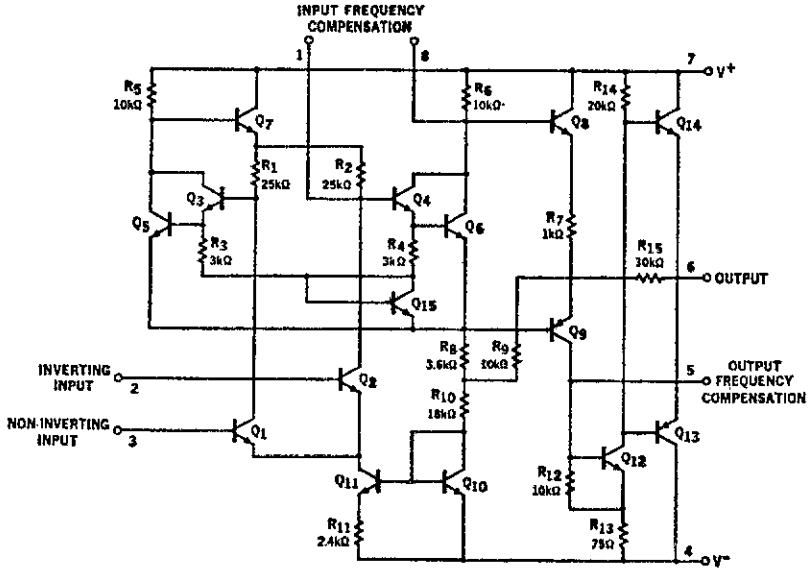


Fig. 1—Internal circuit of the Fairchild μA709C integrated-circuit operational amplifier.

will be amplified and produce an amplified negative output voltage. From this example, then, the term differential amplifier is obvious. It is the *difference* between the 2.000- and 2.001-volt inputs — i.e., .001 volt — which is amplified. This property is often of great value, but one of the inputs can always be grounded rendering the amplifier "single ended".

Real amplifiers are not perfect, of course, so there is usually some "common-mode error," which implies some output with both inputs equal. It is small and just now of little concern. Other imperfections include drift and noise, which are changes in the output for what sometimes seems little apparent reason. The former is at a very slow rate (over seconds to days), while "noise" occurs rapidly at kHz or MHz rates. Another error is called "offset," which shows up as an output with zero input. It can be cancelled out by a small adjustable voltage applied to one of the inputs. Also, a small bias current of a microampere or less must be supplied to the input transistor. This may well come from a dc signal, or a special circuit can be used if the signal cannot supply it. There are certain considerations in supplying bias if very high accuracy at all temperatures is needed. Generally, the costlier the unit the lesser its imperfections, up to such elegant devices as the chopper-stabilized op amp at $100 or more. The cheapest units are completely satisfactory for most uses around the shack.

A remarkable feature of the op amp is its linear dc response. With the gains typically obtainable, tens of microvolts input will produce volts output at steady dc values. The least-expensive devices are capable of outputs of up to ± 5 volts and currents of 10 milliamperes or more. Their linear characteristic means that if 100 microvolts input will produce 1 volt output, then 200 microvolts will produce 2 volts, 300 microvolts will produce 3 volts, and so on up to the linear-response limit of the device.

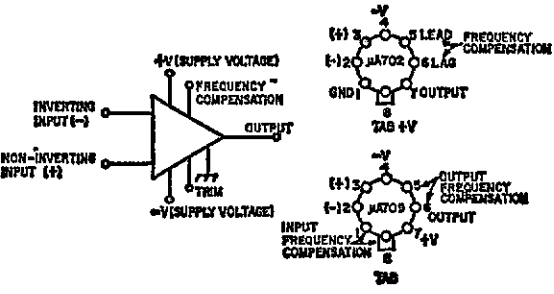


Fig. 2—Symbolic amplifier circuit (left) and bottom views of bases of μA702 and μA709 operational amplifiers. Terminals marked + and — are noninverting and inverting inputs, respectively. V^+ and V^- are positive and negative supply voltages. Note that the μA709 has no common supply connection brought out.

Gain and Feedback

For most purposes, the high "open-loop" voltage gains we have been speaking of are not needed. Many applications require that the gain of the amplifier be fixed at some specific value, say for calibration purposes. Perhaps a gain of exactly 100 is needed, and it must remain fixed, irrespective of changes in supply voltage as batteries age, or changes in temperature. The "surplus" gain of an op amp with open loop gain of 10,000 now is put to good use by employing negative feedback. The resulting "closed-loop" gain, set at 100 by external adjustment, will remain fixed over large changes in external conditions because it is set by external circuitry. Let's see how this is accomplished.

Gain Analysis

To analyze the behavior of an op amp easily, it is necessary to make some idealizations. These will sound absurd at first to the uninitiated, but the actual behavior of the device may frequently depart only 0.1 percent from the ideal case. Most characteristics can genuinely approach the ideal by proper circuit application. We now list some characteristics of an ideal operational amplifier:

1. Its input impedance is infinite.
2. Its gain is infinite.

At first encounter, these statements sound ridiculous, but let's see what an amplifier could do if it could *approach* the ideal. First, the higher the input impedance the smaller the current drawn from the input signal, so that in the ideal, no current is conducted to the amplifier from the signal source. Second, the higher the gain the smaller the input voltage required for full output, so that in the ideal, the differential signal voltage input becomes zero, and the inverting and noninverting inputs are at the *same* voltage for full output.

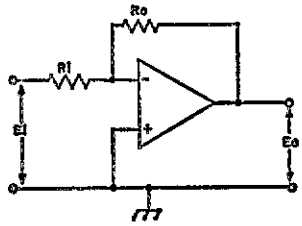


Fig. 3—Inverting amplifier configuration, with feedback.

Let us now apply these characteristics to an analysis of the amplifier under closed-loop conditions. An elementary circuit for the so-called inverting amplifier configuration is shown in Fig. 3. (An actual circuit would have power supply connections, etc.). The addition of the voltage divider network R_oR_i, connected through the signal source E_i to common, causes negative feedback since part of the output is applied to the inverting input. (See any recent issue of *The Radio Amateur's Handbook* for a discussion of negative feedback). To comprehend intuitively what happens, suppose the output somehow became more positive by a small increment. This would add a (smaller) positive increment to the inverting input through the divider network R_oR_i. However, this positive increment produces a negative increment at the output, having been applied to the *inverting* input. As you can see, negative feedback tends to suppress disturbances and prevent runaway and oscillation, albeit decreasing overall voltage gain.

But let's be a little more analytical, using the characteristics of the ideal amplifier. The input signal E is assumed to come from a source having zero impedance. According to the previous discussion, the two inputs are at the same voltage, so the voltage *between* the two amplifier inputs is zero, and the entire voltage E_i appears across the

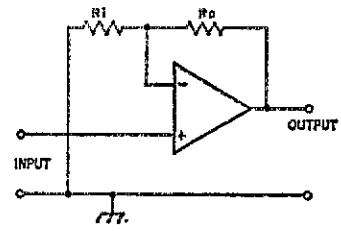


Fig. 4 — Noninverting amplifier configuration, with feedback.

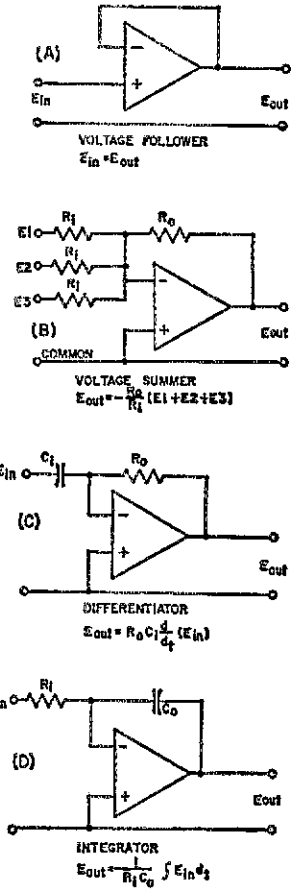


Fig. 5—Basic circuit arrangements for using an op amp for performing four different functions.

input resistor R_i. (This is an application of Kirchhoff's loop rule.) Note, incidentally, that although the input impedance of the amplifier by itself is assumed infinite, the input to the *circuit* — i.e., the impedance seen by E_i — is R_i. Likewise, the loop formed by E_o and R_o across the inputs (which behave as though they were connected together as far as this point of our analysis is concerned, since there is no voltage difference between them) is amenable to the same treatment, and it follows that the output voltage E_o appears across the output resistance R_o. By

Ohms Law, the current through R_i is E_i/R_i and the current through R_o is E_o/R_o. In engineering language, the junction of R_o, R_i and the inverting input is called a "summing point". Kirchhoff's junction rule applies to this point, and since no current flows to the amplifier, the sum of these two currents must be zero, as follows:

$$\frac{E_i}{R_i} + \frac{E_o}{R_o} = 0 \qquad \text{and} \qquad \frac{E_o}{E_i} = -\frac{R_o}{R_i} = A$$

This relationship shows us quickly what the ratio of output voltage to input voltage or voltage gain (A) of the circuit is. It is precisely the ratio of resistance R_o to R_i, and is completely independent of the gain of the amplifier itself. The minus sign denotes the inverting amplifier configuration.

Many op amps are used with this type of circuit, which may be adjusted for gains of one to a thousand or so. R_o could be a potentiometer so that gain could be varied to effect a sensitivity or calibration adjustment. Note, however, that R_i in a real circuit will include any resistance in the actual signal source. In some cases this can be a variable quantity so that gain variations occur. The noninverting configuration shown in Fig. 4 largely eliminates this problem. An analysis similar to that above shows that its gain relationship is:

$$A = \frac{R_o + R_i}{R_i}$$

The input impedance of this circuit is higher than that of the inverting amplifier, and in practice might be many megohms.

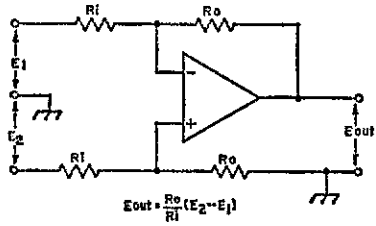


Fig. 6—The differential amplifier.

There are other circuits, a few of which we will mention. The voltage follower, A in Fig. 5, will reproduce the input voltage almost exactly. One may draw relatively large current, always at the input voltage, but with virtually no current drawn from the input source. The voltage summer, B, gives an output which is the sum of all separate input voltages multiplied by the gain of the circuit. Any number of voltages may be summed. The output of the differentiator, C, is proportional to the *rate of change* of the input voltage, while the integrator circuit, D, could be made to average a time-varying voltage, count pulses, and do other interesting things. These have all been single-ended amplifiers; a differential circuit is shown in Fig. 6.

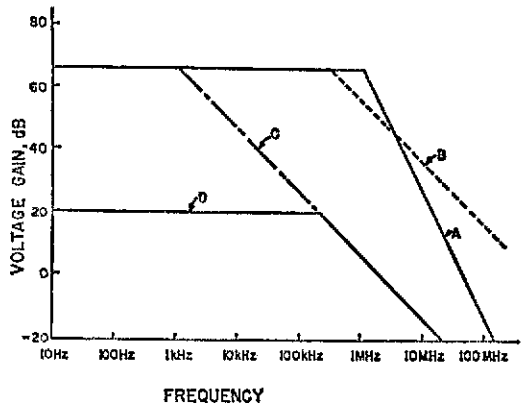


Fig. 7—Bode plot for operational amplifier.

Stability

The frequency response of an op amp is purposely limited in a special way to give it stability under a wide range of feedback conditions. As the frequency increases, the amplifier will introduce a phase shift. If the phase shift reaches 180 degrees before the gain has decreased to unity the amplifier will be unstable. The "Bode plot" is a useful graph in frequency-response discussions, and a simplified one not too unlike the real response of a 702 is shown in Fig. 7. The abscissa is the logarithm of frequency, while the ordinate is gain in "voltage dB" — i.e., $dB = 20 \log (V_2/V_1)$. Thus, 60 dB means a voltage gain of 1000, 40 dB is 100, and so on.

Curve A represents the response of the op amp without any frequency compensation. All older IC op amps have no built-in compensation. Note that above 1 MHz the gain rolls off at 40 dB per decade; that is, for each ten-fold increase in frequency the response decreases 40 dB. For reasons made clear in amplifier theory, this response renders an amplifier potentially unstable. Curve B approximates the response obtained by connecting a 100-pF capacitor between pins 5 and 6 of the 702. Note that it decreases half as fast — 20 dB/decade. This renders the amplifier stable, but not immune of course to positive feedback in the external hookup. A second compensation similar to curve C is obtained by connecting a 0.1 μF capacitor from pin 6 to ground. Note the decreased high-frequency response, but still the 20 dB/decade rolloff. This is adequate for many applications, and is called "conservative frequency compensation" for the 702.

Now suppose we were to set the gain of the circuit by feedback to 20 dB, which is a voltage gain of 10. What would the Bode plot look like? The gain would be limited by feedback from dc through low frequencies, and limited by the compensation circuit at the high-frequency end. For conservative frequency compensation the response would be along curve D. Similar curves could be drawn for other values of feedback.

(Part II will appear in an early issue of *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

REGION II MEETING

Fifteen national amateur organizations of North and South America, represented by 22 delegates and observers, participated in the 1970 tri-ennial Conference of the *Union Interamericana de Radioaficionados* IARU Region II, May 18-22, in Jamaica. The host society was the *Jamaican Amateur Radio Association*; during the week, a conference station with the special call 6YØUIR was in operation and made hundreds of contacts.

In opening remarks, IARU president WØDX emphasized the importance of amateur preparation for the 1971 World Administrative Radio Conference on Space. He pointed out that in the same manner that organized radio has protected its hf assignments in the past, it must now work for the protection of our interests in higher frequencies and their use with space techniques.

The Caribbean Emergency Net has been a major accomplishment of the Region II organization. This operation functions under the expert guidance of XE1AX and 6Y5EM. It was decided that expansion will be undertaken to cover portions of South America.

Slight amendments were made in the "gentlemen's agreement" plan for use of frequencies. This basic band plan now provides that 3500-3510 and 3790-3800 kHz be used only for international DX contacts, that RTTY should use 14090-14100, and that 14190-14200 as well as 21240-21250 should be reserved for DX work.

A contest sponsored by the Region II organization has been attempted for the past two years. But, because interest was small, it has been decided to discontinue the activity and study a possible alternative event to promote general amateur interest in work of the region.

Finally, it was agreed to accept the proposal of the *Radio Club de Chile* to hold the 1973 Conference in that country.

IARU OFFICERS ELECTED

At the recent meeting of the *ARRL* board of directors, an election of League officers was held. According to the International Amateur Radio Union constitution, the President, First Vice-president, and Secretary of *ARRL* (the IARU headquarters society) serve in a like capacity with IARU.

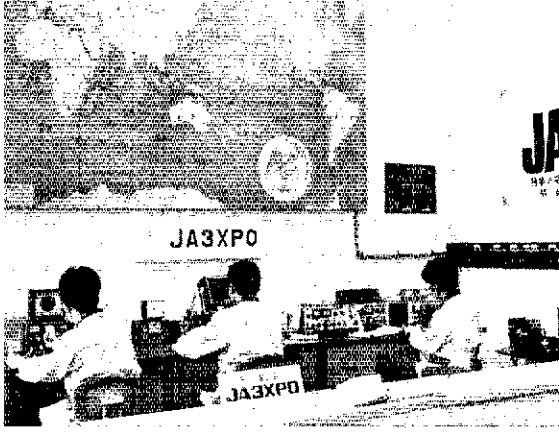
Re-elected were WØDX and W1LVQ as President and Secretary respectively. Charles Compton, WØBUO was elected First Vice-president replacing W5NW who was elected *ARRL* Honorary Vice-president.

WØBUO has served as *ARRL* director from the Dakota division covering the states of Minnesota, North Dakota, and South Dakota since 1960. He was an *ARRL* Vice-president from 1966-68 and has been a member of the League's Executive Committee since 1963.

Jamaica Amateur Radio Association president 6Y5LA sits between the six members of the Region II Executive Committee: VE3CJ, WØDX, OA4AV, XE1CCP, LU3DCA and newly-elected HP1CH. Standing are delegates and observers: VP9AX, XE1CE, VE2MS, W1DPL/6Y5, VP9BK, YS1MCK, CP1AD, CP5ED, W1LVQ, YV5BPG, W4DQS, CE3GE, YV4CQ. Not present at time of photograph: XE1AX, 6Y5EM.

JA3XPO

The World's Fair at Osaka, Japan is on-the-air with the appropriate call sign of JA3XPO. Located at the San Francisco Pavilion, the station during its first five days of operation, contacted over seventy countries! Operation is in the 10-, 15-, and 20-meter bands, usually about 10 kHz inside the American phone bands. WA6IVM provides daily contact between San Francisco, California and the Fair and reports local weather conditions and San Francisco news. Establishment of this World's Fair station was a joint effort of the offices of the Mayors of San Francisco and Osaka with W6VCN, Director of Public Relations, office of the Mayor, San Francisco, providing much assistance.



The operating positions at JA3XPO.

NOTES

U.S. amateurs wishing to obtain permission to operate in French territories under the U.S./France licensing reciprocity, should apply at least three months in advance to *Service Radioelectriques, 5 rue Froidevaux, Paris 14e, France.* There is no license fee. Application forms are available from *ARRL* hq.

The Malta Independence Day Award, to take place September 21, 1970, has been announced by the *Malta Amateur Radio Society*. The contest period will be from 0001 to 2359 GMT. Count one point for each 9H1 station contacted per band. A handsome pennant embroidered with the winning station's call sign will be presented. Logs certified by two other amateurs or one radio society official should be sent to the Awards Manager, Lawrence Smith, 9H1BB, c/o J.J. Uella, "Mayfair" off Ursuline Sisters St., Guardamangia, Malta.

DX OPERATING NOTES

Reciprocal Operating

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

Canada has reciprocity with: Bermuda, France, Germany, India, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Senegal, Switzerland, United Kingdom, U.S., Uruguay 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

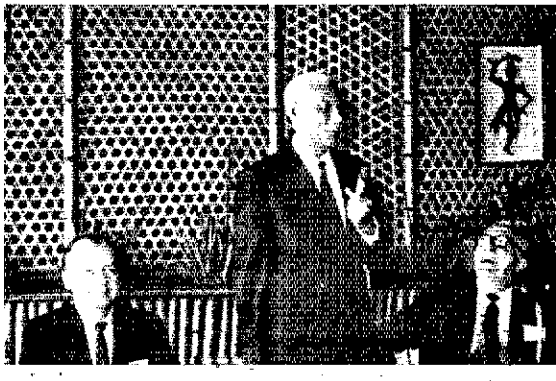
U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateurs should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Laos, Vietnam and Jordan. Prefixes to be avoided by Canadians are JY XU XV XW8 and 3W8.

*Agreement includes overseas entities.

**By special agreements, third-party traffic is also permissable with Australian amateurs for traffic regarding amateur satellites, and with 4U1ITU.

LATE NEWS – A reciprocal operating agreement between the U.S. and Brazil became effective on June 19.



Ainsley Gauntlett, retired chief engineer of the Jamaican "FCC," officially welcomes the Region II conference while IARU international president WØDX and Region II president XE1CCP beam approval.

Correspondence From Members-

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

FIE ON FEES!

● Your analysis [page 80, June *QST*] of the proposed FCC amateur licensing fees and your strong protest meets with my favor 100%. Keep up the fine work. — *Jim Wood, W1AYG, Hingham, MA*

● Please accept my congratulations for an excellent presentation to the FCC in the matter of Docket 18802. Counsel Booth and associates did an excellent job. — *Edward F. Erickson, W2CVW, South Amboy, NJ*

● I must register my support for the League and its stand on fee increases. Sock it to 'em, Mr. Booth! — *F. Benevides Jr., W1BOJ, Somerset, MA*

● Without the threat of an increase in license fees I might never have upgraded to Extra. Without the help of the League I might never have made it. The nightly code practice on 7020 kHz certainly simplified the attainment of the 20 wpm, and the "License Manual," *Radio Amateur's Handbook*, and a couple of your other publications made the written tests almost a breeze — thanks! — *Timothy Lee Bratton, WA5FTP, Houston, TX*

WHO NEEDS 'EM?

● Hams don't need satellites. Do we? Many of us think of amateur satellites as a pursuit of a small group of enthusiasts without any real impact on routine amateur operations. But, the use or lack of use of satellite technology could have a vital effect on amateur radio. Here's why:

For years and years, the frequencies from 3 to 30 MHz served the expanding needs of the communications industry for long-distance circuits. With a fixed limit on the number of channels in this range, crowding became a necessary result. Measures were taken to make more effective use of the hfs. Modern techniques including ssb certainly helped.

But perhaps the biggest boon to providing new channels was the advent of satellite technology. Suddenly through use of orbiting repeaters, the range above 200 MHz, previously thought useless for long-range communication, was found capable of supporting long-range work!

This may prompt some reminiscenses among old-timers who remember when hams, during the '20s, discovered that the wavelengths below 200 meters were indeed not "useless" for DX, but did a better job of it than the other frequencies. This was a boon offering new long-distance channels to the commercials, too. Shades of communication satellites!

Let's suppose hams had not pioneered the shortwaves. Admittedly, their discovery was sure to come sooner or later. What would have happened if, instead of using the new-found DX frequencies, amateurs had contentedly remained above 200 meters? Would we still be there? Or, more importantly, would we, like other relics of the past, have long since faded from existence? Of course, we have no way of really knowing what would have happened.

Let's speculate on what might happen in the future. Will amateurs make use of satellite communications? Or, will we decide that the hf spectrum can adequately satisify our needs? I guess the amateur of 1915 felt secure in thinking the world above 200 meters, the longwaves, was adequately satisifying the needs of the modern amateur of that era!

The point is, just as the long waves once satisfied the frequency needs of amateurs, and the hfs have since been supplying our long-haul frequencies, might not we *need* the channels possible from amateur satellites to supply our requirements in this emerging space era?

I think this deserves serious consideration. You know, it was not up to the average amateur of the 1920s to decide whether or not to go from long to short waves — it was a matter of regulation, or more correctly, relegation, plus some pioneering. However, it is now up to the average DXing, ragchewing, fming amateur to chose to utilize — or not utilize — space communication techniques. What will he do? — *Sheldon A. Glick, WA1IUO, Avon CT*

A WIDER AUDIENCE?

● I wish to compliment Dick Pitzeruse, K2KTK, on the Western New York Section Bulletin. I have no idea whether or not the League is behind this effort financially but feel that if it is not, consideration should be given to some sort of financial support for efforts of this type. I am sorry that all ARRL members can't be included on subsequent mailing lists and think that possibly the League has it within its pocketbook to make a wider audience possible. Congratulations to K2KTK. — *Walter Hagen, WA2ALV, Glens Falls, NY*

[EDITOR'S NOTE: Regular section bulletins are usually supported by those who read them — ARRL has 74 sections, and the potential expense of 74 monthly bulletins is staggering!]

YOUNG SUPPORTER

● I am 16 and have been a ham and a member for a little over a year. I have never had a gripe about the League to date (knock on wood). I just thought I would write to tell you that you do have a few guys who are completely satisfied with the ARRL, besides all the guys who have gripes, retract their memberships, accuse the League of capitalism and such. It's sort of comic. Usually the older people tell me to grow up but this time the older people should grow up. Hey you guys, quit griping — we're lucky to have a League! — *Frank Arciuolo, WN1KLU, North Haven CT*

LET'S TALK TRANSISTORS

● All I know about transistors has been learned from Mr. Stoffels' good work ("Let's Talk Transistors", November 1969 through July 70 *QST*). My compliments to him and to *QST* for publishing it.

Just one more comment: I went from Novice to Advanced in a little over a year. I'm in the Medicare set; if I can do it, so can anyone else. — *Chuck Shaw, WB8CND, Kettering, OH*

MYSTERY SOLVED

● Thanks to the ARRL *License Manual* I passed my Extra Class exam last week. I found the exam followed closely the questions listed therein.

I do think however that the man who writes question and answer for those FCC exams is none other than the one who writes the instructions for our income tax reports. The choice of answers for each question is where the trouble lies. They are tricky and you had better know what the question really means or your answer may be wrong.

The exam is not as hard as you think. At the ripe old age of 64 I found it took a lot of studying to really cover and retain the knowledge required to pass this exam. I hope the growing list of old timers passing the Extra will encourage the rest of you to get that new ticket. – *William F. Bonnell, W5CVW, Ft. Worth, TX*

CODELESS EXPERIENCE

● I would like to make a few comments on W5JJ's letter on page 80 of the December 1969 *QST*. He would like to see the U.S. adopt the codeless vhf license as we have here in Australia. He hopes that it would discourage CB activity, and swell the Amateur ranks.

We have it here; the codeless vhf licence. True, we have a large number of vhf operators. They cannot use cw, and they miss much of the fun of working very weak signal DX which exists many times. These weak signals are readable if keyed, but on am phone, no QSOs result. Also, not even having a 5 wpm code background, the "Limited Licencee" here has no incentive to progress to the higher licence; most vhf'ers regard the code as too difficult. Even the dropping of the "Full Licence" code speed to 10 wpm has not had a very large effect on licence conversions.

As for stopping CB operation, Australia has a 27 megacycle pirate problem too. We have no CB bands here but we do licence 1-watt hand-held units if the owners have a valid reason to need them. These operate on 27 megs. The PMGs department (our "FCC") make regular raids on the illegal operators; their gear is seized and forfeited, and the operators fined. Despite this, pirates continue to operate; the attraction is skip working. Vhf cannot often offer this very long range work, and it is this that keeps CB alive. It is even suspected that some (a very few) Limited Licence operators sometimes work 27 megs, just for DX.

In my opinion, the only answer is to close the 27 meg bands, and put all CB working on uhf. Only then, will the true thrill of Amateur Radio –DX working– attract the present CB user. He will never be attracted to VHF; code or no code. Keep the code; it produces better-equipped amateurs. – *John H. Smith, VK3IQ, Victoria Australia*

● A "Code Free" license would most certainly appeal to a great number of people. If one says that the Ham Bands are too crowded for more it should be pointed out that there are about 300,000 licensed amateurs in the U.S., but few are truly active.

In addition to producing a greater bona-fide interest in amateur radio, reforms in licensing would improve the public's image of amateur radio by making services easier and more abundant to Mr. Citizen during a period of emergency or at least a routine phone patch.

However one must realize that there are couple of drawbacks to the "Code Free" license. The present code test can not be easily faked and surely proves one's ability. If the written exam were rather simple, similar to the present General Class Exam, many individuals could take the exam a couple of times and by memorization be able to pass the exam. By passing a relatively difficult written exam as a substitute for the code exam, one would equally exhibit his deep interests in the amateur service.

Giving the applicant an option as to whether he wanted to take the code test and written test, or just take the more difficult written exam would truly be a wise decision by the FCC, and should enlarge and improve the services of amateur radio. – *Dan Freedman, WA6NYN, Van Nuys, CA*

PUBLIC PAMPHLETS

● Thank you very much for the literature you sent for us to pass out at our local Scout - O - Rama. The material arrived with a couple of days to spare, and everything went well. In fact, our troop (Troop 46/56) won 2nd place in the event which included over a hundred booths! We're glad you could help us out on such short notice – proof that the league *does* help its members! – *Ronald J. Hatch, K7QEZ, Provo, UT*

[EDITOR'S NOTE: Glad we could help, Ron. Anyone putting on a display at a hobby show, fair, Scout-O-Rama or the like can get pamphlets for the public — but please, try to give us a month's notice or more so we can use inexpensive means of shipping.]

NOSE KNOWS!

● KH6IJ's antenna article (April, *QST*) is valid, of course, in theory. Trouble is that hundreds of fellows have had similar systems and never got past first base in DX Contests. The unknown factor which hovers over this article but is never mentioned is the superlative operating skill and contest savvy of the author. Anyone who has ever gotten "599" in any contest from KH6IJ knows that Katashi could attach a piece of coax to a boulder buried underground and still average 60 QSOs per hour!– *Kurt Meyers, WA2LDX, Denville, NJ*

STILL BUILDING

● I would like to compliment you on the excellent construction articles and technical information published in *QST* and the *Handbook*. I spend a large percentage of my ham activity time in constructing, repairing, expermenting, etc. I have constructed the following during the last ten years:

1) A low cost 700 watt linear amplifier, 3-811A's.
2) A 50-watt p.e.p. output transceiver for 75.
3) TR switch, 6BK7A tube.
4) Rf powered cw monitor and code practice osc.
5) 15-watt, 6-meter transmitter and modulator.
6) Break-in control system for cw.
7) SWR bridge.
8) 7-element 2-meter beam.
9) 2-element 15-meter beam.
10) 3000 volt power supply for linear amp.
11) 2000 watt p.e.p. amplifier using 3-1000Z, (under construction).

Keep the construction articles coming for us home-brew hams. – *P. Lanier Maddux, K4DNC, Hixson, TN*

UNWILLING DROPOUT

● One reason why many young kids, like me, discontinue membership in ARRL is that they can't get the $6.50. As a non-member I buy *QST* at the newsstand until I can get the $6.50 to send you. In the meantime, I'll give you all my support except of course, economically. – *Gary Gleicher, WA2IYH, Brooklyn, NY*

"If Your Antenna Didn't Blow Down Last Winter, it Wasn't Big Enough"

— *Harris, W1BU*

— stray notes on filming "The Ham's Wide World" by producer-director Dave Bell, W6BVN, with marginal notes by film editor David Arnold, who, if there were hams by osmosis, would be one.*

IF YOU haven't seen the year-old ARRL film, "The Ham's Wide World," you've been spending too much time on the air.

Statistics being what they are, you may skip this paragraph unless you feel a need to know that the film has been aired on television stations all over the country, will be seen on all the U.S. Armed Forces TV stations, has received a number of awards at film festivals, has been viewed with pleasure by the entire hierarchy of the FCC (including Dean Burch, Barry Goldwater's friend, who is reported to have said he thought he knew everything about ham radio until he saw the film), and has been seen by hundreds of ham and non-ham gatherings. It is getting a French soundtrack for those Canadians who don't dig English, and has been reviewed favorably in *73*'s "Leaky Lines," which has to be considered the acid test.

So much for success. On to the failure: there are still television stations that have not run the film. But TV stations, like hams, operate in the public interest. And fortunately for everybody, nobody can define public interest. The practicality of this is that television stations must run programs from time to time which have some purpose other than mesmerization. So any ham club or area council of ham clubs can quite reasonably ask any or all of its local television stations to run "The Ham's Wide World." That is a worthy project, too, because as we all know from tuning the bands, we really need more hams badly.

*Dave Bell Associates, 1011 N. Cole Ave, Hollywood, Calif. 90038.

Producer-director Dave Bell goes over the script with cinematographer Wayne Threm on the "visitors' side" of K7UGA. *(Photographs furnished by Authur Dubinsky)*

Many Varied Facets

Though I have been a ham for twenty years, I discovered things about ham radio during the preparation of this film which I had no idea even existed. Most of the early planning, of necessity, was concerned with what aspects of the hobby we could leave *out*. I discovered that there are over sixty different ham activities which could have been covered, which in 28 minutes figures out to less than thirty seconds for each. Most of the ex-AM guys I talk to take longer than that to say *aaaaaaaahhhhhh* while getting their brains in gear.

Our first day of shooting was in Ensenada, Baja California, Mexico. Enrique Garcia, XE2RH, owns a wholesale grocery there and is also the local Swan distributor. One of Enrique's friends told me that one ham down in Baja (pronounced Bah'-hah, for those of you reading aloud) ordered a 500C and got a box of carrots, but I think that's apocryphal.

Enrique had asked me during one of several telephone conversations how much of the finished film he was actually going to appear in. I told him that the outline called for him to be on screen for two or three minutes. He figured that it wouldn't take much longer than that to get the filming done. In fact, I think he expected us to wrap up the shooting during his lunch hour. It took us from noon until four to get his scenes completed, and he didn't get much lunch at that. Despite this, Enrique maintained his good humor – though I think he was a bit concerned about the business during his absence. Maybe that was the day his ham friend got the box of carrots.

The original plan was to have Matt Futterman, WB6KPN, in QSO with Enrique during the filming. Matt, however, was busily making money for his impending college education and couldn't get off work to make the sked. So I stood behind Enrique and pretended I was Matt – and we shot Enrique's end of the QSO. Later, we would transcribe the gist of the conversation and I would stand behind Matt and fill in Enrique's half of the QSO. That's how films go together. One scene at a time. Half a scene, in this case.

I'm not sure Matt and Enrique ever have actually had a QSO.

RFI

As it turned out, it was just as well that Matt couldn't make the schedule. We couldn't have recorded a real QSO anyway. Enrique had so much rf in the shack that it wiped out the signal going to our $1,500.00 tape recorder, and we had to shoot all the sound scenes with his rig turned off.

The problem of rf getting into our tape recorder continued to plague us throughout the entire filming. The only rig that didn't give us any trouble at all was homebrew. I'm sure that doesn't have anything to do with anything, but make of it what you will.

The XE2RH-WB6KPN contact was to begin the film, because we wanted a routine QSO – what John Huntoon calls "the staple of ham radio." Having one ham in Ensenada just made it a bit less routine – and more interesting to the non-ham. (Yes, Virginia, this film is mainly for non-hams.) If I'd had the budget, I would have had Enrique and Matt in a threeway with VR6TC or 9V1AC or (fill in the last exotic one you missed). Ah, well, maybe next time.

Shooting The Club

We scheduled one day to shoot not only Matt's half of the QSO but to film his club, the West Valley ARC, in a warm-up for Field Day. Naturally, when we were ready to shoot on the hill selected as their remote site, it started to rain. The dozen or so young hams who showed up for the event were dampened but undaunted. Tarps appeared, rickety tents were draped and hung, and our cameras blazed away. A few parents showed up to join in the fun. An HW 100 was dropped in the mud. The generator voltage oscillated between 50 and 130 volts. One guy, told to bring his rig to the site, brought everything including his phone patch. John Griggs, W6KW, had assured me that this was a unique club. "Unique" is not adequate to describe this aggregation of enthusiasm.

When the crew left to film Matt in his shack, the rest of the club members stayed on the hill, in the rain, to finish the mock field day. It's great to be young. As Arthur Godfrey, K4LIB, mentions in his narrative, over half of the young hams in this club have their Extra-Class licenses. They're not old enough to buy a drink, but I can't even give them a call if I hear them on. Legally.

One aspect of ham radio I wanted to be sure to cover was our work during emergencies. By dispatching about fifty letters and two dozen phone calls, I was able to scrounge enough film from the Alaskan earthquake to piece together a fairly exciting review of ham activity during that disaster. Since most of the footage was black and white and we were making a color film, I decided to simulate a TV news broadcast. Our newscaster was Bill Leonard, W2SKE. He did that kind of work regularly until he became a V.P. of CBS News. He accepted his demotion with good grace.

I also wanted to show a more routine disaster (if there is such a thing). I decided to film a RACES segment and asked Henry Richter, W6VZA, to set up a demonstration for us. We got the extra-class treatment, including a Sheriffs' helicopter landing on cue to take Henry to the site

Senator Barry Goldwater waits patiently while Wayne adjusts his exposure and Dave checks the lighting on the "QSL sequence" of "The Ham's Wide World."

of a make-believe brush fire. The brush fire film, interlaced with all of the ham activity, was borrowed from the U.S. Department of Agriculture. Nearly a fifth of the total footage in "The Ham's Wide World" was borrowed or rented or purchased. The tidal wave in the earthquake segment cost me $30.00. (No, it's not really a tidal wave. I couldn't find any footage of a real tidal wave. Even cinematographers have been known to run on occasion.)

On To Scottsdale

Probably the most interesting shooting we did was at Barry Goldwater's station, K7UGA/AFA7UGA. Somehow, you can't call Barry's place a shack. We were scheduled to film his phone patching activities from 3:00 to 7:00 P.M. Barry was flying into Phoenix from Washington for two reasons: us and a speech. We got there before he did, met the station's chief op, Bill Eccles, K7MJC, and set up our lights, cameras, and recorder.

As we were getting ready, the band to Southeast Asia opened up and the operator at AFA7UGA started his usual busy sequence of phone patches. Barry arrived, took one look at the phone patching activity and said that we couldn't shoot while the band was open. His policy is that nothing interferes with the phone patching. I asked when the band was likely to go out and learned that it would probably fold around 9:00 or 10:00 but might go on longer. Barry, noting that he had a full evening of social activities, said, "Why don't we do this tomorrow morning? Come over about 6:30. My flight leaves for Washington at 9:00." The crew sighed and wondered, I'm sure, what they had done to deserve getting mixed up with hams. We filmed the antennas, the house, recorded some of Barry's off-camera narration, and steeled ourselves to be up the next day at 5:00 A.M.

Meanwhile the operator on duty was recording his phone patches on a cassette recorder, as he often does for reference. The last thing we did before leaving to reorganize tomorrow was listen to several of the recorded patches. To our amazement they were unaffected by the horrendous rf field around the station. (The cheaper the recorder, it

"There's got to be an easier way to make a living." Bell, foreground; Arnold, putting tape recorder in back seat; and Threm, testing the sturdiness of the top rack, as Sharon LaTraille waits.

scans, the less it is affected by rf. Too bad that isn't true of TV sets.) One of the recordings was especially good, and we chose it for our example of a typical patch – fairly easy to understand and interesting.

We arrived at AFA7UGA the next day along with the sun. There waiting was Bill Eccles, who in his duty as chief op seems to spend more time at Barry's than at home. We checked to make sure that everything was ready to go. At exactly 6:30 A.M. Barry appeared in the door, looking disgustingly fresh. The camera rolled and Barry tuned the receiver. He heard something. I thought for a minute the band might be opening up and could see myself running outside and chopping all the head-in. But the signal turned out to be a commercial interloper. Hallelujah! I never thought I'd be happy to hear one of those dingalings. We might get this film finished yet, if only the band stays dead.

"... Take One ..."

Barry, of course, has been on camera before, and his professional approach to the task at hand made our job easier than usual. He made it very clear that he never did things as well the second time, so we'd better get it right on "take one". We did do a couple of second takes, but we certainly couldn't be accused of wasting film in Scottsdale.

Since Barry's whirlwind visit precluded his doing any real operating himself, he simulated a phone patch for us, using one of the recordings made the day before. Everytime something like this is simulated, I worry about all the things we may be forgetting – will it all cut together – will it look fake – will it make sense to ham and non-ham alike? By all reports, it passes every test.

About five minutes before Barry had to leave, we finished the filming and midst a round of goodbyes he was off to Washington.

The balance of the day (and there was a lot of it left) was spent filming Sharon La Traille, WA7DSW. Her role was to show that there are female hams (and good looking ones, too) and to illustrate mobile operation as well. Imagine, if you can, the following entourage driving down a suburban Phoenix street: a Mercedes convertible and a Plymouth station wagon, side by side and seemingly hooked together by several cables, plus a guy sitting on top of the station wagon with a huge camera on his shoulder aiming at this chick in the Mercedes. Several cars turned off the street before we got to them.

There are dozens of stories that come to mind – about digging into history and finding out some of the zany things hams have done (and are still doing for that matter), or about Dave Atkins, W6VX, firing up his spark-gap transmitter for us (wonder how many TV sets that scene wiped out?) – but a recounting of one of the most fascinating segments in the film from the crew's standpoint will end this tale.

Amateur TV – Grand Finale

We wanted to show some amateur TV, and after asking around I found that Tom O'Hara, W6ORG, was one of the leaders in ATV. Tom's shack is a one-car garage, full – *stuffed* – with electronic parts and miscellaneous but apparently useful junk. It looks like a going-out-of-business store on Radio Row. There's barely enough floor space for a guy to stand on both feet, let alone a camera tripod. But in order to film the TV pictures without getting the usual bars, we had rented a special (extra-heavy) camera for this shooting; and the tripod was a must. The answer was to shift a few things around in the shack until we could get two legs on the floor and one propped on a box. That accomplished, Tom's friend WA6EPX tuned up – on cue – and we filmed, finally, a real live QSO.

I must admit I was surprised at the quality of the TV pictures not only in Tom's shack, but on the film. I may try ATV myself. That is, if I ever get my Cosmophone rebuilt, and my tower up, and two more elements on my quad, and my scope working, and ...

When you see the film, read the credits at the end. Those are the people who made it happen, along with Arthur Godfrey and Bill Leonard and Barry Goldwater. They all made "The Ham's Wide World" fun to do. And fun to watch. QST

VHF QSO Party

September 12-14

All set for the September VHF QSO Party? If band openings are even half as good as we had in June, this is one contest you can't afford to miss!

Remember you may pick any two 14-hour periods out of the 35 hours available. All you do is exchange sections for QSO credit, add up your contact points and multiply that sum by the sum of your band-section-multipliers.

Read the rules carefully, then send right away for your free party log forms; a sample is shown below.

Mail your entry to us no later than October 5, 1970. C U then. – *WA1KQM.*

STARTS	ENDS
1900 GMT Sep. 12	0600 GMT Sep. 14

Operate any two 14-consecutive-hour periods

Rules

1) The September 1970 V.H.F. QSO Party begins at 1900 GMT, Saturday, Sept. 12, and ends at 0600 GMT, Monday, Sept. 14. Entrants may operate any two 14-consecutive-hour periods beginning no earlier than 1900 GMT Saturday (starting on the hour) and ending no later than 0600 Monday. All claimed contacts must be within the two chosen periods and must be made on amateur frequencies above 50 MHz., using authorized modes of operation.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed, portable or mobile operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e. able to communicate over at least a mile).

Contacts made by retransmitting either or both stations do not count for contest purposes.

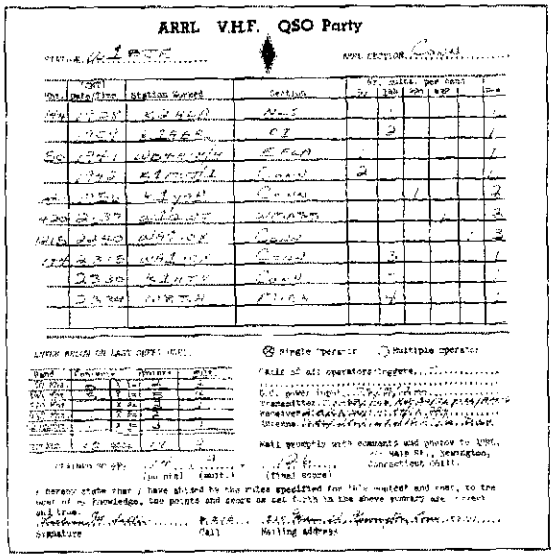
4) Scoring: 1 point for completed two-way exchanges on 50 or 144 MHz.; 2 points for such exchanges on 220 or 420 MHz.; 3 points for such exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked per band; i.e., those with which at least one point has been earned. Reworking sections on additional bands for extra section credits is permitted. Cross-band work does not count. Aircraft mobile stations cannot be counted for section multipliers.

5) Foreign entries: all contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together, and a multiplier of no more than one (per band) may be claimed for contacts with all foreign stations worked. Foreign stations may only work stations in ARRL sections for contest credit and will give their country name.

6) A contact per band may be counted for each station worked. Ex.: W2EIF (S.N.J.) works K1YON (Conn.) on 50, 144 and 220 MHz. for complete exchanges. This gives W2EIF 4 points (1 – 1 – 2) and also 3 section-multiplier credits. (If W2EIF contacts other Conn. stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

7) Each section multiplier requires a complete exchange with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

8) Awards: Entries must be postmarked no later than October 5, 1970. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multiple-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licensees submit logs and to Novices in sections of less than 3 entries, who in the opinion of the Awards Committee, displayed exceptional effort. Awards Committee decisions will be final. QST



ARRL V.H.F. QSO Party

FREQUENCY MEASURING TEST

SEPTEMBER 12

Open to All!

THOSE OF you who have been following recent issues have realized that some basic changes in the quarterly FMTs were underway. For many years the procedures in the quarterly FMTs were essentially standard, to wit: Official Observers could participate in all four FMTs, while non-OOs were limited to participation in the two *QST*-announced runs (held in February and September).

In recent months, W1AW has been transmitting the official readings approximately ten days following each of the tests. The object of this is to get word back fast to those anxious to know how accurately they measured the test signals. (*Well* in advance of the necessary paper work by Hq.!)

Considerable evidence exists that numerous listeners would like the opportunity to actively participate in the test, *and* have the accuracy of their measurements compared with others. Thus, effective with this FMT, we're attempting something different. Participants reporting their measurements prior to the W1AW transmission of results (about 10 days following the FMT), will be listed in *QST*. Results will be tabulated in order of average accuracy with a cutoff point at some still-to-be-determined percentage.

FMT Procedure

1. Do some listening an hour or so *before* the test, to get an idea of band conditions and consequently of which band or bands will be best for measurement purposes. 2. The FMT transmission will start with a general call (QST) at exactly 0130 GMT, September 12. 3. Transmissions for measurement, *sent simultaneously on all frequencies*, consist of 15-second key-down periods interspersed with W1AW identification. 4. The three periods for measurement will start at 0137 (80 meters), 0145 (40 meters) and 0153 (20 meters); for the "late" run, 0437, 0445 and 0453 respectively. Each period will last for five minutes, including a series of dits at the end of it and identification before the start of the next period. We suggest you make your measurements in that order to coincide as closely as possible with those of the umpire. The table herewith shows the approximate frequencies which will be used.

Sept. 12, 1970	Starts 0130 GMT	Starts 0430 GMT
First 5 min.	3530 kHz.	3535 kHz.
Second 5 min.	7064 kHz.	7082 kHz.
Third 5 min.	14,063 kHz.	14,078 kHz.

5. Your percentage error is calculated on all the measurements you submit, so we suggest that you omit any readings in doubt. Watch out for careless mistakes in arithmetic, typing and other simple operator errors which can throw your percentage off. Submit more than one reading on each transmission and, if possible, measure more than one frequency so we can strike an average.

No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on overall average accuracy, as compared with readings made by a professional lab. QST

Never tried the FMT? An excellent introduction to the basic techniques can be found in the W2VMX article "Try the FMT", page 54 July 1968 QST.

Strays

The Foundation for Amateur Radio, Inc., a non-profit organization, with its headquarters in Washington, D.C., announces its intent to make the annual award of the John Gore Memorial Scholarship for either graduate or undergraduate study. The Scholarship pays $500 for the academic year. Upon re-application, it is subject to being renewed for succeeding years.

Licensed radio amateurs who intend making a career in electronics or related sciences may now request the application for covering the academic year 1970-1971. Request should be addressed to the Chairman, Scholarship Committee, 8101 Hampden Lane, Bethesda, Maryland, 20014. The award will be made during the month of December 1970. Receipt of applications for the award must be received prior to the close of business on the 31st of October, 1970.

To be eligible for the award, applicants must have completed at least one year in an accredited college or university and must be enrolled in a course of studies leading to a degree. They must also be radio amateurs holding a valid FCC license of at least a General class level. All things being substantially equal, preference will be shown to applicants from the area served by the Foundation – the District of Columbia, Maryland and Northern Virginia; however, applicants wherever resident are eligible.

The Foundation is devoted exclusively to promoting the interests of amateur radio and to those scientific, literary and educational pursuits that serve to advance the purposes of amateur radio.

John W. Gore, in whose honor the Scholarship is named, was until his death in 1960, the President of the Foundation. He was a prominent radio amateur and operator for many years. At the time of his death he was a Vice-President of the Bethlehem Shipbuilding Corporation in Baltimore, Maryland.

1970 VE/W Contest Announcement

September 19-21, 1970

THE MONTREAL Amateur Radio Club Inc., invites all W and VE amateurs to participate in the 1970 VE/W Contest. This year the contest period will fall on the weekend of September 19 to September 21.

This year the following changes have been made:

1. Band Multipliers
2. Dupe Sheets for 200-plus QSOs
3. Logs available from MARC

Stations look for each other in the "General" part of the phone and cw bands. Stations are reminded to check all bands for openings.

Contest Period

Starts 2300 GMT Sat., Sept. 19.
Ends 0200 GMT Mon., Sept. 21.

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

2) *Contest Period*: All contacts must be made during the period shown above. Only 20 hours total operating time may be used in this period. Times on and off the air must be shown in the log. Minimum time off period allowed is 15 minutes. Listening time must count as operating time.

3) *Bands*: All bands and modes for which the participant is licensed may be used. A station may be worked once on cw and once on ssb on each band.

4) *Classes of Entry*: The contest is divided into parts, phone and cw. These scores must be tabulated separately and not combined. There are two classes of entry, single operator and multioperator.

A single operator station is one manned by an individual amateur who receives no assistance from other persons during the contest period. He may not have assistance in any manner in keeping the station log and records, or in spotting stations during the contest period. Such entries must be placed in the multioperator category.

5) *Exchange*: W/Ks will work VE/VO stations and vice-versa. W-to-W and VE-to-VE QSOs don't count. Valid points can be scored by contacting stations not working the contest if complete exchanges are made. The exchange consists of QSO number, RS or RST report, and ARRL section for W/Ks, geographical areas listed below for VE/VOs.

GEOGRAPHICAL AREAS:

Area	*Prefix*	*Abbr.*
Newfoundland	VO1	NFLD
Labrador	VO2	LAB
Prince Edward Island	VE1	PEI
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE
Ontario	ve3	ONT
Manitoba	VE4	MAN
Saskatchewan	VE5	SASK
Alberta	VE6	ALTA
British Columbia	VE7	BC
Yukon	VE8	YUK
Northwest Territories	VE8	NWT

6) *Scoring*: Each completed contact is 2 points times the number of sections worked on any one band, plus the number of sections worked on each other band.

Example: 22 contacts in 9 sections on 21 MHz, 16 contacts in 4 sections on 14 MHz, and 12 contacts in 7 sections on 7 MHz = 22 + 16 + 12 = 50 contacts x 2 = 100 points x 20 sections = 2000 points.

(Continued on page 85)

VE/W CONTEST LOG

CALL..... SECTION.....

MODE.....

ON/OFF GMT	BAND	TIME	CALL	SENT		RECEIVED			NEW SECT. WKD
				NR	RST	NR	RST	SECTION	
2300 ON	14	2301	VE7LB	1	579	1	579	BC	1
	14	2303	VE6ABV	2	599	3	589	ALTA	2
	7	2305	VE2WA	3	589	6	599	QUE	3
	7	2307	VE2IL	4	599	7	599	QUE	-
2310 OFF	7	2310	VE3EWO	5	579	8	579	ONT	4

Total Operating Time: 10 minutes QSOs: 5 Bands used: 14 and 7 MHz

Band/Sections worked: 2 + 2 = 4 (2 on 14 MHz + 2 on 7 MHz)

Claimed Score: 5 (QSOs) X 2 (Points per contact) X 4 (Band/Sections) = 40 points

I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations, and I agree that the decision of the contest committee of the Montreal Amateur Radio Club, Inc., shall be final

Signature..... Call.....

1969 VE/W Contest Results

COMPILED BY DAVE WEINER,* VE2DCW

THE 1969 VE/W Contest showed a 29% increase over 1968 in the number of logs received, a record 461. The new rules were met with mixed sentiment, but generally were considered to be most fair. Furthur changes are planned for 1970 in hopes of making VE/W even more popular. (Included will be the availability of log sheets for the first time.)

The aurora on Sunday played havoc with conditions, so scores were lowered slightly over previous years. Phone logs were filled with pleas for more activity in the phone section. Activity on 10 and 15 meters was sparse; therefore the 1970 rules will offer more incentive to operate the higher bands.

The University of Saskatchewan VE5US, with Doug 5UF at the key, takes the Canadian trophy, with 93,248 on cw. On the other side of the border, Pete W1BGD/2 takes the American trophy for the third year in a row, with 6,786 points. Top multi-operator entry for Canada was VE5AAA, operated by VE5's GG and XJ, with 74,648 points. The Cornell University ARC W2CXM had the top American multi-operator score of 6,058. An outstanding phone score was received from VE7AHD, claiming 89,378 points. High American phone score was K1ASJ with 2,794.

Soapbox Comments

"Dupe check sheets a good requirement and no problem to any reasonable operator." – W2EY. "VE activity not as expected." – W2CXM. "Wish there would be more activity on 10 meters." – WA3LQE. "Thieves! Give me back my low power multiplier." – K3NPC. "The new rules are perfect. It sure was a pleasure to work Yukon for a clean sweep after 4 years of trying." – WA3ATX. "Don't see how you could improve on the contest as *it now stands.*" – W4YWX. "*The elimination of* power and bonus multipliers seems a good idea. All such multipliers have inherent inequities." –WA4CZM/4. "My first VE/W test." – WA4FFW. "First contest ever entered." – WB4KSL. "Found activity poor, especially on 21 MHz." – W5JAW. "Will be back next year to outgun W5JAW." – K5RLW. "Why not combine phone and cw into one activity?" – W6KYA. "Where were all the VE8s?" – W9JOO. "Received my license Sept. 23, just in time for my first VE/W Contest." – VE3CQA. "Great contest. Where was Hawaii?" – VE1ARM. "Next year, watch out VE5US and beware VE7BDJ, Ontario shall overcome." – VE3ABN. "Great contest. I'll be back next year." – VE3DSS. "Log was prepared with the aid of a computer program run on a PDP8/I. The program tests for duplicate contacts, formats log pages during output and indicates new sections worked. It is easily adaptible to any contest. If anyone else is interested and has access to a similar machine, I would be pleased to supply a copy of the program and operating notes." – VE5US(5UF op).

HIGH SCORERS

CW

VE5US	93,248	W1BGD/2	6,786
VE2NI	89,460	W4YWX	6,682
VE7BD	87,420	W5JAW	6,432
VE7EH	82,908	K4PUZ	6,312
VE2BVY	77,128	W2CXM*	6,058

PHONE

VE7AHD	89,378	K1ASJ	2,794
VE1ARM	45,030	K5SVC	2,784
VE5NW	44,892	K4KJN	1,518

*multioperator

Scores are grouped by divisions and sections. The station first listed in each section is the certificate winner for that section. Multi-operator entries are listed below single operator entries.

Example of listings: VO1HP 29,892-282-53-16-N; or, final score of 29,892 points, 282 contacts, 53 sections worked, total operating time of 16 hours, no power notation. (Other entries have power noted: A indicates over 150 watts, B indicates 150 watts or lower, N indicates no notation of power used.)

*Address all correspondence to 676 Wiseman Ave., Outremont 154, P.Q.

1970 VE/W CONTEST, SEPTEMBER 19-21, RULES THIS ISSUE!

CW RESULTS

CANADA

Newfoundland

VO1HP 29,892-282-53-16-N

Labrador

VO2GD 37,440-312-60-16-N

New Brunswick

VE1AIT 30,030-273-55-17-N
VF1AUT 29,432-283-52-18-N

Nova Scotia

VE1AI 65,400-545-60-20--B
VE1IM 15,930-177-45-07-B

Quebec

VE2NJ 89,460-716-63-20-A
VE2BVY 77,128-622-62-20-B
VE2ASU 70,794-621-57-20-B
VE2IZ/2 44,820-415-54-19-N
VE2DKJ 27,642-271-51-09-A
VE2HN 22,048-212-52-10-B
VE2CO 21,624-212-51-11-N
VE2DIN 1,216-032-19-04-N

Ontario

VE3ABN 67,536-536-63-20-B
VE3KZ 63,116-509-62-20-N
VE3DDU 48,564-426-57-15-A
VE3EEW 46,854-411-57-15-N
VE3FGU 45,144-396-57-17-N
VE3US 44,912-401-56-15-B
VE3GFG 43,268-373-58-20-B
VE3GHO 43,248-408-53-13-N
VE3CQA 33,936-303-56-18-B
VE3AIA 30,576-294-52-11-N
VE3FAC 27,540-270-51-20-N
VE3IR 27,432-264-54-07-N
VE3DSS 26,892-249-54-16-N
VE3DH 26,244-243-54-10-N
VE3AYR 25,896-249-52-11-N
VF3BGX 22,540-230-49-13-N
VE3GCE 21,888-228-48-08-B
VE3BLK 20,094-197-51-09-A
VE3AQT 19,710-219-45-08-N
VE3BUR 16,170-165-49-05-B
VE3FDP 15,300-150-51-17-N
VE3ANJ 13,156-143-46-10-B
VE3BUC 11,520-128-45-10-N
VE3HOF 11,410-163-35-09-N
VE3BTO 150-015-05-03-N

Manitoba

VE4KE 10,700-107-50-16-N
VE4SI 10,160-127-40-08-N
VE4GY(VE4s EW VA)
10,160-127-40-09-N

Saskatchewan

VE5US(VE5UF, opr.)
93,248-752-62-20-A
VE5PC 36,524-327-56-15-B
VE5SC 21,112-203-52-06-N
VE5AAA(VE5s GG XJ)
74,648-602-62-17-N

Alberta

VE6ARG 27,972-259-54-10-N
VE6AIJ 12,080-151-40-14-B
VE6ANI 7,600-100-38-08-N

British Columbia

VE7BD 87,420-705-62-20-N
VE7EH 82,908-658-63-17-N
VE7IQ 54,808-442-62-20-N
VE7GG 48,321-409-59-11-N
VE7AGN 45,076-382-59-16-N
VE7QQ 34,086-299-57-14-B
VE7NP 32,076-297-54-15-A
VE7AZL 20,706-203-51-15-N
VE7AC 18,240-190-48-08-N
VE7BYD 17,034-167-51-11-B
VE7HQ 3,074-053-29-02-N
VE7RZ 2,500-050-25-02-N
VE7AZG 1,820-035-26-11-B
VE7TO 1,160-029-20-17-N

U.S.A.

ATLANTIC

Delaware

K3YBW 316-040-04-06-N

E. Pennsylvania

WA3ATX 5,694-219-13-20-A
W3ADE 1,980-090-11-09-N
W3BWD 1,408-064-11-09-N
W3UT 1,276-059-11-04-N
K3NPC 1,078-049-11-08-B
K3RFB 990-055-09-08-N
WA3ABN 621-036-09-10-N

Md.-D.C.

W3CRE 2,596-118-11-06-N
WA3FCK 1,628-074-11-13-N
WA3LCC 1,200-060-10-05-N
W3OKN 666-037-09-04-N
W3GN 200-020-05-01-N

S.N.J.

WA2ABY 756-054-007-04-N

W.N.Y.

WA2CPQ 2,486-226-11-11-N
W2PXL 1,672-076-11-12-N
W2MTA 1,440-090-08-06-N
WA2GXN 427-032-07-06-N
W2DJQ 350-025-07-03-N
W2CXM (2 Oprs.)
6,058-233-13-20-A

W. Pennsylvania

WA3LQF 2,794-127-11-20-N
K3HZL 1,648-103-08-09-N
W3QEI 900-045-10-07-N
WA3JGY 470-024-10-05-N
WA3MQJ 432-036-06-03-B
WA3GJU 336-024-07-03-A
WA3GTV 290-015-10-03-N
WA3JIH 78-013-03-05-B

CENTRAL

Illinois

W9LNQ 4,598-209-11-14-A
K9VLZ 2,904-132-11-17-N
W9NLF 2,442-111-11-14-N
WA9QBM 2,178-099-11-20-N
WA9TET 1,397-064-11-12-B
WB9AJV 1,344-084-08-08-N
W9FFQ 1,200-060-10-07-N
WB9AJB 728-052-07-09-N
W9FCU 656-041-08-06-N
W9QWM 420-030-07-04-N
WA9ZII 8-002-02-01-N

Indiana

W9JOO 3,190-145-11-17-N
K9MMH 3,124-142-11-12-N
K9TQR 1,584-072-11-05-N
K9HYV 1,560-078-10-09-N
WB9ATI(WA9WHD, opr.)
1,017-060-09-19-N

Wisconsin

W9HE 2,816-128-11-15-A
K9YBC 2,486-113-11-12-B
K9REE 2,040-102-10-12-N
W9NLJ 1,584-072-11-05-N
W9EWC(W9AQW, opr.)
1,100-050-11-04-B
WA9YUZ 240-020-06-05-N
W9TXF 110-011-05-02-N

DAKOTA

Minnesota

K0ORK 5,112-218-12-17-N
K0ZXE 5,018-193-13-19-B
W0IYP 3,806-173-11-13-B
WA0YAW 1,000-050-10-20-A

DELTA

Louisiana

W5QB 3,014-137-11-15-N
W5JFB 364-026-07-03-N

Mississippi

W5RUB 4,642-211-11-12-N

Tennessee

K4PUZ 6,312-263-12-20-N
K4FW 2,960-148-10-12-N
W4SQE 240-015-08-02-N

GREAT LAKES

Kentucky

K4KSB 1,720-155-12-12-N
K4BAM 2,266-103-11-16-N

Michigan

WA8VBY 3,652-166-11-17-A
K8CGD 3,192-133-12-18-N
W8SH(K7NHV, opr.)
2,145-098-11-06-N
WA8VRB 1,590-079-10-09-N
WA8WGM 700-050-07-06-N
W8WVU 510-043-06-03-N
K3ISL/8 288-019-06-03-A
WA8LVT 144-036-02-03-N
WA8YZC 130-013-05-05-N
WB8ASH 8-004-01-01-N

Ohio

K8DHT 4,602-177-13-17-B
W8UQU 2,684-122-11-11-N
WA8AJZ 1,752-073-12-04-N
WA8TYE 1,720-086-10-05-N
W8MXO 825-038-11-05-A
K8HBN 480-040-06-03-N
WB8APJ 364-026-07-02-N
W8YGR 242-011-11-02-N
WB8AKW(WB8s AKU AKW)
4116-172-12-19-N

HUDSON

E. New York

W1BGD/2 6,786-261-13-20-N
W2EY 2,442-111-11-13-B
WA2DEI 1,504-094-08-18-N
WA2HAI 812-058-07-08-B
WA2FBI 320-020-08-03-B

N.Y.C.-L.I.

W2DSC(WB2TUL, opr.)
1,152-065-09-04-B

N. New Jersey

WA2BUE 1,914-087-11-14-N
W2DRV 1,400-070-10-06-N
WA2GUY 800-050-08-06-B
WB2ZLI 774-042-09-06-N
WB2IAE 609-044-07-04-B
W4LIN/2 520-026-10-09-B

MIDWEST

Iowa

WA0MLE 2,168-132-12-07-N
WA0SDC 2,354-107-11-04-N
W0NEL 1,638-075-11-09-N
WA0PKE 1,548-086-09-07-N

Kansas

W0CY 1,586-061-13-07-N
WA0SXB 1,320-060-11-08-N
K0BWI 882-049-09-06-N

Missouri

K0GJD 4,420-170-13-16-N
K0EOD 1,476-082-09-10-N
WA0UYU 840-042-10-05-B
W0BV 400-040-05-07-N

NEW ENGLAND

Connecticut

WA1KMR 2,684-122-11-20-B
K1DPB 1,460-073-10-13-N
W1ACR 1,386-077-09-09-N

E. Massachusetts

K1VUT 2,400-100-12-13-N
WA1FHU 1,224-136-09-06-A
W1AQE 392-028-07-05-N

Maine

W1GKJ 2,244-102-11-12-N
K1GAK 1,232-088-07-07-N
WN1JFX 12-003-02-02-B

New Hampshire

W1DXB 1,260-070-09-05-B
W1FZ 984-051-09-04-N

Rhode Island

W1VPY(WA2LBT, opr.)
3,256-148-11-17-N

Vermont

WA1GRR 1,440-072-10-06-N

NORTHWESTERN

Alaska

KI7MF 528-044-06-07-N

Idaho

W7GHT 630-053-06-05-N

Montana

K7LTV/7 260-026-05-03-N
W7YB 130-013-05-02-N

Oregon

K7WWR 2,668-134-10-14-N
W7UT 909-051-09-12-A

Washington

W7IEO 1,300-075-10-12-N

PACIFIC

East Bay

W6AFI 4,368-182-12-20-N
WR6HDH 4,212-176-12-18-N
WA6HMT 3,563-123-11-15-B
W6RQZ 504-042-06-13-N

Hawaii

KH6IJ 1,240-062-10-13-N
KH6HAM 448-032-07-05-B

Nevada

K7KHA 4,108-158-13-14-N

N.C.V.

WA6GFY(W6HJP, opr.)
3,124-142-11-15-N
W6GJV 2,736-114-12-16-N
WA6MIN 1,485-083-09-11-N
W6BVB 1,012-046-11-04-N
K6TZX 936-044-07-04-N
W6CLM 306-017-09-03-N
WA6NHD 260-026-05-04-N
WA6LVC 88-011-04-02-N

San Francisco

W6BIP 3,816-159-12-13-N
WB6JQP 2,304-096-12-12-N
K6RI 880-040-11-05-N
K6TVL 550-028-10-02-A

S.J.V.

WA6JDB/6 440-037-06-07-N

Sacramento Valley

W6KYA 756-054-07-06-B

ROANOKE

North Carolina

K4CAX 2,376-099-12-13-N
WA4FFW 1,896-080-12-06-N
W4OMW 1,476-082-09-10-N
W4DGJ 276-023-06-04-N
WB4ILO 250-025-05-03-N

South Carolina

K4CSZ 1,480-077-10-04-N
WB4KPN 132-022-03-05-N

Virginia

W4CRW 5,488-204-11-20-N
K4JM 3,036-138-11-09-B
W4DBF 902-041-11-13-N
W4UQ 814-037-11-02-N
K4BTO 102-026-02-04-N

West Virginia

WA8CNN 294-021-07-03-B
WA8HSB/8 20-010-01-03-B

ROCKY MOUNTAIN

Colorado

W0LRW 3,024-092-11-07-A
W0LG 1,809-102-09-14-N

New Mexico

W5ONY 3,102-141-11-15-N
W5DZA 1,342-061-11-09-N

Utah

W7BE 936-042-10-07-B

SOUTHEASTERN

Alabama

WB4KSL 150-025-03-05-N

Canal Zone

KZ5AT 2,222-101-11-14-N
KZ5KD 800-050-08-05-N

E. Florida

W4BYB 5,216-134-12-09-N
W4ORT 2,640-120-11-11-B
W4EY 2,112-096-11-10-N
K4TRH 1,320-060-11-08-N
WA4UFW 1,122-051-11-06-N
WB4INF 540-032-10-04-N
W4LEP 500-025-10-03-N

Georgia

W4YWX 6,682-257-13-18-A
K4BAI 4,730-215-11-16-N
WB4HNG 1,440-072-10-12-N
WA4CZM/4 1,180-059-10-08-N
WB4KVE 960-040-07-06-N

W. Florida

K4VFY 2,948-134-11-07-N

SOUTHWESTERN

Arizona

W7AYY 2,060-103-10-06-N
K7TVS 1,380-069-10-12-N
W7GAF 336-021-08-02-N

Los Angeles

K6BPC(K6OPH, opr.)
3,388-154-11-14-N
WA6CRE 3,234-148-11-13-N
W6JPH 1,950-075-13-04-N
W6HOQ 1,386-063-11-11-N

W6JSO 770-055-07-11-N
WB6YIZ 406-029-07-05-N
K5MHG/6 252-021-06-06-N

Orange

VE2LO/W6 4,186-161-12-20-A
WA6JZZ 752-047-08-08-N

San Diego

K9ZMS/6 2,000-100-10-08-N
K6SDR 1,152-064-09-03-N

Santa Barbara

W6OUL 2,990-115-13-12-N
W6KPJ 1,460-073-10-06-N
W6GEB 1,380-069-10-07-N
WB6VKN 848-053-08-06-N

WEST GULF

N. Texas

WA5CBE 4,896-204-12-14-A
WA5VQT 1,818-104-09-11-N

Oklahoma

K5OCX 2,200-100-11-06-N
W5MIE 414-023-09-11-N

S. Texas

W5JAW 6,432-268-12-18-B
K5RLW 3,792-158-12-12-N
WA5WCT 330-033-05-08-N

PHONE RESULTS

CANADA

Labrador

VO2AF 13,148-173-38-15-B

New Brunswick

VE1ARM(3 oprs.) 45,030-395-64-20-A

Quebec

VE2AQY 11,528-131-44-13-B
VE2BHH 4,012-059-34-14-N

Ontario

VE3BPQ 6,800-085-40-03-N
VE3DLC 5,460-078-3-03-N

Manitoba

VE4ST 14,310-159-45-05-N
VE4NE 10,988-134-41-06-N
VE4GN 6,808-092-37-06-N
VE4AR 5,852-077-38-05-N

Saskatchewan

VE5NW 44,892-391-58-17-N
VE5HI 21,756-222-49- -B

Alberta

VE6GN 36,424-314-58-09-B
VE6UV 20,384-208-49-07-N
VE6TS 494-019-13-07-N

British Columbia

VE7AHD 89,378-667-67-20-N
VE7BLO 22,220-202-55-09-N
VE7AQR 15,908-194-41- -N
VE7AZG 850-025-17-03-A

Northwest Territories

VE8RS 5,610-085-33- -B

U. S. A.

ATLANTIC

Delaware

WA3HGV 294-021-07-02-N
WA9SVZ/3 18-003-03-01-N

E. Pennsylvania

W3EAD 480-024-10-04-N

W. Pennsylvania

WA3GJU 336-024-07-03-B
WA3JGY 192-016-06-05-N
WA3JBN 108-009-06-01-N

CENTRAL

Illinois

WA9WXN 1,200-050-12-14-B
WA9CIO 1,056-044-12-07-N
WA9UMZ 480-025-09-07-N
WA9YNE 306-017-09-02-N
WA9ZII 252-014-09-03-N
W9QQG 182-013-07-01-N

Indiana

K9GEL 792-036-11-07-N

Wisconsin

W9ITD 610-034-09-08-N

DAKOTA

Minnesota

WØPAN 360-018-10-04-N

North Dakota

WØCAQ 228-019-06-02-N

DELTA

Arkansas

WA5VWH 368-023-08- -N

Louisiana

W5JFB 48-005-04-01-N

Mississippi

K5SVC 2,784-116-12-16-N

Tennessee

K4UVH 748-034-11-12-N
WA4WTO 648-036-09-02-N

GREAT LAKES

Kentucky

W4AZU 1,100-055-10-12-N

Ohio

WA8YXE 1,104-046-12-11-N
WB8APJ 836-038-11-06-N
WB8AVH 594-033-09-07-N
W8YGR 50-005-05-01-N
K8HBN 4-002-01-02-N

Michigan

WA8TDY 90-009-05-02-N

HUDSON

E. New York

WA2HXM 150-015-05-04-N
WA2DFI 2-001-01-02-N

N. Y. C.-L. I.

WB2EXS 264-022-06-03-N
W2JTZ/2(WB2EUG, WN2DSD) 42-007-03-12-A

N. New Jersey

W2FCR 630-035-09-05-B

MIDWEST

Iowa

WAØPKE 16-004-03-01-N

Missouri

WAØQBU 1,000-050-10-10-N

NEW ENGLAND

Connecticut

K1ASJ 2,794-128-11-18-N
W1OOS 432-027-08-06-N
K1DPB 48-006-04-01-N

E. Massachusetts

W1UYU 156-013-06-01-N

NORTHWESTERN

Montana

W7YB 2-001-01-01-N

Oregon

K7WWR 4-002-01-01-N

PACIFIC

Hawaii

KH6IJ 168-012-07-03-N

Sacramento Valley

WB6AUH 72-009-04-07-N

S. C. V.

WB6YNK 756-042-09-05-N
WA6MIN 168-014-06-02-N

ROANOKE

South Carolina

K4CSZ 18-003-03- -N

Virginia

K4KJN 1,518-069-11-19-N

ROCKY MOUNTAIN

Colorado

WØMAI 880-040-11-12-N
WØGOR 528-033-08-12-N
WØLRW 60-010-03-01-N
W4UDS/Ø 8-002-02-01-N

New Mexico

WA5VAL 224-016-07-05-N

SOUTHEASTERN

Alabama

K4MG 902-041-011-09-N

Canal Zone

KZ5II 252-018-07- -N

E. Florida

K4TRH 378-021-09-07-N
WB4EYX 226-019-07-03-N
W4LEP 140-010-07-01-N
WA4UFW 18-003-03-01-N

West Indies

KP4DCR 168-014-06-03-N

SOUTHWESTERN

Arizona

W7FCD 130-013-05-01-N

Los Angeles

K6MFS 308-022-07-06-N

Orange

WA6FIT 420-030-07- -N

Santa Barbara

W6GEB 288-018-08- -N

W6OUL 80-008-05-01-N
WB6VKN 78-013-03-02-N

WEST GULF

N. Texas

K5YRK 880-040-10-15-N
WA5CBE 396-022-09-02-N
WA5UAK 224-016-07-02-N

S. Texas

WA5UHR 990-055-09-15-N
DISQUALIFIED: VE2ACP, WA3LHG, K4YXJ, WB6PKA.
CHECK LOGS: VE3OAA, VE7MW

Strays

The Puget Sound Council of Amateur Radio Clubs will again issue a Washington State Operating Achievement Award certificate signed by Governor Daniel J. Evans, for contacts made during Washington State Amateur Radio Week, September 6 through 13, 1970. Out-of-state amateurs must contact ten Washington hams, and in-state amateurs must contact 20 other Washington hams during this week. Send list of stations worked, their locations, dates of contacts, your name, call, and address to: The Puget Sound Council of Amateur Radio Clubs, 12306 80th Avenue East, Puyallup, Washington 98371.

—•••—

The Foundation for Amateur Radio Inc., a non-profit institution devoted to advancing the interests of amateur radio with its headquarters in Washington, D.C., announces the establishment by it of a Hospitality Committee with the objective of providing visiting foreign licensed radio amateurs with an opportunity to meet some of our local active hams and if desired visit a local amateur station. Any visiting foreign ham can get in touch with the Hospitality Group by calling 893-8383. It will be appreciated if calls are made during the hours from 0800 to 2000 daily. Arrangements can be made to greet the foreign visitor and to give him a introduction to our Capital City as well as to amateur radio U.S. style.

—•••—

Stolen Equipment

On June 17, my locked car was parked on the Route 8 bridge over the Merritt Parkway in Trumbull, Connecticut. Some time between 8:00 A.M. and 4:30 P.M. it was broken into and the following gear was stolen:

Heath SSB Transceiver HW100
Astatic Mobile Microphone
Heath speaker built into case
Mobile Mount
Newtronics Hustler mobile mast with 40-meter resonator

Although no serial number is available, the built-in speaker, the uhf antenna connector and several other distinctive design features could easily identify the rig as mine.

Any information should be communicated to me, W.J. Pace, W1ILV, Upland Road, Middlebury, Connecticut 06762. Telephone number is PL 8-9228.

—•••—

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

The 23rd Simulated Emergency Test

To remain on top of SET year after year, each group in a section must be particularly sharp and well prepared. Certainly such a group is the Stark Co. (Ohio) AREC unit, although they admit they aren't perfect. Posing in front of a communications van used in this year's test are WA8ETX, who furnished the vehicle; WA8VYQ; WA8ORG; K8JZN, county EC; and WA8UPI. EC K8DHJ caused a few groans by declaring the emergency operations center out of commission after being hit by a simulated tornado early in the test. It was felt that the EOC capabilities were well known, and more would be learned by operating without it. Auxiliary control points were established at two local club stations, W8LKY and W8NP.

REPORTED BY BILL REICHERT,* WA9HHH

THE REPORTS are all in, the statistics have been compiled, and with the publication of this report, the finishing touches are being applied to the 1970 Simulated Emergency Test.

How well did ARPSC do in the annual test of emergency preparedness? Not as well as 1969's banner performance, but still a fairly respectable effort. The 1970 SET will be remembered as the second best, at least until 1971, when we'll be in there again trying to out-do ourselves in every way.

Of course, the yearly showing in SET cannot and should not be based on scores alone. At best the scoring system for the SET is open to many interpretations. For a clearer picture one must delve more deeply into the reports, into the comments made by the EC, RO and net manager. Still, on the national level, it is largely the scores that give an overall indication of what is happening. We just can't be familiar with every individual local circumstance.

Ironically enough, virtually all the comments on SET were indicative of improved performance and judging from the stacks of reports received, this reporter would have wagered a set of soft sweep tube finals that we'd beaten last year - yet the statistical analysis failed to substantiate the premature conclusion.

The main reason for this failure to show improvement seems to be in the reporting, or rather in the lack of reporting. The NTS had an alarming decrease of nearly 25 percent in the number of section and local nets reporting, while on the AREC/RACES side of the score card, there was a slight increase in the total number of reports received. The fly in the ointment is that the increase came in the reports received by radiogram. These don't add to the total point score. There were at least three or four large activity areas which don't show statistically because no written report was filed to supplement the radio report.

Well, as the old saying goes, you can't win 'em all. We had two years of sweeping improvement; it stood to reason that we couldn't continue upward forever. We'll just have to try a little harder next time, and hope that if an ARPSC unit took the trouble to participate, the leader of that unit will take the trouble to file a report.

*ARRL Communication Dept.

AREC/RACES

Although this SET was not an improvement over last year's total AREC/RACES effort, it was an improvement over all efforts previous to 1969, so a king-sized round of applause is still in order for the AREC/RACES crew. In addition, there were improvements in a few key areas. More total reports were received, even though the number of different sections reporting declined from 62 to 58. There were also more reports received by radio and the number of mail reports stayed the same. Total participation declined by 1.9 percent, as did messages to SECs and State ROs, while reported membership in the emergency organizations dropped by more than ten percent, indicating a higher percentage of active membership than during the previous year. Home stations operating on emergency power increased 8.1 percent while self-powered portables and mobile decreased 9.7, so independence of commercial mains operating capability probably remained about the same. The table below lists the actual figures for the above statistics with figures from last year in parentheses.

Total reports: 290 (279)
Mail Reports: 259 (259)
Radio Reports: 128 (121)
Total reported AREC/RACES membership: 8633 (9693)
Total reported participation: 4398 (4484)
AREC/RACES messages to SEC or State RO: 2470 (2800)
EC/RO messages to ARRL Headquarters: 195 (189)
Self-powered portable and mobile units: 1158 (1282)

Fixed Stations on emergency power: 371 (343)
Total SET points: 34,168 (37,985)

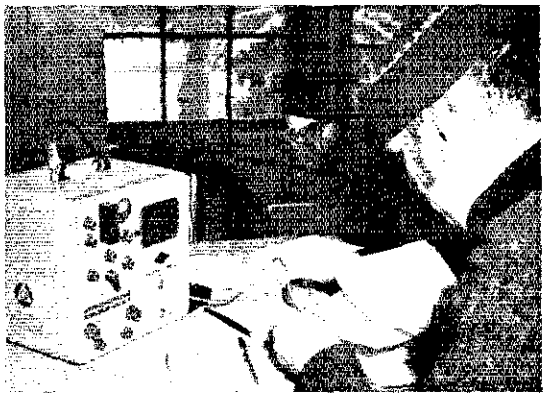
Again heading the pack of sections was Ohio, followed closely by Eastern Florida and Alabama in the same 1-2-3 order as last year. Occupying fourth position, in a surprise move from 35th place in 1969, was Minnesota, with 36, count 'em, 36 individual EC reports. The Washington section, which formerly occupied the fourth slot, dropped to sixth place, behind Tennessee which remained in fifth. There was a three-way tie for seventh place among Kentucky (sixth last year), Ontario (53rd) and Virginia (19th). Michigan rounds out the top ten, having moved up from twelfth place.

Perhaps a few more words about scoring are in order. As was mentioned earlier, there is some room for interpretation in the SET scoring rules, and because of this, a number of scores are listed differently from the way they were submitted. Scores are checked rather strictly in accordance with the intent of the rules in order to keep comparisons as equitable as possible. Comparisons among different sections are not expected, since SET is not a competition. Rather, for meaningful results, comparisons should be made among several years' results for the same section, to determine if that section's emergency preparedness has progressed or regressed.

Sections are ranked only as a convenient means for determining order of listing. Each section is ranked in four categories: (1) total number of reports; (2) number of mail reports; (3) number of radio reports; and (4) total overall score. The sum of all four rankings is taken, giving "ranking points." Sections with the fewest ranking points are listed highest.

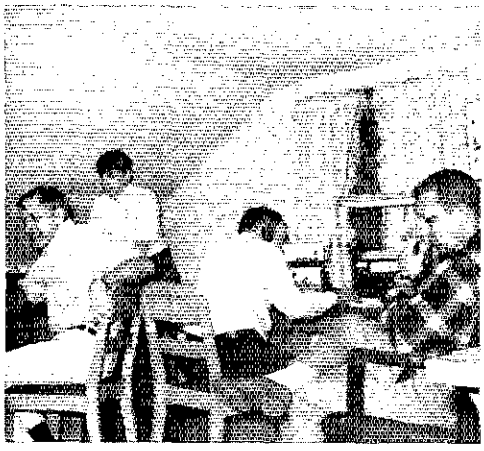
Listed below are the 58 reported sections in their order of ranking. Section names are in boldface type, preceded by place number, with 1969 ranking in parentheses. Following the section name are number of ranking points and number of reports, in parentheses, and total SET points. Below each section are listed the geographical areas reported, followed by the call of the reporter and score. The "M" and "R" in parentheses indicates method by which report was received.

1(1). Ohio (8 ranking pts., 17 reports)		**3146**
Ashland Co. (R)	K8LRN	—
Central Ohio (MR)	W8ERD	369
Clark Co. (M)	W8VZE	121
Danke, Shelby, Miami Counties (MR)	W8ARW	271
Harrison, Jefferson Counties (MR)	W8ERR	154
Knox, Coshocton, Holmes Counties (R)	WA8TKL	—
Monroe, Belmont, Guernsey, Noble Counties (MR)	W8BQ	78
Montgomery, Green, Pueblo Counties (R)	W8LLC	—
Northwest Ohio (MR)	K8LFI	642
Richland Co. (R)	WA8MHO	—
Ross, Pike Counties (MR)	K8SUB	184
Southwest Ohio (M)	K8THT	406
Stark Co. (MR)	K8DHJ	396
Summit, Portage, Medina Counties (M)	WA8FQW	378
Trucomah Co. (R)	K8BXT	—
Tuscarowas Co. (M)	K8DHJ	104
Wayne Co. (MR)	K8DHJ	43
2(2). E. Fla. (14 ranking pts., 11 reports)		**1839**
Broward Co. (MR)	WB4CKY	309
Clay Co. (M)	W4WHK	9
Columbia Co. (MR)	W4YNM	75
Dade Co. (MR)	WB4CBP	339
Duval Co. (R)	W4FWZ	—
Hillsboro Co. (M)	W4BNE	287
Lee Co. (M)	W4SMK	79
Osceola Co. (M)	WB4FJY	73
Polk Co. (M)	WA4WZZ	487
Vero Beach (MR)	WA4SCK	100
Volusia & Flagler Counties (MR)	WB4BPO	81
3(3). Ala. (19 ranking pts., 20 reports)		**859**
Calhoun, Cleburn Counties (M)	K4HJM	28
Clark Co. (M)	WB4HJN	14
Chambers Co. (MR)	WA4VEK	4
De Kalb County (M)	W4DGH	37
Etowah County (MR)	WB4IDB	10
Jackson Co. (M)	WA4NPL	73
Houston Co. (R)	WA4OVS	—
Lauderdale, Colbert Counties (M)	WA4OCM	111
Lawrence Co. (M)	WA4FYO	10
Limestone Co. (M)	K4KJD	42
Macon Co. (MR)	K4HJY	21
Madison Co. (M)	W4YFN	219
Marshall Co. (M)	WA4TMY	3
Mobile Co. (M)	WB4LNM	33
Montgomery Co. (M)	WB4LHH14	—
Morgan Co. (MR)	K4WHW	183
Perry Co. (MR)	WB4BLX	7
Shelby Co. (M)	WB4GTM	8
Sumter Co. (MR)	W4DS	9
Talledega Co. (M)	W4GBQ	33
4(35). Minn. (26 ranking pts., 36 reports)		**1533**
Aitkin (M)	WØOTX	27
Anoka Co. (M)	WAØVAS	38
Brown Co. (M)	KØIUC	27
Clay Co. (MR)	WØGB	118
Crow Wing (M)	WØBUC	45
Dakota Co. (M)	KØKPJ	117
Douglas (M)	WØGTX	29
Fillmore (M)	WAØRQO	3
Freeborn Co. (M)	WØFIT	43
Goodhue Co. (M)	WØKUI	37
Hennepin Co. (M)	WAØMZW	322
Houston Co. (M)	KØJJT	25
Le Sueur (M)	KØGEF	27
Lyon, Yellow Medicine (M)	WAØUNS	50
McLeod (M)	WØOMC	21
Mower Co. (M)	WØAZR	24
Nicollet Co. (M)	WAØUAH	27
Nobles (M)	KØQBI	24
Olmstead (M)	WAØUWT	35
Ottertail (M)	WØLUP	43
Pipeston (M)	WØWFA	8
Polk (M)	KØFLL	19
Ramsey Co. (M)	KØLAV	72
Redwood (M)	KØZSE	20
Renville (M)	WAØNQH	5
Rice Co. (M)	WAØPSI	40
Steele (M)	KØGNH	9
Todd Co.(M)	WAØEBZ	24
Wadena (M)	WAØMMJ	26
Wabasha (M)	KØZRD	26
Waseca Co. (M)	WAØPMM	33
Washington (M)	WAØMQJ	35
Watonwan (M)	WAØOEF	27



The Allegan Co. (Mich.) AREC/RACES team held an interesting exercise in their first SET. A plane had crashed in the nearby state game preserve and amateurs were organized into rescue teams to search for victims. The photo at left shows one team bringing a mannikin "victim" out of a heavily wooded area in the preserve. At right, WB8ASK operates from game preserve HQ keeping in touch with field rescue units and net control K8CJQ. *(Photo by T.H. James)*

Winona Co. (M)	WAØOVV	57
Wright Co. (M)	WAØIXG	19
5(5). Tenn. (29 ranking pts., 8 reports)		**1262**
Anderson Co. (M)	WB4DYJ	186
Bristol (M)	WA4JCF	122
Coffee, Franklin Counties (MR)	K4EGC	387
Greenville (MR)	K4MOS	79
Knox Co. (MR)	WB4DBY	115
Rutherford Co. (M)	W4SZE	59
Shelby Co. (R)	W4OQG	–
Sullivan Co. (MR)	WB4ANX	314
6(4). Wash. (34 ranking pts., 8 reports)		**1469**
Adams Co. (MR)	W7CTS	39
Area 1 (MR)	K7PXA	95
Area 4 (M)	K7NKZ	246
Area 9 (M)	W7GVC	388
Area 9B (M)	W7RXH	19
Area 10 (M)	K7LRD	135
BEARS (M)	W7RJW	418
King Co. (MR)	K7WTG	129
7(6). Ky. (35 ranking pts., 11 reports)		**857**
District 4 (R)	WA4FMY	–
District 5 (M)	WA4UAZ	58
District 6 (M)	WA4AGH	60
District 7 (MR)	WB4HTN	48
District 8 (M)	K4YZU	232
District 11 (M)	WA4BZE	111
District 13 (M)	WA4GHQ	221
District 14 (M)	WB4FDK	62
District 18 (MR(	K4AVX	58
District 20 (M)	W4CID	76
District 21 (M)	WB4CTY	31
7(53). Ont. (35 ranking pts., 9 reports)		**764**
Carleton Co. (MR)	VE3CGO	197
Halton-Wentworth (MR)	VE3AYR	63
Norfolk Co. (MR)	VE3GCE	20
Huron Co. (M)	VE3EHE	6
Kenora (M)	VE3EFX	31
Peel Co. (M)	VE3FQZ	197
Sudbury (MR)	VE3GHO	48
Thunder Bay	VE3AYZ	81
Toronto (M)	VE3PJ	117
7(19). Va. (35 ranking pts., 7 reports)		**1099**
Area 6 (MR)	W4ZYT	132
Area 8 (M)	W4BUW	17
Area 12 (MR)	W4ACC	128
Arlington Co. (M)	W4GBG	175
Fairfax Co. (MR)	WB4CVY	434
Norfolk (M)	WA4RUE	213
Richmond (R)	W4TSV	–
10(12). Mich. (39 ranking pts., 9 reports)		**1332**
Allegan Co. (M)	W8CJQ	100
Calhoun Co. (M)	WA8VXE	102
Cass Co. (M)	K8HPO	182
Genessee (M)	–	132
Kalamazoo Co. (M)	WA8STV	237
Midland Co. (M)	W8AGQ	56
Monroe Co. (MR)	W8NDM	195
Sanilac Co. (M)	WA8ZPH	87
Wayne Co. (MR)	W8BEZ	251
11(27). Kans. (51 ranking pts., 6 reports)		**578**
Finney Co. (M)	KØEXN	48
Zone 1 (MR)	WAØOZP	136
Zone 5 (MR)	WØBXG	137
Zone 9 (M)	WAØUTT	112
Zone 13 (MR)	KØLPE	46
Zone 15 (MR)	KØUVH	99
12(9). Iowa (52 ranking pts., 7 reports)		**503**
Clay Co. (M)	WAØYRJ	36
Clinton Co. (MR)	WAØEFN	194
Marshall Co. (M)	WAØOCD	32
Plymouth Co. (M)	KØTFT	23
Story Co. (MR)	WAØEYG	164
Tama Co. (R)	WAØAFY	–
Webster Co. (MR)	WAØROM	64
13(6). N.Y.C.–L.I. (56 ranking pts., 5 reports)		**1953**
Huntington (M)	W2HAE	268
Kings Co. (MR)	WA2UCP	241
Nassau Co. (MR)	W2FI	1011
Queens Co. (M)	W2IAG	70
Suffolk Co. (M)	W2OQI	363
14(48). E. Pa. (57 ranking pts., 6 reports)		**801**
Bucks Co. (MR)	WA3KTK	353
Lancaster Co. (M)	W3RLT	156
Luzerne Co. (R)	WA3JZB	–
Montgomery Co. (M)	WA3FPM	83
Philadelphia Co. (M)	WA3HIT	147
York Co. (MR)	K3FOB	62
15(8). Ind. (58 ranking pts., 6 reports)		**624**
Clark Co. (M)	K9VUE	74
Gibson Co. (MR)	W9HWR	107
Howand Co. (M)	WA9QEQ	51
La Porte (MR)	K9HYV	196
N.E. Indiana (MR)	K9LSB	115
Vandenberg Co. (M)	W9GGW	81



In Tuscarawas Co. (Ohio) the AREC operated from WA8FPX. Left to right are K8UKY, WA8RFR, WA8FTR and WA8YPX. K8ZJG, who was also very active, was somehow missed in this shot by WA8SHP.

16(24).W.N.Y. (66 ranking pts., 5 reports) 471

Chemung Co. (MR)	K2DNN	*116*
Delaware Co. (M)	W2TFL	76
Glens Falls (MR)	K2AYQ	137
Onandaga Co. (MR)	WA2AWK	78
Tompkins Co. (MR)	W2CFP	64

17(9). N.NJ. (69 ranking pts., 7 reports) 786

Bayonne (MR)	WA2FUI	92
Englewood (M)	WA2CCF	123
Glen Rock (M)	WA2DNU	88
Livingston (M)	WA2BAN	113
Red Bank (M)	WB2BCS	180
Rumson (M)	WB2BXK	67
Stanhope (M)	WA2KZF	123

18(39). Sask. (71 ranking pts., 4 reports) 860

Moose Jaw (MR)	VE5IL	239
Prince Albert (MR)	VE5BO	221
Saskatoon (MR)	VE5RJ	281
S.E. Sask. (M)	VE5DO	119

19(51). N. Texas (73 ranking pts., 6 reports) 335

Coryell Co. 9(R)	WA5QQY	91
Dallas, Collins Counties (MR)	K5LZA	150
Deaf Smith Co. (M)	K5CLH	37
Denton Co. (R)	W5RID	—
Potter Co. (M)	W5CBT	58
Terry Co. (R)	W5NFO	—

20(14). E. Mass. (80 ranking pts., 6 reports) 467

Haverhill (M)	W1EEF	134
New Bedford (M)	W1LE	106
Newton (M)	W1RM	78
Somerville (M)	K1DZG	83
Townsend (R)	K1PNB	—
Whitman (MR)	W1IAU	66

21(18). Mont. (83 ranking pts., 4 reports) 518

Great Falls, Cascade Counties (MR)	K7EGJ	159
Laurel (MR)	W7LBK	137
Livingston (M)	K7SVR	46
Missoula (MR)	K7IMZ	176

22(14). E.N.Y. (86 ranking pts., 4 reports) 649

Bethlehem (M)	W2GTI	124
Duchess Co. (M)	W2HZZ	30
Schenectady Co. (MR)	W2URP	353
Westchester Co. (MR)	WA2JWL	142

23(21). Nebr. (87 ranking pts., 6 reports) 243

Adams, Webster Counties	KØFJT	—
Boyd, Knox Counties (M)	WAØSDP	24
Jefferson Co. (M)	WØAGK	15
Richardson Co. (M)	WAØDFS	92
Seward Co. (MR)	WØDOU	69
Sioux, Dawes, Sheriden Counties (M)	WAØJKN	43

24(22). Colo. (88 ranking pts., 5 reports) 1019

Arapahoe Co. (M)	WØFA	297
El Paso, Teller Counties (M)	WØGCH	170
Jackson, Larimer Counties (MR)	WØBPT	91
Metro Denver (M)	KØFLQ	401
Morgan, Weld Counties (M)	WAØHLA	60

25(13). Orange (91 ranking pts., 4 reports) 928

Desert Area (M)	WA6TAG	105
Orange Co. (M)	W6QAT	157
Riverside Co. (M)	K6CID, K6GME	350
San Bernardino (MR)	K6GGS	316

25(34). W. Va. (91 ranking pts., 5 reports) 270

Fayette Co. (MR)	K8CFT	56
Kanawha Co. (M)	WA8TYP	70
Pocahontas Co. (M)	WA8LFW	29
Randolph Co. (M)	K8MSP	61
Upshur Co. (MR)	WA8NDY	54

27(33). La. (98 ranking pts., 2 reports) 1458

Algiers, Westside (MR)	W5LHS	108
SW Louisiana (MR)	W5SKW, W5IIF	1350

28(11). S. Texas (102 ranking pts., 5 reports) 168

Bexar Co. (R)	W5QMH	—
Galladega Co. (R)	W5GDQ	—
Grimes Co. (MR)	WA5TXI	96
Harris Co. (R)	K5HXR	—
Jefferson Co. (M)	W5TFW	72

29(20). Wisc. (106 ranking pts., 4 reports) 293

Dane Co. (R)	W9ZBD	—
Manitowoc (MR)	W9BZU	85
Racine (M)	W9SZL	*122*
Washington Co. (M)	K9OSK	86

30(32). Okla. (111 ranking pts., 4 reports) 806

Comanche Co. (M)	K5BYE	327
Muskogee Co. (M)	K5WPP	*56*
Oklahoma Co. (M)	W5NL	340
Stephens, Jefferson Counties (M)	WA5YRO	83

31(17). S.C.V. (112 ranking pts., 3 reports) 751

Palo Alto, Mt. View, Los Altos (M)	W6ASH	142
Redwood City, Menlo Park (MR)	W6DEF	412
Santa Cruz (M)	WB6OTB	197

32(49). Ariz. (116 ranking pts., 3 reports) 573

Cochise Co. (M)	K7UOY	117
Maricopa Co. (M)	K7WUG	282
Pima Co. (MR)	K7CET	174

33(16). L.A. (118 ranking pts., 3 reports) 513

E. San Gabriel Valley (MR)	WA6JXG	362
Los Angeles (M)	W6TXJ	134
San Fernando (M)	WA6ILI	17

34(28). S.N.J. (119 ranking pts., 3 reports) 241

Burlington (M)	WA2HJF	117
Gloucester (MR)	K2PQD	98
Mercer Co. (MR)	W2YPZ	36

35(42). Md.-D.C. (124 ranking pts., 2 reports) 280

Anne Arundel Co. (MR)	W3LQY	235
Calvert Co. (MR)	W3ZNW	45

35(60). Sac. V. (124 ranking pts., 2 reports) 413

Sacramento Co. (MR) . . . W6SMU	220
Yolo Co. (MR) WA6TQJ	193
37(36). S.F. (126 ranking pts., 3 reports)	**209**
Humboldt Co. (MR) W6BWV	129
Petaluma (M) W6PZE	80
Mendocino (R) W6KVQ	–
38(38). Del. (129 ranking pts., 2 reports)	**270**
New Castle Co. (MR) . . WA3DYG	222
Sussex Co. (MR) WA3GSM	48
39(61). N.C. (139 ranking pts., 3 reports)	**57**
Buncombe Co. (MR) . . WA4KWC	57
Durham Co. (R) W4LEN	–
Forsythe Co. (R) W4IRE	–
40(23). Ga. (141 ranking pts., 4 reports)	**–**
Hall Co. (R) W4NSO	–
Meriweather (R) W4FDN	–
Muscogee (R) . . . K4VGI/K4BAI	–
Richmond (R) W4DDY	–
41(nil). N.H. (152 ranking pts., 2 reports)	**448**
Hillsborough Co. (M) . . . W1RCC	237
Rockingham, Strafford Counties (M) . K1RSC	401
42(44). Conn. (153 ranking pts., 2 reports)	**136**
Danbury (M) W1ADW	64
Middlesex Co. (MR) W1BKI	72
42(31). Ill. (153 ranking pts., 1 report)	**449**
Cook Co. (MR) W9HPG	449
42(30) W. Fla. (153 ranking pts., 2 reports)	**290**
Bay Co. (M) WB4IXK	148
Okaloosa Co. (M) WB4EQU	142
45(26). Mo. (156 ranking pts., 2 reports)	**26**
St. Charles Co. (MR) . . . WØRTO	26
Saline Co. (R) . . . . . KØONK	–
46(46). Ark. (131 ranking pts., 3 reports)	**131**
Benton Co. (M) W5PBZ	24
Pulaski Co. (M) W5RXY	10
Washington (M) K5TCK	97
47(57). Mar. (160 ranking pts., 2 reports)	**166**
Halifax, N.S. (M) VE1AI	166
Dartmouth (R) VE1HJ	–
48(25). Ore. (164 ranking pts., 1 report)	**192**
Josephine Co. (MR) W7DEM	192
49(29). W. Pa. (165 ranking pts., 1 report)	**446**
Allegheny, Westmoreland Counties (MR) .K3SMB & K3CHD	446
50(36). Wyo. (170 ranking pts., 1 report)	**143**
Natrona Co. (M) K7TAQ	143
51(45). Idaho (173 ranking pts., 1 report)	**173**
Boise (MR) W7IWU	101
52(47). Alta. (182 ranking pts., 1 report)	**194**
Calgary (M) VE6AFR	194
53 (nil). S. Dak.(190 ranking pts., 1 report)	**99**
Pennington Co. (M) . . . WAØUEN	99
54(40) R.I. (191 ranking pts., 1 report)	**86**
Newport (M) W1JFF	86
55(59). New Mex. (193 ranking pts., 1 report)	**–**
Los Alamos (R) W5PNY	–
55(41). Que. (193 ranking pts., 1 report)	**36**
St. Hyacinth (M) VE2BVY	36
55(43). S.J.V. (193 ranking pts., 1 report)	**–**
Kings Co. (R) W6ASV	–
58(61). W. Mass. (194 ranking pts., 1 report)	**28**
Southwick (M) W1ALL	28

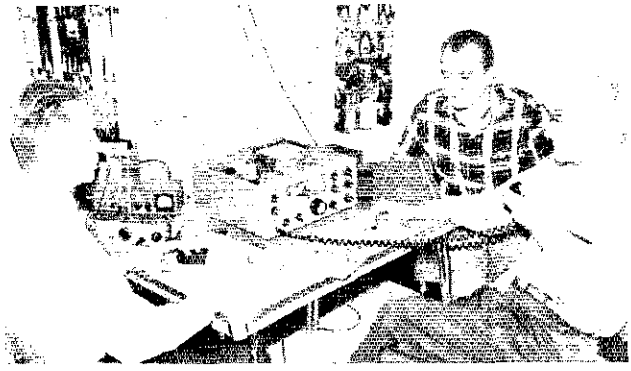
National Traffic System

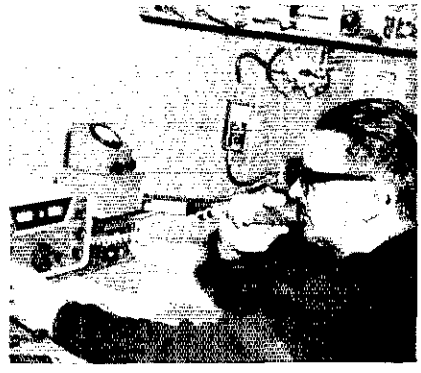
As is the case with the AREC and RACES division of ARPSC, compared with '69, this year's SET doesn't look so successful if one looks only at the total number of points scored: 86,565 this year as compared to 102,158 a year ago. The scoring system can be deceptive, though, and the point total is not necessarily an accurate indication of overall performance.

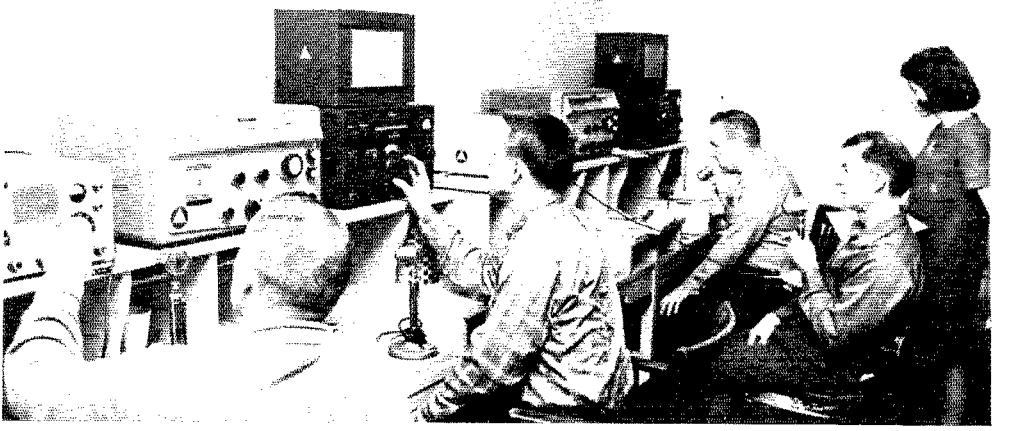
Take, for instance, the fact that reporting was way down, 95 reports as compared with 120 last time. Yet these 95 nets handled slightly more traffic than all 120 did last year, and shaved nearly 20 percent off the time required to do so. Had this time not been saved, a greater number of points would have been totaled under "time in session", and the overall total would have been within a few hundred points of the '69 total. There was also greater participation, although fewer stations acted as net control and liaison stations.

A new wrinkle was added to the NTS test this year – a larger portion of the net activity was "unplanned" in an effort to more closely simulate actual emergency conditions. In the past, it had been the custom for net managers to schedule NCSs and liaisons days or weeks in advance of the SET weekend. This year, however, at the

The Prince Albert, Sask., AREC was active in SET, with VE5VF, VE5DV and VE5EH (left to right in the left photo) shown operating from a station installed at Rosthern Hospital. At the right is VE5BO, the EC who directed the operations in the area. A third station operated by VE5IX was set up in the Victoria Union Hospital and acted as NCS during the drill.







Operating from the Kanawha Co. (W. VA.) Civil Defense Headquarters are, left to right, county EC WA8TYP, WB8BRH, K8NVF and WA8CML. The lady at right was not identified. *(Photo by the Charleston Gazette)*

recommendation of the three NTS Area Staffs, all three Areas, most Region and many section and local nets decided to refrain from pre-SET scheduling and give the unplanned approach a try. What was the result? Most of the managers who tried the new way liked it, indicated that their nets did as well or better than during previous exercises and indicated their intentions to try the unplanned test again. The one repetitive adverse comment dealt with stations that scheduled themselves to be in two or more places at once.

Traffic addressed to ARRL Headquarters was also way up this year and during the week following SET local amateurs WA1HOL, WA1JZC, W1BDI, K1LFW, W1YBH, WA1GFW, K1ZYF, W1NJM and K1ILQ, delivered 565 SET messages. Thanks for the help, fellows and gals.

The reporting nets are listed below, beginning with Region and Area Nets, then followed by section and local nets in decreasing order by total points earned. Column A refers to number of messages handled; B is time in session, in minutes; C is number of different stations participating; D is number of net control points; and E is number of liaison points. To determine the actual number of stations performing NCS and liaison duties, divide the numbers in Columns D and E by five. Some nets not normally considered part of the National Traffic System are listed. If proper liaisons were maintained, however, these nets did become at least a temporary part of NTS.

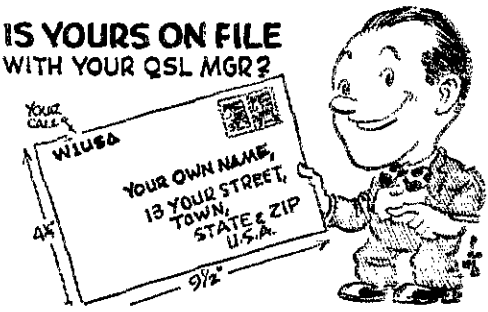
Net Name	*A*	*B*	*C*	*D*	*E*	*Total*
EAN	1558	876	234	30	75	2773
CAN	1094	903	136	45	170	2348
PAN	886	659	82	30	0	1657
1RN	446	960	76	25	50	1557
2RN	714	642	92	30	115	1593
3RN	303	678	72	30	50	1133
4RN	352	682	112	35	75	1256
RN5	615	960	64	55	85	1779
RN6	295	655	42	30	45	1067
RN7	341	810	62	40	60	1313
8RN	412	1020	72	65	70	1639
9RN	319	642	70	40	65	1136
TEN	388	518	24	15	50	995
ECN	193	586	54	30	25	888
TWN	233	662	54	30	45	1024
TCC Eastern	1579					
TCC Central	778					
TCC Pacific	1108					
NYCLIPN (NLI)	1809	1700	82	30	35	3654
OSSB (Ohio)	628	1488	672	45	40	2873
NJEPTN (N. J.)	614	1632	174	50	35	2505
Ga. SSB	415	985	686	90	50	2226
Central Ky. 6 Meter	224	1830	62	25	5	2146
PVTEN (N. J.)	404	1440	66	55	15	1980
Area Four 10-M. AREC	318	1320	92	55	70	1855
OFN/GN (Fla.)	340	1140	112	65	105	1762
STEN (Ohio)	1048	480	116	30	50	1729
KTN (Ky.)	376	969	128	15	20	1508
NYS (N. Y.)	302	965	82	45	60	1454
EPAEPTN (Pa.)	201	960	146	70	35	1412
VSBN (Va.)	165	960	182	45	30	1382
BN (Ohio)	231	874	100	100	50	1355
NCN (Cal.)	226	960	76	35	35	1332
CN (Conn.)	198	940	46	45	75	1304
TTN (Tex.)	187	810	116	55	45	1213
WSN (Wash.)	258	840	50	25	40	1213
EPA (Pa.)	233	709	90	85	40	1157
NJN (N. J.)	535	413	64	65	35	1112
VN (Va.)	250	671	84	35	45	1085
GSN (Ga.)	202	683	26	10	12	1047
YO (Wyo.)	123	840	22	35	25	1045
Area Four 6-M. AREC	141	780	54	25	35	1035
Kans. Side Band	368	554	60	30	15	1027

The Bays Mountain Radio Club station, W4ZJA, was used as control center in the Kingsport, Tenn., sector of SET. At left, WA4ZAL controls 75 meter activity while WA4GEY handles six meters. Ham hopeful Barry Alley, at far right, looks intrigued (?) by the whole thing.

In the town of Bethlehem, N.Y., the AREC had a number of mobiles, something we need more of, active during SET. Four are shown here, with operators (left to right) W2GTI, W2FQP, WB2USB and W2EQV. EC W2GTI is also trustee for station K2BUV which operates from the police department building in the background.

ALMM (Ala.)	228	586	130	35	30	1009
ILN (Ill.)	99	693	40	70	45	945
WIN (Wisc.)	82	705	62	40	50	937
THGN (N. C.)	126	616	94	50	50	936
AFNB (Ala.)	148	644	44	30	50	916
WPA (Pa.)	89	668	60	35	45	897
LAN (La.)	93	660	36	60	50	889
NJAN (N. J.)	94	702	18	30	15	859
NET 680 (Va.)	110	528	36	75	50	786
Orange MTN AREC (N. J.)	547	102	28	15	15	712
Mercer Co. CD (N. J.)	169	510	8	10	5	692
Navesink Emerg. (N. J.)	76	493	40	35	35	679
Atlantic Provinces	74	504	24	25	20	647
FCATN (Ky.)	140	373	44	30	45	632
CCN (Colo.)	109	396	34	30	35	604
QKS (Kans.)	102	356	60	30	40	588
Midland Co. VHF Emerg. (Mich.)	15	480	16	10	5	526
QIN (Ind.)	60	340	42	40	30	518
N. Car. SSB	18	318	122	25	35	518
Lancaster Co. 2 M. Emerg. (Pa.)	20	250	44	5	10	509
Corvell Co. Emerg. (Tex.)	16	428	14	20	20	498
AEND (Ala.)	56	340	36	30	20	482
SATN (Sask.)	70	330	24	20	20	470
MTN (Man.)	55	305	20	20	15	418
Red Cross Chapter (R. I.)	82	270	30	15	10	407
AENE (Ala.)	25	360	10	5	5	405
Clark Co. Emerg. (Ind.)	327	10	18	20	20	395
OZK (Ark.)	35	267	42	25	25	392
Tuscarawas Co. Emerg. (Ohio)	62	240	18	25	20	365
TN (Tenn.)	48	150	28	40	40	333
MSN (Minn.)	45	150	64	50	25	324
VEN (Fla.)	124	165	14	10	10	323
BUN (Utah)	33	152	104	10	10	314
OSN (Ohio)	55	76	102	60	20	311
AENR (Ala.)	71	180	36	5	10	302
OCEN (Ohio)	28	180	36	20	20	284
SPECS (Cal.)	55	180	26	10	10	281
Mich. Thumb Net	26	180	36	15	10	270
AENH (Ala.)	41	157	32	15	15	260
NTX (Tex.)	14	202	6	10	10	242
Charlottesville Emerg. (Va.)	33	150	26	15	10	234
Panama City ARC Emerg. (Fla.)	40	150	22	10	5	227
Clark Co. Emerg. (Ohio)	14	150	36	10	5	215
Bayonne ARES/ORACES (N. J.)	45	120	14	20	10	209
Wayne Co. Emerg. (Ohio)	58	120	6	5	5	194
WMN (Mass.)	27	132	12	10	10	181
PERC (S. D.)	19	99	20	15	15	168
Muskogee ARC (Okla.)	15	120	16	10	5	166
ATN (Ala.)	29	64	32	15	10	150
Tompkins-Cortland Emerg. (N. Y.)	15	77	10	10	5	117
Kokomo Amateur Radio Emerg. (Ind.)	6	60	8	10	6	91
Trans-Canada	41		28	5	5	79
Belmont Co. Emerg. (Ohio)	6	30	17	10	15	73
Totals (1970)	26,292	51,732	6446	2948	3105	86,555
(1969)	24,982	64,476	4297	3635	3859	102,158

QST



A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau 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. Recent change are in bold face.

W1,K1,WA1,WN1[1] – Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.

W2,K2,WA2,WB2,WN2 – North Jersey DX Assn., PO Box 307, Ridgewood, New Jersey 07451.

W3,K3,WA3,WN3 – Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4,K4 – H. L. Parrish, K4HXF, R#D 8, Box 804, Hickory, North Carolina 28601.

WA4,WB4,WN4[1] – J. R. Baker, W4QR, 1402 Orange Dr., Melbourne Beach, Florida 32951.

W5,K5,WA5,WN5 – Kenneth F. Isbell, W5QAD, 307 Kesterfield Blvd., Enid, Oklahoma 73701.

W6,K6,WA6,WB6,WN6[1] – No. California DX Club, Box 24, Los Altos, California 94022.

W7,K7,WA7,WN7 – Willamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.

W8,K8,WA8,WN8[1] – Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio 43215.

W9,K9,WA9,WN9 – Ray S. Buren, W9MSG, Box 516, Elmhurst, Illinois 60126.

WØ,KØ,WAØ,WNØ[1] – Des Moines Radio Amateur Assn., PO Box 88, Des Moines, Iowa 50301.

KP4 – Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.

KZ5 – Gloria M. Spears, KZ5GS, Box 407, Balboa Canal Zone.

KH6,WH6 – John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.

KL7,WL7 – Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

VE1 – L.J. Bader, VE1EQ, PO Box 663, Halifax, N.S.

VE2 – John Ravenscroft, VE2NV, 283 Thorncrest Ave., Montreal 780, Quebec.

VE3 – R.H. Buckley, VE3UW, 20 Almont Road, Downsview, Ontario.

VE4 – D.E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 – A. Lloyd Jones, VE5IL, 2328 Grant Rd., Regina, Saskatchewan.

VE6 – Karel Tettelaar, VE6AAV, Sub. Po 55, N. Edmonton, Alberta.

VE7 – H.R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 – George I. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1 – Ernest Ash, VO1AA, PO Box 6, St. John's, Newfoundland.

VO2 – Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.

SWL – Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

[1]These bureaus prefer 5x8 inch or #50 manila envelopes.

QSL Bureaus for other U.S.Possessions and for other countries appear in the June and December issues of *QST*.

—•••—

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

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity

CONDUCTED BY GEORGE HART,* W1NJM

READY FOR AN EMERGENCY?

THIS MONTH'S lead was inspired by a bulletin written by K2KIR. K2KIR is manager of the Eastern Area Net of the National Traffic System. We can't improve on his style, but since his subject was the emergency preparedness status of EAN, we'd like to paraphrase it to have it reflect, as it certainly does, the subject of emergency preparedness in general. You don't use quotes when you paraphrase, but most of what follows is nevertheless "quoted" from K2KIR's January, 1970, *EAN Bulletin* (written in May).

Most of you guys would be off the air from the very beginning of any reasonable emergency right up to the very end. It's all very fine to sit, cozy and comfy, in your easy chair and handle traffic concerning an emergency far away and think how wonderful it is to be part of a fabulous emergency communications network, but if the geography suddenly did a reverse, most of you wouldn't be in a position even to get on the air.

There are various degrees of emergency preparedness. However, even in the most minor of emergencies, with a short period involving loss of commercial power, how many are still with me? How many can go battery-operated for a brief period, or can get on from their mobile rig in the car? Maybe 30%? OK, you guys come with me to Stage 2.

Now let the power failure extend a little longer. Battery's running down. Car running out of gas, and the friendly neighborhood petrol pusher can't help you because he has no power either. Did you remember to store some extra gasoline? Ten or fifteen gallons would be a bare minimum. How many are still with me? 15%? OK, carry on.

Let's add some bad weather to the power outage (they usually go together). Maybe a small blizzard, or a zero degree north wind at 20 knots. Your cw is getting kind of hard to copy because your fingers are getting numb. You'd use voice, but your teeth are chattering too hard. How are you fixed for heat? Fireplace? Wood stove? Gas stove/oven? How about a generator that can run your furnace for you? Did we lose anybody then? Oh yes, quite a few. Now we're down to 5%.

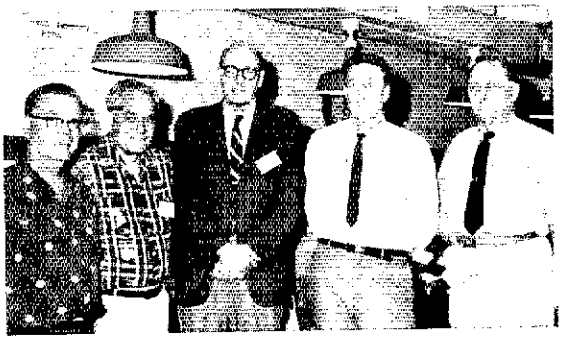
Suppose the emergency lasts a few days. Say you get snowed in and the plows can't get into your street. What do you do about food for yourself and family? Any advance thought given to this? How about alternate cooking methods, milk substitutes for the kids, more gasoline for the generator? Let's see how many of you stalwarts are left. What, only two? OK, you two guys are the fabulous Emergency Corps, the only ones left who haven't succumbed to the ravages of Mother Nature in one way or another. Go get us lots of good headlines and favorable publicity.

Beachhead Nets

The problem of interference among the crowded nets on the high end of 75 meters (3900-4000 kHz, to be exact) was the subject of a study made by the undersigned, at the behest of the Board of Directors, and reported on at the time of the Board Meeting last May. You recall the outcome? The Board decided against phone band expansion and against requesting FCC to revert to Phase I of "incentive licensing" on 75 meters, and this is "water over the dam" and not a part of this discussion. However, one of the possible solutions to the dilemma made mention of "beachhead nets." Since this is something that can be done under present conditions, perhaps some explanation and discussion are in order.

To begin with, let's dispel a bogeyman. There is not and has never been any intention of negatively-affecting public service operating in all the drive toward technical upgrading that has characterized the last few years. On the contrary, the feeling has always been that such an incentive program would have the overall result of *improving* the amateur's capability of rendering an effective public service.

* Communications Manager, ARRL.



Four ARRL officials attended Armed Forces Day activities as guests of Capt. M. C. Hartle, Commanding Officer of the U. S. Naval Communication Station in Washington, D. C. (L-R) WA4JJF EC Arlington Co., Va., K4GR SCM Virginia, W4KFC Director Roanoke Division, WB4CVY Asst. SEC Virginia, and Capt. Hartle.

At the joint Pacific-Southwestern Division Convention there was quite a gathering of NTS and AREC people. Caught just before the beginning traffic breakfast are, left to right, seated; W6INI, WA6ROF, W6LRU, W6ZRJ, W6WLV. Standing; WB6CQR, WA6LFA, WB6DHH, W6KYA and WB6HVA.

One director suggested that public service nets should remain in the restricted segments, inviting those net members not able to operate there to upgrade themselves and join them. But the fact remains that many would not do so and their services would perhaps be lost to the public service effort. This we can't afford.

One other solution would be to petition FCC to permit operating in registered public service nets in the restricted segments by *any* amateur (we call this "incentive operating"), but not many people seem to buy this. The establishment of "beachhead nets" in the restricted segment was suggested in the following terms:

"Perhaps an easier and quicker solution, or partial solution, is to encourage establishment of 'beachhead' nets in the restricted portions of the bands. For example, a large net formerly operating in the now-restricted segment but now operating above 3900 kHz would have a supplementary net in the advanced class segment populated by its advanced and extra class licensees. A 'satellite' net control could be in charge at this point and the frequency could be used by any two stations exchanging traffic who possessed advanced or extra class licenses, or indeed for transmitting-only by a qualified station, with QSL on a frequency above 3900, or on the net frequency. This has the advantage of making 'QNY procedure' available on phone nets, but the disadvantage of using more frequency space for a single net than is now generally the practice. It also has the incidental advantage of giving net members additional incentive to upgrade."

We can visualize all sorts of intriguing possibilities. Of course if your net has no advanced or extra class licensees, you're definitely stuck in the upper regions – for the time being, anyway. But probably most nets have a worthwhile contingent of advanced and extra classers (26% average, according to the above-mentioned study). Say your 3910 kHz net roll call on a given night consists of 20 check-ins, six of whom are advanced or extra class licensees. The NCS calls the roll, records the traffic and quickly gets routings organized. If a message is in the hands of a general class licensee, it must be passed on the net frequency; but if it is in the hands of an advanced or extra class licensee, NCS tells him to move to 3890 (or whatever) and transmit it to so-and-so. If the recipient is also advanced or extra, he goes to 3890 also; if not, he stays on 3910 and listens on 3890, copies the message. Meanwhile, on 3890 the net's business can proceed, the QSL for the message being accomplished during breaks.

Another way to handle it is to have two separate nets, one on 3910 controlled by the regular NCS and another on 3890 controlled by a "subcontrol" station, with one or two liaison stations shuttling back and forth. In nets which have a large number of transceivers in operation, this may be the more practical method. In either case, the NCS will have to be familiar with the license grade status of each member, or the operator will have to indicate such when he checks in.

Perhaps the above will help inspire additional ideas on how to utilize the restricted segments for public service communications. Leave us not "break and flee" because the going has gotten a little tougher. Those of us who are eligible to use the restricted segments should *use* them, one way or another, while those not yet eligible should hold the fort in the unrestricted area while getting eligible. Let not the general class license be a permanent way of life. Let it be a stepping stone, a way station to higher achievement, as it was in the late forties. – *WINJM.*

Public Service Diary

Shortly after noon on April 19, WA5OKI was monitoring a contact between K5KIR and WA5HVI when K5KIR reported a tornado touching down in his area, then went off the air. Further attempts at re-establishing contact were not immediately successful. About an hour later confirmation was received that a tornado had apparently touched down in Corinth, Miss., and that phone lines and some commercial power had failed. A few minutes later, K5KIR returned to the air and reported a number of buildings had been destroyed in Ripley, but there were no injuries.

W5NCB and WA5OKI then activated the Mississippi SSB Net which began handling emergency communications for the highway patrol, civil defense and weather bureau until normal communications facilities were partially restored some hours later. Several stations, including WA5TBA and WA5TCM who set up a station at the Red Cross chapter, mobiled to Corinth. Operations continued for about thirty-six hours with approximately 100 stations participating. – *WA5KEY, SCM Miss.*

—•••—

During the recent campus troubles at a number of universities, amateurs were active in supplying communications in a number of instances which could not be served by other agencies. On April 29 and 30 and May 1, members of Central Ohio

Public Service Honor Roll May, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total in the nine categories below. Use CD-190 or submit equivalent information through your SCM. See page 75, Nov. '69 *QST* for details. Please note maximum points for each category.

Category	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*Totals*
Max. Pts.	10	5	16	12	12	20	3		5	
KØLVB	10	5	16	12	12	20			5	80
WA2BAN	10	5	16	12	12	4	3		5	67
WA2CAL	10	5	16	12	12	4	3		5	67
W5ISM	10	5	12	12	12			16		67
W6BNX	10		16		12		20		5	63
WA7KIU	10	5	16	12	12	8				63
WB8BBG	10	5	16	12	12				5	60
WA8ETX	10	5	16	12	12				5	60
WAØIAW	10	5	16	12	12				5	60
W5MFX	4	5	16	16				12	5	58
W5QJA	10		16		12			15	5	58
WA1HOL	10	5	16	12	12					55
WA3FMI	10	5	16	12		9	3			55
WAØOEJ	10	5	16	12		7			5	55
W7BQ	10	5	16	9	9				5	54
WB6ZVC	10	5	12	6		20				53
W8IMI	10	5	16	3	12				5	51
WØLCX	10	5	16		12		3		5	51
WA1LLB	10	5	8	12	12		3			50
WA2FRZ	10	5	8	12	12		3			50
K7NHL	10	5	16		12	1			5	49
WA8UPI	10	5		12	12	5			5	49
WA9WMT	10	5	16		12	1			5	49
WA2EPI	10	5	12	6	12		3			48
WB2FEH	10	5	16		12				5	48
W2MTA	10	5	16		12				5	48
WA3AKH	10	5	16		12				5	48
W3MPX	10	5	16		12				5	48
W4HFU	10	5	16		12				5	48
WB4HJW	10	5	16		12				5	48
W5SBM	10	5	16		12				5	48
W6BGB	10	5	16		12				5	48
WA6ROF	10	5	16		12				5	48
K7KSA	10	5	16		12				5	48
WA7KOB	10	5	16		12				5	48
W7OCX	10	5	4	12	12				5	48
W9HRY	10	5	16		12				5	48
8RIY/W4	10	5	16		12	4				47
W3EML	10		16		12		3		5	46
K3ZNP	10	5		12	12	2			5	46
W7AXT	10		16		12		3		5	46
WAØVAS		5		12	6	20	3			46
WA1JYY	10	5	16		12	2				45
KØMRI	10	1	16		12				5	44
W1EFW	10		16		12				5	43
WA1GCE	10	5	16		12					43
WA1HSN	10		16		12				5	43
K1PQV	10		16		12				5	43
W2FR	10		16		12				5	43
WA2ICU	10	5	16		12					43
K2KIR	10		16		12				5	43
W2RUF	10		16		12				5	43
W3LOS	10		16		12				5	43
WB4EKJ	10		16		12				5	43
W5EIN	10	5	16		12					43
K5ROZ	10	5	16		12					43
W7PI	10	5	16		12					43
WA8CXY	10	5	16		12					43
WAØUTT	10	5	16	12						43
WAØWEZ	10	5	16		12					43
VE1AMR	10		16		12				5	43
W1BVR	10	4	16		12					42
W4UQ	10	4	16		12					42
WA6FOQ	10	4	16		12					42
WB8BZK	10	5		12	12	4				42
WAØKUH		5		9	3	20			5	42
W1ZPB	10	3	16		12					41
K2KTK	10	3	16		12					41
W3TN	10		16		12			3		41
W4SHJ	4	4	16		12				5	41
W5QGZ	10	2	16		12	1				41
WA5RRH	6	5		12	12				5	41
WAØOTO	10	3	16		12					41
VE4FQ	10	1	16		9				5	41
K1SSH	10	2	16		12					40
K4DPO	10	2	16		12					40
WA1JMO	10	5		12	12					39
W6QAE	10	5	12		12					39
W1HKJ	10		16		12					38
WA1GFH	10		16		12					38
W2FIR	10		16		12					38
W2QC	10		16		12					38
WA3CKA	10	3	16		9					38
WA3JPU	10		16		12					38
W3KUN	10		16		12					38
WB4KSL	10		16		12					38
WA6CBT		5		9	9	15				38
WA6SCE	10		16		12					38
W7GHT	10		16		12					38
W7GMT	10		16		12					38
WØBV	10		16		12					38
WØHI	10		16		12					38
WAØHTN	10		16		12					38
VE1IT	10		16		12					38
VE1RO	10		16		12					38
WA1KZE	10	5	4	3	12			3		37
WB4FLW	10		5		16	6				37
WA4PBG	10	5	12	6	2	2				37
WA6MCK		5	12			20				37
WA1LNF	10	1	16		9					36
WA1MEB	10	5	4	12					5	36
WA2VYS	10	5	16						5	36
W6LRU	10	5	4		12				5	36
W7JWJ	8	5		12	3	3			5	36
WB6GHH	10	5	16			4				35
W7JEY	10		16		9					35
WA8MHO	5	5	4	6		12				35
WØPAN	10	5	5	12						35
WAØVYV	4	5		12	6	5	3			35
K1SXF		5		12	12				5	34
W6FJT		5		9		20				34
K3OIO	10		16		6					32
WB6IYZ	10		16		6					32
WA8ZNC	10	5			12				5	32
WAØHRM	10	5		12					5	32
WA7MEO	10	5	16							31
W7UU	6	5				20				31
K7WWR	10	5	16							31
WBØBEI	10	5	16							31
WB2VJB		5		12	6	2			5	30
K7UYW	10	5			12	3				30
WB8CKI	10	5			12		3			30
WA8ETW		5		12	12	1				30

The following stations had the necessary total of points for inclusion in PSHR, but no breakdown was furnished: W4OGG 55, WA6LFA 39; W6YBV 38; and W6DEE 32.

Category Key. (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; (9) Serving as net manager.

AREC/RACES were asked to stand by for possible use by civil defense authorities. The emergency operations center and W8LT, the club station of Ohio State University, were manned 'round the clock but no communications emergency developed. There was no activity on May 2 and 3, but on the fourth, the Green Ribbon Commission, a neutral faculty group dedicated to the prevention of violence on both sides, requested communications aid. W8CRX and W8ERD set up a six meter station in the Commission's campus headquarters while WB8CLF and WA8YUB manned W8LT.

On May 5 the campus situation worsened and W8ERD and W8CRX were trapped in the former's car between National Guard forces and student lines while attempting to bring more gear into the commission building. The vehicle carried a green ribbon and fortunately the neutrality was observed by both sides. Later in the evening, mobiles manned by K8RLS, WA8LUL, WA8LUR and WA8YHN carried commission members as passengers and patrolled the campus.

The rioting continued and worsened on May 6. Because of greater availability it was decided to

attempt to use citizen's radio units for situation reporting. There was apparent jamming on the channels and after several false rumors were generated through faulty relaying, this system was abandoned and a single amateur unit was pressed into service doing the job of a much larger number of CB units. Late that afternoon it looked as if there was about to be a confrontation between authorities and students, but using amateur radio the rumor that the university had been closed was confirmed and the mob dispersed.

The departure of many students then created problems of its own accord. Telephones were jammed while thousands tried to make calls to notify families of impending arrivals. Amateurs established a message service and all Ohio section nets remained in session continuously to handle the influx of traffic. About midnight of May 6 the operation was secured. – *W8ERD, EC/RO Columbus, Ohio.*

—•••—

On May 11, at 2230Z, WA2EDD called into the Student Information Network on forty meters and reported the discovery of an accident involving an oil truck and automobile on an isolated stretch of Flanders Road near Riverhead, Long Island. W2UC and WB2DTY called the New York State Police and the necessary emergency equipment was on the scene in minutes. – *K2AJA.*

—•••—

While driving home on May 12, VE2AAS discovered an accident at the intersection of the Decarie Expressway and Metro Boulevard in Montreal involving three cars. Using the VE2RM repeater, VE2ALE was summoned and the police were advised. – *VE2ALE, SEC Quebec.*

—•••—

While on the way to work on April 10 at about 0220Z, VE2ALE noticed a boat and trailer partially blocking the inner lane of the Trans-Canada Highway at Vaudreuil, Que. Because the section of road was not lighted, it was nearly impossible to see the obstruction, and there was a serious traffic hazard to westbound vehicles. Again using the VE2RM repeater, VE2AQI was raised and the police were notified. – *VE2ALE, SEC Quebec.*

—•••—

The Peninsula Amateur Radio Club, the Bayonne, N.J., Civil Defense and the Disaster Control Communications Group participated in a civil defense disaster drill. Under the direction of WA2FUI, nine amateurs established communications at a simulated school fire, at Bayonne Hospital and at civil defense headquarters. Boy Scouts acting as disaster "victims" were shuttled to the hospital along routes established by the police department while amateurs, using two meters, provided information on the casualties. – *WA2FUI, EC/RO Bayonne, N.J.*

—•••—

On May 2, the Kansas University Medical Center sponsored a "Walk for Mankind." The Red Cross, which was to provide food and first aid along the twenty-mile length of the walk, asked for amateur radio communications assistance. Fifteen local amateurs operated eight mobile units and one fixed station on six-meter fm. Each mobile unit also carried a student nurse. A number of messages concerning supplies and requests for transportation were handled. – *WØRXD, EC Zone 6, Kansas.*

—•••—

Nine Wayne Co. (Mich.) amateurs helped provide communications for a road rally sponsored by the Detroit Area Council, Boy Scouts of America. There were about 100 participants in the rally which covered a 150 mile course and the usual times in and out of check-points were relayed to a base station at the end of the course. The exercise was especially useful because it pointed out troubles with a portable generator that was to be used at the finish line. However, W8BEZ and WA8SSV were not kept off the air; they simply hooked the antenna to the former's mobile rig and the operation continued. – *W8BEZ, EC Wayne Co., Mich.*

—•••—

Okay, we did a little better this month, but still nothing to brag about: 42 SEC reports were received during April with 14,966 AREC members listed as active. Last year one more report was received during the same period indicating activity by 15,742 members. Sections reporting: Alta, Ariz, Ark, BC, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, La, Mar, MDC, Mich, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Que, SDgo, SF, Sask, SDak, SNJ, STex, Tenn, Utah, VA, Wash, WFla, WMass, WNY, WPa.

Traffic Talk

A question that occasionally comes up and causes some difficulty is: does an amateur have a right to participate in any net he chooses? The immediate answer would seem to be "of course!" but there are some ramifications. How about an amateur who chooses to take part in a section net not in his section? Should he be made welcome, given traffic for his section, awarded a net certificate, recognized and written up in the section net

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for May Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3OUL	359	1860	1401	127	3447
WA5OFO	15	1000	0	1000	2015
KØONK	173	593	585	15	1366
W7BA	6	544	509	33	1092
W3VR	137	397	369	11	914
K5TLY	38	430	419	0	887
WAØVAS	104	338	20	318	780
W5VGO	368	244	34	165	781
W1OJM	5	362	359	3	729
WA2BAN	18	331	304	21	674
W2DSC	534	50	27	15	626
WØLCX	23	318	259	7	607
WB6BBO	21	307	212	57	597
WA4SCK	27	285	275	6	593
KØZSQ	0	284	0	284	568
W3EML	44	299	294	2	549
WA1LLB	40	241	203	29	513
WA2ERZ	70	250	185	8	513
WA2CAL	30	251	206	16	503
WA5PPF (Apr.)	65	980	695	285	2025
KØZSQ (Apr.)	0	335	2	335	672

More-Than-One Operator Station

WA3FXJ	0	10081	0	15432	25513
W5EAK	0	1369	1369	0	2738

BPL for 100 or more originations-plus-deliveries

K8ONA 273	WA2EPI 147	W8QCU 108
WA6BYZ 267	WAØQOQ 143	K1BUS 107
W9UYO 260	WAØVVV 139	W2OE 105
WB4HKP 197	W6MEF 120	W8CKI 105
WB8DSV 189	W5KCK 118	WA1KZE 102
W7AXT 180	W9EQO 118	WA2EBI 102
W6WLV 167	WA3FMI 115	WB2BWJ 101
W3FN 155	K7RQZ 110	WA7LDZ 101

BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA1JTM, WA5GPO, K7KBK, WAØMMV.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

At the Fresno Convention, there was also a large gathering of public service minded amateurs. In the photo at left, in the back row, left to right, are WB6CBW, President of WCARS; W3BG, Chief of the Amateur and Citizens Division of FCC; and W6BSW, XYL of WB6CBW and President of the Western Public Service System. Seated, in the center, is W6AWP, Engineer in Charge, FCC District Office, Los Angeles. At his right is his XYL, K6RPM with W3BG's wife at the far right. A talk concerning views and suggestions of public service operations especially as WCARS is concerned, was given by W3BG and W6APW. In the photo at the right is the entire attending crew, unfortunately not individually identified.

bulletin, invited to the banquet, picnic, etc.? If so, could this not be a deterrent factor to proper implementation of section nets, in some cases?

Let's have an example. Section A is a small section adjacent to a large Section B. Section B has a lot of traffic men and operates a gung-ho section net that is a big cog in NTS, but Section A has only a handful and it has trouble putting a worthwhile section net on the air. Members of Section A start to check into Section B's net, and this makes the situation even more hopeless in Section A. The SCM (or RM or PAM acting for him) protests to the manager of SBN (Section B Net), that he wants his guys back. But the defecting SAN members say phooey on that, SBN is a better net, they prefer to be identified with it and want full recognition.

Who is on the spot? The SBN manager, that's who. If he welcomes the defecting SAN members, he offends the SAN manager. If he doesn't he gets the defectors mad at him and maybe even some of his own members will support them.

The above is pretty specific, but there are a number of variations of it that keep cropping up all the time, especially in the phone ranks, where the "welcome to all, the more the merrier" sign is usually more prominent. In the cw section nets there is more of a tendency to consider the net open to members that reside in that section only; others are expected to take part in their own section nets. If there isn't one, *form* one.

Not all section nets are NTS nets, but for those that are there is a basis for guidance in the Public Service Communications Manual, which says, in part: "NTS nets at local and section level are open to all amateurs in the coverage area of the net. Stations from outside the coverage area who report in with traffic will be cleared. Such stations reporting in without traffic will immediately be excused by the NCS unless they can supply outlets not at that time available through normal NTS channels." This policy certainly does not provide for encouragement of participation from "outside," but neither does it specifically prohibit it. All traffic is accepted, but outgoing traffic is routed via the designated NTS liaison if available.

As for issuing net certificates to members outside the section, this is regarded as a bad practice. SCMs should issue section net certificates *only* to members of their own sections. In cases where a section-level net covers more than one section, the certificate should be issued and signed by the resident SCM of the station concerned. — *W1NJM.*

National Traffic System. Because of the press of college studies, WA9RAK has had to resign as CAN Manager. To replace him, the Central Area Staff recommended WØINH, a real old time traffic man. Wade was the first manager of RN5 about twenty years ago. W1EFW reports the holding of a 1RN meeting-picnic at the end of May. It was attended by 38 members and was well received. Milt has also issued 1RN certificates to W1s ABC EJI FQZ QYY UBG, K1PRB, WA1s FCM GCE GFH HOL IIH IRY JTM JZC and WA3JSU. W3NEM reports traffic down from previous years. Bob has also been elected SCM of Western Pennsylvania. W6LRU congratulates his NCSs because all reports were in to him by the first of the month. W9HRY says he bragged too much on the last report, now says "traffic lousy, rate and rep lousy, conditions lousy." Even with all that, WB9DPU managed to earn a 9RN certificate. WØLGG reports vacations are beginning to cut into the TEN duty roster and also that KØAZJ, WAØs RSR TGM TQT, and VE4KE have been sent their tokens of appreciation for help on TEN in the form of net certificates. TWN Manager K7NHL reports that three regular participants of his net were presented with PICON Awards by Rocky Mountain Division Director WØBWJ at the recent convention in Estes Park, Colo. They were W7EM, WAØMNL and WA5TWA. FB gang!

May reports.

Net	*Sessions*	*Traffic*	*Rate*	*Avg.*	*Rep.(%)*
PAN	31	1581	1.144	51.0	98.4
CAN	31	964	.870	31.1	100.0
PAN	31	1089	1.063	37.3	100.0
1RN	62	601	.363	9.7	89.3
2RN	62	447	.744	7.2	97.4
3RN	62	310	.282	5.0	98.9
4RN	55	476	.355	8.7	84.8
RN5	62	679	.360	11.0	86.4
RN6	62	1049	.737	16.9	98.9
RN7	62	403	.376	6.5	49.0
8RN	61	504	.333	8.1	90.9
9RN	62	490	.437	7.9	94.0
TEN	62	336	.351	5.3	75.2
ECN	62	177	.087	2.9	88.0
TWN	54	183	.156	3.4	66.8
TCC Eastern	124[1]	698			
TCC Central	93[1]	499			
TCC Pacific	124[1]	912			
Sections[2]	1916	8363		4.4	

Summary	*2737*	*20651*	*PAN*	*12.4*
Record	*3237*	*20677*	*1,313*	*18.4*

[1]TCC functions, not counted as net sessions.

[2]Section and local nets reporting (57): CCN (Colo.); OLZ, SSZ (Okla.); CN (N. & S. Car.); CÓ AREC/RACES, OSN, BN, OSSB (Ohio); QKS (Kans.); EPAEPTN, EPA, PTTN (Pa.); UQN, GBN (Ont.-Que.); QIN (Ind.); NCN (Cal.); BEN, WSBN, WIN, BWN (Wisc.); BNN (Ore.); AENB, AEND, AENH, AENO (Ala.); GN, WFPN, VRN, FMTN, QFN, TPTN, FPTN (Fla.); MTN (Man.); KYN (Ky.); NJSN, NJN, PVTEN (N.J.); GSN, GTN (Ga.); WSN (Wash.); MSN, MSPN, MSTN (Minn.); WMN (Mass.); CPN, CN (Conn.); WVN (W. Va.); QMN (Mich.); MDGTN (Md. - D. C.); OZK (Ark.); W. Que. VHF; TEX (Tex.); VSBN (Va.); BUN (Utah); SGN (Me.); ILN (Ill.); NYS (N.Y.).

Transcontinental Corps — May reports.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	124	97.6	1954	698
Central	93	93.8	1068	499
Pacific	124	95.2	1724	912
Summary	*341*	*95.4*	*4736*	*2109*

The TCC Roster: Eastern Area (W3EML, Dir.) – W1s BIG EJI NJM, K1ESG, WA1JTM, W2s FR GKZ PU QC, K2KIR, WA2s CAL HMQ UWA, W3EML, K3s HHK MVO, W4s NLC SQQ UQ, K4KNP, W8UM, K8KMQ, WA8YVR. Central Area (WØLCX, Dir.) – W4OGG, K4s AT DPO, W5MI, W9s CXY DND VAY, WA9s RAK VZM, WØs HI INH LCX UCE ZHN, KØAEM, WAØ DOU IAW RVR. Pacific Area (W6VNQ, Dir.) – W5RE, W6s BGF BNX EOT IPW MLF VNQ VZT, K6DYX, WA6s BRG LFA ROF, W7s DZX EM GHT KZ, WA7CLF, KØJSP.

Independent Net Reports.

Net	Sessions	Check-Ins	Traffic
Clearing House	36	398	212
7290 Traffic	53	2491	1972
ECTTN	21	294	85
All Service	5	73	44
North American SSB	26	614	517
Northeast Traffic	31	465	420
Hit & Bounce	31	269	258
EASN	25	127	51

VE/W CONTEST ANNOUNCEMENT

(Continued from page 69)

7) *Reporting*: Follow the sample log shown. Check sheets (or ARRL Op. Aid 6) are required for every entry consisting of 200 or more QSOs. *ANY LOG OMITTING CROSS-CHECK SHEETS OR A SUMMARY SHEET WILL NOT BE CONSIDERED FOR COMPETITIVE QST LISTING OR AWARDS.* Such logs will be counted as check logs and processed accordingly. Entries must be postmarked no later than October 31. All entries become the property of the committee and none can be returned. Participants are encouraged to submit station photos and comments.

Log sheets will be available from the address shown, upon receipt of self addressed legal size envelopes and IRCs, or Canadian stamps.

8) *Awards*: Certificates will be awarded to the highest scoring cw and phone entry in each section. A minimum score of 25 QSOs is required. Certificates for the high scoring multioperator entries will be issued only when there are at least three entries per section. Phone and cw scores will be listed separately. A trophy will be issued to the high scoring Canadian and to the high scoring US entry.

9) *Mailing*: Please make sure that your call and section are on each page, and especially on the top left-hand corner of your envelope. Mail logs to: VE/W Committee (VE2IZ and VE2DCW), 262 Braebrook Avenue, Pointe Claire, Quebec, Canada.

SHORT ANTENNAS

(Continued from 30)

to resonance at this frequency by the use of auxiliary loading in the form of a second inductor or capacitor outside the trap. In such cases, the *L/C* ratio is very critical. Although there is some interlocking of the adjustments of the trap and the auxiliary loading, to the first approximation one of the resonant frequencies of the antenna is determined by the adjustments of one, while the other frequency is determined by the adjustments of the other.

This discussion has assumed for simplicity a two-band antenna with a single trap. In principle, operation on any number of bands can be obtained by installing the appropriate number of traps. In the first approximation, each trap is designed as though the others were not present although, of course, there is bound to be some influence of one upon another. Correction for this interraction is made by trial and error. QST

Happenings of the Month

ELECTION NOTICE

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

Nominations are now in order for director and vice director in these eight divisions of ARRL. Only ten Full Members need to join together in naming a candidate, by a petition which must reach the Secretary of ARRL by noon EDST September 21.

Democracy within our League starts with these nominations. If more than one candidate is nominated, and each meets the requirements explained below, then all Full Members of the League in the division will have a chance to choose from among the candidates by secret ballot between October 8 and noon of November 20.

The election procedures, outlined briefly here, are specified in the Articles of Association and Bylaws; copies will be sent to members free upon request. An informational pamphlet generally outlining duties and responsibilities of elected League officials is also available for the asking.

Any eligible Full Member of the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions can be nominated for either director or vice director. If one person is nominated for both offices, his nomination for director will stand and that for vice director will be void; no person may simultaneously be a candidate for both positions.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation or inability to serve, careful selection of candidates for vice director is just as important as for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the ..... division, hereby nominate ..... of ..... as a candidate for director; and we also nominate ..... of ..... as a candidate for vice-director; from this division for the 1971-1972 term.

(Name Call City Zip Date)

The signers must be Full Members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No

OVERSEAS AND ABSENTEE BALLOTS

ARRL members who are licensed by FCC or DOT but are temporarily resident outside the U.S. or Canada are eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September will be able to vote this year where elections are being held.

Within the U.S., Full Members temporarily resident outside the ARRL division they consider home may notify the Secretary prior to September 21, giving the current *QST* address and the reason why another division is considered home (e.g., holding an amateur call appropriate to the division). So if your home division is the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf, but your *QST* goes elsewhere because of a different residence, please let the Secretary know, as soon as possible but no later than September 21, so you'll receive a ballot for your home division.

The first tickets to the 1970 ARRL National Convention at Boston were purchased from ticket chairman W1KCO (left) by K1IME and his XYL Bobbie of Arlington, Massachusetts. In addition to being radio buffs both Bobbie and Frank are licensed pilots. Frank is president of Air Industries, Inc. of Bedford, Mass. This year's tickets are in the shape of the ARRL diamond "to better signify the League's importance to amateur radio," according to convention organizers, The Federation of Eastern Mass. Amateur Radio Clubs. Other info appeared on page 67, July *QST*. (Photo by W1VRK)

The *QST* Cover Plaque for April 1970 was awarded to Irv Hoff, W6FFC for his article, "The Mainline ST-3 RTTY Demodulator.". At the presentation, Andy Korsak, VE3FZK/W6, president, Palo Alto ARA; Ray Allustiarti, W6JOV, president, San Carlos CD Radio Club; ARRL Pacific Director Doc Gmelin, W6ZRJ; W6FFC; and Larry Reed, W6CTH, president, South County ARS.

person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or implementation, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 21st day of September, 1970. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures; since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

Bill Choat, VE3CO, at left, receives the ARRL Certificate of Merit from Ken Andras, VE3UU, a director of the Radio Society of Ontario acting on behalf of ARRL Director Noel B. Eaton, VE3CJ. The award was presented for outstanding service to amateur radio, including work with the blind and service as ARRL assistant director for Ontario.

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

Voting by ballots mailed to each Full Member will take place between October 8 and November 20, except that if on September 21 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Central:* Philip E. Haller, W9HPG and Edmond A. Metzger, W9PRN. *Hudson:* Harry J. Dannals, W2TUK and Stan Zak, K2SJO. *New England:* Robert York Chapman, W1QV, the vice-director's office is vacant. *Northwestern:* Robert B. Thurston, W7PGY and David O. Bennett, W7QLE. *Roanoke:* Victor C. Clark, W4KFC and L. Phil Wicker, W4ACY. *Rocky Mountain:* Carl L. Smith WØBWJ, and Thomas G. Banks, W5HJ. *Southwestern:* John R. Griggs, W6KW and Arnold Dahlman, W6UEI. *West Gulf:* Roy L. Albright, W5EYB and Lester L. Harbin, W5BNG.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1970 JOHN HUNTOON W1LVQ
Secretary

SPECTRUM POLLUTION RULES

Another step has been taken toward the eventual cure of spectrum pollution from devices capable of emitting radio frequency energy. Two years ago, Congress adopted Section 302 of the Communications Act of 1934 as amended, giving FCC authority to regulate not only the use of these devices but also the manufacture, shipment and sale of them.

The current FCC Report and Order, Docket 18426, says in part: ". . . The Commission has for many years prescribed allowable levels of emission of rf energy and related technical standards for various types of radio frequency devices, the use of which by any person or company has been authorized by the Commission by individual license or general rule. Although the prescription of such allowable levels of emission and technical standards has been of material

Behind the Diamond

Number 26 of a Series

Where were you on April 10, 1922? If you're the average League Member you probably weren't born yet – in fact, chances are your dad was still in elementary school! But that was the day on which David H. Houghton reported for work at League headquarters at 1045 Main Street, Hartford. (No use looking for the building now, though; Interstate 84 goes through its cellar!)

Dave retired as circulation manager of the League five years ago this month – but he's still working for the League for free, as its Treasurer. In fact, in May he was reelected to another two-year term; when he finishes it in May 1972 he will have been in that position for thirty-one years. The treasurer's job, an unsalaried office, entails general supervision of all League monies and bank accounts, membership on the Finance Committee *ex officio* and, subject to that group's advice, management of the League's investment portfolio.

"DHH" claims fame, however, not as treasurer *but as circulation manager for QST and the other* ARRL publications from 1922 to 1965. During this time, his staff grew from two to 25 or so; *QST* circulation from around 23,000 to over the hundred-thousand mark; gross business from about $125,000 to $1,370,000 *the year he retired!* His conscientious watchdog attitude, his integrity and devotion to duty played a large part in this growth. He was the League's foremost adviser of help, the competent watchdog of finances, keeper of the inventories and copyrights. In building up the network of distributors for ARRL publications, he early learned to walk the tightrope between quality and quantity of outlets – consistently-low figures in the "Bad debts written off" account attest to success in protecting interests of the membership.

We've been expecting Dave to blossom out with a call ever since his retirement – he had several near misses during his career here – but so far it hasn't happened. Perhaps his wife, Jeanne, has been keeping him busy with all the things he didn't *get done when he was working full time at* ARRL. Or maybe it's the time he spends with his son, two daughters and 8 grandchildren. Even the day or two a week he still spends at the office cuts down on the opportunity. Oh, well – maybe next year?

assistance in the Commission's efforts to restrict or eliminate harmful interference, the identifiable detection of specific unlawful uses and users has proven to be most difficult. Despite many manhours devoted to tracing and eliminating interference of all types, the amount of spectrum pollution and harmful interference appears to be on the increase. Another very practical impediment in the system heretofore in effect was that it was directed to persons who may have purchased a radio frequency device in good faith in an open legal market and with no knowledge of its interference potential. In such a situation, it has been difficult to obtain the substantial voluntary cooperation of the user upon which the success of such a program must depend."

"The rules herein adopted are designed to achieve a lessening of the harmful interference problem by control measures applied at the source of the offending devices. Reaching into the source of such devices – to the manufacturers and importers, and in turn to the sellers and shippers of radio frequency devices – should permit corrective action, when necessary, before offending devices have reached prospective users in epidemic proportions. Technical standards have already been prescribed by the Commission for all radio frequency devices used under Commission license or authorization except for those in the incidental radiation category. The rules herein adopted, in effect, require compliance with these standards prior to the sale of such devices, or their importation or shipment for purposes of sale."

There remain two weaknesses in the rules from the amateur point of view. Public utilities were specifically exempted from new Section 302 of the Act. While in the overwhelming portion of cases nationwide the utilities (e.g., electric-light companies) have been most cooperative in tracking down and eliminating interference generated by their equipment, there have been a few unhappy exceptions; the new law does nothing to help with these.

The other weakness is in respect to "incidental radiation devices," the myriad of things which do not have to use radio frequency energy in carrying out their tasks, but which can generate rf as an unwanted by-product – electric motors, *automobile ignition systems, neon signs,* thermostats, etc. The Commission's reasoning:

". . . Technical standards for the many kinds of incidental radiation devices have not as yet been prescribed, and therefore the basic control over the interference potential of such devices will continue to be the present prohibition against their use if the radiation therefrom causes harmful interference."

We'll still have the need to establish that a particular neon sign is causing us trouble, for instance, and then pursuading the owner that he should have it fixed. FCC will help through its field offices *after* reasonable attempts at the local level have been fruitless.

The equipments regulated by the new rules include most receivers, diathermy devices, industrial heaters, etc., and become effective October 1, 1970 for all devices shipped, offered for sale or lease, sold or leased after that date regardless of when manufactured.

KUDOS FROM DEFENSE

During the Armed Forces Day observance in May, the following message was transmitted:

FOR 21 YEARS ARMED FORCES DAY HAS BEEN DEDICATED TO THOSE UNIFORMED AMERICANS WHO SERVE THE DEFENSE NEEDS OF THE UNITED STATES AT HOME AND OVERSEAS.

IT IS ALSO APPROPRIATE THAT ARMED FORCES DAY BE DEDICATED TO THE MANY THOUSANDS OF VOLUNTEER CIVILIAN RADIO AMATEUR OPERATORS WHO CONSTITUTE THE LARGE MAJORITY OF THE MEMBERSHIP OF THE DEPARTMENT OF DEFENSE SPONSORED MILITARY AFFILIATE RADIO SYSTEM — MARS. THROUGH THEIR SUSTAINED AND DEDICATED EFFORTS, SINCE 1948, CIVILIAN MARS MEMBERS HAVE PROVIDED AN AUXILIARY COMMUNICATIONS SERVICE TO THE MILITARY DEPARTMENTS WHICH IS BOTH HIGHLY VALUED AND DEEPLY APPRECIATED.

PRESENTLY, THESE PUBLIC SPIRITED INDIVIDUALS ARE HANDLING HUNDREDS OF THOUSANDS OF WRITTEN MESSAGES AND RADIO TELEPHONE CALLS EACH YEAR BETWEEN OUR SERVICEMEN OVERSEAS AND THEIR FAMILIES AT HOME. THIS UNIQUE AND UNPRECEDENTED VOLUNTEER SERVICE, WHICH COULD NOT OTHERWISE BE PROVIDED, HAS ENHANCED THE MORALE OF OUR SERVICE MEN AND THEIR FAMILIES TO A TRULY INESTIMABLE DEGREE.

I COMMEND ALL OF YOU FOR YOUR EXCEPTIONAL CONTRIBUTIONS OF TIME, TALENTS AND MATERIAL RESOURCES IN BEHALF OF OUR SERVICEMEN AND THEIR FAMILIES AND EXTEND TO YOU MY BEST WISHES FOR SUCCESS IN ALL YOUR FUTURE ENDEAVORS. — MELVIN R. LAIRD, SECRETARY OF DEFENSE.

CB RADIO CONTROL

The FCC proposes to alter the shared use of frequencies in 72-76 MHz by Class C Citizens Radio Service stations for the remote control of models, proposing 72.08, 72.24 and 75.64 for model aircraft only; 72.16 and 72.32 for models other than aircraft; and 72.40 and 72.96 MHz for any models. It's Docket 18733, and the comment deadline is August 21, 1970.

STILL MORE AMATEUR RADIO WEEKS

One of the most consistent states for annual declaration of amateur radio week is Florida. This year's observance of June 21-27, 1970 was proclaimed by Governor Claude R. Kirk, Jr. who mentioned emergency communications, contributions to the art in general, international good will, assistance to the blind and handicapped, aid to religious and charitable institutions in remote areas, and the work of ARPSC and RACES.

A message from Herb Lacey, WB2LZJ, tells of New York State amateur radio week June 22 through 28, but other details are lacking at press time.

The Scout-O-Rama in Louisville, Kentucky April 24-25 awarded a blue ribbon to Troop 166's exhibit of amateur radio, shown here. The Rev. Tom Newton is listening at left, while the Rev. Gregory Combs, K4CRB, prepares to transmit at right. The exhibit also featured the ARRL movie, "Hams Wide World."

WORLD CONFERENCE PREPARATION

The World Administrative Radio Conference on Space and Radio Astronomy will be held in June, 1971 (the only world conference presently scheduled which could affect amateur radio) in Geneva.

As one step in U.S. preparation for the conference, FCC has issued a series of Notices of Inquiry, Docket 18294, asking for suggestions and inviting comment on ideas already submitted by others, which might be presented to the other countries at the Conference.

ARRL has filed comments jointly with the Radio Amateur Satellite Corporation (AMSAT) in response to the Sixth Notice of Inquiry. We're aiming for freedom to do space work on all the world-wide amateur bands, and asking that amateur satellites be permitted in the shared bands when "reliable means is provided to control emissions so as to prevent interference to stations of a primary service in the band." The text follows:

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

In the Matter of	)
	)
An Inquiry relating to preparation for a World Administrative Radio Conference of the International Telecommunication Union on matters pertaining to the radio astronomy and space services.	)Docket)No.)18294
To: The Commission	)

COMMENTS OF
THE AMERICAN RADIO RELAY LEAGUE
AND
RADIO AMATEUR SATELLITE CORPORATION

The American Radio Relay League, Incorporated (ARRL), and Radio Amateur Satellite Corporation (AMSAT) respectfully submit the following joint comments in response to the Sixth Notice of Inquiry, released March 25, 1970 (FCC 70-303), relating to preparation for the forthcoming World

Administrative Radio Conference (WARC) on matters pertaining to the radio astronomy and space services scheduled for June 1971.

The General Policy

The ARRL is a non-profit organization, now 56 years old, with approximately 80,000 United States and Canadian amateur radio operators as full voting members. In addition to being the only such organization in the United States and Canada, the ARRL is the headquarters society of the International Amateur Radio Union (IARU), a worldwide amateur radio organization made up of the national amateur radio societies of 83 countries and administrations throughout the world.[1] The IARU participated actively in the 1963 Extraordinary Administrative Radio Conference on Space of the International Telecommunications Union (ITU) held in Geneva, Switzerland, with representatives of the ARRL and a number of other societies as members of its working group and delegation.

The contributions of radio amateurs since the very beginning of radio are so well known as to require little comment. In 1966, the Stanford Research Institute, under the sponsorship of ARRL, published a comprehensive report, "Amateur Radio: An International Resource for Technological, Economic, and Social Development," which discusses in depth the value of amateur radio to every nation in the world.[2]

Radio amateurs have played a most important role in the development of space exploration and communications. In recent years, two organizations of dedicated radio amateurs, working in their spare time and without compensation other than the personal pleasure which comes from making contributions to society, have made most significant contributions to the development of space techniques and experience. Both organizations have been actively supported by the ARRL. The first was Project OSCAR, Inc. – OSCAR means Orbital Satellite Carrying Amateur Radio – organized in 1960 by amateurs on the west coast of the United States. The second, AMSAT, was organized early in 1969 by amateurs engaged in space research and development in the Washington, D. C., area. AMSAT's purpose is to foster world-wide radio amateur participation in space experiments and, in so doing, bring about improved communications for amateurs and other services alike. Many of AMSAT's members have extensive experience in space telecommunications technology and its membership now includes amateurs in over twenty countries.

The contributions of Project OSCAR over the years are well known and will not be repeated here other than to note that the first satellite constructed without government funds was OSCAR I, which was placed in orbit on December 12, 1961, and whose good-will greeting, "Hi," was heard by countless millions of persons throughout the world. The international aspects of amateur radio space activities was emphasized just three months ago when AMSAT, in cooperation with the National Aeronautics and Space Administration (NASA), arranged for the testing and launch of an amateur satellite designed and constructed by a group of radio amateurs in Australia. Australis-OSCAR 5 was placed in orbit in January 1970. AMSAT not only arranged for its launch but also coordinated the experiments and observations conducted by thousands of amateurs throughout the world, and now is aiding in the analysis and interpretation of the voluminous data collected. AMSAT is now planning more advanced amateur satellites, and has also submitted a proposal to NASA to provide two communications experiments to be carried on the ATS-G Applications Technology Satellite.

Amateur satellite work has been typified by a wide variety of configurations of small and relatively unsophisticated ground stations, such as are operated by amateurs around the world. This approach has made amateur satellite work a truly international venture in keeping with the United Nations General Assembly Resolution 1721 (XVI) part D and 1802 (XVII) part IV paragraph 3 which expresses the belief that "communications satellites should be organized on a global basis with non-discriminatory access for all nations."

It is axiomatic that the contributions of radio amateurs in the years to come will depend to a very great extent upon the freedoms provided and restraints imposed by the forthcoming WARC.

The ARRL and AMSAT urge that the United States continue its national policy of encouraging the development of the amateur radio service, both terrestrial and in space, in preparing and presenting its position to the forthcoming conference. The ARRL and AMSAT urge the Commission, in communicating its suggestions and proposals to its counterparts in other countries, to emphasize again and again that amateur radio is far more than hobbyists talking among themselves, but is a direct road to self sustaining communication systems without which no nation can progress.

Specific Suggestions

The Radio Regulations of the ITU allocate the following frequency bands exclusively to the Ama-

[1]Member societies are located in Algeria, Angola, Argentina, Australia, Austria, Bahamas, Barbados, Belgium, Bermuda, Bolivia, Brazil, Bulgaria, Burma, Canada, Ceylon, Chile, Colombia, Congo, Costa Rica, Cyprus, Czechoslovakia, Denmark, Dominican Republic, East Africa, Ecuador, El Salvador, Faroe Islands, Finland, France, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Korea, Lebanon, Liberia, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Monaco, Morocco, Mozambique, Netherlands, Netherlands Antilles, New Zealand, Nicaragua, Nigeria, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Rhodesia, South Africa, Spain, Surinam, Sweden, Switzerland, Syria, Trinidad and Tobago, United Kingdom, United States, USSR, Uruguay, Venezuela, Western Samoa, Yugoslavia and Zambia.

[2]Much of the report is devoted to the contributions of radio amateurs to the development and maintenance of communications systems within new and developing nations. A typical conclusion is the following on page 71:

> Of particular interest to the governments of the new and developing nations (and to a degree that is not fully appreciated in the United States), today's radio amateur must be professional in his communications and electronics ability.† Because of the increasingly difficult environment in which they must work, radio amateurs have always been compelled, as a group, to improve their skills. The record of technological achievements consistently shows that, in meeting the challenge, the amateur has exhibited professional expertise and resourcefulness and has in fact made many valuable contributions to technology in general and to his nation's overall communications capability in particular.
>
> †This point was further amplified by one prominent U. S. amateur who has had considerable experience with international telecommunications conferences. He stated that, although this professional level of communications ability exists among radio amateurs in most of the countries of the world, developing nations may not be fully aware that amateur radio is more than a mere hobby.

teur Radio Service on a world-wide basis: 7.0 to 7.1 MHz; 14.0 to 14.35 MHz; 21.0 to 21.45 MHz; 28.0 to 29.7 MHz; and 144.0 to 146.0 MHz. The Regulations provide for shared use by amateurs of other bands throughout the spectrum – 1.8 MHz to 22.0 GHz. In some instances, sharing is limited to only one or two of the three regions of the world, and in others, sharing is world-wide.

With respect to the exclusive world-wide amateur bands, ARRL and AMSAT urge that no limitations be imposed by the forthcoming WARC for space operations. Such a policy will provide each administration with the greatest possible flexibility to encourage or limit amateur use and development.

With respect to space operation by amateurs in shared bands, ARRL and AMSAT recognize that some reasonable means must be provided to provide compliance with the priorities applicable to each band should harmful interference occur.

The adoption of the following provision to apply to the shared bands is suggested as a footnote or recommendation for the Radio Regulations:

> Satellites in the amateur service may transmit in a shared band if a reliable means is provided to control emissions so as to prevent interference to stations of a primary service in the band.[3]

Such a provision is fully consistent with the intent of No. 470V, Article 7, and No. 695, Article 14, of the Radio Regulations (Edition of 1968), which specify that some means be provided for satellites to terminate transmissions in the event of interference, and also is consistent with the intent of the United States' proposal to modify No. 470V to combine it with the last paragraph of No. 695.

The suggested wording has been chosen to permit, through the use of telecommand, a shift in carrier frequency, a reduction in power, or a change in the type of emission, as well as the obvious alternative of ceasing emission altogether, so as to prevent interference to a higher priority service in the shared band. This suggestion is fully consistent with present terrestrial amateur operation in the shared bands in which the amateur has secondary status.

Radio Regulation No. 115 permits the use of any frequency if the use does not result in interference. OSCAR 4 and Australis-OSCAR 5 both operated under this regulation. The provision of a reliable telecommand system in amateur satellites is an effective method of insuring that any harmful interference can be terminated.

The feasibility of reliably commanding a satellite in the amateur service was demonstrated for the first time in the Australis-OSCAR 5 amateur satellite experiments in January and February of this year. That satellite contained a commandable beacon transmitter in the ten-meter amateur band. Each Friday morning the transmitter was commanded on and each Monday morning it was again turned off, so that the transmitter was operated on a regular weekend schedule. Future satellites now planned by AMSAT are expected to have lifetimes of a year or more, and produce power flux densities comparable to existing communications satellites. Redundant command systems are planned for these satellites to control the transmitter power, select transmitter frequencies, and switch the transmitter off when not in use. These measures will prove effective in minimizing the possibility of interference and in eliminating interference if any occurs. In the case of satellites operating in regionally allocated amateur bands such as 50-54, 146-148 or 220-225 MHz, they can be designed to be turned on upon positive command by amateurs in the region(s) in which operation is permitted. Since most amateur satellites have been designed for low orbits, their coverage is limited and thus it should be possible to confine operation to regions of the world in which transmission is permitted.

Uplink communications from an amateur station transmitting to a satellite in the amateur service should be permitted in any amateur band, regardless of whether it is shared, providing the terrestrial station's transmissions are in accordance with the regulations of the country in which it is located.

The Sixth Notice of Inquiry proposes to impose a flux limit on amateur satellites transmitting in shared bands. Such a limit would greatly restrict the ability of amateurs to experiment with simple receiving equipment and relatively low gain and small physical size antennas, both of which are essential for direct in-the-home reception of space broadcasts now under consideration in the United States and elsewhere. In addition, such a limit would greatly restrict the number of amateurs and non-amateur experimenters because of the complexity and cost of even minimal receiving equipment, and would tend to limit participation in countries (especially developing nations) where the amateur service has not progressed to the point of providing larger amateur ground stations. In particular, a power flux density limitation would make the use of satellites at the higher frequencies above 146 MHz impractical for the amateur operator. A fixed limit would require the amateur to use higher-gain receiving antennas at the higher frequencies, and the narrower beamwidths of such antennas would pose a severe pointing problem to the amateur unless his equipment was very sophisticated. Amateur satellites have generally been in low orbits where the amateur operator must steer his antenna to keep it constantly pointed toward the satellite. The ARRL and AMSAT contend that amateur satellites with increasingly higher powers are necessary, particularly at the higher frequencies, so as to permit reception by stations with inexpensive low-gain antennas and simple equipment. Through the use of higher power, participation in amateur satellite experiments by large numbers of small users, such as those that might be found in developing nations, would be encouraged.

The introduction of a flux density limit, while perhaps appropriate for geostationary communications satellites sharing bands on a co-primary basis with fixed terrestrial microwave relay stations, will not provide the same protection if attempts are made to apply the same criteria to the amateur case. There is a great difference between satellites in low orbits sharing frequencies with stations of the radiolocation service and geostationary satellites sharing frequencies with fixed microwave facilities. Stations in the radiolocation service often employ highly directional scanning antennas which might be pointed toward a satellite only during a small fraction of the time. Furthermore, sophisticated signal processing techniques such as range gates and matched filter detectors are often employed by stations in the radiolocation service. These methods can provide a significant measure of protection from interference. Indeed, no reports of

[3] If adopted as a footnote to one or more shared bands, the provision would read as follows:
Satellites in the amateur service may transmit in this band if a reliable means is provided to control emissions so as to prevent interference to stations of a primary service in this band.

interference to the radiolocation service caused by the OSCAR 4 amateur satellite, which contained a 3-watt transmitter operated at 431.935 MHz, are known. OSCAR 4 was placed in a highly elliptical synchronous-transfer orbit. Other amateur satellites placed in lower orbits pose only a very limited interference potential since the coverage of such satellites is relatively small and any given area of the earth is exposed to the satellite's transmissions for only a few minutes each day.

For these reasons, ARRL and AMSAT most strongly urge that no power flux density limits be imposed upon amateur satellites.

Even though propagation characteristics of MF and HF frequencies between terrestrial points are well known, only a handful of experiments have been conducted using transmitters in space. The possibility exists that valuable propagation experiments can be conducted in all of the MF and HF bands. The ten-meter beacon experiment flown on Australis-OSCAR 5 demonstrated that amateur satellites could potentially provide useful communications in the HF bands, particularly during minimums of sun-spot activity and during periods of darkness when the ionosphere does not support long distance communications. The amateur service has repeatedly made contributions to the understanding of ionospheric propagation phenomena[4] and satellites operating in the MF and HF bands will provide a valuable tool for further propagation research and contributions by the amateur community. In particular, studies of ionospheric ducting, antipodal propagation, long-delay echoes, and round-the-world propagation can best be accomplished by means of satellites. With hundreds of thousands of experienced amateur radio operators in every part of the world ready, available and already equipped to participate, it may well be that new theories or techniques may be developed by amateur satellite transmissions in the MF and HF amateur bands. Once again, it is respectfully submitted that only good can come from adoption of a most flexible policy.

AMSAT is currently preparing a CCIR report, "Technical Feasibility of Frequency Sharing in the Amateur Radio Service when Using Space Communication Techniques," for the February 1971 Space Conference preparatory meeting of the CCIR in Geneva. This document discusses sharing criteria for satellites operating in amateur bands, and is intended to help develop the U.S. position. In addition to this CCIR activity, we request the opportunity to participate in the work of the Industry/Government group concerned with the formulation of the formal U.S. proposals to be presented at the Space Conference.

Conclusion

The ARRL and AMSAT urge that the United States continue the policy of wholeheartedly supporting the continued growth and contributions of the amateur radio service, both domestically and worldwide, by adoption of the foregoing suggestions and by imposing a minimum of regulations and restrictions upon operation of amateur radio satellites.

In summary, the ARRL and AMSAT urge that amateur satellites be permitted to operate in any of the amateur bands. Both jointly ask that power flux density limits not be imposed upon satellites in the amateur service, and propose instead that amateur satellites be required to contain a reliable telecommand system capable of providing an effective means of taking action to prevent harmful interference.

Respectfully submitted,
THE AMERICAN RADIO RELAY LEAGUE, Inc.
By Robert M. Booth, Jr.
Its General Counsel

RADIO AMATEUR SATELLITE CORPORATION
By Dr. Perry L. Klein
President

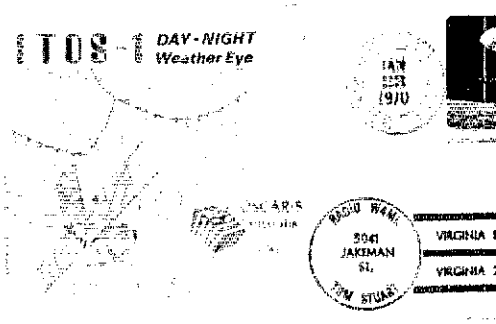
April 29, 1970

[4]In fact, John Reinartz, in the ARRL's monthly journal, *QST*, for April 1925, first proposed the ionized-layer reflection, skip-distance and critical-frequency features of what is now the classical ionosphere-layer propagation model.

Strays

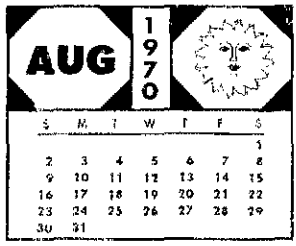
TEN METER BAND-OPENING CONTEST

The West Valley ARC announces their third annual Ten Meter Band-Opening Contest, open to all. QSOs must be made on 10 meters, no cross-band. The contest goes from 1300 GMT Aug. 22 to 0100 GMT Aug. 24, 1970. Stations can be worked just once, regardless of mode. Cross-mode contacts are valid. Exchange reports to claim credit; Score 1 point for each station worked plus 1 point for each state worked plus 1 point for each country worked (ARRL Countries List) plus 1 points for each WVARC member worked. (Some contacts are worth more points as they fall into a number of categories.) Logs should include date/time in GMT, station worked, his QTH, reports and a legible summary showing scoring, your call, QTH, comments and suggestions. Include an s.a.s.e. for results. Logs are available from the WVARC for an s.a.s.e. Certificates to high scorers. Send logs on or before Sept. 24 to the WVARC c/o John Musselman WB6UHF, 22213 Burbank Blvd., Woodland Hills, Cal. 91364.



Here is a commemorative cover produced for the launch of Itos-1 (Tiros-M) — the primary payload on the vehicle which carried Australis-Oscar 5 into orbit on January 23. Appropriately, the special cover also features Oscar. Thanks to W4ML for providing a copy of the commemorative cover.

Hamfest Calendar



Alabama – The North Alabama Hamfest Assn. will hold their Hamfest in Huntsville on August 15 and 16 at The Mall. For more information contact James A. Brashear, WB4EKJ, P.O. Box 432, Huntsville, AL 35804.

California – Palisades ARC, Inc. of Culver City will host a Mini-fest and picnic on Sunday, August 23 from 10:00 A.M. to 6:00 P.M. at Lindberg Park in Culver City. There will be mobile judging, a transmitter hunt, swap table, and lots more. Plenty of great food at good prices. For additional information call John Pearson, W6IOS, at 213-837-8690.

California – See Nevada.

Delaware – The Delaware Hamfest will be held at Banning Park August 16. Tickets are available by writing W3DKX, 345 E. Roosevelt Ave., New Castle, DE.

Georgia – The Charles E. Newton ARC of Griffin will hold their Hamfest on Sunday, September 13 at the City Park on South 9th St. in Griffin. This is a family-style picnic with everyone invited. Pack a lunch and bring the whole family. There will be fun, food, and fellowship for all.

Illinois – The Fox River Radio League is having its annual Hamfest August 23 at Phillips Park in Aurora. Free coffee and donuts will be served from 9:00 to 10:00 A.M. Advance tickets $1.00, $1.50 at the gate. Talk-in frequencies 145.35, 146.94, and 3.94 MHz. For further information contact Tom Rogers, WA9WBV, Box 323, Oswego, IL 60543.

Illinois – The Belvidere (Ill.), Rockford (Ill.), and Beloit (Wis.) hams will sponsor their 5th annual Hamfest/Swapfest at the Boone County Fair Grounds in Belvidere on August 23. Advance tickets $1.00, $1.50 at the gate. Free coffee and donuts 9:30 to 10:30 A.M. Talk-in on 3.910, 28.7, and 146.94 MHz. Camping permitted Saturday night. For advance tickets and information write Box 252, Belvidere, IL 61008.

Illinois – Danville Hamfest, sponsored by the Vermilion County ARA, Inc., will be held August 30 at Douglas Park. Talk-in on 3.925, 7.260, 50.4, 146.94, and 147.3 MHz. Camping facilities available at Kickapoo State Park. Coffee and donuts until 10:00 A.M. For further information and advance registration ($1.00) write Tom Stover, WA9ULL, 1611 N. Vermilion, Danville, IL 61832, or call 217-446-3293.

Iowa – The Iowa 75-meter Phone Net Picnic will be held August 16 in Marshalltown at the Riverview Park. Festivities will begin around noon with the frequency of 3.970 MHz being monitored.

Kansas – The Boothill Amateur Radio Club Hamfest will be held Sunday August 16, 1970 in Hoover Pavilion, Wright Park, Dodge City, Kansas. Registration starts at 10:00 A.M., there will be a covered dish dinner. There will be an ARRL Section meeting 11:30 A.M. conducted by Joseph E. Hoover KØLPE, SEC, Kansas. Entertainment for the XYLs and harmonics in afternoon.

Louisiana – The Central Louisiana ARC Hamfest will be held August 23.

Manitoba – The Manitoba Centennial Hamfest will be held in Winnipeg on September 5 and 6.

Michigan – The Annual Upper Peninsula Ham Picnic is to be held on August 2 at the Iron Mountain City Park. Advanced registration is $1.50, at the gate $2.00. Mobiles monitor 3.920 MHz for talk-in. Refreshments will be served. Send Registrations to Mich-A-Con ARC, Box 251, Iron Mountain, MI 49801.

Minnesota – The St. Cloud Hamfest is set for August 9.

Missouri – The Southwest Missouri ARC will hold its annual Hamfest and Picnic at Phelps Grove Park, Springfield, Sunday, August 30.

Nebraska – The Tri-City Radio Amateur Club of Scottsbluff will hold its club Picnic and Hamfest on Sunday, August 16. Bring your own picnic dinner. There will be a transmitter hunt and fun for all. Contact Franklin Page, WNØYIS, Box 111A, R. R. No. 1, Scottsbluff, NE 69361.

Nevada – The annual Sierra Hamfest will be held by N.A.R.A. on August 22 at Mormon Station Historic State Monument at Genoa, Nevada just off Highway 395 South of Carson City. Cold beer and soda pop, swap table, guest speaker, display of equipment, QSL design contest, historical sightseeing, youngest and oldest ham contest, ladies and children activities, transmitter hunt, antenna demonstration, and more. Bring the kids along, children under 6 free. Those 7 through 16 $1.50; those 17 and over $6.50 each which includes registration, bar-B-Q, refreshments, etc. Pre-registration deadline is August 12. After this date adult registration is $7.50. Make check payable to Nevada Amateur Radio Assn., Inc. and mail to 1047 Mark Way, Carson City, NV 89701.

New Jersey – Saddle Brook Park will be the site of the East Coast VHF Society's (WA2WEB) 12th annual Hamfest and old style picnic, Sunday, August 2, beginning at 10:00 A.M. Displays, contests and games will be featured for hams and non-hams alike of all ages. The park is located on Saddle River Road, Saddle Brook. Admission and parking are free. Food and soft drinks will be available. Listen for talk-in stations or follow the signs from major arteries.

New Jersey – The Knight Raiders VHF Club will be holding their fourth Annual Hamfest and Picnic on Sunday, August 30 at Westbrook Park, West Milford, N.J.

New Jersey– The South Jersey Radio Assn. will hold its 22nd Annual Hamfest on Sunday, September 13 at Molia Farms, off Route 47 at Malaga Lake, Malaga, N.J. Hamfest hours from 10:00 until 5:00. Talk-in and hidden station hunt on 2, 6, and 10 meters. Registration is free. Swap shop, swimming, children's games, snack bar and lots of fun for all. Additional details from Jack Koch, K2MZP, 1529 Dogwood Dr., Cherry Hill, NJ 08034. Telephone 609-429-2642.

North Carolina – The "Hamfest" will be September 6 at Brackett Cedar Park on Highway No. 10 about fourteen miles North of Shelby. Registration will begin about 9:00A.M. This Hamfest has been billed by many as the "Hamfest of the Southeast," and we expect well over 1000 persons to attend. There will be camping facilities, bingo for women and children, sunday school, playground for the children. The admission is $4.00 for adults and $2.00 for children which is all inclusive of meal and registration. The food will consist of southern fried chicken, barbecue, and all the trimmings all you can eat. For further details regarding the Hamfest and motel reservations, write C. F. Harry, III, Secretary, Shelby Radio Club, Grover, North Carolina 28073.

Ohio – The Warren ARA invites you to its 13th Annual Hamfest Sunday, August 16 at the new Trumbull Country Fairgrounds, located North and East of Warren, Ohio, 2 miles North of State Route 305 on Bazetta Rd. just West of the Mosquito Creek Reservoir. All activities under an enclosed pavilion, rain or shine. Snack bar, free parking, dealer displays and the traditional flea market.

Pennsylvania – The Knuckleheads will hold their 13th Annual Picnic on August 8.

(Continued on page 99)

COMING A.R.R.L. CONVENTIONS

September 19-20 – Georgia State, Augusta.
September 25-27 – NATIONAL, Boston, Mass.
October 17-18 – Hudson Division, Tarrytown, N.Y.
Oct.31/Nov.1 – Roanoke Division, Raleigh, N.C.

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* KØCER

North to KL7ABR

ALASKA HAS been extremely difficult to work on 50 MHz since solar cycle 19, which was well past its peak before Alaska became our 49th state. Knowing many six-meter DXers needed the state, WØEKB and WØJCO began plans for a June 1970 DXpedition more than one year ago. In March of this year, KØCER joined them and a planning meeting was held in Sioux Falls. In late April the trip appeared to be on shaky ground, due to various personal affairs. K5MDV was asked to join, assuring at least three would make the nearly 6000-mile roundtrip. Ron was less than sure he really wanted to go, but the "gentle prodding" of K5AGI and WA5TTH assured his presence. They need only KL7 to complete WAS, but while they were among our greatest supporters, we never heard a station that far east from Ketchikan. More on propagation later.

Plans for the trip were finalized, mostly during late May *E* openings from the upper midwest to Louisiana. We selected a Drake TR-6, a Swan Mark 6 amplifier and a CushCraft 5-element Yagi.

The trip began early the morning of June 7 when K5MDV flew from New Orleans to Omaha. He was met by WØEKB and WØJCO, with a camper pickup truck which was to carry us over roads which were – well, call them rough! John, WØEKB, rented the 1970 Chevrolet in Omaha. The man grimaced when he learned it was going to Alaska. John had to put a 500-dollar cash no-check deposit on the line! The trio drove to Sioux Falls, and by 2300 GMT we were northward bound, with six meters open and KL7ABR/mobile working W4s.

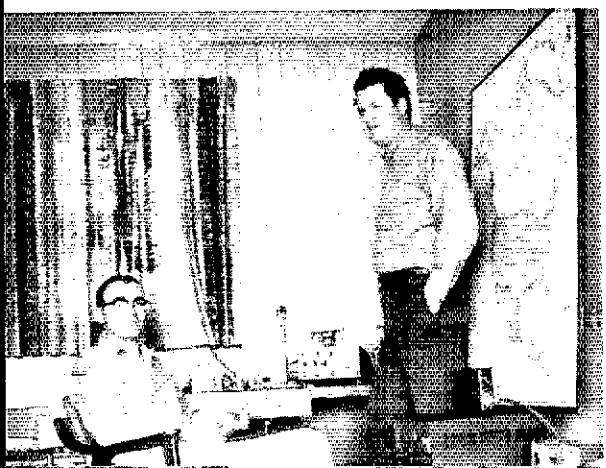
Late that night, around 0530 GMT, while driving near Jamestown, North Dakota we saw a beautiful white aurora. Apparently it came too late at night; the only aurora signal heard was VE5US calling many unanswered CQs. We couldn't raise Doug on the mobile. The next hours were spent crossing Saskatchewan, with the camper yielding 5 miles to the gallon. It wasn't until 0140 GMT, June 9 that we worked someone since leaving Sioux Falls – KØDOP in Missouri – as we sat in a service station at Calgary, Alberta. We drove into the Canadian Rockies north of Calgary and cooked our first meal in the camper; hamburgers and generous helpings of beans. After K5MDV cleaned up, WØEKB drove another two hours to Banff, where we made our first sleep stop, 36 hours after leaving Sioux Falls.

We slept four hours and then again hit the road. It was Tuesday morning and we had a date 24 hours later with the ferry *Taku* in Prince Rupert, 1000 miles away. Until then the roads through Canada had been reasonably good, although WØEKB and WØJCO hadn't learned to sleep in the moving camper. K5MDV could sleep anywhere, anytime, and in any position.

North of Jasper, Alberta, the blacktop highway turned to washboard gravel and by the time we arrived in McBride, we had had our first taste of what lay ahead for four dudes accustomed to interstate highways. How we learned to appreciate them! Between McBride and Prince George, B.C., the roads were better, with just an occasional bridge out or broken blacktop. It is 449 miles from Prince George to Prince Rupert, and about half of that is fair-to-good road, one-fourth rough, and the other fourth I'm glad I didn't see in daylight!

We had a late dinner at a restaurant in Houston, B.C. The waitress asked where we were going. When we said Prince Rupert, she gave us a "good luck" look and said some of her friends had left early that morning to catch the same ferry we were to board in 11 hours! It is 237 miles from Houston to Prince Rupert, so 11 hours seemed no problem. I asked a Canadian Mountie having dinner in the restaurant about the road. "A little rough with some construction, but passable." "At night?" I asked. "Yes, if you take it easy." We decided that no one who lives in northern British Columbia ever travels. We got different road reports from everyone we asked. The first 141 miles to Terrace wasn't too bad, taking only 5 hours to drive. WØEKB was at the wheel, I was riding shotgun, K5MDV was asleep again, and WØJCO was petrified. We pulled out of Terrace after getting what proved to be our only accurate road report of the trip: "winding road with some under construction, and in bad shape for about 40 miles." That 40 miles doesn't

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



Pictured is the shack of KL7ABR, Ketchikan, Alaska during June. The operators shown are Father Leo, WØJCO, and John, WØEKB.

compare with any other on the trip. British Columbia crushed rock is about 8 inches in diameter. The new road is literally being blasted through the mountains, and in places there is one-lane passage with no guardrails and 2000-foot drop-offs. After arriving in Ketchikan we learned that two women, two days behinds us, had pulled over for an approaching car and had gone over the side to their deaths.

It took 4 1/2 hours to drive 96 miles; 45 m.p.h. was absolute top speed, and 5 to 10 was safest. At one point, K5MDV woke up and WØJCO came out of his trance. Later they said they were sure we had missed the road somewhere and were lost in the mountains. WØEKB rolled the rig into Prince Rupert not long before the *Taku* was to sail for Alaska. John's eyes looked something like those of Alfred E. Newman in the *Mad* comic. He walked like an Astronaut just returned from the moon.

We had breakfast and cleaned up some, then boarded the *Taku* for the 100-mile, 6-hour journey to Ketchikan. It had taken 60 hours to reach Prince Rupert, about 50 behind the wheel and 10 hours for sleeping, eating and photographing the fantastic British Columbia scenery. The beauty just can not be described. At this writing I have yet to develop my slides, I can only hope they do justice to the mountains, lakes and forests.

As the *Taku* docked in Ketchikan, WØJCO spotted the motel where we had reservations, just off the end of the ferry wharf. Our room was waiting and ideal for our purpose, upstairs and on the end. The equipment was quickly assembled and the beacon, "V V de KL7ABR," went on the air at 0300 GMT, June 11. Twenty-one minutes later VE6OH was worked on weak E_S for the first contact, followed one hour later by W7VDZ, Wyoming. W7VDZ had worked KL7FNL at Tanana the day before! Other early contacts were W7FN and W7CNK, who we later determined were workable anytime on scatter, and W7FIV, VE7-ANP and VE7BLF.

Early the next morning, Ketchikan time, or 1422 GMT, a W5 was heard, apparently trying to break our beacon. The weak cw signal was heard for 5 minutes but we never got positive identification. For the next five hours we worked scatter into the Seattle area except for a brief, but strong, *E* contact at 1735 with K7WUP in Provo, Utah. At 2300 the capacitor in the CushCraft blew under 500 watts of rf, our only equipment failure. It took one hour to lower the antenna and prune a coax gimmick capacitor. As Murphy's law would dictate, rain fell the entire hour – the only rain of the trip!

Scatter was exceptional June 12. Between 1430 and 1530 GMT, the radio meteor rate was estimated at 60 per hour! Prior to our leaving, I had searched for 2-meter meteor scatter schedules, but could get no takers under 1700 miles so 2-meter gear was left behind. There was no *E* heard on the 12th, but WØJCO was flattened with a *local* answer to a ssb CQ. KL7GFB/KL7 in Ketchikan was just as surprised, I'm sure. His name is Bill McVey and he will retire to Sitka in August of this year. He has a SB-110 and told us he is building a kilowatt amplifier. He has had previous vhf experience in California and could prove to be a real boost to Alaskan vhf activity. KL7GLL, also in Sitka, and KL7FNL and KL7FNM, at Tanana, west of Fairbanks, are the only known vhf operators presently active in the state. KL7GFB also indicated some interest in 144 MHz, and was impressed at our ease in working the Seattle to Portland area on scatter. Perhaps some written encouragement to Bill will keep his vhf interest alive.

On the 13th, we worked more than a dozen scatter stations, but still there was no *E*. The strongest and most consistent scatter signals came from W7FN, W7CNK, and K7OFT. They were workable anytime, peaking during the usual morning hours. We especially appreciated the attention of W7FN and W7CNK during our 8 days in Ketchikan. They helped pass the hours waiting for E_S.

The 14th was almost a repeat of the previous days, until the evening, when we got our first solid *E* opening. It was 0235 GMT, June 15, when WØEKB heard WA4B?? in Tennessee on ssb. At 0242, WA7NGK in Arizona was heard briefly, on ssb, but at 0251, WA7FLB was worked, giving us a 5 x 8 report; a 4-hour opening was underway. Signal reports given us ran 2 to 5 S-units higher than what we returned. A S5 from KL7ABR was an excellent report and I highly suspect our call was worth 20 dB! We just didn't hear many strong *E* signals. WØJCO gave our only S9 report, and that on his first *E* contact. Certainly it sounded that loud, after all the scatter Leo had been copying! During the opening we took 15-minute turns at operating and worked 94 stations in Washington, Oregon, Idaho, Nevada, Arizona, Utah and California. We might have worked more, except that the opening came late in the contest, and we believe many fellows had quit for the weekend. There was some over-anxious operating by several who called out of turn and too long, QRMing others and slowing us down. The interference was bad on our end; we can only guess how it sounded in Southern California. Also the opening was not solid, shifting from nothing to single to double hop. We have received QSLs from stations who thought they worked us, but who were either not in the log or did not complete a satisfactory exchange in the opinion of the operator and logger at KL7ABR. We hope they will understand. There were *no* "one-way" contacts made with KL7ABR.

On the 16th there was brief *E* to Oregon around noon time. That evening (0440 GMT, June 17) W6YKS was heard on weak *E* calling CQ, beginning a 2-hour opening during which we worked Idaho, Washington and most areas of California, though not many stations were on the air.

Our final opening came the evening of the 17th, beginning at 0302 GMT (June 18) with K5EFW, New Mexico, the only 5 worked. Also worked was W7JRG, Montana, and W7UBI, Idaho. Keith was hearing 5s also and tried to find us some business without success. KL7ABR was closed at 0500 GMT after working 115 separate stations in 11 states, including all the W7s, and two canadian provinces. Certainly we wanted to work more, but

being honest with ourselves, we would not have been too surprised if we had been shut out completely, except for scatter.

I believe a few loose conclusions can be drawn from the eight days of operation. Scatter within reasonable range is easily workable between Alaska and the Pacific Northwest. One Northern California station was heard on scatter, but not worked. E_S is surely workable, but the signals are not robust as in the "lower 48." Strong openings within the contigious 48 may or may not produce E_S from Alaska, and most likely then only in the evenings hours after 0200 GMT. The E clouds apparently dissipate rapidly, somewhere between western Wyoming and Washington. There are no likely generation areas over the northwestern states. W7FN and W7CNK kept us posted on their openings and we were able to track the E cloud movement. We had predicted the June 14 and 16 evening openings. Hearing VE6AHE looks like a good stateside tip-off to listen for KL7GLL and KL7GBF in Sitka. We hoped to experience an auroral opening but heard none, although there was auroral indication each night on the broadcast band. Probably this is normal for those latitudes.

Much more vhf activity is needed in Alaska and stateside interest warrants it. After just eight days there, one quickly appreciates the dedication of KL7GLL, KL7FNL and KL7FNM and those before them. It does take time and patience. We only wish there had been some activity from the Ketchikan area during the excellent May openings.

We boarded the ferry at midnight Wednesday, Ketchikan time, for the return trip to Prince Rupert. Arriving there at 0600 local, we drove more than 2500 miles straight through, arriving home Saturday evening. Our thanks to the Seattle gang for their party invitation. We entered Washington near Spokane and just couldn't make it. We know we would have enjoyed your hospitality.

Every contact was verified immediately by QSL mailed in Ketchikan. If any card went astray, another is available from KØCER.

W4GDS, K8BBN and K8GMR enjoyed exceptional June contest success at ZF1RS in the more E-inclined Caribbean latitudes, working 26 states. I understand that K5HVC, operating XE2XN, did well again this year. I am a firm believer in these 6-meter DXpeditions so long as they don't fall into the "contribution" routine, and similar traps of some hf DXpeditions. Kept clean, Caribbean and Latin-American operations will prove most interesting.

OVS and Operating News

50 MHz has been alive with E_S; "best in years" comments come from many. Depending upon where you live, six was open almost every day from early May through June. Some of the better DX worked includes W7VDZ's 0337 GMT June 10 contact with KL7FNL, west of Fairbanks, over a 2000-mile path. June 7 KL7GLL, Sitka, was widely worked in Washington between 0200 and 0500 GMT. KL7GLL also worked K7IEY at 0415 GMT, May 15. Note these contacts fall into the same late evening time slot as E_S worked by KL7ABR.

W1HOY/KP4, Puerto Rico, has been worked by many this summer over paths in excess of 2000 miles and there have been frequent openings between the East and West coasts. WA4MHS, Florida, worked VO1DT, Newfoundland, June 3. This is not exceptional distance, but is the first reported VO1 activity this year.

WA5IYX/5, San Antonio, sent a detailed report highlighted by June 3 double-hop E_S into New England for over one hour, and that fantastic June 14 contest week-end opening. For more than two hours Pat heard VE5US and VE6AHE on multihop. Short skip was also logged into Arkansas, Oklahoma and west Texas for 90 minutes. On June 16, Pat heard E paths as short as Houston to New Orleans in the early evening, but we have not received any reports of 2-meter E_S.

W2AXU, N.J., caught a multi-hop June 9 opening to the Pacific Northwest, working W7FN, K7IEY, VE7ANP, W7DY in Idaho and others.

Additional E_S reports were received this month from the following: W1MX, WA1DFL, WA1IFE, WA3FMI, WA3JWL, WA3NVO, WB4BND, K4GL, K4LQO, K7HIX/4, KØECG/4, WA5HNK, WA5TLY, W6ABN, W6DPD, WA6HXM, WB6NMT, K7ICW, K7ZOK, WA7GFP, WA8FQK, WA8TYF, WA9ABI, WA9SDT, WØPFP, WAØDZI and WBØAWG. Thanks to you all.

The f-layer remained active into the first week of June. The most unusual report comes from K1BXC, Connecticut, who heard ZK1AA's 50.1 beacon for 25 minutes beginning at 2310 GMT, June 1. ZK1AA's signal apparently reached New England through a F_2-to-E_S link. K1BXC was hearing 5s on E_S while copying ZK1AA. K5AGI and K5MDV heard the ZK1AA beacon at 2323 GMT, June 2. WB6NMT says WB6KAP worked 5W1AR, Western Samoa, on May 25. K6JYO reports KH6IJ working ZK1AA and 5W1AR during May.

From the unusual and questionable file this month we have the following. W3GOA, Philadelphia, says he has received confirmation of a January 21 a-m contact with JA3OCD in Japan.

WB4PKR, Pensacola, Florida, reports that on May 31 at 2128 GMT, he heard an am station calling "CQ the United States of America" on 50.29. He says the station gave its location as Hiroshima, Japan but WB4PKR was unable to copy any call letters. He was hearing New England stations on E_S at the time, and his beam heading was almost due North.

A similar report comes from K4HAV in Georgia. Jim says on June 7 at 0307 GMT, he heard a station signing G2MOL, England, calling "CQ DX USA" on 50.25 a-m. Jim was working 5s on E_S. The station was heard also by several W5s.

We would like to think this is valid DX, but we note that W3GOA was the only station to report working Japan. I tend to believe he has been the victim of a well-planned hoax. WB4PKR's report is likewise the only received as is K4HAV's. England does not have use of the 50-MHz band. It would appear someone in the Eastern USA, most likely New England, is doing some bootlegging. The following report supports this belief.

A station signing KS4ABX, allegedly on Swan Island in the far southwestern Caribbean, has caused a stir recently. We are trying to determine if the station is legitimate. KS4 is the proper prefix for American-controlled Swan Island, but the usual two-letter suffix begins with "C." Dottie, K5EPR, worked KS4ABX May 11th and a few days later received a QSL from one Mr. Joe Kuklewicz, "Radio America," Swan Island. Dottie says her beam heading was North Northeast; Swan Island is almost due South of Louisiana. To add to the

puzzle, part of KS4ABX's QSL was printed in Japanese! Anyone know anything for certain on this one? No rumors, please.

For those who missed Grand Cayman's ZF1RS in June, K2OLS advises he will again operate ZF1AA the last week in July through the first week in August. ZF1RS QSLs go to W4GDS with a stamped, self-addressed envelope.

W4ZND has been quite active from Florida this summer. He is exW7UFB, once a popular Wyoming catch on 50 MHz.

KS6CG, Pago Pago, American Samoa, wrote ARRL in June requesting information on rhombic antennas for six and two meters.

VE2AIO is still searching for the elusive 50-to-70 MHz auroral link between North America and Great Britian. Since Geoff set his project in motion there have been no favorable auroras.

144 MHz hasn't been doing well if the lack of reports is any indicator. W5UKQ, Louisiana, writes he has reached 31 states by working K9UIF, Indiana, on June 6. John also worked KØMQS June 2 on ssb meteor scatter. He says the new Swan Yagi is being widely used in Louisiana. John has a pair stacked, K5VQR has an array of four, W5VUY is building a similar array, and so is K5AZU. Louisiana stations monitor 144.105 and W5UKQ wonders if there is a Florida monitoring frequency.

K6JYO says KH6NS is moving to a new location on eastern Oahu to gain adequate space for a large moonbounce antenna system. And Gary at K6QEH is finishing a 3CX1000A7 final for 2 meters.

Orville, W2CUX, has arranged a series of schedules with G8ANQ in England. They are exploring the possibility of trans-aurora propagation.

Don Watters, VE2HW, has built new antennas for 144 through 432, has 500 watts for each band and will accept schedules. Don was assisted in his antenna project by VE2s AQI, DFO and BSB.

These are the only 2-meter reports received this month. Surely there was 2-meter E_S worked during the intense June openings on 50 MHz. Any reports?

220 and Up activity is somewhat better. K4GL writes that K4EJQ built a 220 transmitter just to give him a new state. That's cooperation, Bunky! Jack says WØEYE has designed an easily-built, smooth-working 4CX250B 220 final. Perhaps the details are available from Don. On 432, K4GL has an 88-element array of Tilton Yagis and 550 watts. Jack was recently bothered with electrical noise from the blower on his 432 final. He cured it by drilling a hole in each brush cap and placing the lead from a .01 mica capacitor between the brush cap and the brush spring retainer. The other capacitor lead is grounded to the motor shell with a shakeproof solder lug.

W5GVE, Texas, worked two new states on 432 in April including W5UKQ. Bill says W5UKQ's big rig was down so the Louisiana station "keyed" the flip switch on a Gonset Communicator, which was working into a varactor tripler giving 1 watt at 432! The path was 365 miles. W5GVE has been running 35 watts and a pair of Tilton Yagis, but is building a 500 watt final.

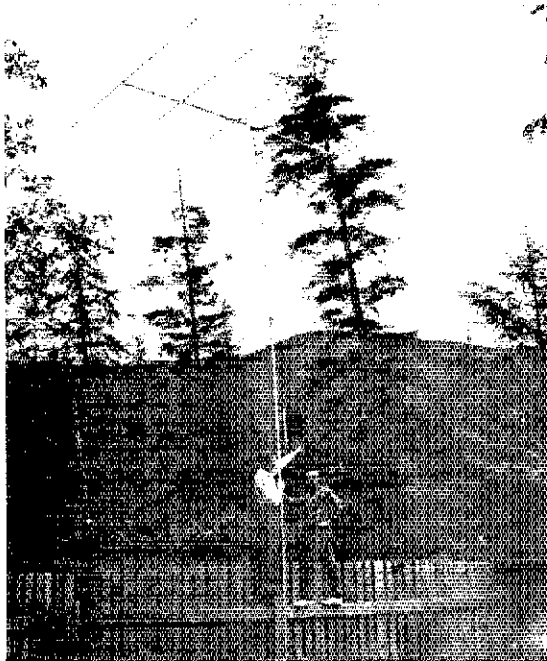
W3YVV sends a report of unusual tropo conditions worked on 449 MHz fm May 12th. Bruce found conditions above normal so he climbed his 72-foot tower with his .7-watt handy-talky in hand. When he cleared the 40-foot tree level, he began hearing signals and at 55 feet WA3BIB was full quieting. So, at 55 feet in the air, W3YVV broke WA3BIB's contact with WA3CJD, over a 41-mile path. While on the tower, W3YVV noticed a thousand foot Baltimore TV tower didn't appear to have any center lights, and the airport beacon was lighting some low clouds moving east. As he watched, the tower lights would come and go at the same time as the 449-MHz signal!

On May 1, W1GAN and K2JNG made what is probably the first Massachusetts-to-New Jersey contact on 1296, covering a 220-mile path – and since then they are making contact on every schedule. W1GAN has 50 watts output and a 32-element collinear, K2JNG has 30 watts and a 5-foot dish. Both use transistor preamps. K2DZM at Rahway, New Jersey is running ssb on 1296. Incidentally, the W1GAN to K2JNG distance is, I believe, the best ever worked by two home, non-portable 1296 stations. How about a picture or two, John?

New Records on 3300 and 5650 MHz

Two new microwave DX records for two-way communication were set June 18, by K6HIJ/6, Mt. Hamilton, and W6IFE/6 and W6OYJ/6, on Mt. Breckinridge, California, a distance of 214 miles. Crews of the expeditions were all members of the San Bernardino Microwave Society. The new record for 3300 is a fitting tribute to the memory of Don Thompson, W6IFE, whose call SBMS now holds. Don was coholder of several early microwave records, and a long-time member of the Society.

Communication was first established at 1410 GMT, on 3335 and 3365 MHz. Signals peaked some 40 dB above the receiver threshold, with deep fades at intervals of about one minute. After a half hour the contact was terminated, to set up on 5860 and 5890 MHz, where contact was made at 1519 GMT, and continued for about 20 minutes. Signals were about the same on the higher band, except that fades were somewhat more frequent. An interesting sidelight of all this was



KL7ABR used a single 5-element Yagi on 50 MHz. Shown at the antenna site are K5MDV and KØCER.

that 75-meter gear, taken along for liaison purposes, was not used until after the microwave work was concluded!

Equipment for the microwave bands was the "standard SBMS setup" using reflex klystrons frequency-locked to crystal oscillators, on frequencies 30 MHz apart. The klystron serves the dual purpose of transmitting oscillator and receiving local oscillator, with cross-polarized probes in a cylindrical waveguide feed illuminating a parabolic reflector. This "polaplexer" technique is described in *QST* for December, 1957, June, 1958, August, 1960, and June, 1963. The ROCLOC frequency control is in *Ham Radio* for September, 1969. With this system the two stations are separated in frequency by whatever frequency is used for the first i-f of the receiver. In this instance, 30-MHz i-f strips with fm detection are employed.

The Mt. Breckinridge party included W6OYJ, W6NVV, WA6QYR and WA6ZKY. W6DSL worked with K6HIJ at Mt. Hamilton.

220- and 420-MHz STANDING

	220 MHz						
W1HDQ	13	5	450	K2RIW	9	3	
K1JIX	12	4	600	K2OVS	8	4	260
K1BFA	10	3	225	W2SEU	6	4	220
				K3IUV	16	5	720
K2CBA	19	7	2650	W3RUE	14	7	585
W2DWJ	15	5	740	W3UJC	9	4	400
K2DNR	13	5	600				
W2SEU	12	5	325	W4FJ	20	7	995
K2RTH	12	4	600	K4QIF	19	7	1065
W2CRS	12	4	600	K4EJQ	19	7	800
				K4SUM	15	5	462
W3UJC	14	5	460	W4HIZ	13	5	560
W3RUE	10	5	480	W4VHH	12	4	750
K3IUV	10	4	310	K4GL	10	3	585
K4GL	4	2	485	K4NTD	9	2	835
K4IXC	3	2	1090				
				W5RCI	19	6	880
W5RCI	10	5	910	W5ORH	12	4	700
W5AJG	3	2	1050	W5AJG	7	3	1010
W5LO	2	2	660	W5UKQ	6	2	590
				W5GVF	3	1	365
W6WSQ	5	4	1142				
WB6NMT	3	3	2650	W6DOJ	4	2	360
K7ICW	4	2	250	K7ICW	4	2	225
W7JRG	2	2	959	W7JRG	2	2	420
W8PT	11	6	660	K8REG	20	7	700
				K8DEO	20	7	675
WØEYE	9	4	910	W8YIO	19	7	650
				W8HVX	16	8	660
VE3AIB	7	4	450	W8CVA	13	7	625
				W8MNT	13	7	600
	420 MHz			W8RQI	10	6	425
W1AJR	16	8	680	W8CVQ	10	6	400
K1HTV	15	5	610	WA8VHG	8	6	625
K3EAV/1	14	6	700	W8FWF	7	4	450
K1BFA	13	5	710				
WA1JTK	11	4	715	W9WCD	19	7	825
K1JIX	11	4	460	WA9HUV	17	7	780
W1QVF	10	5	400	W9AAG	14	5	800
W1HDQ	10	3	250	WA9NKT	12	6	560
				W9IIY	12	6	550
K2ACQ	23	8	925	K9AAJ	12	5	425
K2CBA	20	8	2670	K9CNN	12	5	
WA2EMB	18	6	720				
K2UYH	17	6	840	WØDRL	18	6	1185
W2BLV	17	6	732	WØLER	9	3	709
W2CLL	17	6	693	WØLCN	8	3	700
W2DWJ	16	4	570	WØPYF	7	2	703
W2CNS	14	6	525				
WA2FGK	13	5	425	VE2HW	4	3	750
K2CYO	10	6	675	VE3DKW	12	7	940
K2ARO	10	5	580	VE3AIB	9	5	600
WA2EUS	9	4	260	VE3EZC	7	5	510

DX on 2300 MHz

It's no justification for errors in print, but sometimes a misstatement in *QST* generates not only corrections but interesting and useful information as well. So it was, when the undersigned credited W4HHK and WA4HGN with "probably the longest distance ever covered over an obstructed path by home stations on 2300 MHz." We quickly heard from K2GRI and W2BVU/1 about that.

They reminded us that work between K2GRI and W1AJR, done one-way many times, was made two-way in October, 1969, and was so reported in this space in December *QST*. This is a 175-mile hop, over obstructions up to 3500 feet high. W2BVU says that he (using K1JIX) and K2GRI have made both pulse and crystal-controlled tests on 2300 MHz many times, over their 130-mile path. Their elevations are 700 feet for K2GRI and 500 for K1JIX, and neither has a particularly good horizon in the other's direction. Points in Southern Vermont as high as 3000 feet intervene, in addition to earth curvature.

The latter path was first bridged using 1 to 2 watts average power, on pulse, using 4-foot dishes, with either 144 or 432 in one direction and 2300 the other. K2GRI now has a 6-foot dish, and finds that he can get 2300-MHz signals over either path a high percentage of the time. W2BVU, who was coauthor of the *QST* series on 2300-MHz pulse equipment (February through May, 1963, reproduced the *VHF Manual*, Chapter 10) concludes from this experience that:

1) Signals on 2300 are surprisingly reliable, and compare favorably with those on 432, now used regularly for liaison with K2GRI. Only in wet weather is 2300 inferior.

2) Amateurs are missing a good bet in not working more with simple pulse gear for 2300 and higher frequencies. Watt for watt, pulse can be just as effective as narrow-band crystal control, and considerably easier to get going. There is even low-cost surplus gear, to help you get started.

Using APG-5 Cavity Assemblies

The complete AN/APG-5 (World War II airborne radar) is available on the surplus market, and its oscillator and TR cavities, which are the principal items of interest, can be bought separately. These come in one assembly consisting of a 2C43 pulsed oscillator, a 2C40 local oscillator, and a 1B27 TR cavity. Minus tubes, this assembly goes for under $5 (even less if bought in quantity) and tubes for the oscillators are $2 each, from Arrow Sales, 2534 South Michigan Ave., Chicago, IL. The 1B27 TR tube is quite expensive, on any list we've seen, but the oscillators can be used without it.

The 2C43 oscillator will tune down to about 2410 MHz without any changes. Used with the modulator and pulse transformer, as described in *QST* and the *VHF Manual* information, it will give up to 2 kw peak-power output, depending on the condition of the 2C43.

The 2C40 oscillator will tune through the band if a plate-cap extender and a slightly longer grid cylinder are used. A plate extender was part of the original equipment, but may not be in currently-available surplus. A thin copper or brass sleeve can be made to fit over the plate cap and inside the plate line within the cavity, as a substitute. The grid cylinder should be 1 13/16 inches long, made in the manner shown in the published information.

New output probes can be made readily from BNC connectors (threaded type), as their threads mate with those on the cavities. – *WIHDQ*

2-METER STANDING

K1ABR	34	8	1478	K5WXZ	36	10	1450
W1AZK	34	8	1412	W5HFV	36	10	1285
K1HTV	33	8	1310	W5AIG	33	9	1360
K1WHT	31	8	1300	W5UKQ	31	8	1150
K1UGQ	30	8	1370	W5LO	29	7	1325
K1WHS	29	8	1300	K5PTK	18	6	1330
W1VTU	29	8	1296				
K1BKK	*28*	*7*	*1275*	*W6GDO*	*18*	*5*	*1326*
W1FIH	27	7	1100	W6WSQ	16	4	1390
W1JSM	24	7	1100	K6HAA	13	4	1380
W1HDQ	24	7	1040	K6JYO	12	4	1240
K1RJH	22	7	1450	K6HMS	11	4	1258
K1MTJ	20	7	1225				
W1MX	18	6	850	W7JRG	27	6	1320
K1JIX	18	6	800	K7NU	25	5	1290
				K7ICW	17	4	1246
W2NLY	37	8	1300	K7VTM	10	6	950
W2CXY	37	8	1360				
W2ORI	37	8	1320	W8PT	41	9	1260
W2AZL	36	8	1380	K8AXU	38	8	1275
W2BLV	36	8	1150	W8IDU	36	8	1150
K2RTH	34	8	1215	W8YJO	36	8	1300
WA2FGK	33	8	1340	W8IDT	35	8	1150
WB2WIK	32	8	1080	K8DEO	32	8	960
WA2CJK	31	8	1160	W8NOH	31	8	1165
W2CUX	30	8	1334	W8TIU	24	8	1000
W2CRS	30	8	1270	K2ZAT/8	24	8	925
WB2SIH	25	6	1000	K8ZES	22	8	675
K2DNR	24	7	1200				
WA2EMB	23	8	1335	K9SGD	42	9	1300
W2CNS	23	8	1150	WA9DGT	41	9	1303
K2BWR	23	7	1350	K9AAJ	41	9	1200
W2DWJ	23	6	860	K9UIF	41	9	1150
WB2YQU	22	6	850	W9AAG	39	9	1200
WA2PMW	21	6	1000	W9YYF	38	9	1050
WB2EXB	21	6	915	W9PBP	34	8	820
K2YCO	21	7	750				
				WØBFB	45	10	1380
W3RUE	36	8	1100	WØNXF	45	10	1369
W3KWH	35	8	1335	WØDQY	41	9	1300
W3GKP	32	8	1108	WØLER	40	9	1440
W3BHG	30	8	1140	KØMQS	40	9	1125
K3CFA	25	8	1200	WØLEE	40	9	1100
W3BDP	25	8	1100	WØEYE	35	9	1380
W3HB	23	8	1310	WØENC	35	9	1360
W3TWA	21	8	1342	WØEMS	33	9	1320
K3CBY	21	7	950	WØLCN	28	8	1000
K3OBU	21	7	930	WØDRL	27	9	1295
W3ZD	20	7	850	VE1AUC	7	2	500
WA3GPL	19	6	625	VE2DEO	28	7	1340
				VE2HW	11	5	800
W4HJQ	39	9	1150	VE3BQN	34	8	1250
W4WNH	38	9	1350	VE3ASO	33	8	1290
W4HHK	38	9	1280	VE3EZC	33	8	1283
K4GL	37	8	1325	VE3AIB	29	8	1340
K4EJC	37	8	1125	VE2EVW	25	8	1100
K4IXC	36	8	1403	VE3CWT	21	7	1072
W4CKB	35	8	1440	VE7BQH	9	3	1248
K4QIF	35	8	1225				
W4VHH	35	8	1100	VK3ATN	3	3	10417
W4PJ	34	8	1150	F8DO	1	1	5100
W4AWS	29	8	1350	KH6UK	2	2	2540
				OH1NL	1	1	5850
W5UGO	43	10	1398				
W5RCI	42	9	1289				

The figures after each call refer to states, call areas and mileage of best DX. Revised August, 1970.

National Radio Amateur Satellite Conference

For the first time ever, a national Radio Amateur Satellite Conference is being held. Sponsored by Amsat, the Radio Amateur Satellite Corporation, the Conference location will be the Statler-Hilton Hotel in Boston, on the occasion of the ARRL National Convention, September 25-27.

All three days, a program is planned to explore what's happening in amateur satellite activities. Sessions will deal with topics ranging from an introduction to amateur satellites, to a detailed report on the results of the Australis-Oscar 5 experiment. The latest news on the prospects for Oscar 6 and other amateur space experiments will also be presented. A hospitality suite is being reserved for impromptu meetings, specialized displays, and will serve as a gathering place during the Convention.

Information about the ARRL National Convention is available from Eugene Hastings, W1VRK, 28 Forest Ave, Swampscott, MA 01907; separate registration for the National Radio Amateur Satellite Conference is not necessary. But, if you think you'll be attending, Amsat (PO Box 27, Washington, D.C. 20044) would like to hear from you now to help with their planning. And, they'll send you an advance program schedule when available. — *WA2INB*

ARRL Comments on Repeater Rules

The basic principles of the League's position on *the repeater rules proposal, Docket 18803* were expressed on page 9 of *QST* for June, 1970. The complete text of the ARRL's comments, too lengthy to reproduce here, has been filed with FCC with copies going to all individuals and groups who have recently corresponded with us on the subject. Additional copies of this 62-page document are available, while they last, to interested amateurs and clubs. An addressed 10 x 13 in. envelope with 36 cents U.S. postage would be appreciated. QST

Hamfest Calendar

(Continued from page 93)

Pennsylvania – The 8th Annual Swap and Shop sponsored by the Skyview Radio Society of New Kensington will be held September 13. No Registration fee, bingo for the ladies. Bring your equipment for sale or trade. Food and refreshments available. Mobile and check-in on 29.0 and 50.4 MHz. Follow the direction signs from Camp Joan, Junction Rt. 366 and 380, 10 miles Northeast of Monroeville, Pa.

Pennsylvania – The Uniontown ARC will hold their Gabfest on September 5 on the club grounds (turn off Route 51 at the edge of town, watch for signs for the turn-off onto Old Pittsburgh Rd.). Loads of goodies, swap and shop, park in the front row to display your equipment and parts. For the hungry and thirsty the refreshment stand will be open to serve you. Free coffee. Registration $2.00.

Tennessee – The 11th Annual Cedars of Lebanon Hamfest will be held August 30 at the Cedars of Lebanon State Park ten miles South of Lebanon Route 231 S. Talk-in for mobiles on 50.25 and 3.980 MHz. Pot luck lunch at 1:00 P.M. Everybody bring enough food to feed your party. Drinks will be available on the grounds. For further information call W4VJW, Tennessee Phone Net, 3980 kHz, week days at 6:45 A.M. CDST.

Vermont – The Burlington ARC invites you to the 1970 International Field Day to be held at The Old Lantern, Charlotte, Vermont on Sunday, August 16. Come one day early on Saturday and join the crowd with trailer, camper, or tent. Featured will be the popular flea market, net meetings, antenna raising contest, junk-box amplifier contest, hidden transmitter hunt on 2-meter fm, mobile and portable rf output contest, bingo for the ladies, talk-in on 3.909, and W1KOO and W1ABI repeaters. Food, refreshments and camping supplies available all day. Registration $3.00 at the gate or send *$2.50 for early bird to Bill Fake, W1FS, 30* Southhill Dr., Essex Junction, VT 05452. For further information write or call Bob Hall, W1DQO, General Greene Rd., Shelburne, VT 05482, telephone 802-985-2235.

West Virginia – Remember the Black Diamond Ham picnic, Bluefield on Sunday, August 30.

Wisconsin – See Illinois (Belvidere). QST

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

What's New?

ONE THING that interests all of us is news. It can be on a see-it-while-it-is-happening basis, or the newspapers, or the radio broadcasts. It keeps us all informed on events, and tells us something about people. On a more restricted scale there are the publications of our organizations that are devoted to single-group interest, be it the fourth grade school news, or the regular monthly office bulletin. We have them in our churches, clubs, professional groups, and they give us news about our particular interest.

The many YL clubs and nets in amateur radio sponsor all types of publications which tell the membership what is going on. They range from the single sheet newsletter announcing the meeting date and possibly the program, up to quite ambitious magazine styles, such as *Harmonics*, that cover the YLRL world-wide membership. The club bulletin is one of the activities that keep a club alive. We read of election of officers, re-cap of meetings. We may find a calendar listing contests and coming events. We meet net members and find a "help wanted" paragraph for the club picnic, or code classes, or the coming meeting.

A club paper is news about members. It's the president's lament at a lack of participation, or a burst of gratitude over a project that was a howling success. It's an appeal for new members and it's a who's who. It can be an over-the-back-fence chatter time about the new gear acquired, and about who undertook the thankless job of planning the annual banquet. It's a report of a convention for those who weren't there to share, and very often a desperate appeal from the club treasurer that this is the last call for dues.

To the members, the names are as familiar as the local newspaper — Miss WRONE's *Chatter: SSBer's Voice*; PI-YL *QRV*; BAYLARC *Splatter; Hoot 'n' Holler*; H.A.W.K.'s *Eye View*, for a few examples. We find them in the YL section of Florida *Skip*, and *Auto-Call*. From our DX gals the *YL Beam* of S.A.W.R.C., or the Ontario Trilliums' *Tot-Topics* that is one continous story of what the gals in VE-land are doing. If there is a club there is a newsletter of some sort that ties the membership together by telling them what's new.

Behind these bulletins are the hard-working, often worried editors all of whom have volunteered for the job, and a job it is. Often these bulletins are produced with little or no help. The gals get the ideas and material from listening on the nets, at meetings, and come up with everything that they have been able to dig out from the preceding month. They write the news, create an editorial, type it, do the mass reproducing and end up as the mailing department as well. It could easily be referred to as a one-YL newspaper, in many cases, while in others, as *Harmonics*, the editors are a full club membership.

"YL News and Views" salutes all the women who have taken it as their contribution to produce these publications whether as a group, or just one gal. Often they may feel as if they aren't doing very much, but just stop one month and listen to the chorus of "What happened to the bulletin? I didn't get mine." It is something like a button that isn't noticed until it isn't there.

In almost every one of the newsletters we find a wistful appeal from an editor asking for news. As one put it: "However silly it seems to you, let's hear about it. Someone else will find it interesting because that is what the club bulletin is all about."

YL Howdy Days

Starts: September 23, 1970, 1800 GMT.
Ends: September 25, 1970, 1800 GMT.

Rules: Scores will be based on contacts with licensed women operators only. All bands and modes of emission may be used. No cross-band operation. Net contacts do not count. Only one contact with each station will be counted. Scoring: Score two (2) points for each YLRL member worked, and one (1) point for each non-YLRL member worked. *No multipliers.* Awards: Top scoring YLRL member will receive her choice of a YLRL pin, charm, or stationery. Non-YLRL member will receive a one year membership in

* YL Editor *QST*. Please send all news notes to WB6-BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

Participating in the Northwest YL Luncheon, Beth, W7NJS; Bea, W7HHH; Vi, W7EIU.

QST for

YL Forum at the Joint Pacific-Southwestern Division Convention in Fresno, Calif, May 16, 1970. Faces and backs, as well as those outside the camera range included: K6EIA, WA6HWG, W1YYM, K6ELO, K6JJN, K6DLL, W6ALL, WA6UAH, W6DOY, W6JMC, W6JCA, K6KCI, WA6FHH, WB6OSP, W6KHM, WB6FXX, W6PJH, WA6LWE, WA6OUH, WB6FYH, W6QVK, WA6EAF, WB6BBO, and Becky Johnson, wife of W6MUR, who was visiting to get ideas for the 1971 Southwestern Division Convention YL activities. *(Photo courtesy W6WME and Fresno ARC)*

YLRL. Copy of the log must be received by October 14, 1970. Mail log to Audrey Beyer, K5PFF, 6202 Reed Road, Houston, Texas, 77017.

Whether the total is staggering, or only one contact, please send in your log.

As YLRL members know, this get-acquainted contest was the idea of former YLRL president, Gladys Eastman, W6DXI, who recently became a "Silent Key." A successful record of the 1970 "YL Howdy Days" would be a fitting memorial.

Plan Ahead

For those who like to mark the calendar, and do a little planning for the coming activities, here is the way it will be:

YLRL Howdy Days, September 23, 24, 25, 1970.

31st YLRL Anniversary Party

Cw section - October 21, 22, 1970.
Phone section - November 4, 5, 1970.

1971 YL-OM Contest

Phone - February 27, 28, 1971.
Cw - March 13, 14, 1971.

LA/YLRC 1970-1971 Officers

The Los Angeles YLRC has announced the election of the following women who will direct the club's activity for the year 1970-1971.

President	Roberta Baldwin, WB6DFN
Vice President	Esther Gardner, WA6UBU
Corresponding Secretary	Betty Ekstrand, W6JCA
Recording Secretary	Evi Brightman, WA6ZTW
Treasurer	Mary Savage, W6VDP

Installation of the new officers will be at the September meeting.

YLRL Membership

In response to a number of inquiries to this column, membership in YLRL is open to any YL who holds a current amateur radio operator's license. Novices are as welcome as Extra Class, and YYLs, as well as members of OOTC, are eligible to join.

Those who are interested in affiliation may write to their membership chairman. Eastern U.S. Membership Chairman is Marge Campbell, K4RNS, 65 North Arbor Drive, Ormond Beach, Florida, 32074. Western Membership Chairman is Beth Taylor, W7NJS, 14637 S.E. Fair Oaks Avenue, Milwaukie, Oregon, 97222. For the DX gals, or for those YLs who wish to adopt a DX YL, write to

WB6FFE, Sharlene Katz, held her Novice class for only two months before taking her General class test, and 8 months later had passed Advanced. Sharlene enjoys rag chewing and handling phone patches.

Patty, K7NOR; Joan, K7NXO; and Helen, WA7HKB at the Northwest YL Luncheon.

the International Membership Chairman, Verda Siebenthaler, K7UBC, 905 Hastings Avenue, Coeur d'Alene, Idaho, 83814.

Division "First Ladies," K6BGM and K6ELO

While the division director is busy formulating ARRL policy for all of us, he is often represented in YL circles by his wife who is also a licensed amateur.

K6BGM, Caroline Gmelin, is the wife of W6ZRJ, "Doc" Gmelin, Director of the Pacific Division. In 1953 Caroline decided "if you can't lick 'em join 'em" and took a course in code at San Jose State College because she wanted to find out what her husband was talking about on the air!

K6BGM will usually be found on 80 cw, or 2-meter phone, or keeping skeds with her cousin, W5PKW, on 75 meters. A member of ARRL, and former member of BAYLARC, Caroline spends her off-the-air time learning to ride a Honda, target shooting, reading, knitting, oil painting, and keeping an eye on the two children, aged 8 and 12.

K6ELO, Roxanna Griggs, is married to W6KW, Director of the Southwestern Division, and decided to become a ham to share John's hobby. Roxie is a member of ARRL, YLRL, and her activity in the YLRC/LA has included the offices of treasurer, vice-president, and president of the club. She enjoys ssb and her very favorite activity is net participation.

For several years Roxie was a technical writer. Now her non-amateur interests are working in a literacy center concerned with helping Spanish-speaking persons learn English.

Roxie and John have two sons, one in the Air Force, the other a technical illustrator. QST

K6BGM and K6ELO

Silent Keys

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

WA1ELU, Irving R. Stannard, N. Branford, CT
W1EVA, Chester Sawyer, Needham, MA
W1LSP, Howard Hewitt, Warwick, RI
W1SCJ, Raymond G. Minor, Manchester, NH
K1SKP, Lawrence J. Kelsey, Billerica, MA
W1YPW, Mildred H. Hall, Maynard, MA
K2AUC, Ralph V. Mathes, Westfield, NY
W2AXJ, Ken Tagart, Point Pleasant, NJ
W2DTV, Henry E. Tomaino, Utica, NY
W2LUO, Paul J. Gollhofer, Babylon, LI, NY
W2RJJ, Henry G. White, Binghamton, NY
W2RUR, Alvin Alm, Jamestown, NY
W2SJT, A. Preston Bathgate, Washington, NJ
W2TXW, Ralph E. Moorhead, Buffalo, NY
WA2YYG, Bernard N. Fogle, Island Park, NY
WA3LUJ, John R. McWhorter, Jr., Wilmington, DE
K3NQS, Grayson E. Kilpatrick, Sr., Norristown, PA
W4AHH, John C. White, Fayetteville, NC
W4FMT, John E. Mathis, Shelby, NC
K4GYG, Marcus P. Frutchey, Winter Park, FL
W4OUG, Arthur W. Maunder, Melrose, FL
W4ZCL, William J. Pearson, Sandston, VA
W4ZKE, Charles H. Brigman, Wadesboro, NC
W5FXD, Carl Lemon, Tulsa, OK
K5GMP, Marion H. Strikland, Sr., Tulsa, OK
W5KFG, Eugene Boyer, Indianola, MS
W5KI, Ray A. Garren, San Antonio, TX
W5MAJ, Howard D. Rapple, Mountain Home, AR
K5OUH, Joseph M. McAdams, Irving, TX
K5RGO, James W. Webber, San Antonio, TX
W5SIL, William R. Price, Corpus Christi, TX
WA5UQA, George A. McClaskey, Tulsa, OK
K6CWJ, H. Louis Tardiff, Riverside, CA
W6DXI, Gladys Eastman, Los Angeles, CA
W6KRI, Dale W. Schuyler, Los Angeles, CA
WA6NFF, Raymond Rhone, Concord, CA
WA6OMS, E. L. Simpson, Sebastopol, CA
W6VCV, Glen Roy Ogg, Los Angeles, CA
WB6WBT, Charles A. Larimer, Millbree, CA
WB6ZDK, Harry E. Thomas, Okland, CA
K7JMV, Albert J. Lee, Salem, OR
W7YKG, Henry V. Showers, Kelso, WA
WB8DHD, John Kim, Lima, OH
W8ERW, Philip B. Summers, Fremont, OH
ex-W8IB, Edward J. Bennett, Cleveland, OH
K8IXX, Willie Bell, Detroit, MI
W8OT, Ralph E. Kepler, Warren, MI
W8QRM, James S. Pinkstaff, S. Branch, MI
K9DZH, O. C. Effland, Stronghurst, IL
W9FVN, Harold G. Wise, Belleville, IL
WA9IAJ, Carolgene Turner, Portland, IN
W9JUQ, Robert A. Eberhart, Shelbyville, IN
W9LA, G. L. Thayer, Steger, IL
W9RHR, Charles Bereczky, Waukegan, IL
W9TLB, William A. Ward, Oak Forest, IL
WA9UVI, Ronald C. Eberhart, Shelbyhille, IN
K9YQX, Willard Rieck, Manitowoc, WI
WAØAWL, Carroll D. Berkenbosch, Fairfield, IA
KØFCH, Harold L. Cohen, Duluth, MN
WØJGD, Walter L. Kuss, Ellis Prairie, MO
WØLF, Hug Clinton, Carthage, MO
KH6QO, Vincent De La Cruz, Jr., Honolulu, HI
VE1BG, John Brown, Dartmouth, NS
VE3FFQ, J. J. Cole, Matheson, ON
VE6ZL, Charlie Gibson, Calgary, AB
VK5HG, Harold M. Cooper, Glenelg, South Australia

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

When:

"Now *where* did I see that photo of AP2HB?" is the type of question possibly answered here every third August. Yes, in the twinkling of a few sunspots there are three more years to add to your "How's" DX picture gallery index. Taking up where we last left off, then. . . .

1967

July: UA9PP, HP9FC/mm, YS2OB, HA1VA, FL8HM, 5T5KG. *August:* OK2KMB, ST2SA, DJ7CX/M1, K8NHW/XV5, ZS8L. *September:* W6PIZ's Slinky, CN8FV, WN8TND, 5Z4KN, TL8DL. *October:* VQ9s TC EF, TG5WJ, 4X4s MR TI UM VZ. *November:* 6U8A QRP rig. CR5CA, DI2LE, DL3AR's DXCC-squared, TF3AU, 4S7NE, HV3SJ, FO8s AQ BH BV BW with HB9VP. *December:* W9BRD, PY1BYK/7, YV4NS, KP4AST, CE6EZ, HK3BAE, HP1BR, VEs 3FJZ/SU 6QG/SU, VP5RB, VP7NH, KX6ER, OY2H, OD5EJ, ZD8BUD, VQ8CBB, FP8AP.

1968

January: 7Q7EC, VU2FN, DXCC-squareds of Ws 1DJG 5LZG and K9JJR, KG6IJ. *February:* VK2ADY/VK9, VP8IU, KX6BU, FY7YM, 9V1OB. *March:* PY1NO, YV1DP, G4CP, G2IDC, JAs 4DBQ/mm 1XUM/mm, KA2JP, VK6s MK RU, YV5s BWP CEY, 4X4s SO UH YY, UWØFK, UA9PD. *April:* HS4AK, EL9s B C, HBØs AFM GJ, OX3DM, OA8V. *May:* PY2BJH, EL8A, HU1TU, PYØs DX SP, KP4RK's DXCC-squared, GW3DZJ, 4X4RD. *June:* HC8s EJ KA, VR3s DY C, 9N1MM, KG6IC, W5ODJ's DXCC-squared. *July:* HA1s AJ AM, OX3FS, VP2KW, 5Z4SS, VP5CB. *August:* CEØAE YN1s FR RMP, FG7TI/FS7 (PJ2s MF MI), XE2YP. *September:* G3LPC group, Nagoya DX Club with W6WBP, OH2AM contesters, IIDFD open house. *October:* KS6CQ, 4Z4AG, HBØWN, HG5BFJ, M1s B and H with WB6JKQ. *November:* BV2A, KX6EJ, EAs 2CR 3KI 3NA 4DO, KA5MC, LAØAD, CR6BW, 9Y4LA, KH6BZF. *December:* G5RD, VU2s BK GE HK LL LM RF with W4BPD, EAØAH, OKs 1CG 1LM 1MP 1ZL 2BKH 2PBM 3HM.

1969

January: 9X5PB, ZL2s ATK ATL, HS3s BA DR HM MJ RF WC WT, HA8UU. *February:* W8BT/LX with ON4NM, 3V8AA group, XE1PFL/XF4. PJs 2CA 2CB 2CQ 9CQ, PJØMM team, PX1BW duo. *March:* 9K2s CA CB CC, XW8BP, ZC4GM, KC4USV, AP2HB, DX1HM1's "DXCC." *April:* 8P6CY, VS6s AD DR with JA3AER at CR9AK, TG9RN, 4Z4NAI, 6O1GB, CT1s LN MW. *May:* Radio Society of Iran members and guests, HB9AAA's DXCC-squared, Hong Kong Radio Amateur Transmitting Society banquet. *June:* W9IDY's Gus Machine, HKØTU Malpelo saga. *July:* KA7CS/mm, 5N2s AAF ABG, CR6LF, VKØKJ, DL3EA/CEØ, 4S7PB, FW8DY (KH6GLU and VE8AJT), F2YS/W2, HB9P. *August:* GW3UUZ, 8P6 gathering, VP2MQ, ZL1DS/c, CR8A1, KP4RK. *September:* Jan Mayen view, JA2YAA, ODRC YA bunch, FM7WW, VU2AI, LZ2EA. *October:* DL4QQ and WA6QGW/PX, 9M2KR, YK1AA, VS6s MC MH TH TJ, 4X4FQ. *November:* VK9BM, YO3RF, UA3KWK, DLØLT/LX, 5B4FD/p. *December:* TU2BA, VK8s AV CM KK, EA9EJ, W4VPD/KC4, 3V8AA.

1970

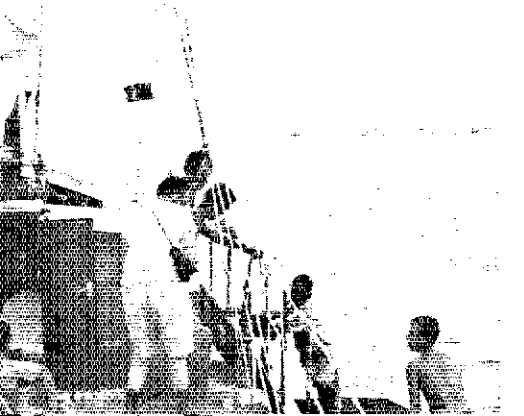
January: OHØNI's QTH, OD5LX, UB5WJ, PY2BJH's Novice WAS, GC8HT, KX6DC staff. *February:* 5H3LV's QTH, PZ1AV, OHØNI, CR9AK, ZE6JL, 9N1RA, HH9DL, VP2AZ. *March:* HBØXFY, KAs 2RM 7CW, JA7DBG, HB9AOE/W4, pioneer JH1s, 8KØAC staff. *April:* 5H3LV, OJØMR, FB8ZZ. *May:* OJØMI, TA1s HY IB, DL6UH/m, DM2APG, FG7TG, VK6s CB IZ, IRØs IJ JX. *June:* Market reef and 1N2A QTHs, VR1O, YV4s QQ UA, 5H3KJ, XF4s EB J KX, GD5APJ.

Those pictures and these pages—practically all of *QST* for that matter—are, of course, only the result of gratuitous contributions from you, the readers. The aforementioned art thus graces your library through the generosity of this *ad hoc* decorations committee:

Ws 1APU 1ARR 1BB 1BPY 1CUT 1CW 1DTY 1IKE 1JMY 1TS 1UED 1WPO 1YRC 1YYM 2CTN 2GHK 2IWP 3BBO 3FWD 3HNK 3ICQ 3VBM 3VEM 4BRE 4ECI 4FRU 4GRG 4PNK 4TZT 4VPD 5GIQ 5OB 5ONL 5QPX 6FAY 7DQM 7VRO 7WLL 8PEY 8RWP 9DY 9GFF 9GZZ 9IGW 9SCD 9SKR 9VES 9WNV, **Ks** 1HDO 2BYB 2DDK 2RYK 3CUI 3FKU 3MNJ 3WAZ 3WUW 4CAH 4CFB 4TKJ 5LMG 5YUR 6AQO 6HPZ 6JXH 8UDJ 9CSM, **WAs** 1CZH 1DJG 1FHU 1KQM 2INB 3DSD 3HRV 4OQO 5EFL 5OFT 5SXC 6AUD 9GGI 9HYS 9UGF, **WBs** 8BCI 2ETI 2OZW 2WOW

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

YVØs AI BBU BPJ and friends poured out plenty of Aves island DXCC credits in a gay May foray. The party embarks for the fun at left. As your "How's" QTH of the Month the place is quite obviously for the birds.
(Photos via WA6AUD, *West Coast DX Bulletin*)



2ZQE 4EHX 4FJO, **WN3**JAB, B. Colapietro, *O Cruzeiro*, Arkansas DX Association, DXpedition of the Month, West Coast *DX Bulletin*, **KH6**s RZF GLU. **VE**s 1KG 7AON, **DU4**ER, **FP8**DG, **HS3**DR, **JX3**DH, **OH2**ER, **YA5**RG and ex-**YO2**BO.

Special thanks are due Ws 1BB 2IWP 3HNK 4VPD 8RWP 9DY 9WNV, K1HDO, WAs 1DJG 6AUD, DL4ER and ex-YO2BO for volunteering acceptable pictures on more than one occasion. ARRL's Newington staff, particularly W1s CW YYM and the C.D. gang, forwarded countless shots of DX interest, too. Which reminds us to mention that three more lively ARRL DX Contest write-ups now appear in your *QST* archives, an additional rich source of photographic DX reference.

When bands are flat, then, happy browsing!

What:

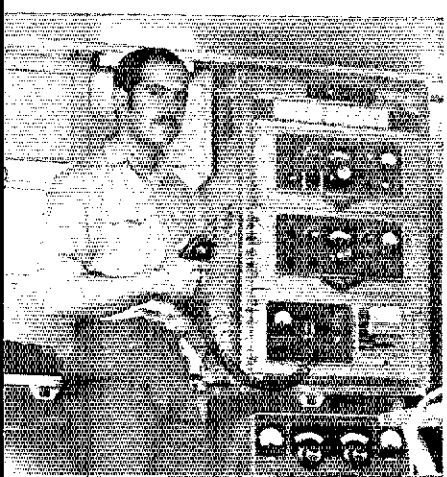
20 CW, our band for all seasons, welcomes a growing trickle of refugees from 10 and 15 meters where DX openings become noticeably fringier. This trend, by the way, also includes enough transitory nonamateur interlopers to keep Intruder Watch watchful. "How's" correspondents **W**s 1BV 1DAL 1FCC 1PL 2KXK 4CZM 4YOK 4ZYT 5BZK 5GB 5KKW 6BAY 7YTN 8KZO 8YGR 9DY 9LNQ. **K**s 3COU 3RPF 4TWJ 5MHG/6 8PYD 8TRF 0GXV, **WA**s 1FHU 1JKZ 1JMR 2BHJ 2FOS 2HDZ 2KEA 2YWR 3GVP 3JHB 3KSQ 4CZM 5UAX 5YMW 9SQY, **WB**s 2DBS 4GAH 4JYB 4KZG 9AVY 9CJS, 1IER and **VE7**BAF and the clubs press now tag the Bandwagon along 14-MHz code trails. As usual, "TU2CX (27) 21" means that TU2CX is reported active near 14,027 kHz around 2100 hours Greenwich. First stop is

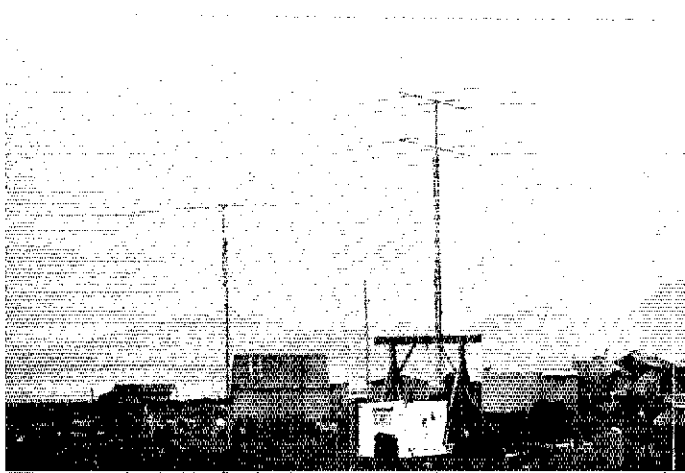
ASIA—AP5s CP (23) 15-16, HQ (28) 2-3, a few curious BTs and BYs, **EP2**BQ (30) 12, **HMØ**B, **HS**s 3LJ (50), 5ABD (33) 11-12, **JA**s 1AKH 1BAL 1CWZ 1FNA 1SYI 1WPF 2DO 2DXL 2JGC 2JFQ 2WB 2WK 3AAW 3DAD 3IG 3OKV 4IF 5BXJ 6PA 6YAF 7BVH 8AA 8BNK/1 8DMU 8RW 9BE ØCUV/1 ØGRF, **JD1**AAH (53) 4, **JH1**FLR (13) 3, **JT**s 1AH (32) 2, 1AK (40) 22, 1KAA (27) 5, 2AA (6) 13, 4KAM (10) 1, **KA**s 2KS 2MH (22) 0, 2RH (17) 0, 9ZZ (7) 2, **KR**s 6TA (33), 8FT (31) 3, **MP4**s BDH (55), MBJ (8) 23, **OD5**s AX (30) 3, LX (5) 3, **TA**s 1WR (30) 2AE (45) 0-1, 2AY (78) 1, 2E (25) 22, 2EA 3AY (57) 1-2, UØL/1 (37) 3, **UA9**s CN DN GW IB JS KAZ KPW KXX LJ OO PG PK PP UY XI YO YW mostly 0-4, **UAØ**s AG AJ AQ AR BS BL CU DL EE FD IK KAR KAE KCA KCN KFG KIP KJA KKT KQU KRH KSB KUE KZD LJ OV QP QW RB RD TD TP US WN YA YT YZ ZB ZG ZH likewise, **UD6**s AM (11) 2, AR (67) 3, AX (66) 22, FA (5) 3, **UF6**s AM (35) 3, AU 20, BD (30) 4, DA (22) 2, CQ (70) 23, HS (40) 3, **UG6**s AB (10) 1, EA (41) 3, KAB (30) 7, KAF (25) 2, **UH8**s BO (52) 3, CB 3, CS (40) 4, CW (33) 2, DC (40) 3, DK (10) 3, DX KAA (50) 13, **UI8**s AI (60) 2, AP (33) 2, AX (74) 2, IZ (12) 2, MV (25) 4, NH (17) 0, OJ (68) 2, OK (10) 2, **UJ8**s AB (29) 2, AC (40) 3, AJ (34) 3, AR (67) 0-1, AZ (20) 2, KAA (28) 11, **UK**s 7EAB 7GAA 9AAC 9AAN 9AAZ 9ABA 9CAE 9CAN 9FEA 9FEE 9HAD ØA (30) 0, ØQAE ØYAA ØYAD ØYAZ ØZAA ØZAI, **UL7**s BK EAA GD GG GP GW IZ JG JI KAA KBA KBK KDW NAD PS QF QQ RK RL XE, **UM8**s AC (65) 15, BB (60) 3, FM (10) 2-3, IE (31) 0, KAI (70) 4, **UV**s 9BB (52) 13, 9BS 9CO (23) 21, 9DX (41) 14, 9OC (57) 14, 9OM (30) 2, 9PR 3, 9VC (25) 1, ØAB (80) 4, ØBB (44) 1, ØED (15) Ø, ØFC (15) 23, ØIA (1) 1, ØJZ 4, **UW9**s JH JM JO OA OD OH OP WB, **UWØ**s AP AU AZ BJ BW BX FP GW IF IH IX IY KQU LQ OH TG UF WB YA YZ, **VS6**FX (30) 11-12, **VU2**s BEO (6) 1, GW (25) 1, JA (55) 13, JN (50) 2, JV (35) 20, KM 12, LE (25) 1, NG (20) 1, OLK (13) 1, SL (60) 13, SV (20) 12, **XW8**s BP (14) 13, DK (35) 11, YAØCDRC (40) 3, **YK1**AD (55) 1, **ZC4**CB, **4S7**s AB (3) 1, DA (26) 7, EA (12) 1, EC (41) 12, **4X4**CJ (18) 21, **4Z4**s AI (34) 0, DZ (42) 1, **7Z3**AB, **8J1**RL, **9M2**s FR (44) 15-16, LN (29) 0 and **9N1**MM (45) 14-15.

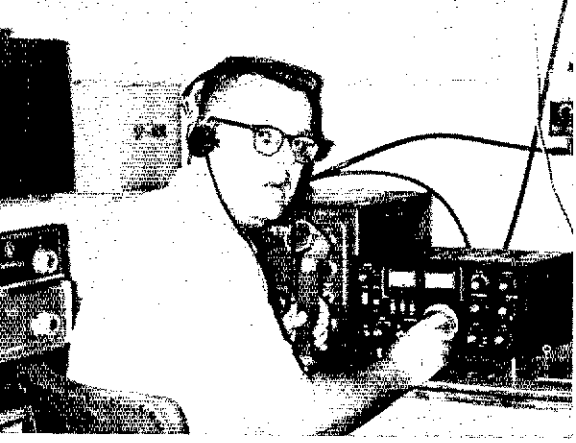
AFRICA—A2CAU (53) 14, **CN**s 2AQ (49) 4, 2AY (28) 19, 8CS (4) 7, 8DW (30) 20, **CR**s 3KD (30) 19, 6AI (10) 21, 6AL (50) 21, 6GO 6CA (21) 0, 6KB (30) 21, 6LV (10) 22, 6NN (25) 22, 7CN (19) 12, 7PC (59) 19, **CT3**AS (25) 22, **EA**s 8AT 7, 8CP (57) 6-7, 8FF (35) 20, 8FJ (30) 2-3, 8FO (68) 0, 9EJ (14) 23, **EL**s 2AW 2BE (8) 22, 2BY (53) 23, 2CB (30) 23, 7CB (31) 2, 8RL 23, **ET3**s AZ (29) 14, I8A (47) 22, **FB8**s WW 14, XX (36) 1-2, YY (30) 5, **FH**ØVP (1) 2, **FL8**s BE (23) 14, MB (67) 2, RC (100) 4, **FR7**s ZQ (45) 20, ZX (65) 15, **SU1**IM (65) 1-4, **TJ1**s AW (50) 0, QQ (23) 0-23, **TU2**CX (27) 21, **VQ**s 8CC (16) 2, 8CD (30) 2, 8CFB (26) 12-13, 8CJ (33) 12-13, 8CR (28) 11-12, 9CD (30) 3, **ZD**s 3D 5M (30) 15, 8BB (38) 1-2, 8DB 9BM (16), 9BO (18) 1, **ZE**s ICY (39) 19, IDC 1DN (22) 19, 2KL (19) 19, 3JJ (33) 5, 8JW (80) 13, **ZS**s 1A 1ACD 1AMB/Antarctica (65) 0, 1O 2CV 2OL 4AK 5DE 5EY 5JM 5XA 6AL 6AYU 6BT 6JK 6OS, **5H3**MB (50) 14, **5R8**s AM 3, AP (95) 16, **5T5**s AD (3) 22, BG (79) 21, YL, **5U7**AW, **5Z4**s DW (33) 19, LW (24) 22, **6W8**s DQ (50) 2, DW, **7P8**AB (20) 0, **7Q7**s BC (25) 0, GB (40) 14, **9J2**s RQ (30) 19, XZ (26) 4-23, **9U5**DL (60) 0, **9X5**s MH (57) 22, RD and SP (93) 19.

OCEANIA—DU1OR (24) 0, **FK8**BO (43) 6, **FO8**s AA (53) 3-4, BV (39) 7, Ks 4U1/**KH6** (65) 4, 4R8D/**KH6** (50) 4, 5MWZ **KH6** (60) 4, **KC6**CT (30) 13, **KG6**s AAY (34), ARO, **KH6**s AX EWA FF FOA GJJ GLU GPQ HCM IJ IU LP RS, **KP6**CA (49), **KS6**s CG 7, DH (25) 11, **KW6**s CP (62) 10, GL (66) 11, fifty-odd **VK**s (and AXs) including IGD 6, IMR (5) 7, 8CE 6HJ 6LJ 6SA 6WT 7CH 7CM 7ZD 7ZZ 9BA (71) 14, 9DH (28) 6-13, 9RH (26), ØKW (38) 12-13, **VR**s 2ER (57) 11, **2**FO 5LT (33) 6, W7WOX/**KH6** (42) 4, **YJ8**JM (60)

VKØHM emitted thousands of prized QSOs from bleak Heard Island in November, 1969, through April of '70. The operator is WA6EAM and these photos come courtesy W7PHO.







KA1C, DXpeditionary coup by KA9s JS RC and ZZ in September, issued a logful in Iwo Jima contacts to excited customers. KA9RC (WA4FLR) is in the hot seat while KA9s JS (WA5VNE) and ZZ (W8FCW) ready a radiator for action. KA9RC scheduled a similar Marcus island venture last month as KA1B.

6, **YBs** 1BC (20) 0, 3DC 15, ØBS (22) 10, forty-plus **ZLs** (and ZMs) including 1AAT/k (27) 7 and 3PO/c (27).

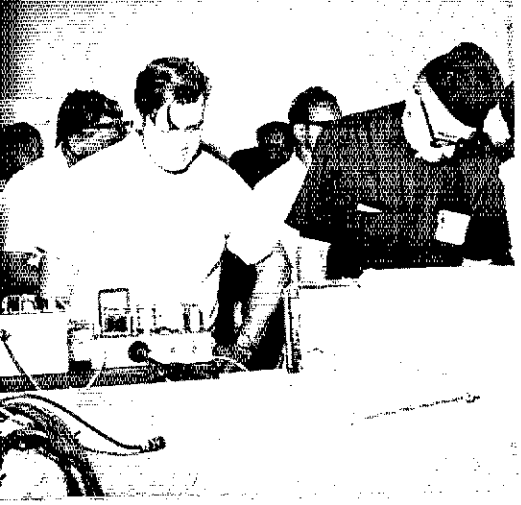
EUROPE—CTs 1IT (19) 15, 1VX (17) 23, 1WY (60) 21, 2AC (60) 11, 2AK (23) 22, 2AO (45) 22, 2AT 9, twenty **DMs** including 5BG 5JL 5VBN ØDSF, **EAs** 2CJ 2CR 2DM 2MZ 2WW 4CS 5BS 5IC 5HT 6AU (24) 19, 6BD (35) 0, 6BH (34) 7, 7FI 7GI 7IZ, **EIs** 4BK (23) 18, 4CB (18) 23, 4Z (7) 23, 5AJ (22) 20, 5V (15) 22, 7AB (18) 0, 8H (52) 18, F9UC/**FC** (51) 3, **GCs** 2LU 6-10, 3IEW 3EML (30) 22, 3UQM (39) 22, **GDs** 3FBS 10, 3WVG (25) 1, 5APJ 1, **GIs** 3AXI (2) 5, 3JEX 11, 3OLJ (40) 1, 4RY 5SJ (38) 2, **GMs** 3EZQ 3JUD 3OAY 3PEQ 3LWS 3VTB 3ZBH 5APK 5AQA 6RI, **GWs** 3CF 3FSP 3JT 3KWB 6YQ, fifty **HAs** including 1SB 1SQ 1VM 2KRB 3MA 3MB 3MJ 8NI 7KLC 7LT 7LU 7PB 9KOB 9KOV ØKDR, thirty HB9s, **ISIs** AEW (35) 22, ATZ (35) 23, PEM VEA (67) 21, **ITIs** AGA (40) 8, ARI (30), 21, LPG (30) 22, **JWs** 1CI (3) 22, 7UH (4), 8MI (70) 13, **JXs** 5CI (8), 8IL (65) 5, thirty **LAs** with ØAD 6, **LG5**LG (26) 0, **LX**1BJ (84) 22, three dozen LZs, **MIT** (40) 23. **OEs** 1MEW 1SF 2EM 2PAL 3RHA 3WJW 5ACL 5PX 9AHI, two dozen OG-OH-OIs, countless **OKs** including 5K S 5TOL, many ONs, **OYs** 1R (20) 13, 2EL (67) 8, 2H (20) 21, 2J 23, 3HP (58) 21, twenty OZs, a dozen PAØs with **PE2**EVO, **SKs** 3BP 10, 5AB 6CF, **SLs** 8CC (25) 21, 9VV, three dozen **SMs** with 1CXE 2ECL 2AQE (25) 1, fifty SPs (3Zs), **SVs** 1AB 1BC (36) 22, 1CH (12) 1, 1DO (25) 23, ØSV (53) 2, ØWNN (20) 20, ØWO (65) 19, ØWOO (40) 4, **TFs** 2WKF 2WLS (10) 1, 2WMB (57) 21-22, 5TP, **U4L/3** (40) 0, scads of **UAs** including 1KAE/6 (3) 2 at Vostok base in Antarctica, 1KED of F.J.L., 2KAQ 2KAT (45) 23, 2KBR 6, **UB5s** AU BB ES GE KAB KGL KUO MZ NQ OE QT RI RR RS SF TH WL ZE, **UC2s** AF BF CW DR IJ IM KAA KAB OZ XB XT, UF5KKM, an outburst of new-style **UKs** 1AAC 1AAG 1ADK 1OAA 1ZAA 2AAO 2ABC 2BAU 2BAV 2BBB 2FAP 2GAN 2GAT 2PAF 2PAR 2RAN 2TAD 3DAW 3DAX 3TAD 3XAB 3XAD 3XAL 4HAP 4NAL 4WAB 4WAC 5EAJ 5JAA 5JAJ 5LAK 5UAK 5UAL 5VAB 5WAZ 6AJA 6LAZ 6QAA, **UNIs** BN (47) 4, BR (53) 3, GK (3) 0, **UO5s** AP (15) 3, AW (10) 5, BM 3, BR (30) 15, BZ (24) 2, PK (50) 2, WU (38) 0, **UP2s** AY (26) 22, BV (30) 14, KBC (29) 6, KNO (18) 4, OE OX (34) 2, OY, **UQ2s** 1L (47) 4, KAA KBP KCR KCT KFN (30) 15, LH 7, OC (23) 21, **UR2s** KAD (43) 4, KAN (5) 15, KAW LO PW (43) 23, QD (34) 22. **UT5s** BP CA EW JD KCU MD OJ ON QO SY TH VU YP, plenty of UVs and UWs, **UY5s** CQ EI MV NL UW WC XR, sixty assorted YOs and YT-YUs, **ZB2s** AV (8) 9-21, BO, **4Us** 1ITU 7ITU (12) 21, **9HIs** AZ (25) 23, BB 5, BM 20 and CB (02) 22.

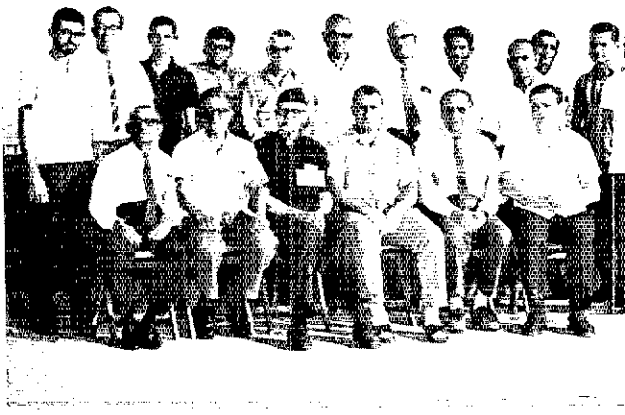
SOUTH AMERICA—CEs 1AD (50) 23, 2PN 3AB (57) 1, 3CF (45) 3, 3LB (28) 2 3LK 4VD (23) 23, 8AA 8CF (68) 3, 9AF (22) 0, 9AT (30) 7, **CXs** 1JM 1OP (40) 0, 2CO (100) 0, 5BH (31) 0, 9BT (54) 2, **FY7YN** (28), **HCs** 1JU 1TH 5, 2GG/1 2HM (13) 1, 2JR (61) 5, 3SM (39) 5, **HKs** 3BED 6, 3BP 3RQ (31) 0, 3VA 4, 7UL (27) 3, **KC4s** USM (32) 2, USX (30) 2. **LUs** 1BB 1BO 1DCW 1DNU 1DSA 1HDZ 2ABZ 2ECF 2ZZ 3DSI 3FGX 3WAP 4ECO 5AES 5AFN 6ADU 6AX 7DSA 7WH 8BAJ 8EY 8FBH 9ACZ 9DTQ 9WA, **OA4s** EK (23) 6, LM MS 7-8, MZ PF PV, **PJs** 2FM 2HR (18) 2, 2HT 2PS (30) 8, 2VD 4PS (19) 8, 7JC (53) 10, 7VL (28) 22, **PYs** 1BQO 1BUK 1CNA 1CIP 1CZR 1DB 1DCG 1DH 1FGN 1LCG 1MB 1MCC 1SJ 2AYI 2BBO 2BFD 2BJB 2BSD 2BYR 2CA 2DCR 2DFR 2EAB 2ECX 2EGT 2EWB 2EWL 2GLJ 2SR 2SO 3CCI 3CEN 3CFN 4BKE 4BML 4BNK 4BQO 4BR 4KB 4OD 4UK 5ASN 6YC 7ACQ 7ALY 7AWD/Ø (50) 2, 7PO 7SR 8FN 8JL, **PZ1s** AG (76) 1, AH AP (3) 23, **VP8s** JV (25) 3, LK, **YVs** 1AA 1AD (37) 6-9, 4OY 9, 5CIZ (44) 3, 5CKR (70) 20, 5DEK (28) 1, 5KL 7, **ZPs** 3AL (43) 23, 3CA (77) 3, 5CE (27) 3, 5KA (50) 3, **8R1J** (56) 20, **9Y4s** AA BS (35) 10, DS (25) 3, EW 3, TR (30) 23 and VU (38) 21-22.

HEREABOUTS:—CMs 2QN (2) 0, 2ZU (28) 23, 6HT (27) 21, **COs** 2AP (9) 4, 2DC (85) 19, 2JY (16) 22, 2RC 3IN, **FG7TG** (19) 20, **FM7s** WG (45) 2, WU (35) 13, **FP8s** AP 9, CW (24) 20, **HIs** 3PC (40) 7JMP (14) 2, 8DAF (15) 3, **HP1s** BR (17) 5, IE (31) 13, XYZ (14) 3, **HU1P** 5, Ks 2RSR/**VP9** (27) 22, 3GWA/**KL7** 7NFV/**KL7, KG4s** AA (70) 1-2, AL (45) 10, AN (29) 2, AS (30) 5, DZ, **KL7s** AD 8, BZO (71) 2, FSV FSY (11) 1, GH JDO 9, MF NJW WAH 2, **KP4s** AN BBN BCL CQB CQC DDO DJI DFH, **KV4s** AA (81) 21, CI (5) 9, **KZ5**WJ 2, **OXs** 3AX (27) 1, 3CJ 3FD 3LP (15) 23, 3MQ (20) 0, 3UD 3WQ 3ZO (55) 23, 5BM, **TG4**SR (2) 3. **TI2s** AB (51) 1, AP (20) 6-7, DL LAB (51) 1, WR, **VE8s** RY ZZ, **VPs** 1VR (49) 14, 2AN (47) 5, 2AZ 2GLE (57) 0, 2MK (60) 23, 2MT (18) 22-4, 2MU (48) 1, 2MW 5CS (19) 1, 7NQ (60) 0, 9GM (62) 17, 9WB (70) 6, 9ZI, Ws 1FKD/**VP9** 4BRB/**VP7, XEs** 1EK (13) 2, 1FFC (75) 7, 1H (43) 22, 1NE (84) 5, 1NNR 1TQ (10) 2, 2AB 2HN 2MX (37) 7, **YN1s** BW (4) 23, CW (24) 1, **6Y5s** ET (69) 23, LA (22) 6, SR (23) 21, **8P6s** AG (27) 2 and A1.

* * *

A warm-season lower-frequencies check is due next, we think, aided by (40 cw) **Ws** 1BMR 1BV 1PL 4YOK 5GB 5KKW 7YTN 8YGR 9EY, **Ks** 1OME 8TRF, **WAs** 1FHU 1IRY 1JMR 2BCT 2FOS 2HRZ 2YWR 3GVP 4CZM 5UAX 9SQY, **WBs** 4GAH 9CJS, **1IER, VE3**GHO; (40 phone) **Ws** 1PL 8YGR, **WAIs** FHU JKZ JMR; (80 cw) **Ws** 1PL 1SWX 8YGR 9EY, **WAs** 1FHU 1IRY 2YWR 4CZM; (75 phone) **WIs** BMR WQC, **WA1s** FHU JMR, **VE3**GHO. Later we'll be hearing from (15 cw) **Ws** 1BV 1PL 4ZYT 5BZK 8KZO 8YGR 9LNQ, **Ks** 3CUI 5MHG/6, **WAs** 1FHU 1IRY 1JKZ 1JMR 2BCT 2BHJ 2DFD 2FOS 2HDZ 2KEA 2YWR 3GVP 3JGY 5SOG 5UAX 5YMW 5ZEH 7CWM 9SQY ØPXT, **WBs** 2DRS 4KZG 9AVY 9CJS, **WNs** 2JNA 2JQL 4OFO 9CDR ØYMC, **1IER, VEs** 3GHO 7BAF; (15 phone) **Ws** 1PL 3HNK 4YOK 5GB 5KKW 8YGR 9LNQ, **Ks** 4TWJ 8PYD, **WAs** 1FHU 1JKZ 2FOS 3JHB 5SOG 9SQY, **WBs** 4KZG 9AVY; (10 cw) **Ws** 1PL





VU2OLK and 9N1MM, participating in dedication ceremonies for school station VU2RES of St. Andrews in Bombay, inspect homemade equipment on display. Among those present were (front, left to right) VU2s GJ ST, 9N1MM, VU2s BEO MD OLK; (rear) VU2s IN DW IAZ LW, WB2WUQ, VU2s FP TP AY ED JDZ, an unidentified guest and VU2MT. (Photos via WB2WUQ)

4YOK 8KZO 8YGR. **K5**MHG/6, **WA**s 1FHU 2HZR 2KEA 5YMW 9SQY, **WB4**KZG, 1IER, **VE7**BAF; (10 phone) **W**s 1PL 3HNK 4YOK 5GB 5KKW 8YGR 9LNQ. **WA**s 1FHU 2FOS 8SOG 5YMW 9SQY, **WB4**KZG; (20 phone) **W**s 1PL 2DY 3HNK 5BZK 8YGR, **WB4**KZG and reporters to file and now filing. Say, anyone for 160?

Where:

EUROPE—G2MI, Radio Society of Great Britain's QSL chief since days of yore, comments incisively re International Reply Coupons: "On each IRC it states, in many languages, 'This coupon is exchangeable in *any* country of the Universal Postal Union for a postage stamp or postage stamps representing the amount of postage for an ordinary single-rate letter destined for a foreign country.' This *includes* the country of origin. Any country which fails to honour one of its own IRCs is breaking the UPU covenant. I understand that many U.S. post offices will not cash U.S. IRCs and it should be pointed out that they are in error. Apart from any other consideration, having repaid to the selling price, any post office which refuses to buy them back at the depreciated value must want their heads examined. As the U.S.P.O. seems more or less permanently 'in the red' I would have thought that a queue of public spirited citizens buying IRCs at 15 cents at one counter and selling them back for 13 cents at another would be a postmaster's dream of heaven." Art knows whereof he speaks, yet bureaucratic practicalities (or impracticalities) described by other correspondents promise that the DX hound who piles into his local U.S. Post Office branch to cash in a basketful of well-traveled IRCs had better be prepared to lose considerable on-the-air time in the process . . . . . CT1LN QSOs after June 9, 1970, can be confirmed via K9CUY . . . . . W2GHK's DXpedition of the Month facility, not W2CTN, takes care of all LA1H QSLing . . . . . "I have the logs for 9A1AIJ operation in 1963," declares I1FLN, welcoming inquiries bearing s.a.e. (self-addressed envelopes) and IRCs . . . . . "Most of us DL4s and DL5s now have two- or three-year duty tours," states DL5GJ (WA6AXE), regretting that the *Callbook* isn't running Yanks-in-Germany addresses because suffixes are bounced around like library books. "Cards via my home address will get W/Ks fastest results."

OCEANIA—VE6AP advises, "I've recently assumed the task of clearing up cards outstanding from the Calgary DXpedition which took place from September 20, 1968, to January 21, 1969. VE6AJT was the principal operator. Calls involved are VR2FR (September 20-27, 1968, and January 22 to February 1, 1969), 5W1AE (September 30 to October 3, 1968), VR1P (British Phoenix, October 12 to December 3, 1968), VE6AJT/KB6 (Canton Island, November 26 to December 1, 1968), and VR5AE (January 8-21, 1969). At the request of VE6AO's widow I am clearing the backlog of cards and will reply to any station still desiring confirmation from these operations." . . . . . WA6ENF can help you confirm QSOs with KJ6s BZ and CF scored during concentrated Johnston isle activity on July 4th . . . . . KP4BJM says mint Timor stamps courtesy W2SAW brought back a CR8AG QSL in two weeks. Don't forget "via Darwin" on your mail to CR8s.

ASIA—Ex-HL9UU regrets, "Due to moving to Germany my Korea QSLs may be a few months delayed." Bill vows a thorough job nevertheless . . . . . VE6AO's unfortunate passing places KW8CS QSLing in the hands of W7QYA. "Dick is in process of transferring back to W-land," says Flo. "Meanwhile I'm trying to help him get caught up with the huge backlog. We're all very sorry for the delay. Further questions may be directed to me or to R. G. Price, KW8CS-W3DBT, Rt. 1, Box 162, Burton, Wash." . . . . . WA8NJP's research convinces him there is no legitimate XZ2DW . . . . . "I've taken on QSL manager-ship for 4Z4NBS," announces WA3JGY. Terry will confirm Shalom's QSOs dating after May 24, 1970 . . . . . KA9RC (WA4FLR) writes, "I see in 'How's' that KG6IF QSLs are still sought. That was the old Coast Guard call on Iwo, now no longer used. KA1IJ is the present one. If anyone still needing KG6IF QSLs will give me QSO particulars I'll try to get confirmations for them on my next trip to Iwo Jima." Bob also holds logs for ex-KA9s EE and ZZ but stresses that WA8NZH handles his KA1B and KA1C QSLing.

AFRICA—"What amazes me is the slowness in requests for Seychelles QSLs," muses W9VNG, managing VQ9RK's pastehoards. "Has everybody already worked VQ9 or are conditions getting rough?" . . . . . K9CUY's responsibility for ZS4JB QSLing dates from June 9, 1970 . . . . . "It seems that a group of my log copies was lost," worries EL9C, newly returned to Liberia from a traveling honeymoon. "Also, some QSLs were forwarded to my Mano QTH via slow ocean freight. These will be answered on arrival." . . . . . W7ZMD, former QSL aide to ZD8BB, receives missent cards meant for ZD8DB which should go to WØEZT. Nick admits, "I've been off the air due to antenna problems but this renewed postal activity is stimulating my ear lobes. See you soon on 20!" . . . . . 9J2XZ QSL rep WA0ZZT writes, "I know from personal experience with ARRL's two and nine Bureau branches that DXers get excellent results if they keep s.a.s.e. (self-addressed stamped envelopes) on file." Don now waits six months for s.a.s.e. before bulk shipments of 9J2XZ cards via bureaus in line with that station's 100-per-cent-QSL policy. "I'm picking up logs once or twice weekly from Don, usually on 20 around

1400 GMT. Contest logs are mailed. We try to make it a fast in-and-out affair." . . . . . Note in the listings to follow that ON5TO uses a speical address for incoming 9U5CR QSLs. Edward also assists 0U5RH, ONs 6SB and 8TP . . . . . W2GBY disclaims Somalia QSL connections . . . . . International Telecommunications Day in May saw action by CR4ITU, 7Q7TTU, etc., most of which should be QSLable via bureaus of countries concerned. Perhaps the 4U1ITU gang can help.

HEREABOUTS—QSL managers for specific hand-picked rare stations are widely publicized and generally thanked, if insufficiently, for jobs well done. Their labors mean more DX for all. WA5UHR, recognizing this, welcomes nominations for his own QSL Manager of the Month award commencing in September. For such honors don't overlook your own ARRL QSL Manager who manages miraculously to push cards for anybody and everybody. How many on-the-air DX man-hours do you suppose Northern California DX Club volunteers sacrificed to sort and distribute the 169,000 cards that hit Sixland's branch in just six months? . . . . . Newark *News* Radio Clubber LeRoy Waite, gamely regaining his health, continues to officiate at the busy ARRL 8WL Bureau listed regularly in *QST*. Every verification-hopeful short wave listener should keep s.a.s.e. on file with Roy . . . . . "Some of the same stations who screamed for my own SVØWZ/Crete QSLs a few years back are slow in answering my Texas cards," chuckles W5IB, Sarge nonetheless has 140/109 cw countries worked/confirmed in six months with his NCX-5 and 14AVQ . . . . . Ws 2BTQ/4 4JUK, K3RPF and the rest of us think it's about time some of this abundant AC BT BY ZA, etc., nonsense produces a few QSL surprises. Elsewhere on the "help!" front W5BZK needs a nudge toward 4U1ITU's QSL; K1IFJ seeks aid in running down CN8CD of '61, PX1HK '63, VPs 5KT '61 and 8EG '61; WA1JKZ desires data on M1B, OHØNI, 5Z4LS; WA2FOS will settle for encouraging TU2CX word; XE1BN could use news of CR6LV, LX1JT, OK3s CIR KAG, ON5TB, TF3AU, ZS5SY and/or 9Q5FH. 'Alp? . . . . . WA5SOG, who issues plenty of first-Arkansas cards, wishes QSL chasers would clearly mark contest QSLs as such, including serial exchange if any. 'Twould save much long-check time . . . . . Your "QSLers of the Month" this trip are AX3KS, CE8AA, CRs 3KD 8AG, EI2VBE, FP8AP, G3KKP, HC2JR, HI7JMP, HS5ABD, KC6CP, KS6DH, SM5EAC, SP2BRY, SVØWU, ZP5GS, 5VZDB, 7Q7AA and 9N1MM, plus QSL nides Ws 3KVQ 4SPX 6DQX, K3EST and WA4PXP, each commended for unusually rapid and reliable card comebacks in "How's" dispatches from Ws 1SWX 5IB 9OW, WAs 2HIU 3JHB, WBs 4GAH 4KZG 9CJS and KP4BJM. Any welcomed winners out your way? . . . . . WA2JIM offers to perform as QSL agent for overburdened ops at the DX end.

SOUTH AMERICA—W2GHK clarifies and corrects, "With respect to Aves island I'm QSL manager only for YVØAI who, incidentally, made most of the contacts." Cards for other YVØ calls signed during this May's Aves splash can go via RCV . . . . . WA5SOG's good friend PZ1BX, now Stateside, may be reachable via Ed. "John was a good QSLer but if somebody was missed I'll attempt to get confirmation. Can't guarantee anything but I expect to be in ouch wih him her this summer." . . . . . For direct reply, unless specifically waived, s.a.s.e. (s.a.e. with IRC's when appropriate) should be included in mailings to QSL managers. Same when soliciting mail response from *anybody*, for that matter . . . . . We normally have no space available to duplicate data already appearing in the *Radio Amateur Callbook Magazine*. The following suggested addresses or routings may be helpful but must be accepted *only* with the understanding that each is necessarily neither "official", complete nor accurate. Grab! . . .

AX6HD, M. Bazley, 32 Flora terr., Lesmurdie, W.A. 6076, Australia

AX9GA, c/o Post Office, Kavieng, T.N.G.

DJ3J6/HK3, H. Reissig, Airbox 6811, Bogota, Colombia

DL4s TJ/LX WJ/LX via DARC)

DL5GJ, J. Glockner, P. O. Box 625, FPO, New York, N.Y., 09514 (or to WA6AXE)

EL2CD, P. O. Box 34, Monrovia, Liberia

FØUG/m-FCØUG, R. Vandegrift, MatCom-DSO, APO, New York, N.Y., 09052

HC2FG, P. O. Box 1233, Guayaquil, Ecuador

ex-HL9UU, W. French (W2SRQ), HHC, 32nd Sig. Bn., APO, New York, N. Y., 09757

HP1XMY, P.O. Box 7265, Panama, R. P.

HS1ABE, B. Lowery, Page Comm. Eng., APO, San Francisco, Calif., 96346

HS1ACC, P. O. Box 2008, Bangkok, Thailand

HT1AJP, P. O. Box 434, Managua, Nicaragua

HU1P, E. Marez, USAF Sect., APO, New York, N.Y. 09889

KA9s EE ZZ (via KA9RC)

KJ6s BZ CF (see text)

ex-KX6FJ, S. Fierston, W1BRJ, P. O. Box 189, Lynn, Mass., 01903

PJ1Z1KVV, P. O. Box 90, Sofia, Bulgaria

PJ4PS, Box 383, Curacao, N. A.

VE6AJT/KB6 (see text)

VK9GG, G. Groat, Box 676, Madang, T.N.G.

VP2AK, K. Pyle, c/o RCA/MTP Antigua, P. O. Box 4036, Patrick AFB, Florida, 32925

VP2MM, Box 45, Plymouth, Montserrat, W. I.

VR4EE, P. O. Box 9, Honiara, Solomons

XW8CS (via W7QYA); (see text)

VS6RFS, P. O. Box 148, Santa Ana, El Salvador

YU3TZC, Box 54, Kranj, Yugoslavia

3A2DX, P. O. Box 52, Monaco

5N2KPT, Kaduna Polytechnic, Staff Development Ctr., PMB 2113, Kaduna, Nigeria

5V2WT, A. Meunier, B. P. 1166, Lome, Togo

7Q7AA, B. Martin (W4FOA), c/o U.S. Embassy, P. O. Box 380, Blantyre, Malawi

9Js 3ITU 5ITU (via RSZ)

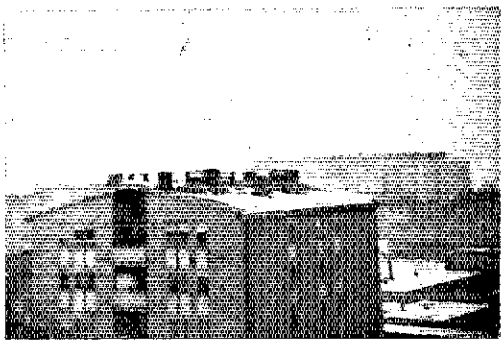
9U5CR, via O. Timmerman, ON5TO, Box 33, Brugge WV, Belgium

9V1QA, J. Smyser (W6BPO), c/o PanAm Saigon, APO, San Francisco, Calif., 96307

9Y4EW, 38 North dr., Champs Fleurs, St. Joseph, Trinidad

CP1HW (via K7DVK)
CT1LN (via K9CHY)
EI2VBE (to G3KKP)
FØVQ/FC (via DJ8JP)
FHØVP (via W2MZV)
FO8BW (to W6JFM)
GC5ANX (to G5ANX)
GD3WVG (to GW3WVG)
GM3CSM (via WB9BGS)
HC1NC (via YU1UW)
HS6ADE (via KØBHM)
JD1AAH (via JARL)
KA1B (via WA8NZH)
ex-KA2BW (to W6CPB)
KC4USM (via K2BPP)
KG4AS (to W2AS)
OJØDX (via OH2BH)
OX3AX (via OZ5GF)
OX3WQ (via OZ6MI
OX3XD (via OZ8KW)
PZ1BX (see text)
PZØITU (via PZ1DE)
SP9PT (via W3HNK)
TCØAE (via DL7FT)
TCØNC (via DJØUJ)
VP1EG (via K7DVK)
VP1WMU (to W5WMU)
VP2GJW (via DL9ST)
VR1P (see text)
VR2FR (see text)
VS5JK (via G3KPV)
XW8DG (via JA8FB)
XEØSCA (to WA4SCA)
YA1R (via G3TXF)
YB1BM (via DL7FT)
YT2BHI (to YU2RHI)
YVØBPG (to YV5BPG)
YVØPP (via VE7BWG)
ZS4JB (via K9CUV)
ZV1DBE (via PY1BQK)
3V8AB (via REF)
4Z4NBS (via WA3JGY)
5T2ITU (to 5T5BG)
5V4JS (via 5N2AAJ)
5W1AE (see text)
6Y5GS (via W4BYB)
9A1AIJ (see text)
9Q5MG (via DJ4PS)

Your Samaritan brigade for the preceding includes **Ws** 1CW 1DTU 1PL 1SWX 2BTQ 3ICQ 4JUK 4UVV 5BZK 5IB 8YGR 9LNQ, **K3**CUI, **WAs** 1JKZ 3JHB 6ENF, **WBs** 4GAH 4KZG 9CJS, **VE6**AP, **KP4**BJM, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *Didi-dumdum-didi* (WA6KZI), *DX News-Sheet* (G. Watts, 62 Bellmore rd., Norwich, Nor, 72 T, England), Far East Auxiliary Radio League (M) *News* (KA2LL), Florida DX Club *DX Report* (W4FRO), Greater Lansing DX Group *DX Bulletin* (WA8VBY), International Short Wave League *Monitor (A.* Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA3UI), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), Nigerian Amateur Radio Society *News* (5N2ABG), North Eastern DX Association *DX Bulletin* (K1IMP), Northern Cali-



YU3s TBM and EY, left and right, fire their big signals off the top of this Ljubljana edifice. Joze and Tine especially enjoy fast action with the W/K/VE/VO crowd in ARRL DX Tests. (Photos via WA1KQM)

fornia DX Club *DXer* (Box 008, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), UBA's *On the Air* (ONs 4AH 5VA), VERON's *DXpress* (PAØs FX LOU TO VDV WWP), Utah DX Association *Bulletin* (K7DEQ) and West Coast *DX Bulletin* (WA6AUD). TU!

Whence:

EUROPE—DARC (Germany) invites amateurs throughout the world to participate in its 1970 Worked All Europe DX Contest, No. 16 in the WAEDC series, scheduled for radiotelegraphy from zero GMT August 8th to 2400 the 9th, and for radiotelephony on September 12th-13th, same times. Non-Europeans will trade RST001, RST002, etc. (no "T" on voice, of course) with Europeans once per band at one point per QSO (2 points per 80-meter QSO). Additional points are yours by sending "QTC" (QSO reports) to European stations at one point per QTC. Each QTC consists of (1) time in GMT, (2) station call, and (3) QSO number of any previous WAE Test contact. For example, W9EVA raises DJ9YL and earns a contact point thereby; W9EVA previously worked G3LUV at 1207 GMT for (3LUV's 96th Test QSO. So, in addition to the QSO point for his serial swap with DJ9YL, another point goes to W9EVA if he successfully transmits "1207/G3LUV/096" to DJ9YL. W9EVA can work DJ9YL later on the same band only for sending more QTC. Over the entire Test period each QTC can be sent to Europe by W9EVA but once, and DJ9YL can accept no more than 10 QTC per band from W9EVA. Thus the more Test QSOs accumulated, the more QTC are available to parlay into more points. *Scoring:* Multiply combined QSO and QTC points collected on all bands by the combined numbers of multipliers collected on all bands, the latter deriving from DARC's Worked-All-Europe Countries List—C31 CT1 CT2, Germany, Spain, EA8 EI F FC G GC GD GI, Scotland, Shetlands, GW HA, Switzerland, Liechtenstein, HV, Italy, IS IT, Norway, Bear island, JW JX LX LZ, San Marino, OE, Finland, Alands, Market, OK ON OY OZ, Holland, Sweden, SP, Greece, Rhodes, Crete, European Turkey, TF, European Russia proper, Ukraine S.S.R., UC UN UO UP UQ UR, Franz Josef Land, YO YU ZA ZB2 3A and 9H1. Entries go to WAEDC Committee, P.O.B. 262, Kaufbeuren D-8950, W. Germany, postmarked no later than (cw) September 15, 1970, or (phone) October 15, 1970. Top Test performances in many regions will be rewarded with testimonials of merit. *Note:* Single-op participants work no more than 36 of the available 48 hours each week end, and divide the 12 hours not used into no more than three rest periods. See you along the north Atlantic path! . . . . . Results of last year's slam-bang WAEDC affair show entries filed by 62 U.S./Canadian mike men, 75 code hounds. Radiotelephony statistics first: Call area leaders hereabouts were K1HVV, WB2SQN, W3GM, WA4VIY, W5JAW, Ks 6AHV 7WWR, Ws 8HXZ 9EXE, WAØEMS, KH6IJ, KL7MF, VEs 1AIH 3GCO 4ZX 5TO and 6GN. In order of score we find W3GM, K1HVV, WB2SQN, K1THQ, Ws 2DKM 1UYU, DL7KX/W2, K6AHV, WA9NSR/1, W1s DTY DO VPY, WA2BHJ, W8HXZ, WAØEMS, W9EXE, WB2ZGI, Ws 3CRE and 5JAW, with W3ZKH & Co. filing a mammoth multioperator effort. On the sponsor's home front DJ2YA, DJ3JB, DM2ATD, DJ3WE, DLØBG, DJs 2TK 4UF 3UM, DK1YK and DL8OH finished in that sequence. Continental kingpins were CR6GO, DU1FH, EP2BQ, ON8CT, W3GM and YV4UA. Other winners per country are AP5HQ, CE6GI, CO2DC, CR7FR, CT1WB, EA3RF, F9RM, G3XYP, GC5AET, GM3VTB, HA5CQ, HB9AKJ, HK6BWX, HL9WH, HP1JC, HPGL, JA6DCE, KP4DCR, KR6JT, KZ5II, LA4ZB, LU8DKA, LX2CQ, LZ2EE, OD5BA, OE6RP, OHs 2BH ØNI, OK1AGQ, OZ3SK, PAØXPQ, PY2EAD, SL5AB, TR8DG, UA4KZZ, UB5DW, UC2BF, UD6CC, UH8BO, UI8CD, UL7BF, UO5BGD, UP2ER, UR2DL, UV9OP, VK3XB, VP9BK, VS6DR, VU2DK, YBØAAF, YO2BB, YU3EY, ZL1AGO, ZP9AC, ZS6ACK, 3Z8AJK, 4Z4HF, 5H3KJ 5N2AFF 7QTAM and 9Y4KR. Now for the radiotelegraphic review: U.S. and Canada call area toppers are W1BPW, WB2CKS, W3GM, K4DSN, W5JAW, Ks 6AHV 7WWR 8DHT, W9VNE, WAØKDI, KH6IJ, KL7MF, VEs 1EK 3AIA 4ZX and 6ARG. In magnitude of score we have Ws 1BPW 3GM, WB2CKS, WA1FHU, Ws 5JAW 9VNE, Ks 4DSN 5YAA 6AHV 4BAI 3HTZ, W1DTY, WA2HLH, K8s DHT BCK, WA6IVN, Ws 2DKM 2MYK and 4HOS, with Ks 4LK 8UDJ and WAØMLE running 1-2-3 in the multiop division. Germany's champs in scoring order are DL7AV, DJ3JB, DM2s ATD AUQ, DL6NB, DJs 1XT 6TK, DLs 8FR 3ZR and 8CM. Pacers by continent are CR6GO, DL7AV, LU1BB, UA9WS, W1BPW and ZL3GQ. Biggies by country are AP5HQ, CE8AA, EAs 2CR 8BK, EI5F, EL2Y, F6AAV, G3FXB, GC5AOM, GM3CFS, HA3MJ, HB9AGH, HP1BR, HA8E, JA1KSO, KR6FT, KZ5II, LAØAD, LZ1AZ, OD5LX, OE4SZW, OHs 5WH ØAA, OK1NR, ON4OV, OZ1LO, PAØINA, PY1ADA, PZ1AV, SM5CLU, UA9WS, UB5TH, UC2XW, UD6BW, UF6BD, UG6JJ, UH8RI, UI8AI, UL7GW, UM8FM, UP2CT, UQ2PG, UV3QM, VE2DHF/YV1, VK2APK, VS6FX, XE1KD, XW8BP, YBØAAF, YO8AP, YU4HA, ZL3GQ, 3V8NC, 3Z8AQN, 4U1ITH, 5H3KJ and 6W8XX . . . . . Remember that the first week end of this month features the Roumania DX Contest detailed in last month's "How's."

ASIA—JARL (Japan) invites world-wide participation in its 11th All-Asian DX Contest, a code-only deal, from 1000 GMT August 22nd to 1600 the 23rd, wherein non-Asians work Asians on 1.8 through 28 MHz exchanging serials to consist of RST plus the operator's age. (YLs are gallantly permitted to substitute two zeroes for the latter.) Final score derives from total contacts multiplied by total band-prefixes (JA1 JH1 JA2 HS1 HS2, etc.). Single and multiband categories are available but only single-operator activity is permitted for nonclub entries. Entries must arrive at the JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan, no later than November 30, 1970, to be eligible for possible certifications of outstanding performance . . . . . In last year's All-Asia shebang our side's call areas were led by WA1FHU, K2BQO, Ws 3MSK 4KXV 5WZQ, K4RVD/6, K7WWR, WA8AJZ, W9WCE, K1ZND/Ø,

(Continued on page 146)

Operating News

GEORGE HART, W1NJM
Communications Manager

ELLEN WHITE, W1YYM,
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE
DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD
Contests: ALBERT M. NOONE, WA1KQM
Public Service: WILLIAM O. REICHERT, WA9HHH

Restructuring. One of the motions made at the 1969 ARRL Board of Directors meeting in New Orleans called for appointment of a committee to study the League's field organization with the object of providing better contact between the headquarters and "those members whose interests do not presently coincide with the interests of the Communications Department." This committee, consisting of Directors Clark (W4KFC), Dannals (W2TUK) and General Manager Huntoon (W1LVQ), submitted its report to the May '70 meeting of the Board. The report is quite comprehensive and broad in scope. It mentions the need for recognition of shifting interests, unprecedented diversity and changes in emphasis, the failure of the present structure to accommodate specialists in areas other than traffic handling and emergency preparedness, the likelihood that simply issuing new "appointments" is not a satisfactory answer, and enlarges at length on the public service implications in nearly *every* facet of amateur radio. The objective of the committee was stated as " . . . to find ways to impart a stronger sense of affiliation and involvement in League affairs on the part of those not directly served by the Communications Department's field organization."

The report then went on to make three basic recommendations: First, to "broaden the scope of interests within the existing CD framework"; second, work through advisory committees; and third, "increase emphasis at division level on matters of concern to various specialty interests." The report wound up with a statement to the effect that increasing emphasis in the areas stated would be more effective than any attempt to restructure the existing CD field organization or its basic plan of operation.

The report was accepted by the Board and placed on file but resulted in no concrete action at this Board meeting.

Since then, the subject of restructuring has again come to the fore, in the form of an informal proposal by a member of the Board for revising the appointment structure and changing a few traditional CD concepts. This matter was covered in some detail in the *CD Bulletin*, but since one of the concerns seems to be that operating amateurs who are League members in many cases engage in activities that are not part of the appointment structure, a rundown in this column is appropriate. The proposals, made by WØPAN, new director of the Dakota Division, can be summarized as follows:

1) The field organization under the overall supervision of the elected SCM to be delegated to three section leadership appointees as follows:

(a) A Section Emergency Coordinator, with jurisdiction over Emergency Coordinators, no change from the present setup.

(b) A Section Net Coordinator (SNC), to consolidate and coordinate all traffic net activity in the section (regardless of mode) and supervise Net Manager appointees, the latter replacing the present RM and PAM appointments.

(c) A Deputy SCM, with same qualifications as the SCM to coordinate miscellaneous activities, act in the SCM's absence and to take over as Acting SCM should the SCM be unable to continue – until a proper election procedure can be completed. The "miscellaneous activities" would include those in the field of DX, VHF, Contests, etc., not at present covered by the appointment structure.

OPERATING EVENTS
(Dates in GMT)

	August
1-2	MDC QSO Party, p. 96 July
	Ill. QSO Party, p. 102 July
5	W6OWP Qualifying Run
8-9	Ohio QSO Party, p. 104 July
	WAE cw, How's DX
14	W1AW Qualifying Run
15-16	N.J. QSO Party, p. 106 July
22-23	All Asian contest, How's DX
29-31	S.C. QSO Party, Sta Act,
	September
3	W6OWP Qualifying Run
11	W1AW Qualifying Run
12	Open FMT, this issue
12-13	VHF QSO Party, this issue
	WAE phone, How's DX
12-14	Wash. State QSO Party
18	W1AW Morning Qualifying Run
19-20	VE/W Contest, this issue
	SAC, cw
21	9H1 Contest, IARU News
23-25	YL Howdy Days
26-27	SAC, phone
	October
3-5	California QSO Party
	Missouri QSO Party
7	W6OWP Qualifying Run
10-11	CD Party, cw
13	W1AW Qualifying Run
17-18	CD Party, phone
	RTTY SS
21-22	YL/AP, cw
	November
14-15	SS, phone
21-22	SS, cw

DX CENTURY CLUB AWARDS

From May 1 through May 30, 1970, DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to the amateurs listed below. The three columns at the right show issuances for radiotelephone operation.

New Members

W5LZZ	292	LA9AD	110	W6EBY	104	W9MYN	233	W9BHC	120	DJ5TL	101
CT1LN	247	W5RUB	110	WA8EVH	104	HK3WO	221	PY1CLJ	113	DL2EA	101
W4NW	201	DL7DO	109	K3ATO	103	DK1YK	196	SM9CER	112	KZ5II	101
JH1ELR	186	W8III	108	UA3RH	102	HK5AZA	172	JH1ELR	110	WA5RVX	101
ZP5KA	176	K6HEM	107	W2UBJ	102	CP1HW	156	PZ1AK	110	W8AAM	101
II1YU	166	WB2IBD	106	W2UL	102	II1YU	156	WB6GKK	110	WA9OMR	101
PY7VON	152	W4OZF	106	W7RO	102	9V1NR	133	W8MXO	109	K8BKF	100
IIW9WR	151	DJ9NA	105	KA2KE	101	ZP5KA	131	K4AKP	107	KL7AGU	100
9V1NR	134	DK3BS	105	VE1QJ	101	TI2KZ	128	JA3HUJ	106	PA9PMC	100
K4ACP	133	JA9AXV	105	WB2VFT	101	K6SVL	127	UA4HH	106	WB2IBD	100
W9BHC	127	VQ8BL	105	WB6ICM	101	WB2SIQ	120	W6KDI	105	WB4APP	100
UA3HH	126	DA1IA	105	WA9ZAK	101	WA3LVX	120	DJ4FT	103	WA9ZAK	100
OA4IW	125	UW3HV	105	EA8EC	100			UL7NW	103		
WA5SDT	123	W6AJZ	105	JH1CXQ	100			WB6VGA	102		
SM9CER	121	W4UDS/9	105	K8RXD	100						
W9CU	119	YU4AAW	105	VE3FUW	100						
KZ5II	118	DJ5TL	104	WB2YPN	100						
K9QMX	116	DL2EA	104	WA6INK	100						
DL8BB	114	OE1CP	104	WA8MNF	100						
JA2DXZ	113			WA9AWH	100						

Endorsements

Endorsements issued for confirmations credited from May 1 through May 31, 1970 are listed below. Endorsement listings from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 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. The columns below cover radiotelephone.

335
KH6CD
320
VE2WA
W2CKY
W9GB
WØBK
315
OA4E
W1BPW
WB2FMK
310
JA6AD
K4ID
WB2EPG
WA4WIP
305
W1WQC
300
K2KBI
W3LPF
W4NO
290
G3IEC

WA2FQG
W9WNB
WØBL
XE2YP
280
K4HXF
W2MZV
W1FJJ
W5MCO
270
JA1MIN
K8UDJ
OZ6MI
VE3GCO
W1RLV
W4OEL
260
K2DKK
WA4VDR
W6LYC
250
K3SGE
K6BIA
WA2HSX
XE1KS

240
DJ4XA
K6OZL
KL7MF
OH2BAC
WA4LSK
W6CS
220
HB9AIJ
JA1GJE
K1KNQ
K3OTY
KH6SP
OE8RF
OH2QQ
OZ3PO
SM3BNV
W2MB
W3CKE
WB6IUH
W8BQV
W8GMX
200
DK1YK
K4LR
K6YUI

W1AJO
W2JWK
W3HNK
W3JXH
W4PLM
W6OL
W8IPA
W8MKF
W8YAH
WA8EDC
180
DI9ON
K6BTT
K9KXA
OZ3KF
W5HCJ
W6UZ
WØIU
160
DJ3NK
DJ5EY
W1LMZ
WA2HIU
W3QLW
140
DL3YO

K2MFY
KZ5EK
WA1FHU
WA3EFH
ZP9AY
120
CT1SH
JA8SW
K4RDU
K7GYA
K8HWW
K9ENC
LA5SH
OH8KLD
OW9CE
VE2UN
W1FTU
W2SZ
WA2DHF
WB2GDN
W3BRB
W4MGL
WB4IER
WA5UCT
W6ONG
W9KCY

320
W2CKY
W7AIS
315
W6CHV
310
F2MO
W7KH
305
W1WQC
W4CWV
WA4WIP
300
W1BHP
290
TG9AD
W5LZZ
XE2YP
280
PY2ASO
YV4QG

270
WA2FQG
W8VHY
YV4UA
9M2DQ
260
F5JA
WA4SPX
WØBK
250
WØIJM
XE1KS
240
DL9CQ
WA2HSX
WB2VZW
W9KRU
WØBL
220
CT1MW
CT1UE

K3OTY
WA4LSK
W6GRV
200
CT1LN
GW3NWV
K4BHF
K4BKF
OA8V
VE3GNM
WA4FDR
WB4BAP
WB4GTC
180
K2DDK
K6BTT
W7IWF
W8LAX
160
DJ4XA
F2YS
K4AJR

K7RDH
KL7MF
LA6RL
OZ3KE
WØPAN
WAØHMP
140
CR6HF
DJ3NK
W4HDK
W4PLM
120
HB9AKQ
K2KGB
K7GYA
PY1MHB
WB2GQK
WA5CST
W7BKR
WA7EES
W9YRM
WA9FBZ
WØUCK

2) New "field" (station) appointments as follows:

(a) Official Traffic Station (OTS), to replace ORS and OPS.

(b) Official League Station (OLS) appointments to be made available to Intruder Watchers, VHFers, AREC members, experimenters, repeater enthusiasts, DXers, Contesters, etc.

(c) The OO appointment would remain as at present, and the OBS appointment would be abolished. Presumably, the OVS appointment would be absorbed as OLS.

3) Revise the National Traffic System to eliminate multiple relays as now and establish Nets on phone (15, 20 and 40 meters) to handle traffic between states as a replacement for TCC, with the Section Net Coordinators insuring equitable distribution between modes.

4) Eliminate the BPL and establish a new PSHR point system assigning single points for each net QNI, each phone patch, each message handled, double points for each NCS function, each assigned net liaison function and each emergency message handled, no maximum to the number of points assigned to each function and requiring 75 points to get a PSHR card certificate. Three PSHR cards would result in a *QST* listing showing total points earned, without a breakdown. Four such *QST* listings to earn a medallion.

Sound interesting? The last time a restructuring proposal was made it was hardly mentioned in *QST*, but was discussed at length in the *CD Bulletin* and a couple of polls taken. In general, the feeling was to leave the field organization alone. What do the non-appointee operating members think about it?

It should be emphasized that the above are one man's proposals and entirely unofficial. Outlining them above doesn't even necessarily constitute an endorsement. But perhaps they will serve as a springboard for discussion. If you write expressing your opinions, it might be a good idea to send off a copy to your director. You'll find his address on page 8 of this issue of *QST*. – *WINJM*.

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.

Here's a photo of "The Wandering Groves - Hawaiian Style," thanks to KH6BZF! (l - r) standing, KH6IJ ORS and prexy of the Honolulu Amateur Radio Club, KH6BZF SCM OPS OO, W5NW ARRL V.P., KH6GJN OPS PAM. Seated (l - r) W5DUR XYL of W5NW, XYL of KH6GJN, XYL of KH6IJ.

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 two years immediately prior to nomination. Petitions must be received on or before 4:30 PM on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of the 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, W1NJM, Communications Manager

Section	*Closing Date*	*SCM*	*Present Term Ends*
Idaho	Aug. 10, 1970	D.A. Crisp	Aug. 17, 1970
Nev.	Aug. 10, 1970	L.M. Norman	Oct. 22, 1970
C.Z.	Sept. 10, 1970	R.L.Oberholtzer	Nov. 10, 1969
Mar.	Sept. 10, 1970	W.J. Gillis	Mar. 11, 1970
Sask.	Sept. 10, 1970	G.C. Pearce	Apr. 11, 1970
Alaska	Sept. 10, 1970	A.F. Weber	July 10, 1970
Utah	Sept. 10, 1970	T.H. Miller	July 15, 1970
Ky.	Sept. 10, 1970	G.S. Wilson III	Nov. 12, 1970
Minn.	Sept. 10, 1970	L.J. Shima	Resigned
Ark.	Sept. 10, 1970	R.D. Schaefer	Resigned
N.N.J.	Oct. 9, 1970	L.J. Amoroso	Dec. 9, 1970
S.Tex.	Oct. 9, 1970	G.D. Jerry Sears	Dec. 10, 1970
Md.-D.C.	Oct. 9, 1970	J. Munholland	Dec. 19, 1970
Ala.	Oct. 9, 1970	D.W. Bonner	Dec. 26, 1970
N.H.	Oct. 9, 1970	D. Morgan	Jan. 2, 1971
Miss.	Oct. 9, 1970	C.C. Comfort	Jan. 2, 1971
Alta.	Nov. 10, 1970	D. Sutherland	Jan. 10, 1971

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.

Ont.	Holland H. Shepherd, VE3DV	May 11, 1970
La.	J.Allen Swanson, Jr., W5PM	June 10, 1970
Iowa	Al Culbert, KØYVU	June 10, 1970
S.C.	Elizabeth Y. Miller, WA4LEP	June 16, 1970
W.N.Y.	Richard M. Pitzeruse, K2KTK	August 17, 1970
S.J.V.	Ralph Saroyan, W6JPU	August 20, 1970

In the Western Pennsylvania Section of the Atlantic Division, Mr. Robert E. Gawryla, W3NEM, and Mr. George E. G. Markis, K3ZNP, were nominated. Mr. Gawryla received 344 votes and Mr. Markis received 255 votes. Mr. Gawryla's term of office began June 11, 1970.

April CD Parties

In the following tabulation of high *claimed* scores, read (from left to right) : total score, number of QSOs, number of sections, hours of operation. Final adjusted scores appeared in the July CD Bulletin. – *WA1KQM*

CW

W8SH (K1ZND, opr.)	296,800-841-70-20
K4PUZ	280,140-805-69-20
WA9QBM*	273,020-797-68-20
VE7BDJ	267,720-769-69-20
W1ETU	251,130-761-66-20
W3IN	227,460-663-68-20
W4UQ	220,150-622-70-18
WA2CAL	214,775-598-71-

PHONE

W3IN	96,075-299-63-10
K1TZD (WA1IQJ, opr.)	92,100-302-60-14
W2CXM (WA3HRV, opr.)	90,480-312-58-13
KØYVU	79,950-242-65-12
W4DQD	66,000-217-60-12
K4FU	62,130-211-57-10
K1HHN	60,060-225-52-12
K3HZL	60,030-207-58-07

*Adjusted score

5 B DXCC

No. 23 – DL9OH
No. 24 – W8JIN
No. 25 – HK3WO
No. 26 – W6ANN
No. 27 – W9HUZ
No. 28 – W2NQ
No. 29 – DL3RK
No. 30 – SMØAJU
No. 31 – OZ1LO
No. 32 – I1KDB
No. 33 – W9BGX
No. 34 – ZL3GQ
No. 35 – G3HCT

W1AW SCHEDULE, AUGUST

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.–1 A.M. EDST, Saturday 7 P.M.–1:00 A.M. EDST and Sunday 3 P.M.–11:00 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you.

	Sunday	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	← C.W.-OBS[1] →					
0020–0030[4]	.....	.....	3.700[6]	14.020	14.020	7.150[6]	14.020
0030	.....	.....	3.700[6]	14.100	14.100	7.150[6]	14.100
0100	.....	← Phone-OBS[2] →					
0105–0130[4]	.....	.....	3.820	50.120	145.600	1.820	21.270
0130	← CODE PRACTICE DAILY[1] (35-15 wpm TThSat), (5-25 wpm MWFSn) →						
0230–0300[4]	.....	.....	3.555	.....	1.805	.....	3.555
0300	RTTY-OBS[3]	← RTTY-OBS[3] →					
0310–0330[4]	.....	.....	3.625	14.095	7.095	14.095	3.625
0330	Phone-OBS[2]	← Phone-OBS[2] →					
0335–0400[4]	.....	.....	7.220	3.820	7.220	3.820	7.220
0400	CW-OBS[1]	← C.W.-OBS[1] →					
0420–0430	.....	.....	3.700[6]	7.020	3.945	7.150[6]	3.520
0430–0500	.....	.....	3.700[6]	7.080	3.945	7.150[6]	3.555
1300	.....	← CODE PRACTICE[1] (5-25 wpm MWF), (35-15 wpm TTh) →				.....	
1700–1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900–2000	.....	14.280	7.255	14.280	7.255	14.280	.....
2000–2100	.....	14.100	14.280	14.095	21/28[5]	7.080	.....
2200–2300	.....	21/28[5]	21.100[6]	21/28[5]	7.255	14.280	.....
2300–2330	.....	.....	.....	RTTY OBS[3,7]	.....	.....	.....
2320	← CODE PRACTICE DAILY[1] 10-13-15 w.p.m. →						

[1] CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, 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 28.095 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 QI8 WPR. * Times-days in GMT. Operating frequencies are approximate.

W1AW Code Practice

W1AW transmits daily code practice according to the following schedule, showing speeds, local times/days, and GMT times/days. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. (Each tape carries a checking reference.)

Speeds	*Local times/days*	*GMT times/days*
10,13,15	7:30 P.M. EDST daily 4:30 P.M. PDST	2330 daily
5,7½,10, 13,20,25	9:30 P.M. EDST SnTTh 6:30 P.M. PDST Sat	0130 MWFSn
"	9:00 A.M. EDST MWF 6:00 A.M. PDST	1300 MWF
35,30,25, 20,15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThSat
"	9:00 A.M. EDST TTh 6:00 A.M. PDST	1300 TTh

The 0130 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 June *QST* practice text to be sent in the 0130 GMT practice on the following dates.

Aug. 17: It Seems to Us, p. 9
Aug. 20: A Digital Generator, p. 11
Aug. 26: Hi-Fi Interference, p. 25
Sep. 1: Let's Talk Transistors, p. 33

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

Sep. 4: Building Receivers, p. 136
Sep. 9: Stability, p. 136

ARRL 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 qualified at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will simultaneously transmit a qualifying run on 1.805 3.520 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz at 0130 GMT August 14. (In converting, 0130 GMT August 14 becomes 2130 EDST August 13.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz, 0400 GMT August 5. (In converting, 0400 GMT August 5 becomes 2100 PDST August 4.) QST

5 B WAS

No. 8 – K4GHR
No. 9 – W4YWX
No. 10 – XE1WS
No. 11 – K4IEX
No. 12 – WA1IHN
No. 13 – W3WGH
No. 14 – WØWLO
No. 15 – W8BT
No. 16 – W2PV

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. The Delaware Hamfest will be held at Banning Park Aug. 16. Tickets are available by writing W3DKX, 345 E. Roosevelt Ave., New Castle, Del. Renewals: WA3GSM as OPS/EC, W3DKX as SEC. K3CUU is now a captain in the Army. WA3DYG nabbed the Extra Class license. W3HGA is communicating with HPIRC for Partners of Alliance for Progress. WA3KFR has joined Army MARS. WA3DUM is working at WTUX. Golf is interfering with ham radio at W3HKS. W3EEB is very busy with his new campground. The Brandywine ARC set up an Oscar tracking station and logged 66 passes on 10 meters. New gear Dept.: WA3KDR has a new SB-401, WA3FCX an HW-100, WA3LQX an SB-301 and 401 combination, WA3LTA a new Hallicrafters receiver. Traffic: (May)W3DKX 32, W3EEB 12, WA3DUM 10, WA3GSM 6, W3TRC 2. (Apr.) W3TRC 8.

EASTERN PENNSYLVANIA – SCM, George S. Van Dyke, Jr., W3HK – SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX. PAMs: WA3GLI, K3PSO. VHF PAM: W3FGQ. OO reports were received from K3RDT, W3KEK, K3HNP; OBS reports from WA3AFI, WA3EEC, WA3JKB, WA3KFT, WA3IHV, W3CBH; OVS reports from WA3JWL, WA3MCK, W3ZRR, K3WEU, W3CL, WA3FMI, WA3NVO, WA3EEC, WA3KFT. PSHR: W3EML, WA3FMI, K3OIO, W3MPX, WA3CKA.

Net	*kHz*	*Operates*	*QNI*	*QTC*	*RM/PAM*
EPA	3610	6:45P Daily	213	238	W3MPX
PTTN	3610	6:00P Daily	142	113	W3MPX
PFN	3960	5:30P Mon-Fri	428	327	K3PSO
EPAEP&TN	3917	6:00P Daily	322	122	WA3GLI

Nets not listed did not report activity for the month. The Knuckleheads will hold their 13th Annual Picnic Aug. 8. Anthracite QCWA will hold its banquet Oct. 3. WA3IHV is busy at school. K3WEU is back in Maine for a spell. The PFN Dinner was a real success. W3VA is going wild on DX! Most clubs report going all out on FD exercises. W3CUL and W3VR are back from the deep South and our traffic total shows it! For 10 bucks WA3IYC converted an old BC-453 into a super cw receiver. W3EML is looking for good cw operators for TCC work. If you think you are up to it give him a buzz. Band conditions sure have made nets difficult lately. It is about evenly divided between guys with rights and QSB/QRN. Cheer up, things can't get any worse. W3CDB is getting back in harness after a long absence. WA3DQS reports getting his 1st-class phone ticket with radar endorsement at the ripe old age of 17! BPL: W3EML, W3CUL, W3VR, WA3FMI. WN3NES got his big G ticket. W3HUG is looking for activity on 1296. If you fellows don't send me any news I can't fill the pages, so what say next month? Traffic: (May) W3CUL 3447, W3VR 914, W3EML 549, W3MPX 367, WA3FMI 207, WA3LMO 190, K3MVO 117, K3PSO 103, K3OIO 69, W3FGQ 68, WA3NVO 65, WA3CKA 61, WA3AFI 60, WA3ATQ 60. W3HK 57, WA3JZB 36, W3HNK 31, WA3IYC 31, WA3IHV 22, W3FPC 21, WA3EEC 20, W3VA 15, K3PIE 14, WA3MCK 11, W3VAP 11, W3JSX 7, K3KTH 6, WA3BJQ 4, W3BNR 4, W3CL 3, W3OML 3, WA3JWL 2, W3PVY 2, W3ADE 1, W3AIZ 2, W3BUR 1, W3EU 1, WA3IAZ 1, WA3JKB 1, W3KEK 1, WA3KFT 1. (Apr.) K3PIE 123, K3OIO 68, WA3EEC 8.

MARYLAND-DISTRICT OF COLUMBIA – SCM, John Munholland, K3LFD – SEC: W3LQY. PSHR: W3TN, W3EZT. Appointments: K3FSY as ORS, W3FDU as OO-III, K3STU as OO-I, W3CSZ as OO-I, WA3LFL as OO-I. Congratulations to W3GKP on receiving (jointly with W4HHK) the ARRL Technical Merit Award for outstanding achievements in moonbounce communications. W3CSZ operated maritime mobile sailing a ketch from Connecticut to Annapolis. W3GN was a guest operator at AIR for Armed Forces Day and will operate under his "alias" call, WB8GDL, during vacation in Aug. EC W3FDU aims to keep his Anne Arundel County ARFC gang on its toes with surprise drills. OO K3STU wrote W1NJM at length about points raised in the last Official Observer's Bulletin and got a nice long reply. WA3BOP reports that Antietam Club station WA3NUL-TV436 is on the air with 30 watts of power and a 22-element antenna at 2145 feet above sea level. W3ZSR built himself a modified version of the 9TO keyer. K3NCM is too busy at work to ham to his heart's content but manages to fire up the mobile rig now and then. The many friends of W3HLE were saddened by word of his passing on May 25. W3EZT ran an emergency phone patch to Lima, Peru, following the May 31 earthquake there. W3FA "raised" his antennas two feet by cutting the grass, with the aid of a tractor. W3FA, K3GPN and W3CSZ were guest operators at NSS on Armed Forces Day. WA3AJR is rejoicing – school's out for the summer. W3JPT participated in the ITU World Communications Day Contest on May 17. EC WA3IHW mailed a very fine circular and questionnaire to about 100 stations in the District of Columbia, giving information on local public service operations and inviting participation by addressees. WA3LFL attended the AFCEA Show and tuned the new Collins 651S-1 – a computer programmed receiver. WA3CUC and other members of the Antietam Radio Association were happy to welcome W3GRH and WA3CFK at a recent meeting after a "long time no see." Traffic: WA3FXJ 25513, W3EAX 2738, W3TN 275, K3FSY 140, W3EZT 65, W3FA 60, K3LFD 42, W3FCP 30, WA3IYS 29, WA3IIV 26, WA3IHW 24, W3ZNW 24, WA3GXN 21, W3LQY 15, K3QDC 15, WA3LKJ 12, WA3ERL 11, WA3EOP 9, W3CWC 5, K3GZK 4, W3ZSR 2.

SOUTHERN NEW JERSEY – SCM, Charles E. Travers, W2YPZ – SEC: W2LVW. RMs: WA2KIP, WA2BLV. PAM: W2ZI. The Englewood Radio Assn. invites all amateurs the world over to take part in the Eleventh New Jersey QSO Party. Mark your calendar for Aug. 15 and 16. Stations planning to participate are requested to advise the EARA by Aug. first of your intentions so that they may plan for full coverage from all counties. The NJEPTN Mgr., W2PEV, advises that there were 31 sessions for the month of May with 551 QNIs and 308 traffic. These are difficult days for copying traffic because of frequent thunder showers with its accompanying static. WA2DRG again made the Honor Roll with a total score of 49 points. Very good, Randy, and best wishes for the coming college days. W2BAY continues very active stimulating SJRA net activities. K8JLF of Princeton University's station W2PU, reports the election of the following officers for 1970-71: WA3DBJ, pres.; K7OWT, secy.-treas. Our congratulations and best wishes for a very successful year. K3CPF of station W2ZQ, ran phone patches for K5AAS/MM, USS *Simon Lake*, for seven consecutive hours on May 30 and 31 and also relayed traffic for Guam. W2BLM does a wonderful job with Boy Scouts by planning a Canadian trip for this summer. WB2DRG and WB2ZED should be operating 2-meter fm. W2ORS spends some of his time umpiring Little League games. A very worthwhile project, Charlie. Traffic: (May) WB2VEJ 137, WB2DRG 93, W2PU 60, W2ZQ 57, W2BLM 36, K2RXB 34, W2YPZ 27, WB2ZED 14, W2IU 9, W2ORS 5, W2FBF 2, WB2HMU 2. (Apr.) WB2FJE 16.

WESTERN NEW YORK – SCM, Richard M. Pitzeruse, K2KTK – Asst. SCM: W2PVI. SEC: W2RUF. The list of RMs, PAMs, and section nets appears in July *QST* Station Activities. WB2NNA/WA2PZD has renewed as OO. Both the Rochester and Rome Hamfests were well attended. WB2FHS is debugging a new 800-watt linear. K2PVN has the 6-meter fm gear hopping. WB2FPG and new XYL enjoyed an Aruba honeymoon. WB2WGF has gone fishin' and tells some wild fish stories. W2RQF repaired all the rigs and does a stint as NCS on WA2CAL's CW NYPON. K2DNN blew up the Valiant and the SR-160. WA2ANE has a new GT-550 and TA-31. W2EMW says DX has been poor but he did manage 5 HS QSOs. WB2QKQ and K2ZSF are alternating net controls on EC WA2AWK's Onondaga County ARFC Net. ARATS and RAWNY combined efforts for Field Day. RAWNY held a ham auction with 150 in attendance. The South Towns Amateur Radio Society is starting a net on 10 meters. When the band is dead, WA2GRP is

getting through with his new vertical. W2GIH is an instructor in USPS radio. Congratulations to W2QLK on becoming an octogenarian. The Otsego Amateur Radio Club combined efforts with the Bainbridge amateurs to provide communications for the Annual General Clinton Canoe Regatta on Memorial Day. WB2ZDP has changed work shifts and looks forward to some good daytime 6-meter openings. WB2MBP is the new Livingston County RACES Officer. WA2JZZ is a new NYPON member. The RIT Amateur Radio Club is proud of its new tri-bander and Henry 2K on the way. OVS WA2BPE did some interesting orbital predictions for Australis-Oscar V. WA2WMT is with the USAF in California and can be found nightly on 14265 kHz or in DX Contests at W6VSS. NYS handled 277 messages in May with 743 check-ins. Congratulations to two new ARRL affiliated clubs, the Jamesville-Dewitt High School Amateur Radio Club and the Monticello High School Ham Radio Club. We could use some of you fellows who participate in local emergency nets to act as Official Bulletin Stations on your nets. BPL: WA2CAL and W2OE. PSHR: W2OC, W2FR, W2MTA, W2RUF, K2KIR, K2KTK, WA2CAL and WA2ICU. Traffic: (May) WA2CAL 503, W2FR 315, W2OE 275, K2KTK 209, WA2ICU 174, W2OC 142, W2RUF 114, K2KIR 96, W2MTA 89, W2FEB 84, W2HYM 79, WB2SMD 78, WB2VND 62, W2RQF 57, WA2BEX 32, K2OFV 26, WB2FHS 19, K2IMI 19, WB2WGF 19, WA2KAT 18, W2EVH 11, WA2ILE 10, WA2JZZ 10, W2AFB 9, K2DNN 8, W2DBU 7, WB2YEE 7, W2PVI 6, W2RUT 4, WA2ANE 3, WB2FPG 3, WA2GLA 1. (Apr.) WB2WGF 24, WA2ILE 5, WA2AIV 4. Total 2522; last year 2222.

WESTERN PENNSYLVANIA – Acting SCM, G.R. Stoneburner, WA3AKH. SEC: W3KPJ. PAMs: W3WFR, K3ZNP. RMs: WA3AKH, W3KUN, W3LOS and W3NEM.

Net	*Freq.*	*GMT*	*Sess.*	*QNI*	*QTC*
WPA	3585	2300	31	354	132
WPP	3955	0200	28	99	15

If you should read these lines before it's too late, don't forget the South Hills Brass Pounders and Modulators 33rd Annual Hamfest to be held at St. Clair Beach Aug. 2. W3BRB and K3HSM are newly-elected directors of the Radio Assn. of Erie. The new officers are K3AFO, pres.; K3TUP, vice-pres.; W3TPW, secy.; WN3MAU, treas. This column congratulates Gilbert Crossley on being named Honorary Vice-Pres. of ARRL at the recent Board Meeting. W3ZUH is nearing his goal of five-band DXCC. WN3KXO is leaving 3-Land for Florida; W3YD has moved to California; WA4RBO/3 is off on a new assignment on Taiwan. Congratulations to W3KGF, who now has his Advanced Class ticket. W3KPJ spent the entire day at the Pittsburgh Hamfest signing up new members for AREC. New appointments: K3YVU as EC for Lawrence County; W3VWA as EC of Somerset County. By the time these lines are printed you will have elected a new SCM for the Western Pennsylvania section. Robert E. Gawryla, W3NEM, and this will be my final column as your Acting SCM. I thank all who have contributed information to me and I especially express my appreciation to each of the clubs who have so kindly furnished me with their club papers. Traffic: (May) WA3IPU 187, K3ZNP 153, W3KUN 95, W3LOS 58, WA3AKH 48, K3ZOB 31, K3HCT 21, W3UHN 10, W3YA 8, K3SJN 7, W3UT 4, W3SN 3, WA3JBN 1. (Apr.) K3HCT 7.

CENTRAL DIVISION

ILLINOIS – SCM, Edmond A. Metzger, W9PRN – SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). RM: WA9ZUE. Cook County EC: W9HPG.

Net	*Freq.*	*GMT/Days*	*Tfc.*
IEN	3940	1400 Su	20
ILN	3760	0000 Dy	163
NCPN	3915	1300 M-Sa	110
NCPN	3915	1800 M-Sa	
Ill PON	3915	2245 M-F	504
Ill PON	3915	1430 M-F	
Ill PON	145.5	0200 MWF	12
Ill PON	50.28	0200 M	0
Great Lakes	3932	0230 Dy	133

New officers of RAMS (Radio Amateurs Megacycle Society) are W9DY, WA9VOL, W9NIX and WA9KHR. WB9ATB is attending Air Force Air National Guard Communications School. W1LVQ, W9HPG and W9PRN, ARRL officials, attended and manned the League's booth at the Starved Rock Radio Club's Hamfest. The night before, they had to leave the Streator Radio Club Banquet at the Elks Club after the kitchen caught afire during the salad course. Our sympathy to the family and friends of K9DZH, who joined Silent Keys. He was the father of W9FJP and father-in-law of WA9THM. WA9JXT, W9QKE, K9YST and WA9ZOL are the incoming officers of the York Radio Club. W9HRY reports that the Ninth Regional Net's traffic count was 587 for the month of May. A new Novice heard on the bands is WN9DXT. New calls heard on 2-meter fm include W9IYK, K9WTS and K9PZZ. K9DGG and K9LFA have been appointed Radio Officer and Asst. Radio Officer of Boone County RACES. The Rockford area amateurs assisted with the River Cleanup project on May 23. Those participating were W9MAP, K9AMJ, K9ORU, K9PAK, K9QYY, K9SAN, WA9BLJ and WA9BWK. WB9EBK is a new General. W9LDU has inaugurated a new Illinois Severe Weather Watch on ssb 3940. As this is being edited many clubs are announcing their Field Day plans. WN9EET and WN9ECT are new Novices. The Western Illinois ARC held its Hamfest June 7 in Quincy. K9AVQ passed the Advanced Class exam. Traffic: (May) W9FUN 206, W9NXG 186, W9NXJ 131, W9FLF 123, WA9WNH 114, K9AVQ 91, WA9SFB 77, WA9ZUE 76, WA9NZF 73, WB9DPU 72, W9HOT 61, W9DOQ 59, WA9BRQ 46, W9LNQ 45, WA9ZPL 29, W9YH 25, WB9BXX/9 22, W9PRN 22, K9RAS 22, WA9TCC 22, WA9LDC 17, W9KUN/WA9RTB 13, WB9AJB 12, W9FHJ 12, K9HSK 12, W9HJM 8, K9WMP 8. (Apr.) WA9BRQ 28, W9FHJ 25.

INDIANA – SCM, William C. Johnson, W9BUQ – SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT. PAMs: K9CRS, WA9OHX, (vhf) W9PMT.

Net	*Freq.*	*Time/Days*	*Tfc.*	*Mgr.*
IEN	3910	1230 Dy 2300 M-F	119	WA9OHX
ISN	3910	0000 Dy 2130 M-S 2300 S-S	403	K9CRS
QIN	3656	0000 Dy	236	WA9WMT
ITN	3740	0000 Dy		WA9WHD
PON	3910	1245 Sun.	83	WA9UMH
PONVHF	50.7	0200 M-Thurs.	30	WA9TJS
Hoosier VHF			69	W9PMT

With deep regret I report K9ONY, of Anderson, and WA9IAJ, XYL of K9ZHV, as Silent Keys. WA9ABI has upgraded his license. WA9YJV provided communication for the Explorer Scouts Safe Driving Road Rally May 9. W9JYO broke her right wrist and now is working cw and typing with her left hand. K9JSI reports that 146.94 fm is very active around La Porte. WA9CUW is back on the air. W9PUB is putting up his quad again. WA9FDQ is halfway through basic training. WA9RNT reports things are looking up at Elkhart. W9JBQ is the EC for Clark County; WA9KWH is the EC for Jay County. W9JBQ has a new rig. WA9WMT needs more net control and alt. net control during the summer months. W9HRY, 9RN mgr., reports that TFC has been very good. All of the Indiana nets listed above need alt. net control during the summer months, as this is vacation time, also. IPON Net has new net managers, WA9UMH, for hf and WA9TJS for vhf. I will be on slow scan as soon as I pass the Advanced Class exam. WA9VJY is located in the Christian Missions Bldg. in Indianapolis. Contact 9Q5AF and 9Q5GJ daily, also ZP5KB and ZP5KU. W9AI is ch. op., assisted by W9HNS. QIN Honor roll: K9VHY 22, WA9WMT 21, WA9KAG 20, W9BDP 19, W9QLW 19, WA9ZKX 19, W9GTW 16, W9QXF 16, W9JBQ 15. Amateur radio exists because of the service it renders. BPL certificates went to W9JYO, WA9QOQ and W9EQO. Traffic: (May) K9FZX 482, W9JYO 339, W9JBQ 305, W9EWH 201, W9GGW 162, WA9QOQ 162, WA9WMT 161, W9HRY 153, W9ICU 120, W9LQO 118, WA9OHX 95, W9QLW 70, K9CRS 53, WA9CEG 52, W9BUQ 50, WA9QOR 35, WA9WJA 34, K9RWQ 29, K9CBY 28, K9KTB 27, W9MZV 24, W9YYX 23, WA9BHG 21, W9EUM 21, K9YBM 20, K9RPZ 18, WA9CHY 17, K9ILK 17, WA9OAD 17, K9VHY 17, WA9TJS 13, WA9VBG 12, W9PMT 11, WA9GJZ 9, WA9YXA 9, WA9BDP 8, K9JOY 7, WA9LHG 7, W9DZC 6, WB9AMB 4, W9AQW 1. (Apr.) WA9YXA 38, W9CMT 16, WB9AMB 12, K9QVT 8, WA9WSX 7.

WISCONSIN – SCM, S.M. Pokorny, W9NRP – SEC: W9NGT. PAMs: WA9EZT, WA9IZK, WA9OAY, WA9OKP, WA9QNI. RMs: K9KSA, WA9TXN.

Nets	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985	1245 Mon-Sat	368	215	WA9OAY
BEN	3985	1800 Daily	626	68	WA9QKP
Wi-Pon	3925	1801 Mon-Fri	429	81	W9VCM
WSBN	3985	2300 Daily	1204	160	WA9QNI
WSSN	3780	0030 TTSat	65	10	K9KSA
WIN	3662	0115 Daily	229	81	W9HQT
WRN	3620	0130 Su. (RTTY)			K9GSC
SW2RN	145,300	0230 Daily	169	9	WA9IZK
SW6RN	50,400	0300 Mon-Sat	145	2	WA9EZT

*All nets one hour earlier during Daylight Saving Time. The special Bring'em Back Alive Net, with WB9ABF and W9CBE as NCs, operated over the Memorial week end May 29-30-31, handling road and traffic condition to the Madison office of the AAA. Many thanks to all who participated. See you again during the July 4 week

EIMAC's new family of outstanding power tetrodes offers 13 impressive features:-

(1) High linearity, 3d order products −40 dB or better.

(2) Low input capacitance. Typically, 45 pF.

(3) Over 600 watts measured output at 865 MHz.

(4) Very high gain-bandwidth product. Over 125 MHz.

(5) Low grid interception in linear amplifier service.

(6) Low drive. Typically 40 volts for class AB-1 service. Easily driven at 150 MHz with 5 watt solid state device.

(7) Plate dissipation up to 800 watts. Both air and liquid cooling available.

(8) Coaxial base adapter available.

(9) Shock-resistant design for rugged service.

(10) 20 kW pulse output at 430 MHz.

(11) Very low cathode lead inductance.

(12) 5-pin base adapted for heat-sink cooling.

(13) High grid and screen dissipation ratings.

The unique 4CX600 family is an exciting result of EIMAC's CAD (computer-aided-design) program for ceramic/metal tetrodes. Closely controlled parameters permit intermodulation distortion limits to be included as a defining tube characteristic, establishing new criteria of performance.

EIMAC's advanced segmented cathode and electron focussing combine with an unusually high figure of merit in this family, providing you with tubes useful in widely diversified services: linear amplification, high reliability aircraft-to-ground communication, wideband distributed amplifier service in airborne ECM gear, and r-f pulse application.

Another example of EIMAC's ability to provide tomorrow's tube today! Here are the numbers to prove it:

TUBE TYPE	FIL VOLTS	RATED TO: (MHz)	BASE	COOLING	MAX. RATINGS Plate Volts	MAX. RATINGS Plate Amperes	TYPICAL POWER OUTPUT (150 MHz)	USEFUL FOR:
4CX600B	6.0	850	5-PIN SPEC.	Air	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CX600F	26.5							
4CW800B	6.0	890	5-PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800F	26.5							
4CX600J / 8809	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE

More? Our Application Engineering Department's ability to design tube into circuit means less engineering time for you. For all-around capability, talk to EIMAC. For circuit and application information on these new power tetrodes, write to EIMAC for our new, free application bulletin #14, *Using the 4CX600 Family Tetrodes*. Or contact your nearest Varian/Eimac Electron Tube and Device Group Office. They are located in:

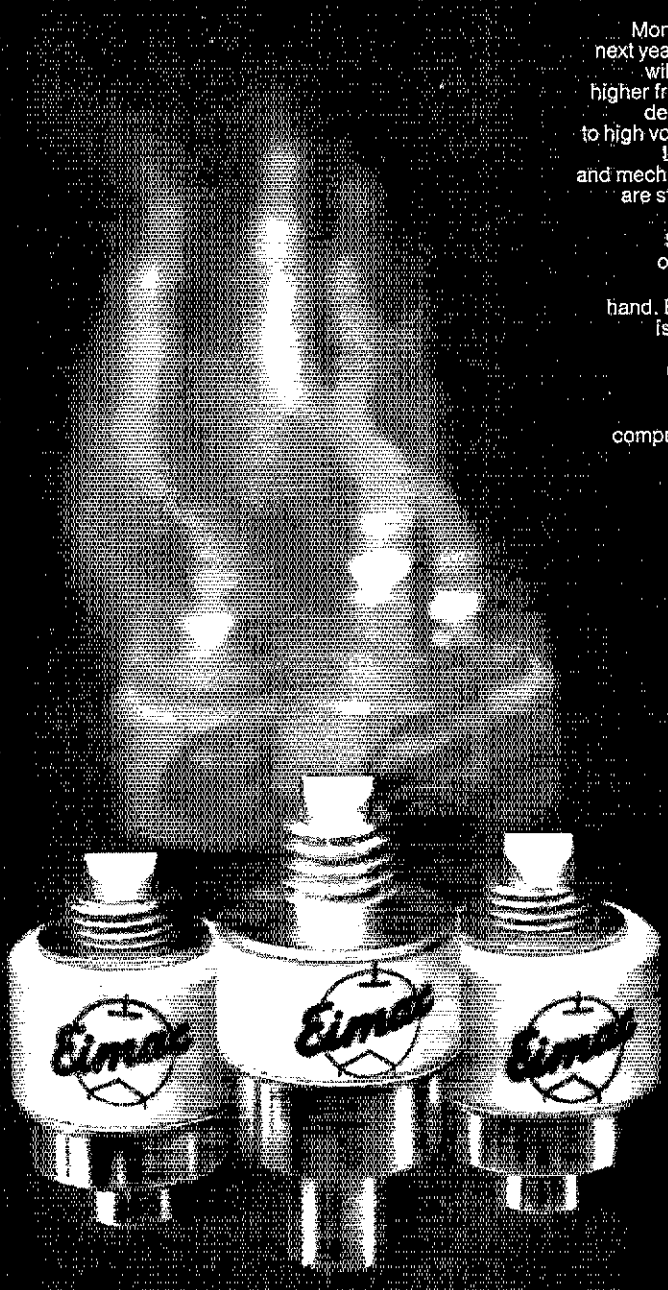
Albuquerque, N. M.
Alexandria, Va.
Atlanta, Ga.
Cherry Hill, N. J.
Clearwater, Fla.
Dayton, Ohio
Los Altos, Calif.
Melville, L. I., N. Y.
Park Ridge, Ill.
Richardson, Texas
Santa Monica, Calif.
Scottsdale, Ariz.
Springfield, N. J.
Syracuse, N. Y.
Waltham, Mass.

International Sales Offices are located in:

Australia
Benelux
Brazil
Canada
France
Germany
Italy
Japan
Scandinavia
Switzerland
United Kingdom and Ireland

Eimac®
division
varian

It's rough keeping up with planar triode requirements.



Month after month, standards get stiffer. But even next year and beyond, our miniaturized planar triodes will still meet them. They provide greater power, higher frequency and more reliability than "standard" designs. Ceramic/metal construction stands up to high voltage, high frequency, high current operation. Large contact areas mean improved electrical and mechanical connections. Frequency stable anodes are standard. And extended interface arc-resistant cathodes let you handle more power.

Solderable terminals? We feature them. Pulse operation? Certainly. Switches? By all means.

But you're not limited by what we have on hand. EIMAC's Application Engineering Department is ready to help you design planars into your equipment, or to propose new planar designs to glove-fit your requirements. So you can spend less engineering time and dollars.

A few examples that show how our computer aided design helps you get fast response:

The 7815AL carries an extended warranty, backed by demanding life tests. It's designed to meet the stringent reliability require-ments of airborne transponder and DME (Distance Measuring Equipment) service.

The new Y-503 planar for uhf pulse service was custom designed to meet an application program of high urgency.

The 8847 was created for DME and CAS (Collision Avoidance System) broad-band amplifiers covering 125 MHz near 1.1 GHz. It delivers up to 4 kW peak power with a gain of better than 8 decibels.

Our new Y-518 planar provides 35 kW pulse output at 1 GHz.

More information? Write for our planar triode brochure or contact: Product Manager, EIMAC Division of Varian, 301 Industrial Way, San Carlos, Calif. 94070, or 1678 Pioneer Rd., Salt Lake City, Utah 84104.

Or ask Information Operator for Varian Electron Tube and Device Group.

Eimac
division
varian

So we moved ahead of them.

end. The Severe Weather Net also operated the late afternoon of the 31st, alternating with the BBA net with the latest weather warning information. New Generals in the Janesville area WB9ARF, WB9BBC, WB9BBE, WB9BFL. The Walk for Development was held in Janesville Sun., May 17 with the following participating: W9KRP, WA9SAB, WA9WYP, WA9YSB, WB9ARF, WB9BBC, WB9BBE, WB9BJU, WN9BJX. Please send amateur radio happenings from around the state. W9HQT is the new RM for WIN, WA9TXN resigned because of work sked. Sorry to see you go, Steve, many thanks for the job you did. Welcome to W9HQT. Traffic: W9CXY 313, K9CPM 205, WB9BJR 139, WAØVKJ/9 124, WA9QKP 76, W9DND 67, WA9QNI 67, K9JPS 58, K9TBY 58, W9RTP 57, W9FSJ 49, W9KRO 49, K9FHL 42, WA9OAY 42, W9NRP 39, W9YT 33, WB9ABF 28, W9IHW 27, W9OMT 27, WA9PKM 17, W9DXV 14, W9BCH 12, WA9ZTY 8, W9ONI 3, WA9SAB 3, WA9EDZ 1.

DAKOTA DIVISION

MINNESOTA – Acting SCM, Bob Schoening, WØBE – SEC: WAØMZW. PAMs: WAØs MMV, HRM, OEJ, DWM, KØGYO. RMs: WAØs URW, IAW, WØAAU.

Net	*MHz*	*Time(Z)/Days*
MSPN (noon)	3.945	1705 M-Sa
MSPN (evening)	3.940	2245 Dy
MSPN (noon)	3.945	1400 Su/holidays
MSN	3.685	2330 Dy
MJN	3.685	0000 Tu-Su
MSTN	50.400	0330 Dy
MINN RTTY	3.620	0100 Su
MINN AREC	3.912	2200 Su
PICONET	3.925	1800 Su
MPON	3.910	1730 Sa
MINN 40 CW	7.060	2200 M-W-F

Net listings appear every other month. A certificate of merit for outstanding service to amateur radio was presented to League VP WØBUO by Director WØPAN at the June meeting of the St. Paul Radio Club. WNØAJA, of Duluth, urges Novices interested in WAS to meet on 21.220. WØWRU, of St. Cloud, is surprised by his tri-band beam after trying a vertical. The St. Cloud Hamfest is scheduled for Aug. 9 and should be great. WØEPX completes five years as ORS and keeps Utica on the map. WØBE thanks those who generously helped with antenna work! Please check your appointment certificates for expiration dates and send them in. Traffic: WAØVAS 780, WAØVYV 269, WAØWEZ 135, WAØOEJ 112, WØIAW 107, KØCSE 97, WØWFA 62, WAØVTZ 53, KØZRD 41, WØEQO 35, WAØHRM 34, KØMVF 28, WØUMX 27, WAØTFC 25, WØUAH 24, WAØ MMV 23, WØPAN 19, KØFLT 18, WAØRKV 17, WAØYMD 16, WAØNQH 13, WØFHH 12, KØGYO 12, WAØVDG 11, WØWAS 10, WØKLG 8, WNØYVT 8, KØFTI 7, WØPET 7, WAØRKF 7, WØBUO 6, KØICG 6, WNØYAH 6, WAØCJU 5, KØORK 5, WAØEZQ 4, WØIYP 4, WAØMNE 4, WAØWDX 4, WØSZJ 1.

NORTH DAKOTA – SCM, Harold L. Sheets, WØDM – SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØRSR. OO: WØBF. WØGFE is quite busy between Grand Forks and Center with power business so has gone mobile with the SB-101 and a Hustler antenna and is putting in a good signal at Grand Forks. KØSPH and XYL went to Kansas to see their son. WØCDO has gone to Norway for the months of June and July. WAØAIN hardly got put at Rugby before he was transferred to Casselton. WAØDLB has a new HW-12. He reports some Novice activity in Jamestown. WBØATJ reports an OM and XYL team of Novices coming up in Rugby. WØDM will be teaching radio in the junior high system again in the fall. WØLCL surprised us by getting on with an NC-500. WAØMND spent a week at St. Luke's hospital in Fargo but is now home recuperating. WAØGRX kept the OM, WØEFJ, in touch with her by patch. KØFRP spent a short furlough home at Valley City from Navy duties at Treasure Island.

Net	*kHz*	*CDT/Days*	*Sess.*	*QNI*	*Tfc.*
Goose River	1990	0900 S	5	78	2
NDRACES	3996.5	1830 M-F	21	658	71
NDPON	3996.5	1730 S-S	14	297	16
		0900			
		1730			
CWN	3640	2100 M-F	16	32	6

Traffic: WAØTBR 6, WØDM 5, WØEFJ 5, WAØADD 4, WAØSJB 3.

SOUTH DAKOTA – SCM, Ed Gray, WAØCPX – WØWCN, South Dakota RM, has announced that the South Dakota CW Net will be closed during the summer months but will resume again this fall. WAØQMP will be leaving Watertown and returning to Minnesota. WAØSHA will be leaving for the United States Military Academy at West Point this summer. WØMZN is working on a 2-meter fm repeater for the Rapid City area. The Morning Net had 382 QNI and 43 formals; the NJQ net had 343 QNI and 10 formals; the Early Evening Net had 287 QNI and 13 formals; the Late Evening Net had 1143 QNI and 42 formals. Traffic: WAØSKA 174, WAØUEN 62, WØHOJ 56, WØIG 33, KØAIE 26, WAØSHA 6, WAØLYO 2.

DELTA DIVISION

ARKANSAS – Acting SCM, Jimmie N. Lowrey, WA5VWH – SEC: W5PBZ. RM: W5NND. PAM: WA5KJT. I would like to congratulate WA5IIS on the wonderful job he did as SCM and I will do my best to continue his good work. Dennis has joined the Air Force after graduation from OBU. CAREN, Little Rock Repeater Club, has moved its repeater to a new location and has changed to 146.34-146.94 and can be heard over most of the state. W5OCO has a new ssb rig and quad. WA5WMC has a new SB-102. Congratulations to K5YCM on winning the hidden transmitter hunt at the Eureka Springs Hamfest. WA5VDH just reached the 200 mark in working DX and has a new tower and TA33 ready to go up. WA5IIS is working on a new power supply for future mobile operation. W5KGJ has a new 15-meter beam and a 2-meter beam. Welcome to new Novice WN5BOL in Little Rock. Net reports for May:

Net	*Time/Day*	*Freq.*	*Tfc.*	*QNI*	*Mins.*	*Mgr.*
OZK	0000Z Dy	3790	39	126	552	WA5TLS
RN	2330Z Dy	3995	54	745	700	WA5KJT
PON	2130Z M-F	3925	65	251	580	WA5TJB
APN	1100Z M-F	3937	3	449	1341	W5VFW
DX INFO	2345Z M	3860				WA5EFL

Traffic: WA5TLS 89, WA5TJB 15, WA5SOG 1.

LOUISIANA – SCM, J. Allen Swanson, Jr., W5PM – SEC: W5OB. RM: K5ANS. VHF PAMs: WA5DXA, W5URA. Remember the CLARC Picnic Aug. 23, up Alexway! The LCARC recently had a visit from WA1MEA/HK3. My apologies for no column last month; it just could not be helped. The Ozone ARC is planning on publishing a La. ham directory. WA5ORS is starting a GNOARC 20-meter net. K5YMM passed the Extra! The GNOARC 6-Meter Net meets Wed. at 8:00 DST on 50.4 MHz. WA5YJZ NCS. The GNOARC repeater, 146.34/.94, is reported to have a mobile range of 60 miles. W5SBM, Miss. RM, invites any La. QNI on the new Miss. CW (Slow) Net, 0045 GMT on 3665 kHz. New officers of the Lafayette RC are WA5AWN, pres.; W5EXI, vice-pres.; WA5RKL, treas.; W5MPX, secy. WA5LPW, a past-pres. of the Lake Charles RC, was recently honored as "Lawman of the Year" by the LC Kiwanians. Good luck to W5NQR and W5NQQ on their move to Houston. The Lafayette RC recently won the thanks of the local American Cancer Society for its help in the annual fund-raising drive. W5JYA has moved to Hartford, Conn. W5NGA is new net control for the La. Alligator Net, 2030 local time on 3925 or 3925 kHz. WA5PME passed the Advanced Class exam. WN5ZCF reports the new officers of the Twin-City ARC are WA5GIU, pres.; WN5YKD, vice-pres.; WA5QVN, treas.; WN5ZCF, secy. WA5WBZ was inactive for awhile as his rig went back to the factory. Congrats, Bob, on the Advanced Class ticket. W5CEZ says that between MARS meetings and the West Gulf Division Convention his fishing has been messed up! WA5QVN is busy with two construction projects, RTTY and a 2-meter rig. WA5NUK lost both his 80- and 40-meter antennas in recent high winds. K5BLV recently joined the DXCC Club. Yours truly, who leaves in Sept. for a six-week tour of Europe, will meet with some of our "G" cousins in London for a dinner Oct. 4. Traffic: (May) W5MI 247, WA5QVE 76, W5CEZ 64, WA5WBZ 43, WA5OVX 20, W5EA 14, WN5ZCF 9. (Apr.) WA5QVN 23.

MISSISSIPPI – SCM, Clifton C. Comfort, WA5KEY – SEC: WA5IWD. RM: W5SBM. PAMs: W5JHS and W5NCB. The Gulf Coast Side Band Net Dinner was a large success with members from Fla., Ala., La., Tex. as well as Miss. present. The film, Ham's Wide World, was enjoyed by all. W5NCB is very close on 5-Band WAS, and has 93 on DXCC! RACES will gear up for local weather disasters as well as its national function. The MTTN changes its time to avoid conflict with RN5. It's vacation time for many, including K5ZFM, WA5SKI and WA5IXC. The Jackson Hamfest is coming up. The Tombigby ARC now is on a firm footing with a new constitution. A solid 2-meter contact beam to beam over 160 miles is repeated by WA5MPI and WA5IXC. The MSBN welcomes check-ins in cw and am modes. I regret to report that W5KFG has joined Silent Keys.

Nets	*CDT/Days*	*Freq.*	*Mgr.*
MTTN	1845 Dy	3665	W5SBM
GCSBN	1830 "	3925	W5JHS

MSBN	1915 "	3990		WA5UBQ
CGCHN	2000 "	3935		WA5GOH

Traffic:W5SBM 241, WA5EIN 103, W5WZ 45, WA5OKI 35, W5HTV 27, WA5TCM 20, WA5KEY 17, WA5SEG 9, WA5YJA 8, W5NCB 5, W5BW 3.

TENNESSEE – SCM, Harry A. Phillips, K4RCT –

Net	*Freq.*	*Time(Z)/Day*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	2330 Tu-Su	26	1234	79	K4MQI
TPN	3980	1145 M-Sa 1300 Su	31	1384	75	W4PFP
ETPN	3980	1040 M-F	21	562	26	WA4EWW
TPON	3980	2330 M	5	181	22	K4RTA
TTN	7270	2100 Dy	31	95	5	WB4HIH
TN	*3635*	*0000 Dy*	*31*	*125*	*64*	*K4AMC*
ETVHF	145		8	38		WB4IOB
RTVHF	50.4		11	125		WB4IOB
TnMSN	50.1	0015 W	4	21		K4LQO
ETTMN	28.8	0130 W&F	7	58	8	K4LTA
MTTMN		0200 M&Th	8	69		WA4GLS

K4LQO reports good hidden transmitter hunting activity in Knoxville. W4MXF has been working some very good DX on 15 meters. If you would like to list your activities in the Public Service Honor Roll, please obtain from League Headquarters Form CD-190 *for reporting your activities. The prize winners at the* RACK (Knoxville) Flea Market were WN4NDY, 1st, WB4JSD, 2nd, WB4KMK, 3rd. Congratulations. RACK has completed its area ham directory, which includes 900 listings. To obtain a directory at a slight charge contact Sally Sliger, secy. It seems that all amateur radio clubs (and SCMs) are plagued by poor response from members when it comes to communications (written and spoken). Surprise the editor of your club bulletin with a few words relating your experiences. Traffic: K4AT 241, K4DPO 123, W4SQE 116, W4OGG 89, WA4UAZ 87, W4WBK 44, WA4YFG 38, WB4ANX 33, WA4GLS 31, W4MXF 27, K4AMC 25, WA4ZXZ 21, WA4UCE 20, WA4CGK 19, W4PCP 18, W4PFP 18, WB4EHD 9, WB4EHK 9, K4LQO 7, W4SGI 7, K4UMW 7, WB4DYJ 6, WB4GTW/4 5, WB4GSS 4, W4VJ 3.

GREAT LAKES DIVISION

KENTUCKY – SCM, George S. Wilson, III, W4OYI – SEC: K4YZU. Appointed: WB4LIL as ORS.

Net	*EST*	*Days*	*Freq.*	*Mgr.*	*QNI*	*QTC*
KRN	0630	Dy	3960	W4BEJ	342	39
MKPN	0830	Dy	3960	K4TRT	452	92
KTN	1900	Dy	3960	WA4AGH	720	110
KYN	2000 2200	Dy	3600	W4BAZ		
KCATN	2100	TWFSS	50,700	W4OTP	60	80
C Ky 6	2100	SNW	50,300	WA4GHQ		

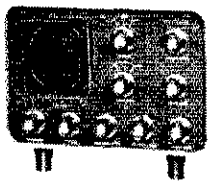
K4FPW reports good 6-meter DX and increasing activity on 2 fm in the Louisville area. We're all proud of three kentuckians being in the top 1500s on the Frequency Measuring Honor Roll. Congratulations to W4CMP, W4JUI and W4TOY. One can't help but be impressed with the technical competence of hams in our state in this and other fields. Ham activity seems to be taking a bit of a premature summer dip, although nets reporting and public service activity is holding up well. Public service is where you find it, so go looking for it. ARRL's repeater rules proposals are helpful, and would seem to recognize the need for unhampered use of this excellent mode. Traffic: (May) WA4VZZ 306, WA4MKH 135, W4OYI 107, W4BAZ 67, WA4AGH 63, WA4MXD 53, WA4DYL 48, K4MAN 48, K4UMN 45, K4TRT 43, WB4LIL 36, WB4EOR 26, WA4FAF 22, WB4HQW 21, K4FPW 16, K4UNW 15, WB4FLA 13, W4SZB 13, W4OTP 11, K4AVX 10, WB4MQR 10, WB4LFZ 8, K4VDO 8, W4YOK 8, W4BTA 7, WB4ILF 7, WB4AUN 6, W4KJP 3. (Apr.) WB4HQW 34. Total traffic 1155, total reports 31.

OHIO – SCM, Richard A. Egbert, W8ETU – SEC: W8OUU. RM: W8IMI. PAM: K8UBK. VHF PAM: WA8ADU. May section net reports:

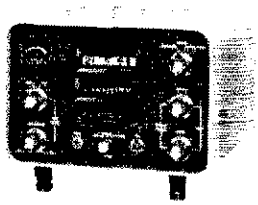
Net	*QNI*	*QTC*	*Sess.*	*Freq.*	*Time(Z)*	*Mgr.*
OSSBN	2015	1099	65	3972.5	1430/2245	K8UBK
BN	678	424	62	3580	2300/0200	W8IMI
6MtrN	584	60	62	50.61 50.16	2300 0100	WA8ADU
SN	179	69	30	3580	2225	WA8VNU

8PL certificates for May were earned by W8QCU, K8ONV, WB8CKI and WB8DSV. Net certificates for participation in BN were awarded to W8CHT, K8DHJ, K8LGA, W8GOE, K8UMX, WA8WAK, WA8LAM, W8WEG, WA8ULF, W8GVX, WA8CXY, W8IMI, WA8ZAH. K8EHU wrote this month's report while W8ETU was off

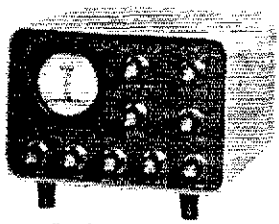
Heathkit® Amateur Station Accessories



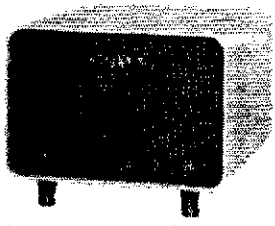
SB-610 Signal Monitor Scope . . . operates with transmitters on 160 through 6 meters at power levels from 15 watts through 1 kw. Shows transmitted envelope. Operates with receiver IF's up to 6 MHz. Spots signal distortion, overmodulation, etc.
Kit SB-610, 14 lbs. **$79.95***



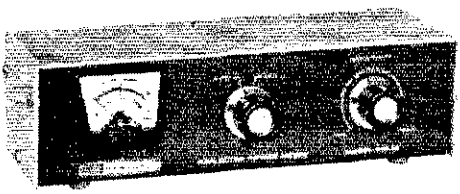
SB-630 Amateur Station Console . . . including 24-hour clock, SWR meter, 10 minute timer with audio-visual signaling, and more. Styled to match your SB-Series station.
Kit SB-630, 10 lbs. **$79.95***



SB-620 Amateur Radio Spectrum Monitor . . . displays all received signals up to 250 kHz either side of receiver tuned frequency. New narrow sweep function shows 10 kHz for single signal analysis.
Kit SB-620, 15 lbs. **$119.95***



SB-600 Communications Speaker . . . matches the Heathkit SB-Series line and includes space for HP-23A fixed-station power supply. Features an 8 ohm 6" x 9" speaker with 300 to 3000 Hz response.
Kit SB-600, 6 lbs. **$19.95***



HM-15 Relative Power SWR Meter . . . indicates forward and reflected power and SWR. Band coverage is 160 through 6 meters. Handles peak power well over 1 kw. Wiring options permit operation with either 50 or 75 ohm transmission lines.
Kit HM-15, 2 lbs. **$14.95***

HD-10 Electronic Keyer . . . all solid-state circuitry for perfect characters. Two speed ranges — 15-60 wpm or 10-20 wpm. Solid-state switching . . . no sticking relays or contact bounce. Built-in sidetone & speaker. Grid-block keying, -105 V. @ 35 mA. max. only.
Kit HD-10, 6 lbs. **$39.95***

HN-31 "Cantenna" Transmitter Dummy Load . . . provides 50 ohm non-inductive load with SWR less than 1.5:1 for frequencies from 1.5 to 300 MHz. Coax fitting for transmitter line; phono jack for relative power measurements. Oil coolant (not supplied) permits power up to 1 kw.
Kit HN-31, 3 lbs. **$10.95***

FREE '70 CATALOG

Describes these and over 300 other Heathkits. Save up to 50% by building them yourself. Use coupon and send for your FREE copy!

HEATHKIT
a Schlumberger company

HEATH COMPANY, Dept. 9-6
Benton Harbor, Michigan 49022

☐ Enclosed is $_____ plus shipping.
Please send model (s)_____
☐ Please send FREE Heathkit Catalog.

Name_____
Address_____
City_____ State_____ Zip_____

Prices & specifications subject to change without notice. AM-224
*Mail order prices; F.O.B. factory.

on a business trip. The 8th Area ARRL QSL Bureau had representatives at the Dayton and Lancaster Hamfests selling envelopes and stamps at cost. They hope to have reps at all the major Ohio hamfests. Do you have an envelope at the bureau? W8AG, W8LQB,W8ERW and K8MGF joined Silent Keys. W8GD reports that the 160-Meter Sunday Net will start again Oct. 4 at 1300 local time on 1812 kHz. Congratulations to W8BZN/W8TQS on being Queen City Emergency Net Ham of the Year. May appointments: K8RMK as OO, WB8BZK as OBS, WA8WAK and WB8CKG as ORSs. BN is sorry to see FB operator WA8DUL moved to another section. Congratulations to K8RXD on going DXCC. Ross and Pike County EC K8SUB reports AREC/RACES supported the local civil defense with mobile units to check flood conditions in the recent heavy rains. Northwest Ohio EC K8LFI has the AREC group helping civil defense regular checkout of the warning siren system. WA8TYF and WB8CEH report Memorial Day 6-meter openings to the south and southwest and XE1PY 6-meter signal strong May 14. *Traffic: K8ONA 489, WA8FTX 379, W8LAG 378,* WB8DSV 253, WA8CXY 228, WA8UPI 228, W8QZK 207, W8IMI 194, WA8DWL 180, WA8WAK 165, W8OCU 157, WA8ETW 150, WB8CKI 128, WB8ALU 106, W8JD 99, W8PMJ 99, WA8SED 88, W8MOK 79, WA8QFK 77, WA8VNU 76, K8UBK 73, W8RTR 60, WA8ZTV 56, W8ERD 54, W8FGD 43, W8BHY 41, WB8BZK 40, W8JH 38, K8IGA 36, WA8VKF 36, WA8MHO 35, W8ETU 34, *K8ONV 31, K8BYR 33, WA8MCR 30, W8GNL 27, W8OE* 27, WA8YIV 25, WA8ADU 22, W8BWV 21, WB8AJC 20, WA8KPN 20, WA8AJZ 19, K8BHH 19, WB8CWD 19, WB8BLR 18, K8DHJ 18, W8GOD 18, WA8VWH 15, W8DAE 14, W8GOE 14, WA8JSW 14, WA8NOQ 14, WA8TKM 14, WA8YHN 14, W8TV 13, WB8AYC 12, W8LZE 11, WA8EBS 10, WA8JEH 10, K8QYR 10, WA8SHP 10, WA8ZUK 9, W8NAL 8, W8BZX 7, W8ARW 6, WA8ZNC 6, WA8FSX 4, K8CKY 3, WB8EHI 3, WA8LAM 3, WA8WDU 3, WB8BPB 2, WB8CQC 2, WB8FWX 2, K8BPE 1.

HUDSON DIVISION

EASTERN NEW YORK – SCM, Graham G. Berry, K2SJN – SEC: W2KGC. RM: WA2VYS. PAM: WB2VJB. VHF PAM: WB2YQU. Section nets: NYS nightly 3675 at 2300Z; ESS nightly 3590 at 2300Z; NYSPT&EN nightly 3925 at 2300Z. Appointments and renewals: W2EAF as OO, ORS, OPS; WA2VYS as RM, ORS, OPS; WB2VJB renewed as PAM. All appointees, send renewal requests to ORS, PAM or VHF PAM promptly, please. With the clubs: *The* Communications Club of New Rochelle heard *WHCP* and supplied 2M control for the city's Memorial Day Parade at month-end. Operators were W2DPV, WB2RLS, WB2NOY, WA2OEG. Albany ARA heard K2TJB on meters at its new meeting place in the Red Cross Center. Albany Red Cross is giving a First Aid course for AREC and RACES members. Schenectady Club heard W2ODC on "Measurements in the Shack." The prized Henry P. *Broughton Memorial Award went to WB2BDB. K2ONF is* conducting a course for SARA wives. New club: LERA ARC in Rockland County, with WA2FBI as activities chairman. League affiliation is pending. Individual station activities: W2SZ raised his antenna another 25 feet for better vhf coverage. Schenectady Cy EC W2URP reports a recent code speed check of AREC members shows 5 at 35 wpm; 1 at 30; 4 each at 25 and 20 wpm. Calls are W2URP, W2EEU, W2IR, WA2JAE, WA2UBE, WA2UWI, W2FW, K2HNW, W2GTC, W2PKY, K2DID, WB2HNO and WB2ROT. Nice going! WB2AMO operated as chief op at Armed Forces Day Exhibit on Nanuet Shopping Mall for Crystal RC. WB2FWK has a new SB-102 in *the nets. WB2VJB has* a quad atop the new crank-up tower. Congratulations to new Novices WN2s JKF, LRD, NSL, NSJ and new Tech, WB2NOY; also new Novice father-son team WB2NSP and WB2NSO, WB2FEL now is Tech. Class. By the time you read this, new club years will be starting. Keep your SCM advised of activities and plans. Traffic: (May) WA2FBI 208, W2EAF 147, WA2VYT 97, WA2GOW 64, WB2JLR 64, WA2VYS 50, K2SJN 33, WB2EUV 28, WN2MGT 23, WB2VJB 17, K2UYK 10, WA2LNX 3. (Apr.) K2UYK 20, WN2MGT 12.

NEW YORK CITY AND LONG ISLAND – SCM, Fred J. Brunjes, K2DGI – SEC: K2OVN. RM: K2UAT. PAM: WB2RQI. VHF: PAM: WA2UWA HF.

NLI*	3630 kHz	1919/2200 Nightly	K2UAT RM
NIL VHF*	145.8 MHz.	1930 M1WTF	WB2RQI PAM
NLI Phone*	3932 kHz	1600 Dy	WA2UWA PAM
Clear House	3925 kHz	1100 Dy	WA2GPT Mgr.
Mic Farad	3925 kHz	1300 Ex Su	K2UBG Mgr.
East U.S.	3683 kHz	0001 Nightly	K2UBG Mgr.
All Svc.	3925 kHz	1300 Su	K2AAS Mgr.
NYSPTEN	3925 kHz	1800 Dy	WB2VJB Mgr.

*Section Nets. All times above are local. I hope everybody is enjoying the summer here in "Fun City" and those week-end

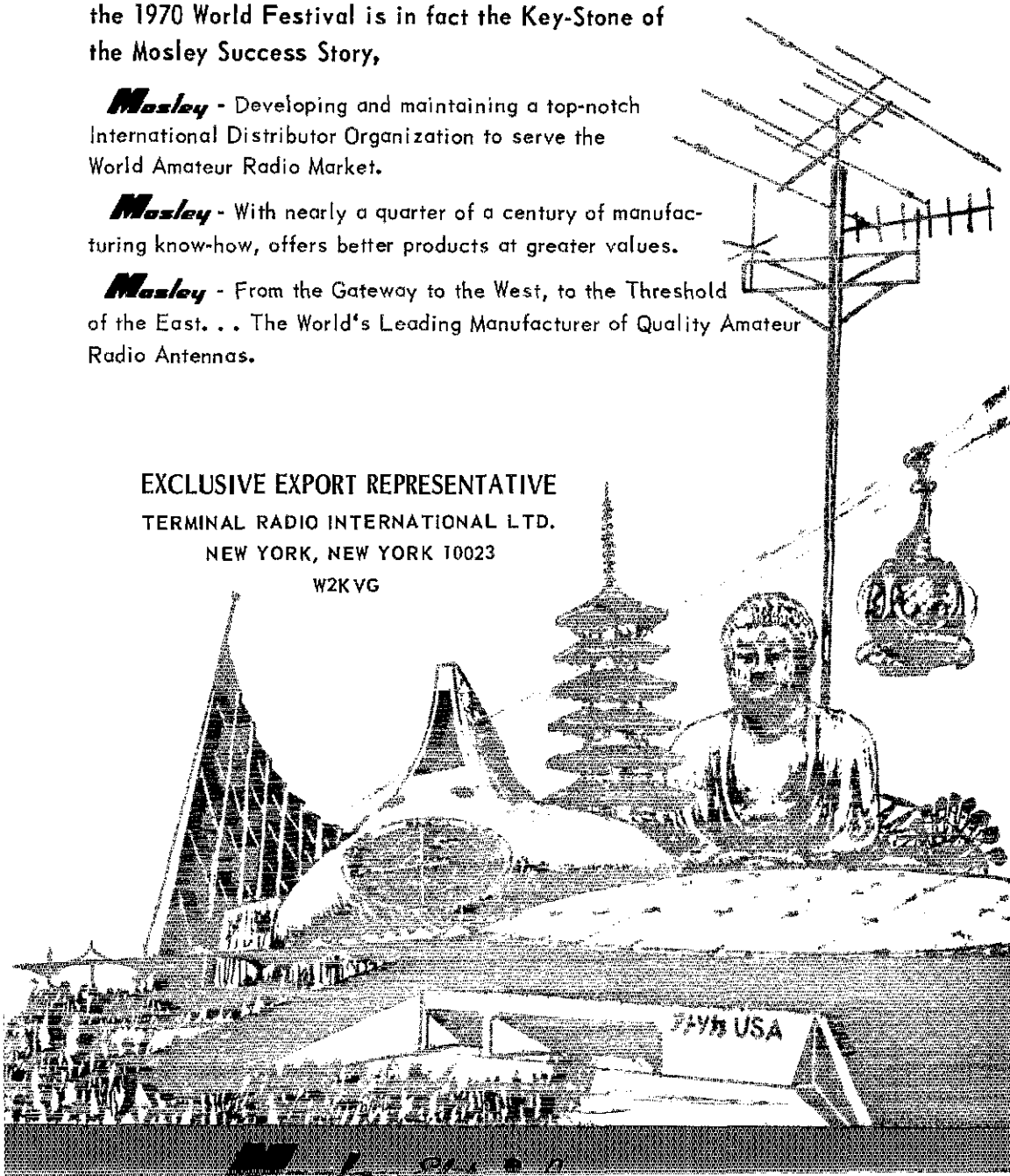
. . TOWERING OVER EXPO '70

EXPO '70 - HARMONY AND PROGRESS, the Theme of the 1970 World Festival is in fact the Key-Stone of the Mosley Success Story,

Mosley - Developing and maintaining a top-notch International Distributor Organization to serve the World Amateur Radio Market.

Mosley - With nearly a quarter of a century of manufacturing know-how, offers better products at greater values.

Mosley - From the Gateway to the West, to the Threshold of the East. . . The World's Leading Manufacturer of Quality Amateur Radio Antennas.



EXCLUSIVE EXPORT REPRESENTATIVE

TERMINAL RADIO INTERNATIONAL LTD.
NEW YORK, NEW YORK 10023
W2KVG

parking fields, better known during the winter as roadways to the beach. Time is a fleet'n for the Hudson Division Convention Oct. 17 and 18. Rumor has it to be another goody. W2BCB says he's looking for a modern transmitter; guess the trusty ol' 6AG7-807 rig has run out of steam! WB2WFH reports new officers over at the Wantagh Radio Club: K2QNU, pres.; WB2WFH, vice-pres.; WB2SEL, treas.; WN2MIF, rec. secy.; WN2LOM, corr. secy. WA2GLR reports he is on the 2-meter fm bandwagon from the base, working to put wheels under an 80D. WB2HWI is looking for those interested in starting a 160-meter cw net. Interested? Contact him! Sounds like a good idea! K2UBG would like to have more stations keep him company on the East U.S. Traffic Net (see above) particularly some night owls from the five boroughs of N.Y.C. How about climbing on board some evening and QLF a little to keep him awake? Think you might enjoy a little traffic-handling? It only sounds difficult. Check in with K2UAT some evening and let him know you are interested. Ole Skip will welcome you aboard. It may sound a little weird at first. Just announce yourself with a quick BK and your call after the traffic is cleared from the net, then let the gang know of your interest and they will take it from there. Testing for TVI? Contact W2LGK. He says he has an old Comet Pro receiver that generates TVI like mad! WB2RQF reports a staunch group of supporters on the VHF Net NLI, and would like to see a few more would-bes stop by. How about some of you hf/vhf types dropping in on the groups on the hf nets and the vhf net once in awhile to possibly give the troups a hand with a liaison traffic between the nets. It doesn't have to be on a regular schedule, once or twice a week will do, if you can make a regular stop, fine; a stop-by while in the neighborhood would be fine also. Whatever help you can give would be much appreciated by all concerned. Received some word from WA2ITR, who is operating portable ϕ in St. Louis these days while attending St. Louis University Medical School. He'll be heading for Boston to serve his internship, so look for him on 40 and 20 ssb and 2-meter am with a "lunch box." Traffic: W2DSC 626, K2BUG 99, WB2DZZ 89, WB2LGA 68, K2AAS 18, WB2ROF 16, W2LGK 12, W2PF 10, W2EC 9, WA2KSB 7, WA2BRF 6, W2DBQ 4, W2EW 3, WA2QJU 2, WA2GMD 1.

NORTHERN NEW JERSEY – SCM, Louis J. Amoroso, W2ZZ – SEC: K2KDQ. RM: WA2TAF. PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

Net	kHz	Time (PM)	Days	Sess.	QNI	Tfc.	Mgr.
NJTTYN	3625	7:30	MWF				WA2TAF
NJN	3695	7:00	Dy	31	361	238	WA2BLV
NJN	3695	10:00	Dy	31	200	75	WA2BLV
NJSN	3740	8:00	Dy	18	39	17	WB2FEH
NJPON	3930	6:00	Su	5	93	25	WA2TBS
NJEPTN	3950	6:00	M-Sa	31	581	308	W2PEV
NJAN	50425	8:00	M-F	21	210	52	WA2KZF
PVETN	145710	7:30	Dy	31	164	84	K2KDQ
ECTN	145800	8:30	M-Sa	27	128	44	WA2TBS
	146700	8:30	Su				

New appointments: WA2RIN as EC for Riveredge and vicinity; WB2NCP as EC for Franklin Township and vicinity; W2BWL as OO and WA2HMH as OVS. Endorsements: WA2ATO as OBS; W2ABL, WB2JWB, WB2UIR and W2TFM as ORSs. Our SEC, K2KDQ, is looking for ECs in Hunterdon, Ocean and Warren Counties. If interested, please contact him or your SCM. The Annual NJ QSO Parties is your opportunity to feel like a DX station. Please answer the QSL card request. K2BN is active again with a new HW-100 and is enjoying NJN. The group at K2DEL has a new 14AVQ. WA2HFL is trying hard for the Extra Class. WA2EIN, WA2HSJ and WB2HMT report all have facsimile working. WA2EUX was in both the Georgia and Michigan QSO Parties. K2EIF received his DXCC for phone. W2CVW is working lots of DX on 80 for his 5BDXCC. WA2EPI is now mobile on 20 and 40. WB2BKC is using a TR-4. WN2OEP is a new Ham in Bergenfield. WN2LCH is new in Morris Plains and WN2MXY is new in Bricktown. Welcome to ham radio, gang, and the best of luck and DX. WA2WHZ is now located in Franklin Lakes and is planning his antenna system. W2JDH is looking for a club to join in Ocean County. W2QPN and WB2ZBI passed the Extra Class exam. They credit W1AW code practice sessions with a big assist. WN2KYB has a new inverted Vee and vertical for his 80- and 40-meter station. WB2BXK added ntm and a new Eico vfo to his shack. WA2KZF is building a new 4CX300A 6-meter final. W2CU reports his brother W3CU and grandson WN3NPL attended his retirement celebration. Congratulations, OM, we all wish you a long and enjoyable retirement. WA2BAN attended the Penn Phone Net Dinner. W2TUK and W2ZZ attended the NJDXA meeting. I suggest all stations keep SASE or envelope credits on file with the W2 DX QSL Bureau. The monthly volume is now 40,000 a month. The address is Box 505, Ridgewood, N.J. 07451. WB2LTW received his Masters Degree and will begin teaching in Sept. Traffic: (May)

WA2BAN 674, WA2FRZ 513, WA2EPI 330, WB2TUL 244, WB2DDQ 166, K2KDQ 158, WB2VPR 121, WB4PYA/2 107, WB2BWJ 105, K2DEL 91, K2OOJ 75, WA2LDX 53, WA2EUX 50, W2PEV 40, WB2LTW 36, WA2BCT 29, WB2BKC 29, WA2GLI 21, W2ZZ 21, W2CU 12, WA2HEL 12, WB2WNZ 12, WA2YXQ 12, WA2CCF 10, WN2KYB 10, WB2BXK 9, K2ZFI 9, WA2KZF 8, WA2GIE 7, W2TFM 6, WA2DMF 5, WA2DRH 5, WA2JXE 5, K2BN 4, W2EWZ 4, W2JDH 3, WB2DRJ 2, WA2JIM 1. (Apr.) WB2BKC 41, W2ABL 1.

MIDWEST DIVISION

IOWA – SCM, Al Culbert, KØYVU – SEC: KØLVB. New appointments: WØNFL as ORS, WAØTJL as OVS and KØLHW as EC for Pottawattamie County. The Iowa 75-Meter Picnic has been rescheduled to Sun., Aug. 16 at Riverview Park in Marshalltown. WAØOTE was married Memorial Day and will be moving to Ill. soon after graduating from I.S.U. this summer. WAØASU has moved to Grinnell. KØLKH has a Galaxy and a new piece of wire up for 75 and would like to contact hams who are "toastmasters." KØZTV is a transplant to I.S.U. for EE studies from South Dakota. WØDSP reports WNØBKN and WNØBNB as new Novices from St. Ansgar. Who says incentive licensing isn't going over? Look at what happened in June! New Extras: WØBSK, WAØOTQ and WAØSEQ. New Advanced licensees: WØUDQ, WØUDZ, KØEMJ, KØGXI, KØOCC, KØQXT, WAØPIP, WAØPIX, WAØRGV, WAØTDX, WAØYDR, WAØYSO, WAØYZY and WNØWXX. New Generals: WNØBLM, WNØVBF and WNØZXQ. A new Tech is WNØTVK. Our congratulations to the above, and our thanks to WØSEJ for the list. WØNFL reports 160 in the doldrums, but anticipating great things this winter. Public Service Honor Roll: KØLVB 80, WAØOTQ 41.

Net	*GMT*	*QNI*	*QTC*
Iowa 75 Noon	1730	1370	104
Iowa 75 SSB	2300	868	24
ILCN (CW)	2330	120	64
PON (CW)	2330	32	3
PON (fone)	2330	71	3

Traffic: (May) WØLCX 607, WAØVZH 85, KØLUZ 50, KØAZJ 47, WAØOTQ 46, WAØQZL 13, KØJGI 12, WAØOTF 8, WAØMIT 6, WAØPOE 6, WØMOQ 5, KØLKH 4. (Apr.) KØQKD 20.

KANSAS – SCM, Robert M. Summers, KØBXF – SEC: KØLPE. PAM: KØJMF. RM: KØMRI. VHF PAM: WAØCCW, WAØTRO. A recent change in station appointments finds KØLPE in the SEC position. Earl's address is P.O. Box 263, Concordia, Kans. You will also note a new addition to the VHF PAM position. WAØTRO will coordinate the 6-meter activity for us. Congratulations to WAØSEV, who won top honors for QNI into the Kansas Weather Net, WØINH, of Goodland, is now the manager of the Central Area CW Traffic Net. The Kansas Nets Picnic at Wilson Dam was the best yet. A day long get-together provided us with the opportunity to talk to many new faces and pick up some new ideas. Two weeks later the Kansas section meeting at the Salina Hamfest was attended by more of the QKS gang than ever before. Attention club bulletin editors: Add your SCM to your mailing list. This month I received only one club paper. Understand KØOCS has his tower and beam back up and should be more active now. WØCHJ is going to attend the Rocky Mountain Division Convention while he is vacationing out west. Net reports for May: QKS – QNI 382, QTC 156; HBN – QNI 607, QTC 61; KSBN – QNI 618, QTC 56; KPN – QNI 227, QTC 14; KWN – QNI 635, QTC 30; Ks EC Net – QNI 10, QTC 0; QKN – QNI 113, QTC 31. Traffic: WØHI 267, WØINH 264, WAØLBB 145, KØBXF 125, WBØBFI 117, WNØAJU 88, KØJMF 74, KØMRI 74, WAØLLC 59, WØNEE 59, WØGCJ 54, WAØTZK 52, WØMA 42, WAØUTT 36, WAØSRQ 18, KØLPE 16, WNØYXK 14, WØBGX 11, WAØOZD 10, WØCHJ 9, WAØSEV 9, WAØOWH 8, WAØUMZ 6, KØGZP 4, WØLYC 4, WØPB 3, WAØSXR 3, WNØWXY 1.

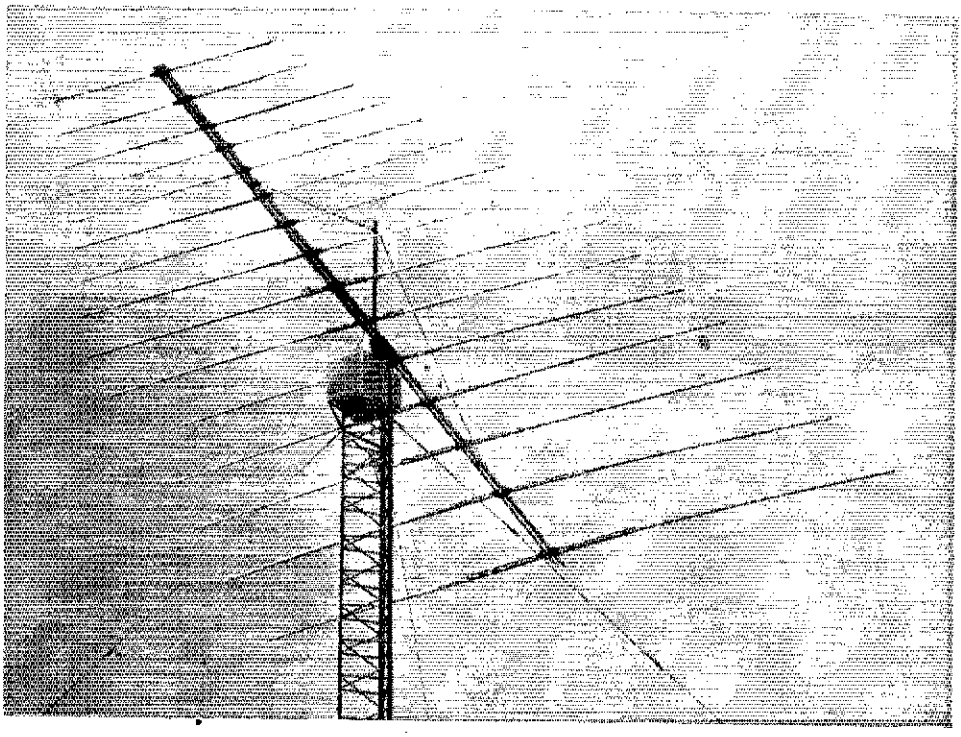
MISSOURI – SCM, Robert J. Peavler, WØBV – SEC: WØENW. New appointments: WØENW as SEC, KØAHL and WØJKF as OVSs, WAØSKP as RM.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MoPON	3933	2200 M-Sa	27	380	47	WAØTAA
MoSSB	3965	2300 M-Su	27	1121	91	WØRTO
MON	3585	0000 Dy	31	171	50	KØAEM
MWN/MON2	3585	0245 Dy	31	157	65	WAØSKI
MoCD/CW	3531.5	1500 Alt. Su	5	12	3	KØRPF
PHD	50.45	0030 Tue	4	91	7	WAØKUH

The name of MWN has been changed to MON2. MoCD/CW net is on a summer break with the next session scheduled for Sept. 13, after which it will meet every week. The Northwest St. Louis Amateur Radio Club will not sponsor a Mo. QSO Party this year, so the SCM has decided to sponsor one Oct. 3-4. WAØYBB is in the Navy a

6.2 THROUGH 30 MHz CONTINUOUS COVERAGE

WITH ONLY **36—FOOT BOOM LENGTH**
40—FOOT MAXIMUM ELEMENT LENGTH
250 LBS.



HY-GAIN'S NEW LP-1017
ROTATABLE LOG PERIODIC ANTENNA

From the pioneer in large rotatable antennas comes the LP-1017, a reduced size rotatable log periodic antenna. For 1/3 the cost and 1/2 the size of comparable antennas, the LP-1017 provides 10-12 dbi of directional gain for power inputs of up to 2 kw. The wide band coverage makes it ideal for MARS, maritime, or government HF communications systems. The LP-1017 is also available as a complete system with a roof mounted tower, rotator and installation hardware.

For further information about the LP-1017, as well as the complete line of Hy-Gain government and commercial antenna systems for all frequencies, write, wire or call us collect.

HY-GAIN ELECTRONICS CORPORATION
P. O. Box 5407-HH Lincoln, Nebraska 68505
Phone: (402) 434-9151 Telex 48-6424

Great Lakes and is an operator at K9NBH. WAØRBZ is home from school and helping his father, WNØYBO, with General Class. Congratulations to WAØKUH, who received the Clay County Civil Defense award for outstanding service, and to WAØWOW, who graduated from Northeast Mo. State College. He was a student in several classes taught by WØBV. I am glad to report that WØGQR is recovering after an operation. WNØBVD has a new SB-102, but can use only receiver at present. WAØRTO has completed SB-101. Traffic: KØONK 1366, WØBV 66, WAØHTN 61, WAØTAA 34, KØRPH 28, WAØVRI 19, WAØKUH 11, WØBVL 4, WØGBJ 2, WØJKF 2, WAØWQA 2, KØIPJ 1, WAØZLU 1.

NEBRASKA – SCM, V.A. Cashon, KØOAL – Asst. SCM: Velma Sayer, WAØGHZ. SEC: KØODF. As of June 1, CHN meets on 3980 kHz. The Tri-City ARC Picnic is scheduled for Aug. 18. Contact WØPHA for details. KØODF is hoping for more AREC applicants. If not already an AREC member, your registration will be welcomed. *Congratulations to new Novice WNØBHT, of Chadron. New* appointments: WAØGHZ as Asst. SCM, WØDMY as ORS. Renewed appointments: KØODF as SEC, KØFRU as ORS and WØFQB as OPS. May net reports:

Net	*Freq.*	*GMT/Days*	*QNI*	*QTC*	*Mgr.*
NSN I	3982	0030 Dy	822	33	WAØLOY
NEB	3590	0300 Dy	154	13	WAØHWR
EBSN	3982	1130 1st M.	3	3	WAØSOP
NMN	3982	1230 Dy	980	23	WAØJUF
WNN	3950	1300 M-Sa	549	4	WØNIK
AREC	3982	1330 Su	183	3	WØIRZ
CHN	3982	1730 Dy	620	42	WAØGHZ
NSN II	3982	2330 Dy	681	13	WAØLOY

Traffic: WØLOD 126, KØUWK 63, WAØCBJ 27, KØJFN 20, WAØJIH 20, WØBFV 15, WAØFGV/Ø 13, WØOOX 12, WAØGHZ 11, WAØHWR 11, KØDGW 10, WØDMY 9, WAØBOK 8, KØODF 8, KØHNT 6, WØHOP 4, WAØJUF 4, WAØOQX 4, WAØQEX 4, WØAGK 3, WAØEEI 3, WAØJKN 3, WØNIK 3, WAØPCC 3, WAØSOP 3, WAØYGI 3, WAØQLE 2, WØRAM 2, WØRJA 2, KØSFA 2, KØUDW 2, WAØNYM 1, KØOAL 1.

NEW ENGLAND DIVISION

CONNECTICUT – SCM, John McNassor, W1GVT – SEC: W1HHR. RM: WA1HSN. PAM: K1YGS. VHF PAM: K1SXF.

Net	*Freq.*	*Time/Days*	*Sess.*	*QNI*	*QTC*
CN	3640	1845 Dy	31	383	297
CPN	3965	1800 M-S 1000 Su	31	408	172
VHF 2	145.98	2200 M-S	21	76	10
VHF 6	50.6	2100 M-S	21	152	6

High QNI: CN – WA1GFH, WA1LLB and W1KUO. CPN – W1GVT 30; WA1JZC 29; WA1LLB and K1SXF 28; K1YGS 24; WA1HOL, *WA1JVV, W1LUR, W1MPW 20. SEC W1HHR* has visited many clubs to speak on the AREC program. I am sure members of your club could benefit by this and equally sure he would accept your invitation. This is our greatest opportunity to provide the Public Service Expected and Required of all Amateurs and Organization is required to make it successful. W1QV is recovering from the ARRL Board Meeting. It's time to submit your comments to him. Many *CN and CPN members are active on Navy MARS – contact W1FUF* for details. Hamden ARA again is sending out *Harascope* – another fine bulletin. K1YGS sent the new CPN Roster to all members. The 1RN Picnic in New Hampshire was attended by many CN members. WA1KMR/1 and group were active at the Weston Fair. W8CWE/1 now W1FUF, qualified for the Armed Forces Day test at 25 wpm cw and 60 wpm RTTY. K1ZAT is active as DL5DY, W1CUH is back on CN after recovering from an accident. W1DQJ is on all bands with a new SB-102. Congratulations to: WA1LLB May BPL; W1FUF Extra Class; W1WHR and WA1KRG Advanced; WA1LUA General; WN1NBB and WN1MTZ Novice Class; Middlesex ARS ARRL Affiliated Club! Prepare now for the 160 Meter Contest – *more activity is needed on our top band! Let's use it! Traffic:* WA1LLB 513, WA1HOL 182, W1EJI 170, WA1JZC 143, WA1HSN 104, WA1GFH 83, WA1JMO 81, WA1JVV 76, W1GVT 60, WA1JQC 48, K1YGS 47, W1KUO 39, K1SXF 27, WA1UGF 18, WIMPW 17, W1QV 17, WA1KRG 16, W8CWE/1 15, W1YBH 15, W1AW 14, W1KAM 12, W1DQJ 9, W1HHR 8, WA1JYP 8, W1CTI 5, W1CUH 5, WA1JGA 5, W1BDI 4.

EASTERN MASSACHUSETTS – SCM, Frank L. Baker, Jr., W1ALP – W1AOG, our SEC, received EC reports from W1s BHD, NZP, K1s ZUP, NFW, DZG, WA1DXL. K1IOE is RO for Waltham and EC. K1KBB, W1s LR, EUD. ALP attended meeting of the Mass. Emergency Communications Commission in Boston. W1ALP represents the amateurs. W1KRR, K1SKP, ex-W1IVT, are Silent

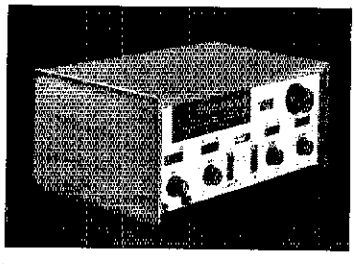
he worked the world.

Mr. John H. Thompson, W1BIH/PJ9JT, recently packed his Ten-Tec Power-Mite PM 3A transceiver into a suitcase and headed for the Coral Cliff Hotel, Curacao (Netherlands Antilles). From there he worked the world.

"Final tally on the PM 3A results at PJ9JT are 261 QSOs on 14 MHz and 41 QSOs on 7 MHz for a total of 302. This includes 32 different countries in 5 continents. I operated only with the PM 3A on 7 and 14 Mc. CW. No contacts were set up first on high power, nor was any auxiliary receiver used. It was all done with the PM 3A. Of course I had a FB location and the PJ9 call didn't hurt. Among the DX worked were five VKs, a ZL, VU and 4X4. Only Africa was missed and I did get a PJ? response from an EL. The batteries, a pair of 6V lantern batteries in series, lasted the entire operation and showed no signs of failing. Some comments from stations worked:

W8KIT: 'Congrats on that signal with real QRP'
WØOPK: 'Unbelievable'
W5IUW: 'Ur really busting my ears'
W3KR: 'Boy, ur 5 watts FB here on my attic antenna'
W4KC: 'Did you say 5 watts?'
W2GA: 'Boy, ur rig doing FB'
W4YWX: 'Unbelievable — if I didn't know you I'd swear you're pulling my leg because ur hitting 20 DB'
K3CUI: 'Are you really running only 5 watts? FB'
OK1AOR: 'Sigs 589 FB'
K6IC: 'Your 5 watts sure good here'
UK2KAF: (ex UP2KNP): 'Ur low power sure doing FB'
K4ZA: 'Ur sig has real punch'

I did other hamming, making some 400 contacts on the other bands, both CW and SSB using high power equipment. Could have made many more QSOs in the same time using the high power rig but it wouldn't have been half the fun."



Power-Mite PM 3
PM 3: 20-40 meter bands CW only — power input 5 watts power required 12 V d.c. — 500 ma. High impedance output for headphones. **$69.95**

Power-Mite PM 3A
PM3 A: Same features except with break-in keying. **$79.95**

Order today from your distributor, or direct:

Please ship my ☐ PM 3 $69.95 prepaid at once.
☐ PM 3A $79.95

I enclose my ☐ Personal check ☐ Money order in full

Satisfaction guaranteed or money back.

Name_____

Address_____

City_____ State_____ Zip_____

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

Keys. W1ELE/7, in Sequim, Wash., is on 14225 kHz. W4WLG and K4NS visited in this area. VE7AUA now is in Boxboro. WA1MYT, Malden Catholic ARS, is a new club. WA1MYT is a new YL in New Bedford. W1UYL is on 2. Barnyard Net had 26 sessions, 840 QNIs, 7 traffic. We hear that W3EHX, ex-W1BNS, is in Framingham. W1UQB has his Advanced Class ticket. South Shore Club held its Ladies Night and W1BIO, in whose cellar the club started, was present with his XYL. WN1MGY is working W6-Land with his one-tube 25 watts on 15. W1ZQQ has a new house trailer. W1IH has Mini Prod. vertical. W1HXK has a new job. W1BGW is on 21 MHz cw. W1LE is on 6 for emergency drills. FC WA1JLX has 56 hams in his town. WA1KDL has DX-560 and E.V. 719 mike. WN1KRV has a Gotham three-element beam for 15. He is pres. of B.C. High ARS, W1BCH, and is going to W1MX next year. WN1MSB is using a 15-watt rig on 80. The 6-Meter Crossband Net had 18 sessions, 60 QNIs, 3 traffic. W1PL received CHC top honors. NEEPN had 5 sessions, 109 QNIs, 10 traffic. WA1JBQ has SB-2200. WN1MQI has HW-16 and 35 countries worked. W1JDP is on 20 some. W1TWG has TR-4 at his QTH, TR-3 in the car and phone patch. WA1JKJ made DXCC. WA1FNM is on 15. W1OJM and WA1KZE made the BPL. W1ZQM spoke about RTTY at the Waltham Club. The club's new meeting place is V.A. Hall, Carter St., Waltham. WA1IFE worked K4SAO on 6. EM2-MN had 21 sessions, 152 QNIs, 151 traffic. K1RAN is on 2. W1QYY has an HW-117A. WA1ECY is in Viet Nam. New officers of MIT RS, W1MX: WA3CTW, pres.; Alan Luse, treas.; WB4CPE, secy.; WB2GLQ, stn. mgr.; WA8WNU, act. coordinator. New officers of Whitman ARC: WA1DUZ, pres.; W1BDC, vice-pres.; WA1AXK, treas.; WA1MGC, secy.; K1UMP, W1IAU, W1DKD, WA1HIH, directors. KJDZG is on his way to VO-Land, mobile 10 through 80. Southeastern Mass. ARA has four new Novices: WN1s MYM, MSB, MXV, NEN. New officers of Mass. Ch. NAHC: WA1EZA, pres.; K1YBS, vice-pres.; W1DKD, secy.-treas.; W1DOM, awards custodian; W1DFR, WA1DFL, K1WRO, trustees. WA1MQG is radio op on SS *Exford*/KHND. Some of the gang went to an "FM Symposium" at Providence, R.I. Appointments endorsed: W1DAL, WA1ECY as ORSs; W1RM, K1HHN as ECs; W1HXK as OO; 1BUF, WA1s DEC, DED as OPSs. Members and XYLs of the New Eng. Chapter of OOTC visited ARRL. W3s ZI and GCW came up and they will be in N.H. for the summer. WN1MGY visited ARRL. Framingham RC had Commander Bob Cameron, of the Coast Guard, as a speaker. Somervill ARC. WA1MHN, has a new Hy-Gain antenna for uhf. WA1EBG spoke on Transistors at the Massasoit ARA. W1AUU went to Channel Islands for a stay. New officers of Framingham RC: WA1IGL, pres.; W1UFM, secy.; W1FO, treas.; WA1LKF, act. mgr.; WA1KPU publicity. Capeway RC met at W1GPL's. K1TRL is new EC for Tewksbury. Traffic: (May) W1OJM 729, WA1EYY 379, W1PEX 355, WA1KZE 244, WA1FAD 212, K1ZYW 172, W1EMG 115, W1ABC 98, W1HKJ 91, W1PL 80, WA1JYY 74, WA1KFJ 69, WA1IFE 67, W1CTR 52, WA1IJL 37, W1UX 33, K1ESG 25, W1DOM 19, WA1DPX 19, W1AOG 14, WA1MFG 14, WA1JHQ 13, W1JDP 11, W1DKD 7, K1CLM 4, W1TWG 4, WA1FNM 2, WA1JKJ 2, K1LCQ 2, K1OKE 2, W1BUF 1, WINF 1. (Apr.) K1ZYW 145, WA1JYY 37, W1ABC 32.

MAINE — SCM, Peter E. Sterling, K1TEV – SEC: K1CLF. PAM: WA1FCM. RM: W1BJG. There will be a ham gathering at WA1GRA's QTH in Abbot Village Aug. 9. For more information check the Sea Gull Net 1700 on 3940. New hams in the State of Maine are WN1MWH, WA1MVQ, WA1MYG, WA1MXK, WN1MXO, WN1MXQ, WN1MXR. Congratulations, fellows. WA1JTT has a new Classic 33 beam. W1DIS is the proud owner of a Signal One. Sea Gull Net meets on 3940 Mon. through Sat. at 1700. The Pine Tree Net meets at 1900 on 3596 Mon. through Sun. Interested in an appointment?? If so, drop your SCM a line. We are still looking for news for the column. Any piece of news will be most welcome. Still looking for NCSs for the Pine Tree Net. Anyone who is interested in one night a week, please contact W1BJG for information. Traffic: W1YA 106, WA1FCM 77.

NEW HAMPSHIRE — SCM, Donald Morgan, K1QES – We welcome with pleasure the following new hams. WA1MYU, WN1s MYQ, MWZ, MVX, MXU, MXS, MXT, MXN, MYW. Again a brother and sister join us as Novices. Two net reports follow: The GSPN reports 601 check-ins, 72 pieces of traffic. The VTNHN reports QNI 203, traffic 174. Station reports are on the increase and show much cw activity. The phone bands, especially 75 meters, is crowded to capacity and makes traffic-handling very difficult. W1JY/K1QLZ sends word that he and his wife enjoyed the Fresno convention and met WB6EFZ. W1BYS, with W1ALE, is busy with 2-meter repeater fm activity. The VTNHN hosted the 1RN meeting and picnic at Pawtuckaway State Park May 31. WA1KTX has a new 2-meter rig. WA1JTM lost his dad, whose call was W0SAL. Our sympathy. Buzz WA1GCE has his Extra Class license and is chasing DX in his spar

Savoy Crystals Are Practically Everywhere...

For absolute accuracy and superb frequency control, specify Savoy Crystals.

You will find them in use around the world in every field of communication where accuracy and dependability are a must.

We invite you to contact us for one, or a million, or just write for our free catalogue.

Savoy Electronics, Inc.

P.O. Box 7127 - Fort Lauderdale, Florida - 33304

Tel: 305-566-8416 or 305-947-1191

time. W1UBG has a new IRN certificate. Courtesy and helpfulness pay great dividends. Traffic: (May) WA1JTM 303, WA1GCE 167, K1BCS 154, W1UBG 87, K1POV 85, WA1KTX 42. (Apr.) WA1JTM 251.

RHODE ISLAND – SCM, John E. Johnson, K1AAV – SEC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK, W1OP. the Providence Radio Club, reports that at its Annual Meeting the following officers were elected: W1EYH, pres.; WN1LAD, vice-pres.; K1HZN, secy.; W1KKE, treas. Elected to the Board of Directors were K1BKM, WN1IZM and WN1LGD. The PRA is now in its 51st year and has been affiliated with the ARRL for 49 years. The club has several new Novices: WN1LAD, WN1LGD and WN1MFL. PRA has joined the Explorer Program of the Boy Scouts by acting as advisor to Explorer Post No. 5 in Cranston. If R.I. hams know of any boys wishing to participate in the program, contact any PRA member for information. The club plans to build a 450-MHz "topsy-turvy" repeater capability tied into the Marlborough repeater soon. The W1AQ Club of Rumford reports three new members were elected at arecent meeting, WA1MGU, WA1JWC and WN1MUO. The club will have its new operating area completed soon and the club station has been operating for some time. RISPN report 31 sessions, 517 QNI, 62 traffic. Traffic: K1QFD 31, K1VYC 8.

VERMONT– SCM, E. Reginald Murray, K1MPN –

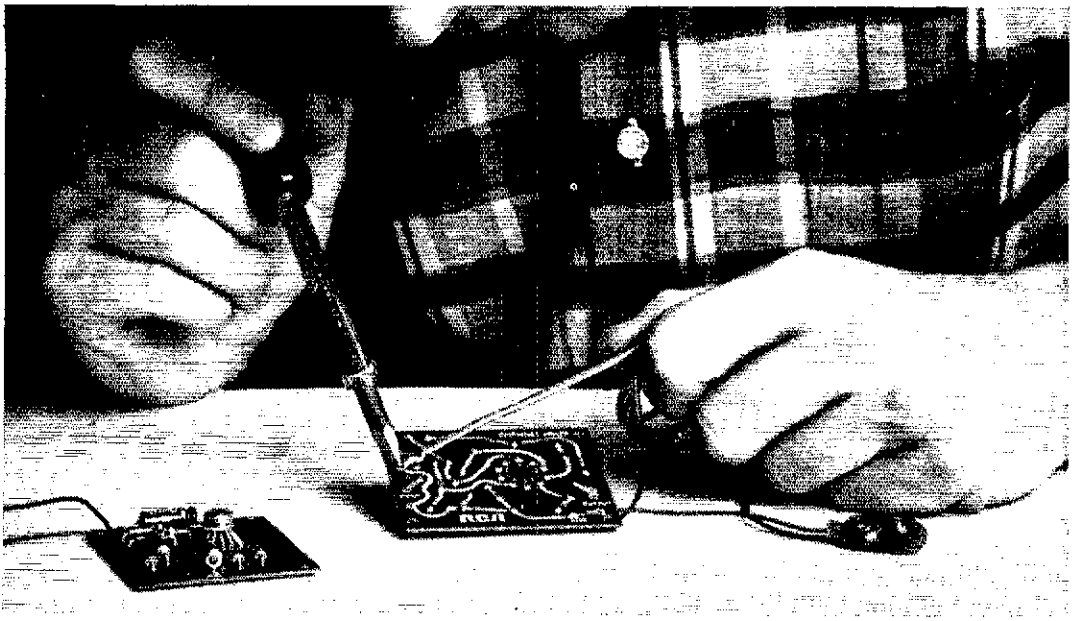
Net	*Freq.*	*Time(Z)/Days*	*QNI*	*QTC*	*Mgr.*
Gr. Mt.	3932	2130 M-S	654	59	W1ILZ
Vt. Bone	3955	1300 Su	80	5	WA1EDI
MNV	3685	2230 M-F	203	174	K1BCS
VTPO	3909	2200 Su	80	30	K1BQB
VTSB	3909	2130 M-S 1230 Su	443	74	WA1HSG

Welcome to new Novices WN1MWK (Burlington), WN1MYY and WN1MZI (Bennington) and new Tech. WA1MZM (Pownal). WN1LCO, a recent winner in the Novice Roundup is now in the Armed Forces. Don't forget International Field Day Aug. 15-16, Green Lantern Inn, Charlotte, Vt. Congrats to W1MRW on being 1st in Vt. for the SS (phone) Contest. It is with deep regret that we must record W1ILF (Barre) as a Silent Key. Al was well known and liked by many amateurs and it was always a pleasure to hear his Scotch brogue. Traffic: WA1GCE 167, K1BQB 105, W1ERT 24, K1MPN 12.

WESTERN MASSACHUSETTS– SCM, Percy C. Noble, W1BVR – SEC: WA1DNB. RM: W1DVW. PAM (6 meter net): WA1IGQ. ORSs: W1KZS and WA1LPJ. New OPS: WA1IGQ. New vhf appointees: W1KZS and WA1IGQ. W1ZPB has made many appointments direct via ham radio for visits during his 6-week European trip this summer. W1HRC is assembling an SB-200 for WA1JNW. WA1LNF and WA1LGU were awarded Section Net certificates. RM W1DVW reports the following: WMN handled 169 messages during the month with the following five highest in attendance: W1DVW, W1BVR, K1SSH, W1ZPB and WA1LNF. A total of 23 stations were active. SEC WA1DNB reports that West. Mass. now has 57 ARFC members and three active nets, the Sun. Morning Section FC Net and two 6-meter nets in Berkshire County. The CMARA has made arrangements for the showing on TV of the ARRL film "The Hams' Wide World," along with a discussion panel consisting of N.E. Director W1QV, W1JLA, K1RNG, W1SPG and K1HIS. The HCRA's May meeting was the annual homebrew night. Its *Zero Beat* has a fine article by K1NJC on the amateur in emergencies, stressing especially the advantage of emergency power. K1DPP, W1FVH and W1FJH, of the MARC, have Motorola 450 MHz fm rigs. K1YLU has a job in Maryland for the summer. The VARC's new officers are WN1IRT, pres.: WA1KTT, vice-pres.; WA1CXD, treas.; WA1ICA, secy. WA1LGU has another of her famous poems in this month's *The Oscillator*. Traffic: (May) W1ZPB 156, W1BVR 108, W1KK 91, K1SSH 90, W1DVW 73, WA1KLN 40, K1IJV 38, WA1MFB 38, WA1LNF 28, K1WZY 22, WA1LGU 17, WA1IGQ 9, WA1LPJ 9, WA1ISH/1 6, W1PUO 5, WA1DNB 3, WA1BXO 2, W1KZS 2. (Apr.) WA1LNF 33.

NORTHWESTERN DIVISION

IDAHO – SCM, Donald A. Crisp, W7ZNN – The FARM Net meets on 3935 kHz each day at 0200 GMT. The Idaho RACES Net meets week days at 1415 GMT on 3991 kHz. WA7EWV, 1508 Alder, Lewiston 83501, has been appointed SEC for Idaho. All amateurs are urged to join the AREC. If there is no EC in your area, volunteer or recruit one. The All Idaho County Award, sponsored by the Gem State Club, has created a flurry of activity for county hunters. For more information on the new award contact WA7GEL.



For the shack and bench

Assemble these new RCA Integrated-Circuit Experimenter's Kits quickly and easily. All the active and passive components, the pre-drilled printed circuit boards, and full clear instructions are included. (8-ohm speakers for KC4005 and KC4006, and batteries not included).

KC4000: Microphone Preamplifier IC Kit – a high-gain, low-noise, wideband preamplifier that accommodates both low- and high-impedance microphones.

KC4001: 2-Channel Mixer IC Kit – combines any two audio inputs, such as microphone, radio, phono, or oscillator, into a single output.

7 NEW IC KITS FROM RCA

KC4002: Audio Oscillator IC Kit – for testing audio, hi-fi equipment, and amateur radio transmitters – also for code practice.

KC4003: Amplifier/Oscillator IC Kit – a 500 mW audio amplifier or a variable tone audio oscillator.

KC4004: 9-V Regulated Power Supply IC Kit – supplies 9 volts DC output with voltage regulation of less than 3% at a maximum current of 250 mA.

KC4005: Intruder Alarm IC Kit – a circuit that develops a warning "whooping" signal.

KC4006: Fire Alarm IC Kit – a heat-sensing wire sets off a warning circuit.

KC4500: IC Kit Enclosure and Hardware Pack – optional for KC4000, KC4001, and KC4002 – a handsome, sturdy, prepunched case with input and output jacks, switch, and other hardware.

Buy these kits from your RCA Distributor. For information, write: RCA Electronic Components, Commercial Engineering, Section 129 H/S3OR, Harrison, N.J. 07029

(STARTING AT UNDER $5.00*) *Optional distributor resale price.

RCA

Printed in U.S.A.

WA7EWV has installed a new tower for his 3-band beam. WA7GOO is back in Boise on vacation from the U. of I. and is active using SB-101 and SB-200. New officers of the Eagle Rock Club are W7DQU, pres.; WN7JYW, vice-pres.; WA7KMF, secy.; WA7BGK, treas. The Eagle Rock Club is sponsoring hidden transmitter hunts. WA7MPS has a new three-band beam and is building a linear. FARM Net report: 31 sessions, 1057 check-ins, 61 traffic handled. Traffic: K7KBX 240, W7GHT 107, WA7BDD 42, W7ZNN 25, W7FIS 4.

MONTANA – SCM, Joseph A. D'Arcy, W7TYN – SEC: W7RZY.

Montana traffic Net 3910, 0000 GMT, M-F.

Montana PON 3950, 0145 GMT, Daily.

The Butte Club is sponsoring a net on 3915 kHz for the summer. New calls in the Anaconda area are WN7OUZ and WN7OVA. WA7HPL has passed the Extra Class exam. K7CCZ is leaving the state for a year's schooling on a fellowship. Not much news this month. Please write your SCM or SEC if you have items for this column. Traffic: WA7IZR 83, W7LBK 26.

OREGON – SCM, Dale T. Justice, K7WWR – SEC: W7HLF. RM: K7GGQ. PAM: K7RQZ. Net reports: K7YQM reports for the AREC Net sessions 31, traffic 23, check-ins 648, contacts 41, maximum number of counties 16, QSTs 5, bulletins 1. K7OUF reports for the NSN, sessions 31, traffic 120, check-ins 235. WA7FTN reports 1316 patches from S.E. Asia during May. W7LT received his WAC and WAS certificates. The Willamette Valley DX Club met with CP1EP for an informative get-together. W7HLF spent 15 days in the hospital. Traffic: WA7ICX 225, WA7KDU 223, K7RQZ 204, WA7IFS 172, W7BDU 162, WA7LDZ 132, K7OUF 84, WA7KIU 67, WA7KRH 65, K7QFG 54, W7ZB 46, K7WWR 35, WA7JAW 26, K7YQM 19, W7MLJ 15, W7HLF 13, W7WHY 10, K7KPT 8, W7BFX 5, W7LT 2.

WASHINGTON – SCM, Harry W. Lewis, W7JWJ – The Columbia Basin Net Picnic is scheduled for Aug. 9. SEC: W7UWT reports 269 AREC members in the section with 7 active emergency AREC nets. K7YRC is the new EC for Area 1. W7PI, W7ZIW, W7USO and WA7KOB are liaison to RN7 1st session and W7APS is liaison for the 2nd session. Recently W7AXT was commended at a YMCA program. This for his origination of traffic and dissemination of same via WSN. WA7KOB recently was elected manager of the Northwest Slow Speed Net (NSN). From Wi-Land, W1EEE/7 is active on 14,255 kHz from Sequim. K7EFB is pres. of the Spokane Radio Amateur's Club. The Walla Walla group is now finishing plans for the annual hamfest to be held in Sept. How come no QSLs from the Willamette Valley DX Club? The subject of QRP (low power) is gaining interest with K7ZVA, secy. of the QRP ARC-1. Up in Everett W7IEU is QRP and ARK 5. The Puget Sound Council of Amateur Radio Clubs will hold its Aug. meeting at the QTH of WA7EKM in Lynnwood. Washington State Amateur Radio Week is being planned for Sept. 6 through 13. Traffic: W7BA 1092, W7AXT 228, W7PI 228, WA7KOB 207, WA7LOQ 195, W7DZX 151, K7CTP 127, W7BQ 86, W7HMA 86, W7MCW 80, WA7DZL 46, W7BUN 39, W7APS 36, WA7MEO 26, W7JWJ 25, W7JEY 24, K7LRD 23, K7OKC 12, W7FQE 11, W7UU 8, W7ZHZ 8, W7AIB 7, W7OEB 4, K7EFB 1.

PACIFIC DIVISION

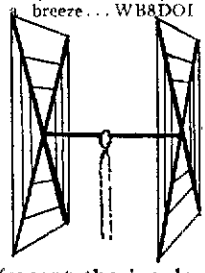
EAST BAY – SCM, Paul J. Parker, WB6DHH – Greetings to all, and while I have everybody ready I would like to know which one of you out there would like the job of Section Emergency Coordinator. I am in real need of a person who has the time to put into this office, and I would welcome anyone. Please consider this appointment, and if you feel that it might be worth a try please let me know. The Pacific/Southwestern Convention has come and gone and I would like to thank the Oakland Radio Club for the conference of Royal order of the Wouff Hong. They really did a bang-up job of it this year and I want everyone to know it! K6OSO racked up a 71,650-point total in the April CD Party. W6RGG did fairly well in the May FMT. W6TI is transmitting the Northern California DX Club Bulletins and the ARRL Bulletins on 20 meters at 14,002 kHz 1800Z Sun., 0200Z Mon. and on 2 meters (146.540 MHz) Wed. and Fri. at 0400Z. W6CBF reports having worked all the Armed Forces Day stations again this year and got the message as well. Did you? W6IPW reports that 20 meters has been real favorable for TCC skeds this month and in one hour he handled 41 messages. The Oakland Radio Club had a white elephant sale June 5. K6PJ thought he would give his radio a break and was on vacation most of June. That just about does it for this month, gang. Remember that the SEC job is open and I would love to have somebody who does not already have something to do step up and

AHA! YOU THOUGHT GOTHAM

was a giant, automated, mechanized, computerized factory. No, no, no. Just two brothers, making thousands of the best antennas possible at low, low, low prices that reflect the tiny overhead. In QST since '53 without missing an issue!

QUADS

Totally satisfied with quad. Worked DK4VJP, SM7DLH, XE1AB, DM4SEE, FL8SR, N6AUM, HK7YB in few hours. Instructions a breeze... WB8DOI



CUBICAL QUAD ANTENNAS— these two element beams have a full wavelength driven element and a reflector(the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

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' × 1¼" 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: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞" 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.

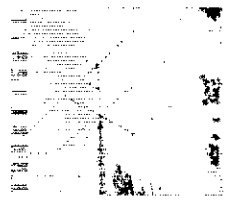
Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

"Just a note to let you know that as a Novice, your 3-El. 15 Beam got me R1 Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20.	$21	4 El 10.	$20
3 El 20.	27*	7 El 10.	34*
4 El 20.	34*	4 El 6.	20
2 El 15.	17	8 El 6.	30*
3 El 15.	21	12 El 2.	27*
4 El 15.	27*	*20-ft. boom	
5 El 15.	30*		

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, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN,FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. *DEALERS WRITE!*

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

take it over. Traffic: (May) W6IPW 346, WB6VEW 40. (Apr.) WB6VEW 15.

HAWAII – SCM, Lee R. Wical, KH6BZF – SEC: KH6GQW. RM: KH6AD. PAM: KH6GJN. QSL Mgr.: KH6DQ. ECs: KH6s GPO, LP, BAS, GRV/KR6, KIHNO/KH6, KX6ET, KC6EJ and W7UZH/Guam. RACES nets coordinate with KH6AIN, RO.

Net	*MHz*	*Times(Z)/Days*
Friendly	7.290	2030 M-F
World Wide Boy Scout	21.360	1800 Sa
Confusion (Patches)	21.400	0130 All
Pacific Interisland	14.335	0830 M-W-F
Micronesia	14.335	0800 TuThSaSu
S.E.	14.320	1200 All
Pacific Typhoon	14.265	

I regret to report the death of a well-known amateur and Honolulu ARC member KH6QO. Those in town recently were WØBWJ and his XYL, W9IOP and JA1ANG. KH6CU dropped the Hono ARC a line from Moscow. KH6BJ and XYL recently vacationed in EA6-Land. WØBWJ/KS6 had a ball on the air from Pago Pago. WH6HDW recently won the Honolulu ARC Novice Trophy donated by KH6BM. KH6AG and W6SMO/KH6 visited KC6EJ, ex-KW6EJ. Sadami Kitahara's son Lester received an appointment to the USAF Academy at Colorado Springs. KH6AFN/6 reports that she's now WB6ZZM. Her hubby, KH6ABQ/6, hasn't received his 6-Land call yet. KH6GSK re-rigged his tower recently. KH6BAS reports his new monster four- element quad is taking shape. Ed still reports that the Kauai ARC gang is gathering speed. Fond Aloha to K5MWZ/KH6, who leaves Hawaii soon. PAM KH6GJN reports the Confusion Net Dinner, cocktails and eyeball get-together will be held at the Town and Country Hotel, San Diego, Ca July 11, '70. KX6DQ is now recovering from surgery at Queen's hospital. KH6GRG put KH6BSA (special call) on the air from the recent Boy Scouts America Aloha Council "Makahiki". KH6GJN would like to get another KH6 to cover the Confusion Net in his absense. W7UZH/KG6 has deactivated the Gecko Net temporarily until a suitable frequency can be determined for the forthcoming typhoon season. KC6SG and his XYL are sailing around the world on the triamaran *Ava Kaze*. They stopped to visit KC6EJ. Listen for Herb/mm 0800Z on 14,290 MHz. Traffic: (May) KH6BZF 19, KH6BAS 7, KH6AK 6, KIHNO/KH6 2, W7UZH/KG6 1, WØDAD/KH6 1, KH6GJN 1. (Apr.) KH6AJF 104, KH6GRG 42, KIHNO/KH6 8, W7UZH/KG6 1.

NEVADA – SCM, Leonard M. Norman, W7PBV – SEC: WA7BEU. Hats off to the Fresno ARC for an FB Convention. W7TVF will schedule anyone needing a Nevada contact, DX or stateside. K9VFR/7 has made WAS. K7ZOK and WA7DSP are active on 6 meters. When mobiling in Nevada and other Western states, check in on 7255 MHz. WCARS is active from 0730 until late evening. FM activity is on the increase in Nevada; Reno Simplex on 94. Las Vegas 34/94. The 1971 SAROC is scheduled for Jan. 7-10 at the Flamingo Hotel Convention Center. The Sierra Hamfest will be held Aug. 22. Get details from K7ZAU, chairman. WA7BAV is conducting a code and theory class at the Nellis AFB ARC. Traffic: K9VER/7 29.

SACRAMENTO VALLEY– SCM, John F. Minke, III, W6KYA – Those of you who are interested in a 160-meter contest, contact W6CUF of the Contest Advisory Committee. The North Hills Radio Club held its First Annual Banquet in Penryn and had a good turnout. K6TWE built a 5-watt rig and worked Susanville on 40 from Sacramento; WB6AUH topped that by working Berkeley with his 200-milliwatt rig. W6ZOH, who let his expiration date get by him, is now W6MDP. Hear about Bill Harrah of Harrah's club acquiring an old Ford Tri-motor transport? W6PIV used to fly that identical aircraft, the "City of Reno." Seen at the convention in Fresno were WB6AUH, W6DOR, WB6MZX, K6DLL, W6SMU, W8VDA, W6BIL and W6KYA. Plan now for the California QSO Party, the first week end in Oct. Contact me if you plan portable operation for the affair. W6KYA took first place in the Vermont QSO Party and the VE/W Contest for Sacramento Valley. See you all at the Sierra Hamfest at Bower's Mansion Aug. 22nd. Traffic: W8VDA/6 106.

SAN FRANCISCO – SCM, Kenneth S. McTaggart, K6SRM – WB6FZN is now an ORS appointee. Information received via W6RQ: W6KWE, according to the *RSGB Bulletin*, has worked HSSABD on 160 meters; W6VCN is once again active on 20 cw from San Francisco and was instrumental in having JA3XPO located in the San Francisco pavilion at Expo '70; W6RQ has kept up his record by qualifying in his 70th consecutive EMT. W6WLV says his

On November 15th, 1962 WE SHIPPED AN AFRICAN CUSTOMER 130 SSB MOBILE TRANSCEIVERS.

LAST WEEK WE DECIDED IT WAS TIME TO SUGGEST THAT THEY BUY SOME SPARE SERVICE PARTS.

JUST IN CASE.

THIS MAY GIVE YOU A CLUE TO WHY WE FEEL SECURE IN OFFERING THE INDUSTRY'S ONLY THREE YEAR GUARANTEE.

Our regular customers of SSB equipment systems and accessories probably couldn't care less about this "increased guarantee to three years." Most of them have been using our radio communication equipment for many years with never a call-back... never a guarantee claim ...hardly ever an urgent call for a single rush part. CAI customers know that a minimal inventory of replacement parts will keep their equipment working trouble-free 'round the clock, year in and year out. For the new customer—our full THREE YEAR GUARANTEE should sound exciting. But take the word of our regular customers throughout the world—you will most likely never need it.

Write or Call for Data on Our Standard and Custom Systems

cai
communication associates, inc.

1208 Third Ave., New Hyde Park, L.I., N.Y. 11040
Telephone: 516-488-2323 TWX: 510-223-0400

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

efforts in notification of QSL recipients for the W6 QSL Bureau have jumped his traffic total. W6EAJ continues to be active on 160 meters. W6KWE transmits Official Bulletins on 3824 MHz at 0400Z Wed. WA6BYZ is still at it on NCN – he is working on an unbroken BPL string for 1970. W6OER keeps active with check-ins to WCARS, Mission Trail Net, and the Arizona Copper State Net. Don't forget the Sierra Hamfest at Bowers Mansion (between Carson City and Reno) Aug. 22. K7ZAU is the man to contact for further information. The Greater Bay Area Hamfest follows in Oct. An active 2-meter fm repeater is now operating on Sonoma Mt. Both 2 meters and 420 MHz are used. W6PZE is the one to contact for further information. 146.65 MHz is a simplex frequency in use in southern Sonoma County. Traffic: (May) WA6BYZ 405, W6WLV 257, W6KVQ 90, W6OER 66, WB6FZN 49, W6BWV 26, W6RQ 2. (Apr.) W6OER 23.

SAN JOAQUIN VALLEY – SCM, Ralph Saroyan, W6JPU – WB6OSH is the new SEC for San Joaquin Valley. The Pacific Division Convention, held in Fresno May 15, had 680 in attendance and everyone seemed to enjoy himself. K7VNO, ex-W6ZOI, flew up from Tucson to attend. W6JPU won the home-brew contest with a transistorized receiver. K6OZL is back home in Hanford after spending a year in New England. W6DPD reports that on 2 meters the local contacts can be made on 145.05 MHz and that the serious DXers operate on Mon., Wed. and Fri. on 144.120 MHz from 7:30 to 8:30 P.M. W6DCP is working out very well on 6- and 2-meter ssb. WB6HQU has a 250-C and a TV-B on 6 and 2 meters. K6MFJ has a TR4-A. WA6NRV has a TC-2. W6TUI has a Galaxy and Swan antenna. W6DPD has a new self-supporting tower. WB6ZOB has a 6-meter beam up. K6KZL is on the higher frequencies chasing DX with a tri-band beam. WA6CPP has been appointed OPS and has a Hunter 2000-C amplifier. WB6QQF is on 6 meters. W6WSI is on 40 cw. WB6LAY is on 6 and 2 meters. W5PPH is now in Fresno. Traffic: WA6SCE 146, WA6JDB 41, WA6CPP 8.

SANTA CLARA VALLEY – SCM, Albert F. Gaetano, W6VZT – SEC: W6NVO (acting). RM: WA6LEA. W6AUC has moved his QTH after fifteen years in the same place. I'll bet moving the ham gear was a bigger job than the household stuff considering all the junk a guy can collect in that length of time. WA6AIX is out of the service now and back checking into the local CD net. We're sure glad to hear him again. K2EIU/6 has been busy putting up antennas at his QTH. W6ZRJ, D6DYX and W6VZT have been holding weekly skeds on RTTY for traffic work. Maybe if we can get more guys interested we could handle a lot of local traffic on RTTY. Sometimes while listening to the various ham activities on the air, I get the impression that some fellows forget it is just a hobby. I think if all would remember this we might have a little more patience with some of the newer fellows and consequently not run them off when with a little experience they would also make good operators. With the summer months coming on, the noise condition will get worse and consequently traffic-handling tougher. This means slow down when passing traffic may take less time than spending a lot of time giving tills. WN6OMK has passed CP-15 and also has 30 states toward WAS. Nice going, Chris. PSHR: WA6LFA 39, W6YBV 38, W6DEF 32. Traffic: W6RSY 427, W6YBV 385, W6RVB 220, WA6LFA 183, W6DEF 132, W6NW 132, K6DYX 91, W6ZRJ 78, W6VZT 57, W6BPT 56, W6AUC 52, K2EIU/6 9, W6RFF 8, K4BVD/6 3.

ROANOKE DIVISION

NORTH CAROLINA – SCM, Calvin M. Dempsey, WA9UQC – SEC: W4EVN. PAM: W4AJT. VHF PAM: W4BIZ. RM: W4WXZ. K4CAX participated in the Georgia QSO Party and worked all four military stations on Armed Forces Day. WN4QJA, of Tarbobo, worked 18 states in a month mostly on 40 meters. He is an ARRL member and is 15 years old. W4WWD passed the Advanced Class exam. WA4TRQ, an electrical engineering student at North Carolina State University at Raleigh, is back with NASA at Wallops Island, Va., for the summer. We are happy to have W4WXZ as RM. He replaces W4IRE, who had to retire for awhile. Plan to attend the Roanoke Division ARRL Convention in Raleigh, N.C. Oct. 31 and Nov. 1, 1970 sponsored by the Raleigh Amateur Radio Society.

Net	*Freq.*	*Time(Z)/Days*	*QTC*	*Mgr.*
N.C. SSB	3938	2330 Dy	19	WA4KWC
CN(L)	3573	0200 Dy	52	WB4GHK
THEN	3923	2330 Dy	90	WA4UQC

Traffic: W4EVN 235, WB4MLI 188, W4WXZ 82, K5TGA/4 70, WB4ICF 64, WA4GMC 43, WB4HGT 43, WA4UQC 43, K4TTN 30, WB4BGL 29, WA4VNV 22, K4VBG 20, WB4IMG 18, K4MC 18, W4ACY 14, WB4HGS 14, WB4BXQ 11, WA4NUO 9, K4EO 4, WA4KWC 4, WB4OZL 2, K4CAX 1.

AMATEUR ELECTRONIC SUPPLY

is the Best Place to purchase your new

SWAN *gear for the following reasons-*

SWAN 260 Cygnet 80-10m AC/DC	($50 Bonus)	$435.00
SWAN 270 Deluxe Cygnet	($50 Bonus)	525.00
SWAN 350C 80-10m Transceiver.	($50 Bonus)	420.00
SWAN 500CX 80-10m – Deluxe	($50 Bonus)	565.00
SWAN 250C 6m Transceiver	($50 Bonus)	450.00
NS-1 6m Noise Silencer		36.00
TV-2B (Specify 14 or 50mc if)	($30 Bonus)	350.00
CYGNET 1200W Linear	($25 Bonus)	295.00
Mark II 80-10m Linear – w/tubes	($50 Bonus)	395.00
Mark 6B 6m Linear – w/tubes	($50 Bonus)	395.00
Power Supply for Mark II & 6B		265.00
117XC AC Supply w/spkr. in cabinet		105.00
14-117 12v DC Supply w/Cable		130.00
510X MARS Oscillator - less crystals		55.00
508 Full Coverage VFO		145.00
210 6 Meter VFO		120.00
VX-II Plug-in VOX		35.00
100kc Calibrator for 350		19.50
100kc Calibrator kit for 350C only		19.50
500kc Calibrator kit for 250 or 250C		19.50
FP-1 Phone Patch		48.00
AF-800 Audio Filter		28.00
14C 12v DC Module/cable		$ 65.00
14CP As above, but Positive Ground		75.00
117X Basic 117v AC Supply ONLY		65.00
230X Basic 230v AC Supply ONLY		75.00
117 or 230vac Line Cord (specify)		8.00
8' Cable w/plug (Supply to Transceiver)		6.00
230XC 230v AC Supply, speaker, cabinet		115.00
14-230 12v DC Supply w/230v Basic		140.00
Universal Mobile Mounting kit		12.00
SS-16 Custom Crystal Lattice Filter		95.00

SWAN HORNET TRI-BAND BEAMS (2kw P.E.P.)

TB-2 2 Element (standard)	$ 99.00
TB-3 3 Element (standard)	119.00
TB-3H 3 Element (Heavy Duty)	139.00
TB-4H 4 Element (Heavy Duty)	169.00
1040 10-40m Trap Vertical	59.95

"MODEL 35" SINGLE BAND MOBILE ANTENNAS

5' top section with kwik-on	$ 11.95
15m coil with kwik-on	21.95
20m coil with kwik-on	23.95
40m coil with kwik-on	25.95
75m coil with kwik-on	27.95
18" Base Section	8.50
36" Base Section	8.95
48" Base Section	9.50

80-10m MOBILE "SWANTENNAS"

Model 45 (Manual Bandswitch)	$ 79.50
Model 55 (Remote Bandswitch)	129.50
Custom Contour Bumper Mount	24.95
Kwik-on Antenna Connector	5.95

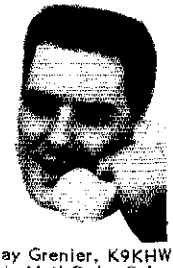
AMATEUR ELECTRONIC SUPPLY

4828 W. Fond du Lac Ave.; Milwaukee, Wis. 53216
Phone (414) 442-4200

STORE HOURS: Mon & Fri - 9 am to 9 pm; Tues, Wed & Thurs - 9 am to 5:30 pm; Sat - 9 am to 3 pm

- ★ **TOP TRADES** for your good clean equipment
- ★ **STAY-ON-THE-AIR PLAN** – Enables you to keep your trade-ins until your new gear arrives – Lose no operating time!
- ★ **Convenient Revolving Charge Plan**
- ★ **PERSONAL SERVICE** from fellow hams who understand your problems
- ★ **SAME DAY SERVICE** on most Orders and Inquiries from our Centrally Located Modern Facilities
- ★ **Top Notch Service Department**
- ★ **UP TO $50 CREDIT** may be taken towards other merchandise when on a unit that indicates a Bonus is purchased without trade-in and at the regular price.

GET OUR DEAL TODAY!
Use Handy Coupon Below



Terry Sterman, W9DIA
Proprietor

Ray Grenier, K9KHW
Mgr. Mail Order Sales

To: **AMATEUR ELECTRONIC SUPPLY**
4828 West Fond du Lac Avenue
Milwaukee, Wisconsin 53216

I am interested in the following new equipment:

_____

I have the following to trade: (what's your deal?)

_____

Ship me the following New Equipment:

_____

I enclose $_____. I will pay balance (if any)

☐ C.O.D (20% deposit) ☐ Revolving Charge Plan

Name_____

Address_____

City_____

State_____ Zip_____

SOUTH CAROLINA – SCM, Mrs. Elizabeth Y. Miller, WA4KFP – SEC: WA4ECJ. PAM: WA4GAW. RM: Vacant. As of this writing the RM job for S.C. is still unfilled. This places us in a particularly embarrassing position since when the S.C. and N.C. nets merged it was agreed that we would alternate the job of net manager on a six-month basis. As of July 1 it was S.C.'s turn and we are without an RM to fill the job. Any volunteers? In Spartanburg, WB4LMS got his linear going and WB4MCI is working on a new HW-12. W4NTO missed two readings on the last EMT by 3 and 4 cycles. Don't forget the Camden Picnic the 1st Sun. in Aug. and the S.C. QSO Party Aug. 29 to 31. Let's have a better showing this year than last! SCSSBN traffic: 117 (May), 73 (Apr.) Traffic: (May) W4NTO 29, W1OA/4 17, W4JA 6. (Apr.) W1OA/4 70.

FOURTH SOUTH CAROLINA QSO PARTY

This contest, sponsored by the Los Country Amateur Radio Club, Inc., will take place from 2000 GMT Sat. Aug. 29 to 0500 GMT Aug. 31, 1970. Full or part-time operation is permitted. It is open to all amateurs. Stations may be worked on different bands and different modes for extra points. The exchange will be QSO number, report and state, province or country. S.C. stations give county for QTH. Logging information: show date, time, band, mode and location of station worked; with claimed score. Suggested frequencies plus or minus 15 kHz: 1810 3580 7060 14070 28060 for cw; 3915 7260 14290 21380 28600 for ssb. Novices use 3725 7175 and 21110. Scoring system: Score one point for each contact and multiply by the number of states, provinces or countries. Out-of-state stations use the number of different counties worked for the multiplier. Awards: Certificates will go to the first place winner in each state, province or country and the first three winners in S.C. The mailing deadline is Sept. 15, 1970. Send your log to Contest Chairman, Box 5026, North Charleston, South Carolina 29406.

VIRGINIA – SCM, Robert J. Slagle, K4GR – Asst. SCM: A.E. Martin, W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY. RMs: WA4EUL, K4MLC, W4SHJ. PAMs: W4OKN, WA4YXK (vhf). We regret to announce W4ZCL as a Silent Key. It was a great day Armed Forces Day at NSS; WA3LKH put the Navy ahead in traffic handled. Had a marvelous reception at Richmond ARC and a great day at Roanoke. Appointments: WB4FDT as OBS, WA4WOG as EC, K4PRQ as OPS (moving to Annandale), WB4NNO as ORS and WB4PYA as OPS. PSHR: WA4PBG, W4UQ, W4SHJ. OO W4HU still is reporting excessive second harmonics observed. WB4NNO made WAS and WAC with 85 countries. WA4WQG is working on mobile. Director W4KFC attended several ARCs and the Board Meeting and operated A-1 operator position at NSS Armed Forces Day. W4YZC has moved back to Fairfax. K4ZRU has put up a sixteen-element 2-meter beam. 50-year ARRL member W4BGS is back on the air with a new NC-200. KL7EGA/4 is now WB4QYE. W4DM reports summer doldrums. WB4DRB reports great success with Ten Tec PM2 QRP receiver. WB4FDT says Extra helps with DX. K4JM reports fishing fabulous. WB4DRC is home from college and back on the air. W4TE/K4LMB report visitors – no hamming. W4JUJ is off for G-, GW- and GM-Lands. W4SSQ will be G-Land-bound again soon. W4QCW talked to King Hussein.

Net	*kHz.*	*EDST Dy.*
VSBN	3935	1800
VSN	3680	1830
VN	3680	1900
VFN	3947	1930
VSBN	3935	2200

Traffic: (May) W4SQQ 336, WB4GTG 169, WB4NNO 156, W4UQ 147, W4NLC 125, WA4JJF 70, K4GR 58, WA4PBG 44, W4OKN 41, W4SHJ 37, WB4JJS/4 33, WB4KCM 32, WA4WOG 22, K4PRQ 10, WB4KBJ 10, K4TSJ 10, W4KFC 9, W4KX 8, W4TJF/3 8, W4DSW 7, W4MK 7, KØYQX/4 7, WB4DRB 6, WB4FDT 6, K4JM 6, WB4CSR 5, WB4IRA 5, WA4BIX 4, K4JYM 4, W4KAO 2. (Apr.) W4SQQ 224, K4FSS 37, WB4NNO 27, K4JYM 2.

WEST VIRGINIA – SCM, Donald B. Morris, W8JM – SEC: WA8NDY. RM: WB8BBG. PAMs: K8CHW, W8DUW, W8IYD. Phone Net Mgr.: WB8AQE. Congratulations to K8SXO, Tri-State ARC Amateur of the Year. Don's work in 2-meter fm repeaters, Huntington area, has been outstanding. SEC WA8NDY spoke at the Kanawha ARC meeting; WA8WCK also attended. WB8CYB will be mobile ssb 40 meters to West coast in Aug. WVN CW Net: 23 sessions, 90 stations, 40 messages. WB8BBG received 35-wpm CPC and will study under National Science grant this summer. W8HZA will assume cw net control until WB8BBG returns. W8DUV, publicity chairman for the YLRL, attended the Midwest YL Round-up. W.J.B. Bond, of Huntington, has been an ARRL member for 50 continuous years. He was 8CY before WW1. Officers of the Greenbrier Valley ARC are W8FFC, pres.; WA8OXI, vice-pres. and act. mgr.; WA8PFB, secy. Watch for W8EV operating from his new home in Florida. John Huntoon, Gen. Mgr. of ARRL, attended the West Va. State Convention along with Director Clark and Vice-Director Wicker. Remember, Black Diamond Ham Picnic, Bluefield, Aug. 30. Traffic: WB8BBG 148, WA8POS 89, WA8NDY 74, WB8CYB 31, WA8ZZI 12, WA8WCK 11, W8JM 10, K8QEW 7.

ROCKY MOUNTAIN DIVISION

COLORADO – SCM, Charles M. Cotterell, WØSIN – May I thank all of you traffic-minded amateurs who sent in your monthly traffic report? Thank you, and thank all of section appointees who regularly send in reports on other matters, too. Never seem to get around to a section letter so will ask here, what else do you expect your SCM to do? Many of you took time to vote at the last election so surely you expec ted something. Why not let me know? The SEC has 16 ECs now. Is your area represented? If not, why not volunteer? Several of your fellow amateurs in other parts of the state did. Tried 160 yet? WØLRW is still looking for more check-ins. Let's not let this band go by the way. VHF PAM WBØAWG reports "E" openings last month. Other areas of the section need a VHF PAM. Are you interested? We need a couple of more OBSs. WØOUI is now the only active one in the section. Without more help from the membership all of our amateurs are being shorted to some degree. Thanks to all the nets in the section. All seem to be doing fine business. We are fortunate to have such excellent net managers. The WØWYX 2-meter fm repeater has been helping on the Denver parades. Columbine Net: QNI 1021, QTC 72, patches, etc. 191, time 1422. Hi-Noon: QNI 1031, QTC 124, time 1034. Traffic: (May) KØZSQ 568, WØWYZ 265, KØJSP 122, WAØMNL 100, KØECR 92, WAØLVM 92, KØIGA 30, KØSPR 22, WØKFH 2, WØLCE 2. (Apr.) KØZSQ 672, WAØLVM 4.

NEW MEXICO – SCM, James R. Prine, W5NUI – The Initial Damage Report to the Federal Aviation Agency Regional Office, Fort Worth, Tex., of the tornado in Lubbock, Tex. May 12 was initiated from the Lubbock Airport by W5HUJ to W5NON in Albuquerque, who patched him into the Fort Worth Office. WA5MIY handled 5 welfare messages arising from the Lubbock tornado. W5MYM has "unsuccessfully" conducted destructive testing on his linear amplifier. Better luck next time, Ski. W5SDK has moved to Hawaii and WA5UNA has moved to the Washington, D.C., area. Good luck in your new assignments. The combined efforts of the Albuquerque Caravan RC and the Los Alamos RC utilizing the 2-meter repeaters provided a communications net for the sports car rally over the week end of June 6. The New Mexico Net, 3750 kc., has changed to 0230Z for the summer. Traffic: WA5TWA 44, W5DMG 40, WA5MIY 16, W5NUI 15, WA5OHI 11, W5PDY 11, WA5JNC 8, W5NON 7, WA5WYV 6, WA5BLI 4, W5HJ 4.

UTAH– SCM, Thomas H. Miller, W7QWH – SEC: W7WKF. RM: W7OCX. Please submit your nominations for SCM to League Headquarters as soon as possible. W7QWH will not be running for reelection and it is imperative that Utah has continuity in the office. K7ZJS has just finished four months training with Bell Telephone and is now back home and eager to resume his OO activities. K7BNZ is back on the air after a long absence. Remember WIMU Hamfest at Macks Inn, Idaho, Aug. 7-9. W7EM has been quite busy repairing equipment. WA7MEL received his Advanced Class license in May and has also received the WAS award and needs Africa for WAC. Dallas was also recently elected secy. of UARC. WA7NHA has a new 3-wire folded dipole on 40 meters and is working to make it better. WA7IZR, in Livingston, Mont., has been awarded the BUN certificate. This is certificate No. 77. BUN report for May: QNI 712, QTC 77, sessions 31, average time 16.13 minutes. W7OCX made 41 points on the PSHR. Traffic: W7EM 84, W7OCX 69, K7SOT 46, WA7NHA 2, K7CLO 1.

WYOMING – SCM, Wayne M. Moore, W7COL – SEC: K7NQX. We have a new club in Wyoming, the Wyoming Amateur Repeater Society. Officers are WA7DNZ, pres.; W7BAF, vice-pres.; WA7EGK, secy.-treas., with W7FT, K7SDD and WA7MKU as trustees. WA7DNZ and WA7MKU will be operating from Laramie this summer while going to summer school. DNZ is also sporting a new car. By the time this goes to print Field Day, the division convention and hamfest will have passed. If you didn't participate in one or all, you can be assured that you missed something. W7VTB has been working mobile from around the state. Nice to hear Bob on again on the lower frequencies. A couple of new ones on the air from Casper: WN7OFL and WN7NZV. Ken and Doug are working on their General and hope to be on the phone bands by this fall. WA7AUV was guiding on a bear hunt this spring. Traffic: W7GMT

333, K7KSA 114, W7HLA 94, W7SDA 68, K7WRS 56, W7TZK 41, W7GSQ 32, K7TAQ 30, K7VWA 16, K7SLM 10, K7AHO 8, W7NNX 4, K7WNF 4, WA7AUV 2.

SOUTHEASTERN DIVISION

ALABAMA – SCM, Donald W. Bonner, W4WLG – RM: W4HFU. The North Alabama Hamfest will be held this year in Huntsville at the Mall Aug. 15 and 16. We are getting more of our members on the Public Service Honor Roll now. See past issues of *QST* or your SCM for details pertaining to this award. You may qualify if you are active on a few NTS nets, operate in emergencies, handle phone patches, etc. WA4VUG has his Extra Class license now. There have been quite a few Motorola 80-D 2-meter transmitter/receivers move into the Huntsville area lately. I see a real good emergency communications group in the making. At present, the future of unattended repeater operation is not real clear but fm still has a clear noise advantage for mobile emergency work and is available now cheap – just a though for the ECs. I would like to say thanks to the faithful crew of good operators on the two cw nets. You are doing a good job holding the traffic up this summer. Traffic: WB4KDI 175, W4HFU 138, WB4JMH 128, WN4PQC 93, WB4EKJ 82, K4AOZ 48, WB4LAO 43, WB4KSL 35, WA4FYO 34, WA4GGD 32, WB4LAL 16, W4WLG 16, WN4OJD 13, WA4VEK 13, WA4AZC 9, W4DGH 9, WN4OVW 8, K4UMD 7, K4WHW 5.

EASTERN FLORIDA – SCM, John F. Porter, W4KGJ – Asst. SCM: Albert Hamel, K4SJH. SEC: W4IYT. Asst. SEC: W4SMK. RMs: W4ILE, K4EHY. PAM 75: W4OGX. PAM 40: W4SDR. W4RHA is a new member of the Gator Net. He hails from Va. Any others? K4BLM was elected secy. of Country Cousins. The Ft. Pierce ARC elected WN4NOZ pres.; WN4MEJ, vice-pres.; WB4MIQ, secy.; WN4LME, treas. Looks as if the Novices are starting off with a bang. This is a healthy sign. WB4FLW now has his Extra ticket. WB4HKP now has SB-10 and can be found on most traffic nets, cw as well as phone. WB4JCW now is General. Duval County is switching from am on 2 and 6 to fm on 146.940. Thanks to WFGA-TV for showing Ham's Wide World. They are also planning a summer rerun of same. Nice going, you guys in Jax. WA4SCK and WB4HKP made the BPL this month. Hollywood ARC now has a regular Newsletter and also is backing a 2-meter fm repeater for Broward County CD. Keep your eyes on this club. It is growing like a well-fed weed and also operates a class for new hams. WB4FMZ reports that six have passed their code tests and expect their licenses soon. New mgr. of QFN is K4VFY, who needs no introduction. Many thanks to WB4HJW for his fine work during his tenure as mgr. Your SCM had a nice visit with the St. Pete gang during the Annual Hamfest. We even managed to pick up a possible three new appointments while there. The following week we took in the big Orlando Hamfest. Our section meeting there was attended by W4DQS, ARRL Southeastern Director; W4RKH, W. Fla. SCM; W4YPX, Asst. Director; W4ILE and K4EHY E. Fla. RMs; K4BAI Ga. RM; W4IYT, E. Fla. SEC; WA4VZF, WB4OMG, W4BCZ, WB4FJY, E. Fla. ECs, plus many ORS, OPS, OO and OBS appointees. Traffic: (May) WA4SCK 593, WB4HKP 342, WB4HJW 292, W4FPC 169, W4ILE 149, W4SDR 118, 8RLY/W4 117, WB4ICJ 114, WA4IJH 103, W4BKC 101, W4LSR 75, WB8ZY/4 59, W4NGR 57, WB4HNL 56, W4KRC 55, K4DAX 49, WB4GHD 49, WA4UQQ 44, W4IA 43, K4GJ 40, WA4FJA 37, WA4HED 36, W4SMK 36, W4OGX 34, WB4RTJ 31, W4KGJ 27, WB4KUZ 27, W4YPX 25, W4GUI 24, K4IEX 24, WB4ADL 23, WB4IHI 23, WB4IER 21, W4GDK 20, K4HS 20, K4BAK 19, W4DVO 19, WA4HDH 19, K4CVO 17, WB4FLW 17, W4FP 16, W4TRS 13, W4ZAK 13, WB4FJY 12, WB4JRV 12, W4VPQ 12, W4TJM 11, W4BNE 10, K4BLM 9, W4LK 9, WB4OMG 9, K4SJH 9, WB4MIQ 7, WA4EYU 6, WB4NTH 6, K4EBE 3, W4IAD 2. (Apr.) W8BAY/4 30.

GEORGIA – SCM, A.J. Garrison, WA4WQU – SEC: W4YDN. RM: K4BAI. PAMs: K4HQI, W4LRR.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*
GSN	3595	2300/0200 Dy	62	586	262
Ga. SSB	3975	0000 Dy	31	1001	77
GTN	3718	2200 M-W-Sa	6	14	8

Correction: K4PIK was reported in June *QST* this column to have received his Advanced Class license. This report was in error. Toby says, "Only wish it was true." W4ISS is a professional musician on the road with the Jimmy Dorsey orchestra. Thanks to all who participated in another real successful Georgia QSO party. A tip of the hat to the Atlanta group for a real outstanding job of communications during the dedication of Stone Mountain. Vice-President Agnew filled in for President Nixon who, at the last moment, had to cancel plans to attend the dedication. Special Event station W4RI, operating during the Rotary International Convention in Atlanta, was a smashing success. W4YDN, this year's Georgia State ARRL convention chairman reports that plans are almost complete for the Sept. 19-20 event in Augusta. Congratulations to WA4VWV, who recently received a Public Service Award for his services during Hurricane Camile. Traffic: WA4RAV 217, K4BAI 180, WA4WQU 157, WA4GXZ 105, W4NSO 76, W4CZN 75, W4PIM 75, W4DDY 55, WA4VWV 43, W4AMB 39, WB4DMO 34, WB4KVE 29, W4UVP 28, K4JFY 12, W4FDN 10, WB4NDR 7, W4REI 7, W4YDN 7, WA4LLI 3.

WEST INDIES – SCM, Jose Medina-Hernandez, KP4CO – KP4BFF is club station for Sabana Seca Naval Radio Station (R) (Zip Code 00749) with 20 members; 15- and 20-meter ssb, cw, RTTY classes for Novices. WNØBED/KP4 became first XYL member. Field Day preparations were made and there was active participation on Armed Forces Day. Applications blanks are available for all ARRL appointed offices. Check your qualifications and send a written notice to the SCM or QSO him on the air or send a radio message. KV4EY operated from Tortola as VP2VY. QSL via W3HNK. The P.R. Amateur Radio Society is planning some surprise activity. Virgin Id. Emergency Net is run daily on 7203 kHz, 1100 GMT KV4FC and KV4FZ are net controls. Those actively participating are VP2SY, 2DAJ, 2AL, 2KS, 2AM, VP6FAH, 9Y4AR, 4MM. HI7FCL/KP4 is working in Ponce for the summer. KP4WT received awards for Public Service during May. Traffic: (May) KP4WT 160, KP4BFF 5. (Apr.) KP4WT 209.

WESTERN FLORIDA – SCM, Frank M. Butler, Jr., W4RKH – SEC: W4IKB. PAM: W4MQQ. RM: K4VFY, RM-RTTY: W4WEB.

Net	*Freq.*	*Time(Z)/Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957	2230 Daily	18	261	16
QFN	7095 / 3651	0000/0300 Daily	61	690	458
2m FM	146.94	0030 Thurs.	3	26	1

Pensacola: K4ZLE went on a DXpedition to HB3 and 3AØ-Land. K4CFS is QSL Mgr. WN4ORM went from Novice to Advanced Class. WA4IZM added an SB-220 linear. WA2WAL/4 operates 2-meter fm from the USS *Lexington*. K4CFS handled Red Cross traffic during Texas tornados. Ft. Walton: K5UUN/4 and WA5COV/4 spent many hours with tornado traffic; assisting were K4UBR, WB4EQU and W4BVE. W4BVE devotes full time to ham radio after retiring from CS at Eglin. WA2BDA, ex-CT2AS, is stationed at Eglin and active on WFPN. WA1KS is with the U.S. Coast Guard here. WB4MHG hosted a swim party for the Playground ARC. Defuniak Springs: A list of radio equipment to outfit a C.D. EOC was prepared and presented to county officials. WA4PXR is on 2-meter fm. Panama City: The PCARC enjoyed a fish fry at Alligator Point campgrounds. WN4QLU is the newest club member. TVI Committee members W4GGU and K4JDT are working on a severe case in the Cove area. Chipley: WN4PVG, age 12, now has 13 states and 4 countries confirmed. Tallahassee: The TARC bought the W4IKB repeater and plans to set it up on .34/.76 as a club project. Traffic: 8RIY/W4 117, K6QPH/4 39, W4BVE 34, WB4DVM 10, W4FDJ 9, W4RKH 9, K4CFS 8, WB4EQU 8, W4IKB 7, WA4IZM 7, WB4NHH 2.

SOUTHWESTERN DIVISION

ARIZONA – SCM, Gary M. Hamman, W7CAF – PAM: W7UXZ. RM: K7NHL. Officers of the Phoenix VHF Club elected in June are K7OWI, pres.; WA7FMP, vice-pres.; W7DRR, secy.; K7UJV, treas. K7GPZ resigned as State Radio Officer and plans to do more traveling and relaxing than previously. K7WUG was selected to be the new State RO. K7UOK is now the RO for Yavapai County. K7GHS coordinated a group of amateurs on 2 meters and CBers to provide communications for the Walk for Development program in Phoenix. Other amateurs helping were WA7CBB and K7YDJ. WA7CBB has a new Inoue transceiver and monitors 146.94 MHz quite often while working the late shift. WA7MAD is back in Phoenix and active on TWN. More liaison stations are needed between TWN and CSN, ATEN and PON. Contact K7NHL or W7CAF if you can help. The Bash-Hai-Ne-Ae ARC (K7UGA/AFA7UGA) completed almost 3900 overseas phone patches in May and K7HQF ran more than 600 patches. K7HQF has a new Inoue IC2F and plans a trip to Okinawa and Japan in Aug. PSHR: K7NHL 49, K7UYW 30, W7CAF 27. Traffic: K7NHL 256, WA7MAD 71, W7PG 64, K7UYW 38, W7UXZ 16, W7OUE 15, K7ZMA 13, W7CAF 12, K7NTG 9, W7JMQ 8, W7LLO 8, WA7FEG 6, WA7JCK 4, W7FCD 3.

LOS ANGELES – SCM, Harvey D.D. Hetland, WA6KZI – Asst. SCM: Don Etheredge, K6UMV. A record six individuals earned

PSHR in our section for May: WA6CBT, W6FJT, WB6GHH, WB6MCK, W6QAE and WB6ZVC. WB6UYV is kept very busy as a TVI chairman. W6INH now has ssb mobile. W6NJU is sticking to 80 meters until other wind-damaged antennas are repaired. The TRW Systems ARC offers a certificate for working five of its members. WA6MCK and WA6LSB added phone patches to their stations. WA6FQC spoke to the Crescenta Valley ARC regarding causes and cures of electrical interference, WB6HBO spoke to the Downey and Long Beach ARCs and displayed her collection of telegraph keys and WA6KZI and K6UMV spoke to the Palisades, Downey and Antelope Valley ARCs regarding how the ARRL functions and local objectives within our section. WB6HCQ has a skeleton slot in the air. WB6ZES earned his 15-wpm CP while W7GAQ got his 30 wpm. The Downey ARC now has its old W6TOI call back. WA6WPX advises that the Monterey Park ARC is now sponsoring an Explorers Group of the Boy Scouts. The San Fernando Valley DX Club is sponsoring an award to foreign amateurs for working 10, 20 and 28 cities in the San Fernando Valley. W6BFO has a 7-MHz beam up. K6YRA and WA6GLD planned vacations in KH6-Land. W6YRA, with K6SE doing much of the operating, is collecting numerous certificates for the UCLA ARC. WB6PAV has a new bug. WA6FJJ added a Heath twoer. WA6CBT expects to be maritime mobile in the near future. The team of K6VLM and WB6FXG won a recent video hidden transmitter hunt, with K6YGX and W6QUI placing second and W6ORG and WA6KAA being the hidden ATV transmitter. New officers of the So. Calif. ATV Club are K6INQ, pres.; K6VLM, vice-pres.; WB6FXG, secy./treas./editor. The ATV Club now uses 146.05 MHz (am) and 146.90 MHz (nfm) as primary and secondary ATV calling frequencies. New additions to the ever-growing list of ATV stations are W6PJA, WB6YMX, WB6SUT and WB6ZMI. As part of the May 16 Sheriff's Open House K6OMU, K6OXX, WA6IDV and others manned RACES stations in Norwalk, Temple City, Altadena and San Dimas to demonstrate their voice and RTTY communications abilities to the public. WA6FQC, K6AWO, WA6MLC, WB6UWJ, WA6ONK, K6KNB and WB6SQD were among many Field Day chairmen in the section. SCN Mgr. W6LCP notes that while check-ins are down because of the vacation season, traffic is up because of mass originations from the No. Calif. DX Club reminding fellows to get their SASE to the QSL Bureau. May net reports:

Net	*MHz*	*Time*	*QNI*	*QTC*	*Mgr.*
SCN	3.60	6:30 P.M.	470	755	W6LCP
Metro	50.40	8:00 P.M.	408	84	WB6ZLP

Traffic: (BPL/PSHR): W6AM 4/0, WB6BBO 597/3, W6BHG 49/0, WA6CBT 0/38, K6CDW 127/0, K6CL 40/0, W6DGH 4/0, W6DQX 21/0, W6FAV 8/5, WA6IJJ 10/7, W6FJT 12/34, W6FD 5/0, WA6FQC 0/2, W7GAQ 49/10, WB6GHH 43/35, W6INH 407/0, W6IUV 16/0, W6IVC 5/0, W6JBX 0/5, WB6KGK 20/17, K6KUQ 0/5, WA6KZI 1/2, WA6LSB 0/11, W6LYY 28/13, WA6MCK 0/30, W6MLF 274/3, W6NKE 35/10, W6OEO 38/0, WB6OUD 4/0, WB6PAV 1/0, W6QAE 102/39, W6TXJ 1/5, WB6WIT 6/0, W6YRA 3/0, WB6ZTI 56/0, WB6ZVC 110/53.

ORANGE – SCM, Jerry L. VerDuft, WA6ROF – A newly-affiliated club is the Anaheim H.S. Electronics Club. OVS K6YNB will be spending more time on 220 and 432 MHz now that he has his Doctor of Education Degree from UCLA. W6SYC reports that the WB6LXD 2-meter repeater is now back in operation from Sierra Peak on 146.94 and 146.46 MHz. EC W6KFF has formed an Orange County 6-meter AREC net. It meets Sun. at 1300 local on 52.5-MHz nfm. The WA6UJS repeater can be used to check in with input on 52.76 MHz. EC WB6WOO reports the Orange County 2-Meter AREC Net now meets Sun. at 0700 and 2030 local on 145.53 MHz; and also provided communications for the CTF Tennis Tournament in Santa Ana May 2 using our new AREC portable generator. K6LJA has again stepped in as EC for the Orange County 75-Meter AREC Net, which meets Sun. at 0900 local on 3965 kHz. Ted has appointed K6MYN, WA6FIT and WA6OOR as Asst. ECs. If you can participate in any of the above AREC nets, even on a limited basis, contact the EC or SCM, address on page 6 of *QST*. RM W6LCP reports SCN had 56 sessions in May with 470 QNI and 755 QTC. OO W6BAM has also accepted appointment as OBS on 40-meter cw and transmits ARRL Bulletins on the following skeds: Mon., Wed., Fri., 7080 kHz at 2030 local; Tue., Thurs., 7145 kHz at 1530 local. Section appointees known to have attended the combined Pacific-Southwestern Division Convention at Fresno were W6FB, WA6TAG, W6AOC, K6LWE, WB6CQR, W6BNX and WA6ROF. W6FB and WB6QAH were interviewed on KMIR-TV at Palm Springs May 13. WB6ZKK mastered the photography at the Fresno Convention traffic breakfast. PSHR: W6BNX 65, WA6ROF 48, WA6FOQ 42, WB6TYZ 32. Traffic: W6LCP 310, WA6FOQ 300, WA6ROF 101, W6BNX 86, WB6TYZ 74, K6OT 39, W6WRJ 28, K6DLY 9, K6GGS 7, W6FB 5, WB6ZEC 14.

SAN DIEGO – SCM, Richard E. Leffler, WA6COE – Asst. SCM: Art Smith, W6INL. SEC: K6EDA. There are appointees throughout the section who are functioning regularly as Official Bulletin Stations (OBS). WA6TJK reads Bulletins on 2 on the AREC net, WB6UNB is on 10 (29.0 MHz Sun., Mon., Wed. eves at 2100) and WA6HGU as OBS for the 75-Meter AREC Net. Listen for the latest amateur news from one of these stations. Clubs: Active member of the SD DX Club was W6DAX, who passed away in May. The DX Club met at the home of W6ID in June. The El Cajon Club had a program in June by the Mountain Rescue Team. OCWA enrolled W6YES, W6AKZ, K6IL, W6DEY, VE3ZF/6, W2OE/6, K6VUA and WN6RMM (ex-6ACW) as new members in May. W6DEY spoke to the Palomar Club as a retired FCC man. Station Activities: WA6HGU is working some DX on 75 at 3 A.M.! W6JSL has an S/Line and 2 fm rig going now. WB6UHF reports he is active at UCSD station WA6DOT. WB6WHM applied for his DXCC last May. W6SK has left for his 9-month trip and W6LRU is building a new mountain cabin this summer in the Sierras. WA6TJK is also K6JCC-115, county alternate CD station (was in Washington State in June and July). New call for W6BKZ is K6SQ. K6PM sends greetings from Hall River, Mass. Join AREC now – others are. Traffic: W6VNQ 485, W6FOT 367, W6LRU 367, W6BGF 332, W6YKF 67, WA6BDW 35, WB6SFZ 14, W6DEY/W6PJU 4, W6MAR 4, WA6COE 2.

SANTA BARBARA – SCM, Cecil D. Hinson, WA6OKN – SEC: W6JTA. RM: W6UJ. The Ventura Co. ARC meets at the Oxnard Community Center the 2nd Fri. of each month. The 1970 officers are WA6IJZ, pres., WA6PIIV, vice-pres.; K6VMN, treas.; WA6WYD, secy. I am happy to announce the appointment of W6JTA as SEC for the Santa Barbara section. For those wishing to contact the SEC with regard to ARPSC matters, please address your correspondence as follows: ARRL Section Emergency Coordinator, Mr. Robert Lauxe, W6JTA, 2133 Fresno Street, Los Osos, Ca. 93401. K6CS, who lives in Thousand Oaks, operates during the week from St. Nicolas Island. His shack is at the top of the 900-ft. Island "mountain" and he operates 10 and checks in on the SCN. WA6DEI has built a new auto start circuit for his RTTY. WN6NFB is a new Novice in Morro Bay and holds New England skeds. The new San Luis Obispo County Emergency Net (SLON) meets every Sat. at 1630 on 7155. The Estero ARC meets the 2nd Thurs. of each month at the Security Bank, Quintana Road, Morro Bay. The Central Coast ARS meets the 2nd Tue. of each month at 7:30 P.M. in the San Luis Obispo Courthouse. Traffic: (May) WA6DEI 188. (Apr.) WA6DEI 337.

WEST GULF DIVISION

NORTHERN TEXAS – SCM, L.E. "Gene" Harrison, W5LR – Asst. SCM, Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOO. RM: (On Leave). Asst. SEC ETEX/PAM VHF: WA5KHE. RACES Bulletins shows WA5PPF Dist. 42 RO. Note phone procedure in net calls results in pileups. Would alphabetic call-ups eliminate this? RM W5QGZ believes cw operators should try to extend their operating speed permitting move to higher class license. Jim feels this brings a sense of accomplishment. Arlington RC held its outing May 16 at Randol Park. No reports from W5HMR, K5BIQ, W5AQS, K5LZA and WA5PXQ. WA5MKV, Bryan EC, wishes NTEN affiliation with the League. The Texas VHF Society has available a copy showing model nr. Motorola equipment aid identifying gear usable in ham operation. W5TOO, Fort Worth, submitted the most concise report of the Lubbock Tornado acceptable to INS, UPI, plus networks. W5EYB and W5LR attended the CenTexRC (Waco) meeting plus opening new facilities May 21 at 12th & Austin Sts. W5HD is back on the air. The SCM attended a joint meeting of TI-Richardson RC May 18. Attendance was 75. He also made the meeting at Mother Neff State Park May 24, attendance 50. The ARRL film was shown in both places. WN5BAO is interested in AREC work. The Kilocycle Club of Ft. Worth has a new format for NL. W5NFO advises WTEN was activated from 7:55 P.M. Mon. to 3:00 A.M. Tue. with 26 stations participating. The pres. of the Garland ARC reminds each of us of the Lubbock disaster and asks if we are ready? SEC W5JSM has been under somewhat of an overload the past two months because of two major disasters. Mr. Thompson cites WA5NIB and W5TJG for their services from Lubbock during the emergency. Lubbock County EC WA5WBK will submit a direct report to Headquarters. Some stations participating include WA5VPL, K7CMH/5, W4FEC/5, K0JXZ/5, K5SXU/5, WA5UNL, WN5VET, WA5WSI, WA5LNM, W5EXG, K5OIF, W5YNL, W5GHO, WA5UVA, WA5TJU, WA5EIY, M5MTM, W5PXI, WA5WBK, K5RZN, WA5IOC, W5AER, K5ESB, W5KFT, WA5JZE/5, W5ZYF, WA5KSV, WA5OEQ, W5TUW, WA5VDV, W5SOD, WA5WZO, WA5ZIK/5, WA5FKE, W5RGP, WA5RTB, WN9DJS/5, K5GYG, K5ISB/M5, WN5YTR and WN5WOW. Traffic: (May) WA5OEQ

SALE ON FAIRCHILD "ICs"

*Brand New! *Lowest Prices

- ☐ RTL-908 Full Adder .....
- ☐ RTL-909 Buffer .....
- ☐ RTL-912 Half Adder .....
- ☐ RTL-913 Shift Register .....
- ☐ RTL-914 Dual 2 Input Gate
- ☐ RTL-915 Dual 8 Input Gate
- ☐ RTL-923 JK Flip Flop .....
- ☐ RTL-960 Dual Buffer .....

99¢ Each 3 for $2.75

Guaranteed! W/Spec Sheets

400 mc 2.99 ea.

NPN HIGH POWER UHF TRANSISTORS

☐ 2N3632 23W, 3A.

- ☐ Fairchild 958 Decade Counter
- ☐ Fairchild 959 Quad Latch .....
- ☐ Fairchild 9601 Mono Vibrator

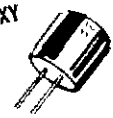
$3.98 each

TEXAS! NATIONAL! COUNTING "IC's"

Guaranteed! W/Spec Sheets

- ☐ SN7475 Quad Latch 4.50
- ☐ SN7490 Decade Counter 5.50
- ☐ SN7493 4 Bit Binary Counter . 4.95
- ☐ SN7441 BCD Decoder 6.50

HIGH VOLTAGE 1 AMP EPOXY



PIV	SALE
☐ 2000*	1.00
☐ 3000	1.35
☐ 4000	1.65
☐ 5000	2.25
☐ 6000	2.96
☐ 8000	3.50
☐ 10000	3.95

SILICON RECTIFIERS

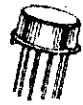
GE PA-237 2-WATT AUDIO AMPLIFIER

☐ *Lowest Prices *Brand New! $3.95

2 watts continuous 9 to 27 volt supply, 8 mV sensitivity, includes 11 circuits, for phono, tape recorders, dictating, TV, FM, movie.

WESTINGHOUSE AUDIO AMPLIFIER

★ 8 Transistors
★ 6 Diodes
★ Dime Size ☐ $1.49 for phono, tape.



LINEAR AMPLIFIERS

$1.49 each, 3 for $4.

- ☐ 702C DC Amplifier
- ☐ 709C Operational Amp
- ☐ 710C Differential Comp.
- ☐ 711C Sense Amplifier

How's "MEMORIES" for 1970?

- ☐ Fairchild 1128 8 bit $2.49
- ☐ Fairchild 9033 16 bit $3.98
- ☐ Philco PL5R100 Dual 50 bit $12.50
- ☐ 4000 Bit Core Planes $8.50

★ Handles 2 Amps

1 AMP EPOXY 800 PIV 10 for $1

- ☐ Fairchild 741 OP. Amplifier*

*Frequency compensated 709 .....$2.98

POLY PAKS P.O. BOX 942 M Lynnfield, Mass. 01940

Terms: add. postage. **Rated:** net 30, cod's 25% **Phone Orders:** Wakefield, Mass. (617) 245-3829 **Retail:** 211 Albion, St., Wakefield, Mass.

☐ CATALOG 10¢

BARRY ELECTRONICS

COLLINS 32V2 with 4D32-200 Watts AM/CW all Bands. Requires repairs. Only **$95.00.**

HALLICRAFTERS DELUXE HT-44. SSB Xmtr W/ Matching PS-150-120. Matching SX-117 Rcvr. Operate separately or Xceive. All excel. Lab Certified "A-OK"—All for **$395.00.**

COLLINS KWS-1 SSB/CW/AM KW. Xmtr. Using 4CX250's. Excel, Lab-Certified, Calibrated "A-OK". With matching Collins 75A4 Rcvr. and matching Collins 5C-101 Desk Control Box. All for **$975.00.**

COLLINS 75A3 HAM BAND RCVR. Excel. 10 Thru 160. **$190.00.**

COLLINS 30L-1 LINEAR AMPLIFIER. Excel. **$375.00.**

COLLINS KWM-2A TRANSCEIVER (Mint condition). With Collins 516F2 A.C. P.S. and with Collins 312B3 Speaker. (P.S. mounts inside speaker). All for **$795.00.**

JOHNSON KILOWATT MATCHBOX. New. **$154.50.**

SOMMERKAMP FL-200B- 10, 15, 20, 40, 80 SSB Exciter/Xmtr. New. **$350.00.**

GPR-90 TECH. MATERIEL CORP. Gen'l Coverage/ Ham Band Recvr. Excel. **$295.00.**

TRW SP3T "N" COAXIAL SWITCH. 80 VDC, **$8.50.**

LAFAYETTE HA-250, 6, 10, & 15 Meter 100 Watt Business-Band/Ham Linear. "Mint". **$80.00.**

LAFAYETTE HA-750 Mobile Xceiver (6 meters) "Mint", **$85.00.**

KW. PLATE XFMR. Pri: 210, 220, or 230 @ 50 or 60 Hz. (Single Phase). Sec: 3500 VAC R.M.S. (approx.) @ 500 to 600 Ma. (No C.T.). Modern 2 KVA. Hipersil core. Approx. 8" x 8" x 7" H. Ship'g Wt: 35 lbs. approx. **$34.95.** (Open frame type)

WESTINGHOUSE OIL CAPACITORS—4 Mfd @ 10,000 Volts at **$19.95.**

8,000 MFD. @ 55 Volts C.D. Capacitors (r/e/) **$1.20.**

1,000 MFD. @ 400 W. Volts (Sprague) Capacitors (new) **$2.50** (Bracket 25¢)

"HAM-M" C.D. ROTATORS in stock. Also TR-44 and AR-22. Write or call for prepaid deal.

DRAKE R-4B RECVR and T-4XB Xmtr in stock. New. Write or call.

SWAN CYGNET LINEAR AMPLIFIER. 10 thru 80. 1200 W. P.E.P. Self-contained P.S. **$295.00** (new).

ELECTRA-BEARCAT MODEL BCH Automatic Scanning Receiver. 150 thru 174 MHz. **$139.95** (xtals at **$5.00** each) new.

AMECO MP-1 Hand-Held Tunable Receiver. (W/provision for xtal control). 146 thru 175 MHz. **$29.95** (new).

SILICON RECTIFIERS 1000 PIV at 1.5 Amps. (Epoxy type.) **35¢**

BRAND NEW 572B's at **$14.95** each, new 4X150A/7034 tubes at **$16.50** each . . . Buy all your tubes at Barry's.

Barry Electronic will ship all over the World. So for those Hams in DX Land, do not hesitate to write us your requirements. Our Export Dept. will expertly handle all the paper work and packing necessary to handle all your orders.

BARRY ELECTRONICS DEPT. Q-8
512 BROADWAY, NEW YORK, N. Y. 10012
WALKER 5-7000 (Area Code 212)

☐ Enclosed is money order or check and my order. Prices FOB, NYC. Shipments over 20 lbs. will be shipped collect for shipping charges. Less than 20 lbs. include sufficient postage. Any overage will be refunded. Fragile tubes shippd via Railway Express. Minimum order $5.00.

☐ Send 15¢ for new 104 page Greensheet 1970 Catalog #20. Write for your copy.

☐ Send information .....

.....

Name ..... Title

Company .....

Address .....

City .....State.....Zip.....

2015, W5TOO 751, W5HVF 328, W5FCX 166, W5JSM 87, W5RID 66, WA5WBK 40, W5PBN 38, W5IZU 29, W5MSG 20, W5LR 15, WA5KIV 6. (Apr.) WA5PPF 2025.

OKLAHOMA – SCM, Cecil C. Cash, W5PML – Asst. SCM: W.L. "Smoky" Stover, K5OOV. SEC: WA5FSN. RM and QSL Bureau: W5QMJ. SEC WA5FSN and I will make our report to you in next month's column, as we plan a Field Day trip to the central, north, west and southwest portions of the state over Field Day week end. K5TCG, of Bartlesville, has moved to Borger, Tex. K5WPP reports a great time at the Arkansas Phone Net Picnic at Raven Den, Ark., sponsored by K5COS. W2FIR/5 who is on the move quite a bit for the Airforce communications group out of Altus AFB, spent most of May in Oklahoma City and was in Lawton working out of Fort Sill in June. WN5AKU, Stillwater, reports regular schedules with WNØZXG, WNØYMZ, "Ham's Wide World" ran on KTV channel 13 and 11 on Fri. night, June 5 then on KOCO channel 5 Sun. afternoon June 7. If you would like additional runs on your local channel or closed circuit TV system, contact your SCM who has a color video tape copy. Congratulations to new Novices WN5s BCH, BNP, BNQ, BNR and BNS. Thanks to K5BYF, WA5IDY and the LFSARC. Net reports.

Net	*kHz*	*Local Time*	*Sess.*	*QNI*	*QTC*
OPEN	3915	0800 Su	5	199	5
OPON	3913	1700 M-F	21	233	52
STN 1	3850	1730 M-S	25	263	28
STN 2	3913	1730 M-S	25	368	17
OLZ*	3682.5	1900 M-S	12		21
SSZ*	3682.5	2145 M-S	11		29

(*Late report for Apr.)
Traffic: (May) K5TEY 887, WA5IMO 78, WA5ZOO 58, W5MFX 20, W2FIR/5 16, K5ZDB 12, WA5FSN 11, K5WPP 10, WA5NZM 9, W5FKL 6, K5OCX 4. (Apr.) W5QMJ 77.

SOUTHERN TEXAS – SCM, G.D. Jerry Sears, W5AIR – SEC: K5QQG. PAM: W5KLV. RM: W5EZY. June 1 officially opened the hurricane season in South Texas and Gulf Coast areas. Be sure your emergency power is okay and antennas well guyed. Check into the emergency nets so you will not be caught with your procedures down. STEN (South Texas Emergency Nets) had a splendid turnout at the recent Annual Convention in New Braunfels under the leadership of NCS W5WPC. New officers elected for the coming year are K5ZOD NCS; WA5PCU, ANCS; WA5RNL, pro.; and W5KLV, secy.-treas. During the Convention K5SJA and XYL K5UNC were each presented a Certificate of Merit for their outstanding activities in emergency communications over the past years and especially at Zapata immediately after two tornadoes struck the area recently. Watch for new club station WB5BIP from Southwest State University at San Marcus with 14 members - W5AEQ is trustee. Welcome to K5HPJ, recently moved to Pecos from New Mexico. OO W5NGW and his XYL have returned from a trip to Miami, Fla. EC WA5TPY, Nueces County, reports the Corpus Christi gang has found the best way yet to handle the Buccaneer Days Parade, low-power walkie-talkies and mobiles and vhf repeater worked wonders. Twenty or more participated with club station W5MS/5 operating as NCS. Swell job, fellows. W5QJA and K5ROZ both made the Public Service Honor Roll for May. Nice going. Our sincere thanks to all the amateurs participating in the recent Lubbock disaster operations. There are too many to list here and we hope that the amateurs story will be disclosed when all the reports are in. Traffic: (May) W5QJA 172, K5ROZ 93, W5EZY 72, W5QO 66, W5NJH 35, WA5QKE 33, W5BHO 23, W5TFW 19, K1PKQ/5 10, W5KLV 6, K5WYN 2.

CANADIAN DIVISION

ALBERTA – SCM, Don Sutherland, VE6FK – SEC: VE6XC. PAM: VE6ADS. RM: VE6TY. ECs: VE6SS, VE6AFQ, VE6AFR. With sincere regret I report the passing of VE6ZL. Once again in the Alberta Motor Assn. BEBA campaign the Alberta amateurs did a fine job. VE6ADX, on his mountain-top, is an invaluable NCS for this province-wide scheme. I hope the surveying on the new NARC repeater site is not for a provincial highway. VE6ADS reports 1230 QNI and total of 240 informal and formal traffic on the APSN. VE6TG is doing a nice job as NCS on the Aurora Net. VE6ALQ is putting out an FB signal with his new mobile. The NARC, under the organization of VE6PM, did a fine job on the communications for the Edmonton Miles for Millions March. By now, the first week of June, I imagine you are all fed with summer with its attendent lawn, tree, hedge and garden nonsense and are looking forward to next winter with none of these chores to interrupt your operating. Traffic: VE6XC 13, VE6FV 10, VE6FK 7, VE6YW 5, VE6ADS 2.

BRITISH COLUMBIA — SCM, H.E. Savage, VE7FB — The "$22,000,000.00 Ham Shack," Apr. '70 *QST*, moved the North and West ARC to hire a bus for inspection at the factory. Boeing was a good host, but no samples. VE7AAN is out of the hospital and home working 147.33 MHz. ORS/OO VE7GG has been very busy with exams and building a rec room. VE7BVU, North and West ARC, has turned the pres. office over to VE7AIY. VE7CN is back on 3755 after an absence of many years. Prince George RAC has a nice newsletter. Chilliwack ARC repeater is progressing after some delay installing several thousand feet of power cable to the site. Soon VE7EUK will be on 147.50 in and 146.76 out. VE7AL is 1970 pres. of the Fraternal Order of Eagles for Vancouver, Nanaimo ARC reports new calls in the area are VE7AYB and VE7BON. It's nice to hear VE7DH, but it is sad that the ssb rig is only on loan to him. VE7AEB is our newest EC; his area is The Kootenay. VE7AMW, who has been Vancouver EC for nine years, also looks after the Provincial Fire Marshal's emergency AREC requirements. Traffic: VE7BLO 46, VE7AC 25, VE7SE 12, VE7KZ 11, VE7LL 11, VE7DH 8.

MANITOBA — SCM, Keith Witney, VE4EI — The Winnipeg Repeater Society reports a successful range test from the repeater site on top of the Richardson Building. We wish VE4OV, ex-XJ, success with his new job in Toronto where he will be staying with VE4HK. VE4FB will be taking over his post as technical chairman of the Repeater Society. Once again WARC reaped praises for its handling of the March for Millions. VE4HJ has the first Sonobouy on the air and it sounds great. Congratulations to VE4HI on his law degree. VE4FQ reports things very slow on the cw net but he still was able to make the PSHR listings with 41 points. VE4IA is the CJOB-FM morning man on Sun. in case you wondered who was hamming it up. VE4UM looks impressive with 3 teletype machines but no summer operators. Phone Net, 31 session, QTC 6, QNI 793; MTN, 27 sessions, 59 QNI and 25 QTC. Traffic: VE4FQ 21, VE4CR 7, VE4NE 6, VE4QJ 6, VE4RB 4, VE4JF 3, VE4IA 2, VE4YC 2, VE4EW 1.

MARITIME — SCM, William J. Gillis, VE1NR — Asst. SCM: Clarence Mitchell, VO1AW. SEC: VE1HJ. VVO1CZ and VO1JH transferred to VE1-Land. We wish a speedy recovery to VO1CV. K1DZG and XYL were visitors in VO-Land. VE2AYA transferred to St. Georges, Nfld. VO1BL, a member of St. John's City Council, is working in by-law related to the erection of towers for amateur use. The Newfoundland Net, on 3.785 MHz at 2130Z, will operate Mon.-Fri. during the summer months. VE1EV is on the sick list. VE1ASR now is on phone. VE1AMB has cards in for DXCC. VE1AMR has volunteered for instructor duties in the recently-organized NBARA/CNIB classes. Several VE2 and VE3 visitors are showing up on 2-meter repeaters. The 2-meter gang held a successful gathering at Halifax. Traffic: VE1AMR 71, VE1RO 52, VO1CA 32.

ONTARIO — SCM, Roy A. White, VE3BUX — SEC: VE3EWD. RMs: VE3s AKQ, BLZ, DPO, AYZ, DBG. The Ontario section now has a new SCM, VE3DV. VE3AUN and VE3CY headed for California in June and VE3CO, who recently retired, is off to Europe. Welcome to VE3FXA, ex-WA9VZS, as an Ontario Phone Net controller. VE3WH, of Picton, is seriously ill in hospital and VE3NW is around again after a session in the body-shop. VE3AMT has "EFI" of all things. (That's electric fence interference!) Some of the boys are using "maritime mobile" after their call incorrectly. A rig in a cruiser, house-boat, etc., operating from inland waters, is *not* "maritime mobile." To all those amateurs who have given me their cooperation and valuable assistance over the past two and one-half years, once again let me express my most grateful appreciation. From VE3DV: Only two candidates were nominated as SCM, VE3BUX and VE3DV. Roy declined to run and with the proverbial single vote by ARRL Hq. your SCM for the next two years will be VE3DV. One of the responsibilities of every SCM is to promote the ARRL in his section and, as a first step in a necessarily short-range program, i.e., two years, I would like to establish a closer liaison with all Ontario radio clubs and with traffic-handling nets. Perhaps the easiest way would be to have the SCM placed on the distribution for your club or traffic net bulletin. All SCM appointment-holders are reminded that monthly station reports should be forwarded to the SCM on the first of each month. Reports, in formal message form, may be passed on the Grey Bruce Net, 3645 kHz Mon. through Sat. 2230Z; Ontario Quebec Net, 3535 kHz daily 2300Z, or Eastern Canada Net, 7040 kHz daily 2345Z and 3540 kHz daily 0130Z. I will also try to ONI the Ontario Bone Net if time permits. Needless to say your active support is earnestly solicited and I look forward to a very rewarding term. Traffic: VE3DPO 87, VE3ERU 81, VE3BUX 62, VE3GI 58, VE3EHL 25, VE3FXI 24, VE3GHO 13, VE3EWD 10, VE3GCE 10.

QUEBEC — SCM, J.W. Ibey, VE2OJ — MARC has undertaken operation of amateur radio at Man and His World and still requires volunteer operators. VE2-Land amateur radio clubs or a provincial society of them could fill a much-needed bill of help to sightless persons who could be prospective amateurs — also let's not forget other handicapped persons. Amateur radio is good therapy. The very fine French language contributions to this report have been from VE2WP, ex-VE2ASU, who is also publicist for RAQI. Closer contact of Amateur Radio Emergency Corps and the provincial civil defense organization are now possible because of the efforts of VE2IJ and Field Day. VE2APT is now OVS. Bon succes a VE2BOZ, responsable du comite feminin de RAQI. VE2ASU a maintenant un nouvel indicatif d'appel: VE2WP. Le concours VE2 de cette annee a remporte un grand succes; merci a toutes les stations qui y ont participe. Felicitations successeur. VE2APF opere maintenant avec un NCX-3; VE2BVC a change son rig pour un HT-46; VE2AFJ est papa pour la premiere fois; VE2BPT convolera en justes noces dans le courant de l'ete. Merci au club MARC pour la facon fort aimable avec laquelle il a recu le publiciste de RAQI, VE2WP. Traffic: VE2DR 33, VE2CP 17, VE2EC 17, VE2BVY 14, VE2APT 12, VE2ALF 3, VE2OJ 3.

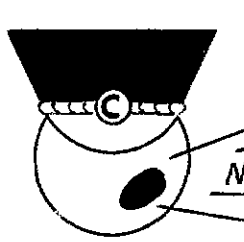
SASKATCHEWAN — SCM, Gordon C. Pearce, VE5HP — SEC: VE5CU. PAM: VE5HZ. OOs: VE5HQ, VE5PK. OBS: VE5HQ. OVSs: VE5CU, VE5US. OPS: VE5US. ORSs: VE5GL, VE5SC. RM: VE5GL. PCs: VE5IL, VE5DO, VE5RJ, VE5NX, VE5BO. Walkathons, car races, parades and search and rescue operations were the order of the day in Saskatchewan recently. Two, 80 and 40 meters were utilized very effectively. One of the highlights was the Band Festival Parade in Moose Jaw. Moose Jaw and district hams were stationed strategically along the parade route using 2-meter mobiles. Further north the Prince Albert hams and some from the northeast of the province assisted in the search and rescue operations for a lost boy of nine. He was found alive and well. The glowing words of praise from the RCMP and the emergency personnel were gratifying. Several of the Saskatchewan hams have made or are planning trips overseas. VE5DV spent two months touring Hawaii and Japan, VE5KI is even at this writing in England and parts of Europe looking up some of his DX contacts and VE5HP, your SCM, will be over there driving on the wrong side of the road. Traffic: VE5SC 19, VE5BO 11, VE5SN 4, VE5YR 4, VE5RE 2.

HOW'S DX?

(Continued from page 108)

KH6IJ, KL7MF, VEs 1AE 2NV 3KZ 4YZ 7IQ and VO1AW. By score size it went K4BVD/6, W3MSK, WA6IVN, W3GM, KH6IJ, WB6OLR, KI2ND/Ø, Ws 6QY 5WZQ 4KXV, K4BAI, WBs 6QJD 8AJZ, WA1FHU, Ks 2BQO 6AHV, Ws 8HN and 8AFI. Continental whoppers were K4BVD/6, LU1BB, OZ1LO, UL7BG, ZL3GQ and 5H3LV. Japan's call areas were topped by JAs 1NCZ 2LA 3GZN 4CX 5LI 6TQ 7BO 8DJO 9APS and ØBBB, while the point-total order went JAs 1NCZ 3GZN ØBBB 1YAC 7BO 2LA 1CC 1NLX 1NDO and 9APS. Country leaders: AP5HQ, CE4AD, CRs 6UV 7IZ, DL7AA, DM2AUO, EA2HR, EI5F, EL2Y, EP2BQ, F8TC, G4CP, GM3CFS, GW3TAD, HA8KUX, HB9MO, HL9VX, HP1BR, HAMO, KR8AG, KZ5II, LA1H, LZ2KAF, OD5LX, OE4SZW, OH8RC, OK3CIR, ON4XG, PAØLOU, PY7APS, SM5CMP, TA2EA, UAs 2CD 6KOD 9WS, UB5KAF, UC2TA, UF8KAF, UG6EA, UH8KAA, UI8KBA, UJ8KAA, UM8AO, UP2NK, UQ2OA, UR2FU, VK2AXA, VP2GLE, VR6FX, XW8CR, YO8AP, YU3TCB, ZC4TI, ZP3CE, 3V2AOB, 4U1ITU, 4X4MR and 5H3LV.

HEREABOUTS—Just enough space left to pass along W9ZRX's invitation to attend the 1970 W9-DXCC Meeting scheduled to begin at noon, September 12th, at the Marriott Motor Hotel, Chicago. Contact Dave for your reservation and further details by the 12th of this month or risk missing the gala event, man. QST



NOW HEAR THIS!

FOR SSB ON TWO METERS

LISTEN FOR Clegg's NEW COMET

It's coming soon . . . and what features! The Comet is a self-contained, high quality 125 watt SSB/CW transmitter with built-in VFO and power supply. A solid state SSB generator provides carrier suppression of more than 60 db with unwanted sideband down more than 40 db. Frequency range is from 143.5 MHz to 148.5 MHz in 500 kHz segments.

e.t. Clegg associates, inc.

LITTELL RD., EAST HANOVER, N. J. 07936

There's so much more to tell about this 2 meter SSB champ that we couldn't possibly give you the whole story in this announcement ad. Write or call your dealer for complete specifications and you'll see what we mean.

WA3IYD

3" × 11"

Enclose check payable to:
Arthur G. Turner, WA3IYD
618 West Chesapeake Avenue, Towson, Maryland 21204

MAGNETIC CALL SIGNS

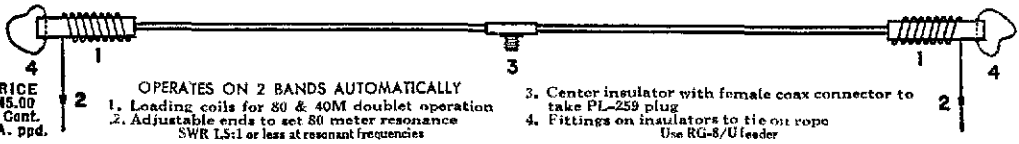
MADE TO ORDER FOR YOUR CAR

- Goes On Your Car Instantly
- Will Not Damage Vehicle Surfaces
- Tested To Speeds Of 105 Mph
- Molded In Heavy Gauge Plastic
- Black Lettering On White Background
- Washable And Will Last For Years
- Distinctive Prestige Identification

PROMPT DELIVERY PRICE **$4.95** PREPAID USA

LRL-70 ANTENNA

70' LONG, 80 & 40 M • Power rating 2 Kw. P.E.P. or over

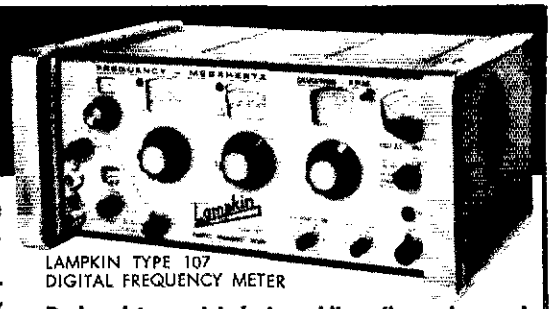


PRICE $45.00 In Cont. USA. ppd.

OPERATES ON 2 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance SWR 1.5:1 or less at resonant frequencies
3. Center insulator with female coax connector to take PL-259 plug
4. Fittings on insulators to tie on rope Use RG-8/U feeder

LATTIN RADIO LABORATORIES • Box 44 • Owensboro, Kentucky 42301

"Look what Lampkin's type 107 Digital Frequency Meter can do for YOU..."



LAMPKIN TYPE 107
DIGITAL FREQUENCY METER

★ Accuracy guaranteed better than 0.0001%, in the field, independent of WWV. Dial precision 0.00002%.

★ Operates as **FREQUENCY METER** or **SIGNAL GENERATOR,** to above accuracy, all channels, from 10 KHz to 500 MHz—IF, RF, UHF.

★ Extremely simple and easy to operate. Simply set frequency on digital dials. Easier and faster than a counter. Shows **DIRECTION** and **AMOUNT** of transmitter error — no arithmetic.

★ Dual power supply, either 110 volts AC or 12 volts DC. Weight only 22 lbs. Leasing terms available.

$2,390 F.O.B. Bradenton, Florida

Designed to meet today's mobile-radio service needs

For complete specifications — Mail coupon today

Name .....

Address .....

City ..... State ..... Zip .....

LAMPKIN LABORATORIES, INC.
MFG. Div., Bradenton, Fla. 33505

NOVICES
Need Help For Your General?
Recorded Audio-Visual
THEORY INSTRUCTION
EASY – FAST – PROVEN
No Electronics Background Necessary
For Complete Free Information
Write: Amateur License Instruction, Dept. N
Box 6015 Norfolk, VA 23508

ELECTRONIC FIST . . . THE PROFESSIONAL KEYER

Every feature you need for easy, accurate CW
- IAMBIC FOR SQUEEZE KEYS
- VARIABLE WEIGHTING FOR DX'ers
- DOT MEMORY FOR EVERYONE
- COLORS TO MATCH YOUR RIG

KIT OR WIRED. PRICES START AT $ 69.95
WRITE FOR SPECIFICATIONS
Box 4090, Mountain View, California – 94040

CURTIS ELECTRO DEVICES

Etched Circuit Boards and Kits
. . . for Electronic Projects.

Digital Clock Kits
$110.00 to $750.00

10 Models to Choose From.

Send 25¢ and s.a.s.e. for more info.

STAFFORD ELECTRONICS, Inc.
427 South Benbow Rd.
Greensboro NC 27401
Day or Night a.c. 919-272-3992

PICKERING RADIO CO
Post Office Box 29
Portsmouth RI 02871

NOW! USE YOUR TAPE RECORDER TO LEARN CODE!

Read code like a Pro! It's easy! PICKERING CODEMASTER tapes give *professional instruction* on your own tape machine from digital computerized tapes! They can't be matched for timing accuracy! Beginners get course of professional instruction at 5-9 WPM right on the tape! Practice for General and Amateur Extra ranges from 11 to 30 WPM. Nothing else like it! See below for CODEMASTER tapes you need. Get up to speed! Order today!

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.

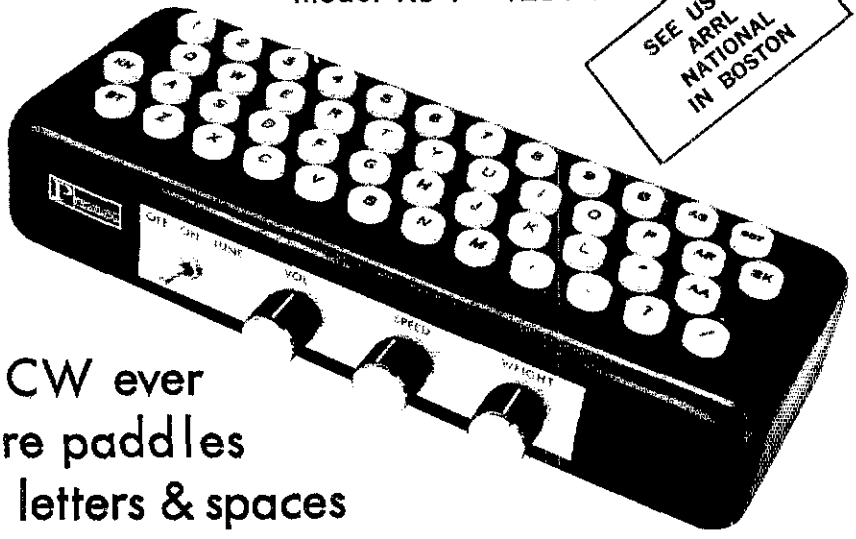
CM-2: For Extra-Class license study. Mostly straight text; some code groups. 1 hour at 20 WPM; ½ hour each at 25 and 30 WPM. For real QRQ, play this tape at twice speed!

CODEMASTER tapes are 2-track monaural; available in two sizes: 7-inch reel (3¾ IPS) and 3¼-inch reel (1⅞ IPS). Will play on any but full-track machine. SPECIFY both type and size of tape you want. Any tape, $6.95 postpaid USA 4th class. Any two tapes, $13.00; all three, $17.00 PPD. Immediate delivery. CODEMASTER tapes are made only by Pickering Radio Company, P. O. Box 29, Portsmouth, R. I. 02871. Satisfaction guaranteed.

The CW Funmachine.

model KB-1 • $265 net

SEE US AT ARRL NATIONAL IN BOSTON



- Easiest CW ever
- No more paddles
- Perfect letters & spaces
- Small size
- Write for brochure

PICKERING RADIO CO.
Post Office Box 29
Portsmouth R.I. 02871

PICKERING

CORRECTION

Due to an error by the *QST* Advertising Department, the Call-Ident above was shown in the June issue at a price of $22.50. It should have been $23.50.

QUALITY MERCHANDISE — QUALITY SERVICE

MERCHANDISE IN STOCK — PROMPT DELIVERY

NATIONALLY ADVERTISED BRANDS, THE LATEST MODELS

Instant shipment on cash or bank charge orders of new equipment and accessories. TRIGGER ELECTRONICS has the most complete stock, for your convenience. Shipment is usually made the same day your order is received. Avoid delays! With cash orders send cashiers check, postal note or certified personal check.

•

NO DOWN PAYMENT WITH INTERBANK AND MIDWEST BANK CHARGE CARDS. Just confirm your order in writing along with the number and expiration date or series of your card. Your goodies will be on the way.

•

Trade-ins: We allow much more on trade of ur present gear. (Clean, recent vintage equipment.) Write for a trade-in quote.

•

Like new equipment at money saving prices. The most complete inventory of top-notch, clean as a pin gear at bargain prices.

another important
TRIGGER service:

WE BUY USED HAM GEAR FOR CA$H

PROMPT SERVICE...
PROMPT CASH!

TRIGGER ELECTRONICS An Exclusive Ham Store.

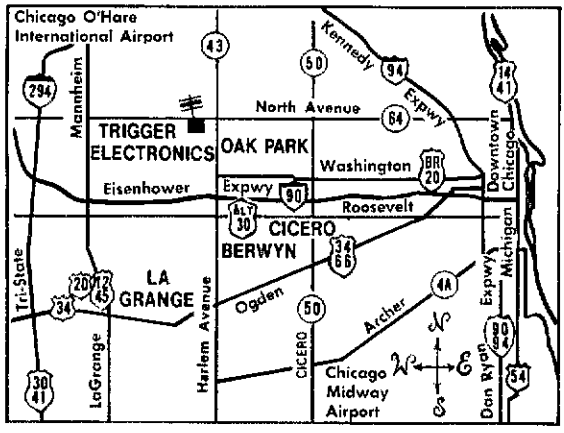
ALL PHONES: (AREA 312) 771-8616

STORE HOURS

(CENTRAL TIME)

WEEKDAYS . . . . . **10:00 A.M. - 7:00 P.M.**
SATURDAYS . . . . . **10:00 A.M. - 3:00 P.M.**

TRIGGER ELECTRONICS is conveniently located 2½ miles north of the Eisenhower Expressway 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 AUGUST

3253 & AC.....	$699	RANGER II.....	$169	GRS4.....	$ 79
KWM2.....	689	INVADER 200....	249	SB301 RECEIVER.	349
NOISE BLANKER..	99	HR0500 NEW....	1295	SB200 LINEAR...	199
51661 DC.....	87	LF30 MINT.....	599	HM-10A WIRED...	30
35102 MOUNT....	90	NC121.....	39	HO-10 SCOPE....	79
DRAKE 2B.....	199	NCL2000.....	450	EICO 777 WIRED.	59
DRAKE 2C.....	187	HT44 & AC.....	329	EICO 722K NEW..	35
DRAKE SW4A.....	229	SX73.....	399	EICO 751K NEW..	60
DRAKE R4B MINT.	399	SX115.....	329	20A & QT1.....	89
DRAKE 2NT.....	129	SX122 MINT....	269	CLEGG 99ER.....	77
DRAKE T4X.....	319	SX146 MINT....	229	INTERCEPTOR....	249
DRAKE T4XB MINT	599	WR2000.....	77	ALLIED 2515....	79
TR6 & NB MINT..	499	HA-1 KEYER.....	77	SB2 VOX.....	30
SWAN 240 & AC..	229	SR46.....	99	SB2 XC.....	18
SWAN 260 MINT..	339	SR46A MINT.....	119	SB2 MOUNT.....	10
SWAN 250C MINT.	359	HQ170A/VHF MINT	279	RCA WV98A VTVM.	49
TV2 MINT(14MC).	249	HQ180A &NB.....	599	RCA WT11A.....	29
SWAN NS1.....	28	86W 5100.....	99	REGENCY AR136..	77
GALAXY GT550...	450	HEATH DX20.....	39	GONSET GPP-1...	25

(Special mail order prices valid to end of month only)

Write today! Send for FREE Catalog!

TRIGGER Attn: W9IVJ Q8/70
7361 North Avenue
River Forest, Ill. 60305
RUSH THE FOLLOWING: Amount 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 50 cents 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 15 cents per word will apply to advertising which, in our judgement, 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 15-cent 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 50-cent 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.*

AN Invitation NYC Area Hams and SWLS are invited to attend NY Radio Club Meetings - 2nd Monday of every month. George Washington Hotel, 23rd St. and Lexington Ave at 8 PM.

QCWA 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. A. J. Gironda, W2JE, Box 394, Mamaroneck, NY 10543.

FREE Sample copy Long Island DX Association Bulletin, Latest DX news. Business size s.a.s.e. to K2AFY, Box 74, Massapequa LI NY 11762.

PEORIA Hamfest — September 20, Peoria, Ill., same place as last year. For details see September issue of QST, hamfest calendar. Advance registration $1.50. Write Ferrel Lytle W9DHE, 419 Stonegate Rd., Peoria Ill 61614.

CINCY Stag Hamfest: The 33rd Annual Stag Hamfest will be held Sept. 27, 1970, at Stricker's Grove, Compton Road, Mt. Healthy, Cincinnati, Ohio. Lots of food, flea market, model aircraft flying, and contests. Identify Mr. Hamfest and win prize. $5.00 cost covers everything. For further info, contact John Bruning, 6307 Fairhurst Ave, Cincinnati Ohio 45213.

BELVIDERE Illinois, August 23, Fifth Annual Illinois-Wisconsin Hamfest/Swapfest, Box 252, Belvidere, Ill, 61008.

SAROC, January 7-10, 1971, Flamingo Hotel Convention Center, Las Vegas, Nevada. Sponsored by Southern Nevada ARC, inc., Box 73, Boulder City, Nevada. Advance registration $14.50 per person accepted until January 4, regular registration at door, includes Flamingo Hotel late show and drinks, Sunday breakfast, cocktail parties, technical seminars and meetings, ARRL, DX, FM, MARS, QCWA, WCARS-7255, WPSS-3952 and WSSBA. Ladies program. Flamingo Hotel SAROC room rate $12 plus room tax, per night, single or double occupancy January 3 thru 12 1971. Mail accomodations request to Flamingo Hotel. Mail advance registration to SAROC.

15TH ANNUAL Hamfest by four York County clubs again sponsored at Adam's County Fairgrounds, 4 miles north of Abbottstown, Penna., Sept. 6, 1970, rain or shine. Registrations begin at 0900 hours. Talkins 50.62 and 145.62 AM for the mobiles. York County hams were pleased with the FM interest last year. This year emphasis is being put on the FM swap and sell section. Talkins on 52.525 MHZ and 146.34-146.76-146.94 FM. Plenty of eats, drinks, transmitter hunt, auction. For XYLs free bingo. For info write K3POR, LeRoy Frey, 170 S. Albemarle St. York Penna 17403, Keystone VHF Club.

WARREN Amateur Radio Association (WARA) 13th annual hamfest Sunday, August 16, 1970, at new location, New Trumbull County Fairgrounds, 2 miles north state Route 305 on Bazetta Road just west of Mosquito Creek Reservoir. Registration begins at 1000 hours. Mobil talk-ins on 3940 kHz and 145.3 MHz.

QSL CARDS??? Personalized made-to-order!! Samples 25c, Deluxe 35c. Religious 25c. (Deductable). Sakkers, W8DED, PO Box 218, Holland, Mich. 49423.

C. FRITZ QSLs bring greater returns! Samples 25c, deductible. Box 1684, Scottsdale, AZ 85252.

QSLs. All types. Attractive designs, quick return, free sample. W7UIZ Press, Box 2387, Eugene OR 97402.

SAMPLES 10c. Harry Sims, 3227 Missouri Ave. St. Louis MO. 63118.

QSLs — 100 3-color glossy $3.50; silver globe on front — report form on back. Free samples. Rusprint Box 7875, Kansas City MO 64116.

PICTURE QSL cards of your shack, etc. from your photograph. 500, $12. 1000, $15.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum's, 4154 Fifth St. Philadelphia PA 19140.

QSLs 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples, Thomas St. Riegel Ridge, Milford, NJ 08848.

3-D QSLs — The modern concept that makes all others old-fashioned. Samples 25c (refundable). 3-D QSL Co. Monson, Mass. 01057.

QSLs 300 for $4.50, samples 10c. W9SKR, George Vesely, Rte.#1, 100 Wilson Rd., Ingleside, Ill. 60041.

3-LINE Engraved badges, any color, $1.25. Special rates to clubs. WB8GEW, Fallert's Engravings, 121 N.C. St., Hamilton OH, 45013.

RUBBER stamps $1.25 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 10c. Alkanprint, Box 8494, Minneapolis, Minn. 55408.

QSL, SWL cards that are different. Quality Card Stock Samples, 10c. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

QSLs. Second to none. Same day service. Samples airmailed, 25c. Ray, K7HJR, Box 331, Clearfield UT 84015.

GORGEOUS QSLs. Rainbows, etc. Top quality! Low prices! Samples, 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater Fla. 32032.

NEW! QSLs professionally designed. Every card original. Samples, 10c. Printing follow-through by W1FLX, QSL Designs, 20 Britton St., Pittsfield, MA 01201.

QSLs "Brownie," W3CJI, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

QSLs. SWLs. Samples 25c. Malgo Press, Box 375, M.O., Toledo OH 43601.

QSL Print. Samples 25c. PO Box 33, Melrose MA 02177.

QSLs. Radio Press, Box 272, Poway CA 92064.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

FREE QSL samples. Cent each and up. Your design. 3111 Brian, Arcata, Calif. 95521.

DON'T buy QSL cards until you see my free samples. Fast service. Economical prices. Little Print Shop, Box 9848, Austin, Texas 78757.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductors and resistors. Astral Electronics, 150 Miller St., Elizabeth, NJ 07207. Tel. 201-354-3141.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antenna Accessories, 1339 So. Washington St., Kennewick, Wash. 99336.

TRANSFORMERS rewound. Jess W4CLJ, 411 Gunby Ave, Orlando, Fla. 32801.

FRAME Display, and protect your QSLs with 20 pocket plastic holders. 3 for $1, 10 for $3, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

TELETYPE Mod. LPR 28 receiver-only typing reperforator without cover good cooperating condx, sync motor 60 wpm. $125. Tape winder 110vac $15. †28 LBXD1 trans-dist 60 wpm, sync motor, wired for complete 100vac operation and converted to 7.42 code $75. T. Howard Box 262 Boston MA 02101. Tel. 617-742-0916.

GREENE, Center of dipole insulator, with or without balun. Free flier. See our display ad in this issue! O. Watson Greene, Box 423, Wakefield RI 02880.

VERY In-ter-est-ing! Sample copy free. "The Ham Trader", Sycamore IL 60178.

CAPACITORS. Brand new 140 mfd electrolytics @ 450 vdc, ten for $9.50. K4UHP, Meaffey, 6835 Sunnybrook Lane, NE, Atlanta, GA 30328.

SATELLITE Amateur Radio Equipment Co. New and used ham gear. Repair service. Ham antennas, supplies. 426 Boston Post Rd., Waterford CT 06385. Tel: 203-443-8841.

WORLD QSL BUREAU. See display ad elsewhere in this issue.

160 meter Matchverter resonates any 40 or 80 meter inverted vee/dipole on 160 meters. Handles 250W PEP. $29.95 ppd. Top Band Systems, Dept.4, 5349 Abbeyfield, Long Beach, Calif. 90815.

TOROIDS! Lowest price anywhere. 40/$10 postpaid. Center tapped 88 or 44 MHy. (5/$2). 32KSR Printer, reconditioned, perfect $200. Lorenx ASR page printer (all 60 speed) $100. Perf tape 11/16" $10/case/40. Facsimile electrosensitive paper $3/box/250. Stamp for list. Van W2DLT, 302A Passaic Ave. Stirling NJ 07980.

RECEIVING & Industrial tubes, transistors, all brands — biggest discount. Technicians, hobbyists, experimenters — request free giant catalog and save! Zalytron 469 Jericho Turnpike, Mineola NY 11501.

TOROIDS Uncased 88 or 44 MHy 5 for $1.50 ppd. M. Weinschenker, Box 353, Irwin PA 15642.

PROTEST! Picket! Write your congressman! Let nothing prevent you from attending the ARRL Hudson Division Convention, Oct.17-18, Hilton Motor Inn, Tarrytown, NY. Exhibits, lectures, contests, gabfests, banquet, NY City sightseeing. Fun! Info from Hudson Amateur Radio Council, Larry Strasser, K2UMM, 3591 Bainbridge Ave., Bronx NY 10467.

SWAN 500CX 117xc, 510x crystal oscillator, 719 Electro-Voice mike. First $550. You pay shipping. Emergency Ph. 675-2486 — Equipment brought May 26 1970, Cecil Brower, Coffeeville Miss 38922. WA5SNX.

CIRCUITS for 32 electronic projects, RF, audio and gadgetry - complete plans $1. PM Electronics, Inc., Box 46204, Seattle, WSN 98146. Dealer inquiries invited.

HAMMARLUND HQ170A receiver 80-6M with preamp Ameco for 6M band. Clean and in very excellent condition. Price $200 you pickup or pay shipping charges. W4DUL 11346 SW 172 St. Miami Fla. Tel. 235-4637, 33157.

FIELD strength meter Jerrold 704R 54-220 Mcs $195. Color bar generator Hickok 662 $75. Two TV chan. 4 sound generators each $25. All like new. WB6MUN PO Box 21-4735, Sacramento Calif. 95821.

WANTED. Eddystone receiver. All offers answered. W2IQ/4, 1710 Point Pleasant Av. West Bradenton, Fla. 33505.

COLLINS 75A4, prime upgraded, with spkr, best offer over $450. Mosley TA33 beam $60. CD Ham rotator, factory rebuilt $60. Heath HO10 scope, perfect $42. Cesco CM52-a vswr meter $20. Yaesu FTdx400 transceiver and FLdx 2000 linear never used, both $500. W2WK 516-378-1155.

RG11/u 800 feet 8c foot plus postage. Sell part or all. W3HMR, 222 Sherbrook Blvd. Upper Darby Pa 19082.

WANTED HT41. Write stating price and condition. Pickup preferred. Also wanted modulation power supply transformer for an HT9. John J. Jankowski W1OM, 133 Sexton St. New Britain Conn 06051.

SELL. Heath DX60B xmtr, HG10B vfo, HR10 rcvr. Mint condition. $150 postage excluded. WA0ZJJ, 1022 S. 10th St. Fargo ND 58102.

MUST sell, Swan 500C with matching ac power supply, NC300. Both mint condition. Make offer. Stanley Bahl, 2909 Orton St. St. Charles MO 63301. 314-723-776.

SALE HT32, HQ170, HE45B, HE61 vfo, $375. Ship at your expense. Don WA3CAW, RD 1, Manns Choice PA 15550.

SELL 10 watt bi-band fm xcvr. Complete with accessories plus manual. Best offer. K1QQX, 165 Stonecrest Dr. Apt.143, Middletown Conn. 06457.

SWAN TV2 2 meter transceiver with three xtals. Less than three months old and in excellent condition. $190. Andy Dierlam, WA1KXJ, 123 Pine Knob Drive, Wapping, Conn. 06087, 203-644-0360.

SB200 new tubes excellent $175. K6SUZ Los Angeles 90048, (213) 731-2561; 938-4003.

SWAN 500C transceiver plus power supply included used only twice $450. Swan 250 six meter transceiver plus power supply $350. Both together $750. Will throw in DX 104 mike. Pickup only. 516-798-2947.

FOR SALE rcvr Drake 2C and matching speaker $195. Drake 2NT xmtr $100. One year old. WN4LWE Walter Furtak, 4291 Applecrest Drive PBG Fla. 848-9364.

PREPARE for FCC exams! You need Posi-check. Original, expertly devised, multiple-choice questions covering all areas tested in FCC exams. Same form as FCC exams. Keyed answers, explanations, IBM sheets for self-testing. Over 300 questions and/or diagrams for each class. Each class complete in itself. Basic questions duplicated where they apply. Continuously updated and reprinted since 2964. General Class $3.50, Advanced Class $3.75, Extra Class $4. Third class postage prepaid. Add 32c per copy for first class mailing, 64c for air mail. Send check or money order to Posi-Check, PO Box 3564, Urbandale Station, Des Moines Iowa 50322.

WRITE, phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, Galaxy, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, Henry linear, towers, antennas, rotators, other equipment. We will try to beat any deal you can get anywhere and to give you the best service, best price, best credit plan, top trade-in. Write for price lists. Try us. Henry Radio, Butler, Missouri 64730.

HEATHKIT Chippewa linear, spare 4-400A, relay, 2 kw plus, excellent $275. HW100, HP13A, SBA100-a, HS24, Hustler 20-15-10, SWR bridge, never mobile, perfect $300. HO15 patch $15. No shipping on linear. K1SCQ, 44 Parkway Crescent, Milton Mass. 02187.

SELL Pair Lafayette 2 watt walkie-talkies with fresh batteries $35. Heath electronic keyer $25. Skylane fiberglass quad steel boom $30. (no wire). Dr. Crosby W1QP, Chatham Mass. 02633. 432-1157.

SELL: Drake R4B, excellent condition $300. WN5AES, 801 Richardson Dr. Henderson Texas 75652.

QSTs 1917, also CQ RAdio 73 SASE for list. W5DTJ 535 Astor, San Antonio TX 78210.

WANTED. Heathkit SB200, SB640, SB620, SB610. Tim Bogner, 562 Marion, Leavenworth Kansas 66048.

SELL Hallicrafters SX146 $140, Knight T60 $30. WN7KUF, 475 SW 150th Av. Beaverton Ore. 97005.

HEATH SB401 with crystal pack $310. SB301 with all filters $290. Both professionally built and aligned, used little, guaranteed mint condition. Bill Wallace K8HYY Rt.6, Box 110, Xenia Ohio 45385.

FOR SALE or trade. Collins 75S3; 32A1 with 51F6-2 pwr supply. $425. Drake W4 wattmeter $25, HA1 keyer with paddle $50. Will trade any above for photographic enlarger or Hasselblad 500C. Richard Riegert, 2618 Minnesota, St.Louis MO 63118.

SELL — TH2MK2. Tel. 212-569-6121. WA2ERL George Man NY. 10034

COLLINS SC101 (deluxe station controller for KWS1/75A4), mint, complete with wiring duct, remote coax relay box, and manual $200. 500 cps filter for 75A4 $45. LW51 (6meter xmtr) Harvey wells p/s $35. New vibroplex "original bug" $20. D104 mike w/ptt stand $19. W4PLM Fred Huff, 2310 NW 38th Av. Fort Lauderdale Fla 33311.

HIPOWER men: 872A fil xmfr Thor T5523 125VAC pri 5v 7.5A sec 10kv $8 ea. 2@$15. Choke Thor T20C57 10 henries @ .5A 10 kv $10. Filter cond Westinghouse 6000V 4 mfd $8 ea 2@$15. Plate xfmr Thor T7P55 pri 115/230ac sec. 2330/1770 -0- 1770/2330 @ .5 amp Wgt.100 lbs $30. Use in bridge for 3500/4600 VDC. All broadcast commercial grade guaranteed. Also meters and 3 kv cond. 4 mfd @ $3 ea. K2EGI, 5 Stratford Pl, N. Babylon NY 11703.

ANTENNA homebrewers only. No gimmicks. No instructions. Guaranteed premium quality reinforced fiberglass quad spreaders, 13 ft $7.95 each FOB Edocraft 54 Johnson Lane, Bay Shore LI NY 11706.

HT37 mint cond original owner $275. Johnson match box & other gear pick up only. R. W. Downes Phone 479-0935, Denton Md. 21629.

GALAXY V vox, xtal calib ac power no spkr. Galaxy 2000 linear ac power, $650 takes everything, certified or cashiers check only. FOB Pgh Pa. William Harry Popowniak, 915 N. Yale, Apt.20, Tulsa Okla. 74115.

60' EZWay crankup tiltover tower, TH3 HamM, new SB200, Knight oscilloscope, signal tracer, capacitor checker, D104 microphone, Hustler mobile antenna, Reese trailer hitch, 6 & 2 meter beams. WA9KBL, 312-439-6884.

HALLICRAFTER S108 receiver, real nice $44. Knight P2 SWR $7.50. WKL MM100 $6. Other items. Postage extra. R4JCK Oak Ridge Tenn. 37830.

SALE TR4, AC4, MN2000 & MS4. K2MJE call evenings after 5 pm. Mario A. DeBellis, 116 Holly Dr. Woodbury NJ 08096, 609-845-9084.

FOR SALE. Drake R4B receiver, my spare so little used $350. Pwr supply, brute, 2500 vdc 600 ma CCS, 872A rectifiers $35. KW class C amp PP813s coils 10 thru 160 meters $35. Johnson Viking cw xmtr=exciter 75 watts $30. 6 ft Bud rack=cabinet $14. All FOB. W4PGW, 3 Pelican Isle, Ft. Lauderdale Fla. 33301.

HALLICRAFTERS HT37 xmtr mint $190. HT41 linear $175. HT33A $225. Johnson Valiant $100. Collins 75A1 $120. Collins 75A4 with 3 filters $375.

SELL Pacemaker $150. Courier linear $125. Matchbox Johnson 250 $50. Eddie Goon, 1066 Westbrook, Perrysburg Ohio 43551.

TRADE Radio shack seven room house at Barranquilla Colombia South America for Collins KWM2 and cash write W6YMX New Orleans La 70114.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Erv Rasmussen, 164 Lowell, Redwood City CA 94062.

COLLINS 32S3, 75S3, 312B4, 516F2. $1150. Also Heath SB200 $200, WB6FDV 3416 Cork Oak Way, Palo Alto, CA 94303. 415-321-8675.

EICO 460 PW scope $55. 145A signal tracer $17.50. Galaxy cw monitor $15. Plus shipping. W5DZA 826 Ranchitos, Santa Fe, N.Mex. 87501.

SALE — Drake R4B, 2NT, six months old $550 or best offer. Mike Pyle PO Box 957 Gulfport, Miss 39501.

HALLICRAFTERS SX130 receiver, nice. $75 plus shipping. WA9PIW 8234 Central Park, Skokie, Ill. 60076.

SENIOR citizen needs used 2 meter transceiver, must be reasonable. Write to WB4FEQ.

"HOSS trader Ed Moory" says he will not be undersold on cash deals! Shop around for your best cash price and then call or write the "Hoss" Before you buy! New equipment: Factory warranty: New early model Swan 260 Cygnet with microphone ($435) cash price $339). New Gonset GSB 201 MKIV linear 2000 watts ($495) cash price $299. New Swan 350C ($420) cash price $339, New Rohn 50 ft foldover tower prepaid $199.95. New Mosley Classic 33 and demo Ham-M rotor $199. Used equipment: R4 $259. L4B $549. TR4 $419, 500C $375. 75A4 $319. HT37 $169. Two locations: Moory Electronics Phone 501-946-2820, PO Box 506 DeWitt Ark 72042. Also Bill Davaul W5FQX Moory Electronics 415 W. 33rd N. Little Rock Ark.

WORLD Radio's used gear has trial-terms-guarantee! HX30 (6M-ssb) $199.95, RX1 $149.95, Swan TV2 $199.95, 350 $279.95, DuoBander 64 $104.95, T4X $299.95, HQ110C $139.95, HQ170C $179.95, NC300 $139.95, Galaxy 5mk3 $279.95, SB33 $189.95, SB34 $249.95, GD104 (mic-stand) $19.95. Free "bike-book" list for more. 3415 West Broadway, Council Bluffs, Iowa 51501.

SELL Heath HW12 mint condition $85. Homer P. Schulz Box 8 Valentine Nebr. 69201.

WANTED: 5UP7 cathode ray tube. Contact WN6MIE, Tony, 5671 Rochelle, Westminster, Calif. 92683.

BEGINNERS: Globe HG303 75 w transmitter with relay, filter, crystals $55. Lafayette HA225 receiver, speaker $65. Eico vfo $30. Keyer and vibro keyer $30. Manuals. WB2ZQE, 31 Eaton, Syosset NY 11791. 516-931-2966.

EICO 753 transceiver $100 or with dc supply $125. Dumont DC-coupled dual-beam oscilloscope $200. 877 shortwave radio $40. Wanted: 9 Mc crystal filter with crystals. WB6LGQ, 22515 Decoro Dr. Saugus, Calif. 91350.

SALE Hw 18-2/HP23A $175. Adven. with HB mod $25. HB Kw2-813 with pwr sup $50. Sixer $25. SB630 $75. SB600 $15. Call W3INW 215-536-0448.

SELL, trade KWM2, late serial, plug in relays, absolutely like-new, never mobile with 516F-2 $795. DX engineering linear compressor $45. Don Payne, K4ID Box 525, Springfield Tenn. Nites 615-384-5643.

WANTED: Hammarlund SPC10 converter. W1DBS John Savonis, 410 Blake Rd. New Britain CT 06053.

DISCOUNT prices! New equipment, factory sealed cartons, full warranty. New Drake TR4 (Reg.$699) $595. New Drake R4B (Reg.$479) $404. New Drake T4XB (Reg.$495) $420. New Galaxy GT550 (Reg $550) $439. New Galaxy R530 (Reg.$795) $639. New Hy-Gain TH6DXX (Reg.$169) $139. New Hy-Gain TH3MK3 (Reg.$149) $111. New Hy-Gain Quad (Reg.$109) $89. New Mosley Classic 33 (Reg.$147) $119. New Classic 36 (Reg. $171) $136. New Tri-Ex W51 Self-supporting Crankup (Reg.$393) $333, shipped prepaid. New Ham-m rotator (Reg.$129.95) $99.95. Send for price quote on all amateur equipment. Discount Radio Sales, Box 6044, Lubbock, Texas 79413.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer, Collins, Signal/One, Drake, Swan and all others. Also $25,000 inventory used gear. Request list, Chuck, W8UGC, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

QSTs before 1927 and amateur teletype publications wanted. Orville Magoon, 1941 Oakdell Dr., Menlo Park, Calif 94025.

SAVE on all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd. Swampscott Mass 01907. 617-589-9700.

WIRELESS sets, parts, catalogs, bought, traded. Laverty, 118 N. Wycombe, Lansdowne, Pa. 19050.

HAM ticket — the amateur radio license courses for Novice, General, Advanced, Extra Class. "FCC makes it difficult to get a ham license . . . let Ham Ticket make it easy!" Courses may be leased or purchased. Write for brochure. Clayton Radio Co. 220 Mira Mar Ave. Long Beach Calif. 90803.

COLLINS 75A-4 3 kc and 2.1 kc filters, in perfect condition. $390. John Morin, WN8BAV, 4145 Sonnet Ave, Oscoda, MI 48750.

CANADIANS: Wanted to buy, transmitting tubes, various types. S.a.s.e. VE3EYW, 15 Grandmont, Sault Ste. Marie, Ontario.

WANT: Early issues of Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord NC 28025.

COLLECTORS Item: IRE Proceedings, run '50 thru '54; broken '45 thru '48. S.a.s.e. list. Interested Kennedy 110 and SR-2000. Have Grebe CR5 and Crosley 51. Trade. W5LR, 1314 Holly Glen, Dallas TX 75232.

DIODES — 1N4007 Volt PIV @ 1 amp. Silicon diodes. 28c ea. $25 for 100 ppd. M. Weinschenker, Box 353, Irwin PA 15642.

SELL Collins 32S1 †395 with vox modification 516F2, 312B4 all single owner, to best offer over $425 FOB. Bornemann W5FV Rt.1, Box 168B, Lacombe La 70445.

ENGRAVED plastic badges, name plates, $1.15 pp. T. Connor, 75 Edwin St., Boston MA 02124.

CUSTOM made printed circuit boards. K9BIT, 1307 N. 3rd St. Vincennes Ind. 47591.

HALLICRAFTERS HT40 $45. SX140 with speaker $55. Lafayette HE30 gud condx will ship shipping charges collect $30. WB2GFB *S. Grabel, 40 Argyle Rd, Brooklyn* NY 11218.

CV-591A/URR — ssb converter for R-390 series of RX. Xtal usb/lsb plus tunable i-f bandpass. Will enhance any RX with 455 i-f. Large SASE for specs. $185 FOB. John Possehl W3KV, Box 73, Blue Bell Pa. 19422.

FIND buried treasure. Detectron medal detector for sale $100. Never used. Still in original packing carton. I will ship anywhere. Contact Lon WB2ETV 77 Gless Ave. Belleville NJ 07109.

MINT HQ129 receiver $100. NC sixty special receiver $40. Johnson Valiant transmitter $110. Phasemaster 50 watt ssb transmitter $45. Globe six, two meter transmitter $45. AR22 rotator $20. Scope Dumont model 274A $50. New TCS transmitter 1.9 to 12 Mc. All excellent shape. W5SYB 5000 Hall Amarillo Texas 79109.

DRAKE R-4B, T-4XB, AC-4, MS-4. Electrically and mechanically in excellent, like new condition. $675. L. Barnard W2KIM, 224 N. Jensen Rd. Vestal NY 13850.

VHF: College expenses force me to sell Clegg Thor 6 with all cables and shielded ignition. Dave Vogel WB2NOS, 1132 Godfrey Lane, Schenectady NY. 12309.

FOR SALE: TR3 transceiver with ac power supply, speaker and Turner 454X mike $300. Mosley TA33 Jr beam ant $35. Mrs. John Sexton 176 Bishop Curve Berlin CT 06011. Tel 828-6681. Local sales, sri will not ship.

CLEGG Venus ps Apollo linear, Waters filter, 6 el Telrex beam complete $495. WA8SAY M. Listiak, 717 S. Schenley Av. Youngstown, Ohio 44509.

SELL: HW100 transceiver, HP23A ac power supply state price in first letter. Patrick Barkey WA8VYR, 404 Sharon Dr, Flushing Mich. 48433.

SB101, ac & dc supplies, well maintained. Sell for best offer or trade for recent Drake R4 or 2C/2NT outfit. Bevelheimer, W3GDZ, RD1, Venetia Pa. 15367.

FOR SALE or trade NCX3 $145. Need five Johnson TR switches. CE20A and mobile supply for NCX500. W1JGU, 59 Randolph AVe. Milton MA 02186.

WANTED: Type CNA coil drawers for Navy "RDG" rcvr. K4EPI.

NEED March 1965 and April 1967 QST for library any decent price paid. Reply after 12 September to Naval Academy ARC, Midn S. R. Ingram, 29 Co. USNA Annapolis MD 21412.

SELL: Hallicrafters SX122 rcvr. $175. Heath Seneca xmtr $100. Jeffrey Weiner, 225 Elm Av. Rahway NJ 07065.

SELL, trade Viking I (includes 160). Want general coverage rcvr. Phone 207-324-4074, K1TJM, 7 Kirk, Springvale Me. 04083.

SELL. As a unit, swan 400, full-coverage vfo, and 117 VAC power supply. All in excellent condition. $300. Ronald P. Schultz, 76 Orange St. Port Jervis NY. 12771.

SALE: SB101,SB500,both just factory aligned. CIE 1st class FCC license course. Sam Reck 230 Morris,Morristown NJ 07960.

AMATEUR Paradise Vacation, Livingstone Lodge, Mascoma Lake, NH. Cosy cabin for two, weekly, $55. Swimming, Fishing, Boats, Sports, Ham Radio, Hot Showers, Fireplaces. Light Housekeeping. Children half. Camp sites, literature. A.Q. Livingstone, W2QPN.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York NY 10007.

1000 PIV @ 1.5 amp epoxy diodes includes disc bypass caps & bridging resistors, 10/$3.95, 100/$30 postpaid USA. Dealers inquiries invited. East Coast Electronics 123 St. Boniface Rd., Cheektowaga NY 14225.

WE BUY all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co. Box 516, Hempstead NY 11551.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway NY 10012. Tel 212-925-7000.

WANTED. Tubes and all aircraft and ground radios. Units like 17L, 51X, 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 NJ 07032.

WANTED. For personal collection. The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914. W1CUT, 18 Mohawk Drive Unionville, CT 06085.

NOVICES. Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk VA 23508.

WE'RE trying to complete our collection of callbooks at Hq. Anyone having extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington CT 06111.

MANUALS. R390A/URR, BC639A, OS-8C/U, $6.50 each; R-388/URR $7.50. S. Consalvo, 4905 Roanne Dr. Washington DC 20021.

SELL: HT37 $175. Drake 2B $175. Johnson Valiant I make offer. Dale M. Johnson K9VUJ/WB@AYV, 15800 Buckhill Rd. So. Lot 78, Burnsville, Minn. 55378. Phone 435-5895 after 5 pm.

SELL Lafayette HA460 6 meter xcvr like new $65. Heathkit 2 meter lunch box 4 xtals works fine $25. 14AVQ assembled with roof mounting kit $25. Hygain 6 meter dual stacked halo assembled $15. Saturn 6 meter halo with xformer $5. Antennas local sale only. Offers considered. W4IH, 6819 Skyline Ct. Alexandria VA 22307. Tel. 703-768-0098.

RADIO officer's manual just published, 95 illustrations, over 295 pages. Covers many subjects, radio mathematics and calculations, word count rules, operating procedures. You will find this manual a valuable source of ready information particularly for maritime operation. Postage paid in USA, $8 each. ITT Mackay Marine, 133 Terminal Ave. Clark NJ 07066.

HEATHKIT Twoer excellent condition $25. Eico model 232 vtvm excellent condition $16. Mark WB2WKL, 118 Red Maple Drive, Levittown, NY 11756. PE5-2511.

WANTED — Heath SB10 ssb adaptor in good electrical and physical shape with cables and instruction book. Bruce Berman, 7 Lark Lane, East Northport NY 11731.

WANTED. In like new condition June 1962 issue of QST. Alanna Koralko WA2VFT, 14 Bedford Av. Brooklyn NY 11222.

NOVICE crystals: 40-15M $1.38, 80M $1.83. Free flyer. Nat Stinnette Electronics, Umatilla Fla 32784.

WANTED: 70' or 80' heavy duty crankup foldover tower. State make and model. Sell SBE34 with mic like new $250. Will consider trade. T. G. Soukup, 161 Bob Hill Rd. Ridgefield Conn 06877.

INSTANT superjunkbox. Must sell mine. Write for list. R. Stinaff, 206 Magnolia Terr. Pendleton SC 29670.

MUST sell mint HQ180A with matching speaker, manuals, spare tubes, phones. Year old. Best cash offer. W. Jandro, 473 Success Av. Bridgeport Conn. 06610.

SB101 with SB600/HP23 and optional cw filter. $425/offer. Excellent condition. Built by electrical engineer. Roger Melen WB6JXU, 340 Crothers, Memorial Hall, Stanford Calif. 94305.

COLLINS 32V3 $175. Johnson Thunderbolt kilowatt linear amplifier $250. EC221T, book, power $50. HRO60 $150. HQ129X $40. NC190 $110. SX110 $75. DB22A $25. VHF152A $25. Heathkit GR81 $15. Morrow CM1coneirad $10. Pentron 9T-3C tape recorder $25. B&W CX153B variable condenser $7.50. Ameco CB6 converter $10. Ameco PS1 power $8.50. Back issues QST, CQ, IRE, IEEE, Radio, WRA, etc. All items good working condition. Applicable manuals or diagrams furnished. Everything FOB Indianapolis. Wanted, SR200 or 30L1. Write requesting detailed listing, descriptions. W9DPL, Howard Severeid, 3602 West 71st St. Indianpolis Ind. 46268. Telephone evenings only, five to nine EDST. 317-291-4444.

RCA diversity system for RTTY, consisting of two CV57/URR converters and one CB14/URR comparator in desk top rack, 10 to 1000 cycle shift. Trade for R390 receiver or make offer. Boehme keying head and Wheatstone perforator for Morse code. 0 to over 75 wpm. $175. Boehme ink recorder head tape puller for Morse code $75. Heath LCR bridge $35. Meas.Corp. 10-1-1 Mc. calibrator $20. IBM 36V transistor supply, 2 amp, $15. RTTY paper rewind $15. RCA pixicon 1698 tube, socket, schematic $6. John Christy W6JX, *14943 Dickens St. Sherman* Oaks Calif 91403.

PROP pitch motor $20. LM freq meter $20. Pair large selsyns $10. Don McDouglass W6TYM, PO Box 83, Livermore CA 94550.

HQ170AC builtin 25 kc IC calibrator, new set tubes, clean as whistle but needs some aligning best offer over $160. HX50 also very clean but also needs aligning, best offer over $160. W9LAX 1114 Amsterdam Ave, Madison Wis. 53716.

2B RECEIVER, Q Multiplier/spkr, xtal calibrator, mint $165. Power transformers Cygnet 260-270 or 1200 w amplifier 220V $15, 110V $10. Norelco 101 recorder ac adaptor, case, phones $50. Ballantine 316 vtvm $70. All FOB. William 802, 9600 Palisade Ave., North Bergen NJ 07047.

SALE Kw linear $50. Solid state pwr supply 2000-3000v 500 ma 50 mfd oil filters variac control $50. BW 72 ohm lp filter $5. Charle A. Dene W2DMP 45 Eastbrook Lane Willingboro NJ 08046.

CERAMIC 7289 (3CX100A5) tubes replace 2C39 $3 each or trade for 2 mtr fm gear. W4SOD Box 73 Folly Beach SC 29439.

COLLINS KWM1 $225. Monitoradio M160 police band fm 12v receiver $75. Offers considered. Normal Fertel 1200 Van Nest Av. Bronx NY 10461.

DRAKE 2B like new $135. Motorola D33GGV (Twin V series) with xtals $55. 2 meter commercial cavities transmit and receive, make offer. Shepard, Limeledge Rd. Marcellus NY 13108.

FINE stainless, bronzes, other, threaded, washer, hardware. Over 100 new packets! Your needs?? W8BLR 29716 Briarbank, Southfield, Mich. 48075.

HEATH HR 10B xtal calibr, and manual $50 postpaid. Paul Kubik 402 Fourth St. Rochester Mich 48063.

SELL Heath ssb station Hw32 w/HP23 ac supply xtal calibrator, Turner mike, HD15 phone patch, coax, cables, etc., complete w/manuals. Superior condx $140. Ronald WB2OOF 152 Davis Av., White Plains NY 10605.

FOR SALE: Hammarlund HQ170AC with speaker $200. SB401 w SB401-1 crystal pack $275. WB2HUN 34 Alpine Lane, Chappaqua NY 10514. 914-238-8498.

SWAN 140 good $65. Johnson 6-2 converter, like new, 20 meter output $20. Andrew Byerley WBØBHK Route 2, Webster City Iowa 50595.

R-200 RECEIVER 19-238 MHz 7 bands, FM/AM/CW 6 filter positions trade for TR4 ng. Freq meter 100-10,000 MHz w/pwr $65. Trade vhf/uhf, test equip, list SASE. W4API Box 4095, Arlington VA 22204.

WANTED unmodified prop-pitch motor. For sale 30S1 $800. E. J. Vielhaber RR2 Byron Minn 55920.

SWAN 350C 117xc cw monitor, mike, $410. WB2SCT 85 Sherman Av. Teaneck NJ 07666.

EXTRA gear. Poly-Comm PC6 complete $110. Knight R100A $20. Ameco CN50 converter $20. Vibroplex champion bug $10. Will ship. Franklin Davy 39 Third St. Frenchtown NJ 08825.

I NEED QST for February 1921. Must have both covers. Elmore Fitz, Lanesboro Mass 01237.

HQ110C $110. CE20A sideband exciter $90. David Pollock 44 Wicks Lane, Malverne NY 11565.

SR42A will ship $135 or best, mint condx. L. Booth WA5QEK 504 Transcontinental Dr. Metairie La 70001.

SWAN 350C and noise silencer. Mint, used 23 hours. Cost $486 new. Best offer over $335. Kenneth Masse 115 Woodlawn Dr. Ironton Ohio 45638.

SWAN 240 triband $135, SW117ac supply $35. Both excellent. WB6MNS 440 N. Mentor (†11) Pasadena Calif 91106.

EICO 753 transceiver and 751 power supply excellent working condition. Factory wired, factory cartons $195. Absolutely firm. Steven Bartha jr 9 Dixon Court, Sea Cliff LI NY 11579.

SPADARO solid state speech processor (QST Nov.'69). Exclusive soft clipping. Pronounced increase in intelligibility. Doubles the average power input. Introductory price only $79. Professionally printed circuit board in deluxe cabinet (6"w x 3"h x 4"d). Order from author today. Spadaro Speech Processor, 2154 57th St. Brooklyn NY 11204.

WANTED, Hallicrafters HT32. Pse give best offer. Jay Winkler 1650 Ronald Loop, Placerville CA 95667.

AUTRONIC Keyer $43. C. Lachterman 3 Archer Ln., Searsdale NY 10583.

SELL SB300 mint $200. SB400 mint $190. with manuals and cables for TRCV. 4BDQ four band antenna new $15. W8VSL Stuber, Amherst Ohio 44001.

SELL: HW- 2A mint $85. HP13A $55. Mosley Tote-tenna $50. H. Tatar, 1625 N. Park, Cleveland Heights Ohio 44106. 229-3755.

WANT used Collins 75S3B. Write details to Reginald Wilson K5TOL 107 N. Main Dayton Texas 77535.

SELL one antique Dumont Phasemajector, Type 1, similar to early monoscope TV picture generator. Has picture of Lincoln inside. Write for details. Woodie Weiss, 1 Bolivar Ave. Troy NY 12180.

FOR SALE: DX40 $30. HG10 vfo $35. Low pass filter $10. DK60-62c antenna relay $10. DX100 $40. 15 mtr beam $25. Drake 2B and 2BQ $175. Swr bridge $7. Code osc. $6. Vic WA8TNJ 143 Longford, Elyria Ohio 44035.

FOR SALE. Swan 500 and 117xc p.s. New August '69 now in excellent condition. Also vibroplex bug, swr meter, digital clock EV 729SR mike, and misc. for $550. With manuals and cartons. Will sell separately. Contact WA1JYE Todd Leary 4 Mossledge Rd. Westport, Conn. 06880. 203-227-6595.

KW linear beautifully built for extensive contest/DX operation (ssb/cw). Self-contained in 4' cabinet on casters. Bandswitching with S&W 850A turret. Power supply controlled by "power-stat." Fully metered. Full internal and external control circuitry. Very clean and complete with spare tube. Parts cost over $700. Asking $150. Bill Shepherd 12,000 Twin Cedar Lane, Bowie MD 20715. 301-262-0155.

SELL/Trade KWM2 high S/N 12225 $650. PM2 $100. 312B $15. 75S3 high S/N 13615 $375. SX117 $170. HT44 $170. PS150-120 $50. HT32A $200. All mint. Prices firm. Don Burns 4410 Reading Rd. Dayton Ohio 45420. Ph. 513-256-0345.

SELL: QST 1929 thru 1951, 12 issues 1924-1928. R9/Radio 1934 thru 1946. All issues home bound less some advertising and non technical pages. $75 shipped prepaid. James Scott W9CWH 706 N. Elmhurst, Mt. Prospect Ill. 60056.

COLLINS 75A4 S/N 8003 KWS1 with factory mods excellent condx. $1000. WAØJXN 2310 S. Ridgewood, Wichita Kans 67218. 316-682-8623.

HEATH linear amplifier will sell either SB200 for $200 or SB220 for $349. Both excellent condition. W1DO Ernest Bosselman 210 South Rd. Farmington Conn. 06032. 203-521-3617.

GONSET Communicator II two meters, for sale, good working condition $75 plus shipping. Harry McGavran WBPNY 2506A 35th St. Los Alamos, New Mex. 87544.

HT37 $180. SX111 $120. Beautiful condition, prefer local, call 913-888-6232. Write Pat Ables 9808 Hayes, Overland Park Kans 66212.

SELL DX60B 3 crystals HR10B crystal calibrator, complete, v.g. condition. $120. Jay Lasner 607 Huntington Ave., Plainfield NJ 07060.

SELL Heath 10-18 5" scope perfect cond cost $120, make offer. T. Rodgers 120 E. End Av. NYC 10028.

GETTING married, half of station must go. Galaxy Vmk2, ac400, G350C $350. 1kw Johnson matchbox w/coupler $50. B&W model 381 TR switch $25. Eico 722 vfo $20. Cert check or m.o. Mike Tarnowsky WB2YJS 24 S. Middletown Rd. Montvale NJ 07645.

SWAN 500C and 110v p.s. $350. Hallicrafters SR42A and vfo 2 meter transmitter — receiver $100. 2 meter FM transistor transceiver Fdfm2S 12 volt and 110 volt p.s. made by Varitronics 10 watts $200. Lafayette 6 meter transceiver $75. Jos. Michaels W2MNR 80 Birch Lane, Woodmere NY 11598. 516-295-3598.

YOUR Heathkit professionally wired debugged and calibrated for 15% of the kit price. John C. Allen, WA7OAE, 1232 NW 201st St. Seattle WSN 98177.

DUMMY loads, 1 kw $9.95. Phone patch $8.95. Wired $4. Ham Kits Box 175 Cranford NJ 07016.

50 WATT 6 meter B&W xmtr, vfo, pwr supply, 4 el beam, intl crystal conv to 40 meters, pass band filter, control pnl. All for $95. WA7GUV Fred Zieseniss 8535 SW Gayle Ln, Portland Ore 97225.

CRYSTALS airmailed. QST "Novice special" all frequencies, all bands, FT243, active - accurate, five or more 99c each. Regular price singles $1.50. Fast service from Mid-America. SSB, MARS, Marine — custom finished, etch stabilized, FT243 .01%, 3500-8600 kc. $1.90 (minimum five, same or mixed, $1.75). (nets, minimum ten, same frequency $1.45). 1700-3499 and 8601-13,500 fundamentals add 10,000-30,000 overtones $2.85. Add 50c/crystal for .005%. Add 75c/crystal for HC6u hermetics above 2000. Airmail 10c/crystal, surface 6c. Builders crystal groups, inquire. Free order-bulletin. Your crystal shop since 1933. Bob Woods WØLPS C-W Crystals, Marshfield MO. 65706.

HEATHKIT SB220 linear wired, perfect condition $350. W4KTD PO Box 961 Canton NC 28716, 704-648-2694.

WANTED, SB10 working and reasonable. WA3MNS Phil 5932 27th Av. Hillcrest Heights MD 20031, Tel. 301-423-7311.

FOR SALE: Model 19 teletype $100. HY32B $225. SB200 $200. M/V of the SX73 general coverage receiver $125. 30L1 $400. All in good shape. S. W. Henderson K4NJY PO Box 236 Camp Hill Ala 36850.

SALE Good signal generator and frequency meter with PS. Paul Wise 519 East 33 Joplin Mo.

COLLINS R392 dream general coverage receiver; SASE for details. J. Salter K5BQA 11040 Creekmere Dallas TX 75218.

FOR SALE: Apache TX1 with TR switch, Hallicrafters SX111. Both for $160. WA1HCE, Meadowbrook Rd., Carlisle, Mass. 01741.

FOR SALE: Hallicrafter SX101 receiver in good condition $85. Will ship. Jack Koehne W4LUJ 1220 37th Ave NE., St.Petersburg Fla. 33704.

SELL: HT44 with PS-150-120 power supply, excellent condition $225, †15 teletype $25. Don Fox WB2OYF 10 Amy, Utica NY 13502.

SELL QSTs December 1915 to date; make offer. Old Call Books, catalogs, tubes. Write for list. W4KL 1243 Westridge Rd SW, Atlanta GA 30311.

HEATH HW12 75 meter ssb transceiver, with mobile bracket and mike. A1 condition only $55. Ray Zarling W8JXT 58 Putnam Place, Mariette Ohio 45750.

SELLING HT37 H200 mint condx. WB2HWH 18 Pitney, West Orange NJ. 201-731-1292.

SELL Collins 32S1 †395 with vox modification 516F2, 312B4 all single owner, to best offer over $425 FOB. Bornemann W5FV Rt.1, Box 168B, Lacombe La 70445.

SELLING: Factory recalibrated Collins 75A1 and realigned 32V2, Johnson Matchbox 250-23-3, Johnson heavy duty deluxe Roto (138-11) first reasonable offer accepted. Also selling custom built 1 kw, 4-250TH in final, 210s in modulator, beautifully metered, mounted in two racks, complete schematics, yours for a "song." Wanted: Collins 75S3B or 3C-32S-3 312B4 30L1 or 30S1, quote best price. John Bess, W2YIX Great River NY 11739.

COLLINS 75S3B (†S5237) and 312B3 speaker with only ten hours use, original cartons, manual, perfect $549. Also D104G stand mike $15, Vibroplex champion $10, and Tekrex 15M317 one year old beam $80. All excellent, FOB Newport News, Virginia 23602. W4UJT Larry Guenther 13441 Warwick Blvd.

FOR SALE: HamM rotor with indicator, factory rebuilt in factory sealed carton. Complete like new $85. E. A. Freikco W3EGM 555 Thayer Ave. Silver Spring Md 20910.

WANTED: Navy test bridge ZM-11/u. 500v power supply for command xmtr, with 12v fils. Geo. Leininger W8QZF 16412 Marquis Ave. Cleveland Ohio 44111.

SELL: Heathkit Apache, Lafayette HA350 and Johnson TR switch complete $200. Kurt Glogau WB2BLP 813 Orchard Rd. Vineland NJ 08360.

SELL: Lafayette HA350, excellent, with speaker $80. Heath DX40 $30. Gloger 3608 Berkeley Cleveland Ohio 44118.

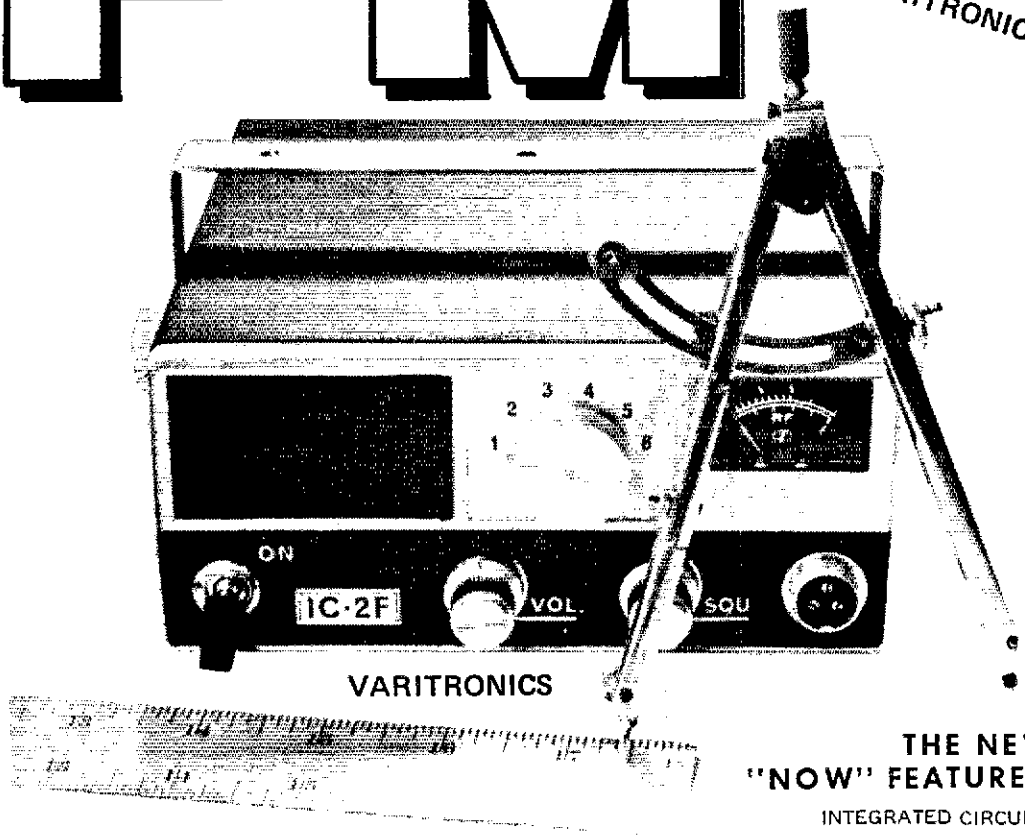
Index of Advertisers

FM

Harrison

LEADERS!

VARITRONICS



THE NEW "NOW" FEATURES:

INTEGRATED CIRCUITS

ALL SILICON transistors.

ELECTRONIC T/R SWITCHING

FET front end for low noise!

AUTOMATIC PROTECTION CIRCUIT

20 WATTS RF INPUT for 10 watts+ output.

Comes complete with microphone, three position chrome mobile mounting bracket, crystals installed for two channels (Ch. 1, 146.34 / 146.94; Ch. 2, 146.94 / 146.94,) power connector and plugs, and operation manual. TINY — 2¾"x 6¼" x 7¼".

AMATEUR NET $349.95

PROMPT ORDER DEPT.
We carefully pack and ship ham gear, accessories and parts to most any part of the world.
Address your orders to:
20 SMITH STREET
Farmingdale, N.Y. 11735
Please include ample postage (plus $1 handling cost with orders under $10.)
OR, PHONE YOUR ORDERS TO
(212) BA 7-7922 OR (516) 293-7990

Harrison

"HAM HEADQUARTERS, USA"®

NEW YORK CITY • 8 Barclay St. • BArclay 7-7922

JAMAICA, L. I.
139-20 Hillside Ave.
REpublic 9-4101

FARMINGDALE, L. I.
Route 110 at Smith St.
(516) 293-7990

Yaesu divulges the secret behind the incredible low price of the FTdx 560:

Made in Japan.

Japan is one of the few countries in the world with an ample supply of low-cost skilled workers who can do intricate, painstaking, precision work.

Like hand-wiring a transceiver. Meticulously.

To produce the Yaesu in the U.S., without cutting any corners or lowering quality standards, we would have to sell it for at least $800. And even at that price, the FTdx 560 would still be a good buy. Because Yaesu is quite likely the finest transceiver made anywhere in the world—at any price.

But since the Yaesu is made in Japan, we can sell it for $450. That includes everything but speaker, mike and antenna. So in the price, you get a year's warranty, power supply, WWV, calibrators, VOX and 560 watts PEP SSB or 500 watts CW.

We have an information packet we want to send you. It gives you the Yaesu story in general and the FTdx 560 story in particular. It includes an eye-opening comparison chart that shows you how the FTdx 560 stacks up against rigs you're more familiar with.

Please send me your free Yaesu FTdx 560 information packet:

Name _____

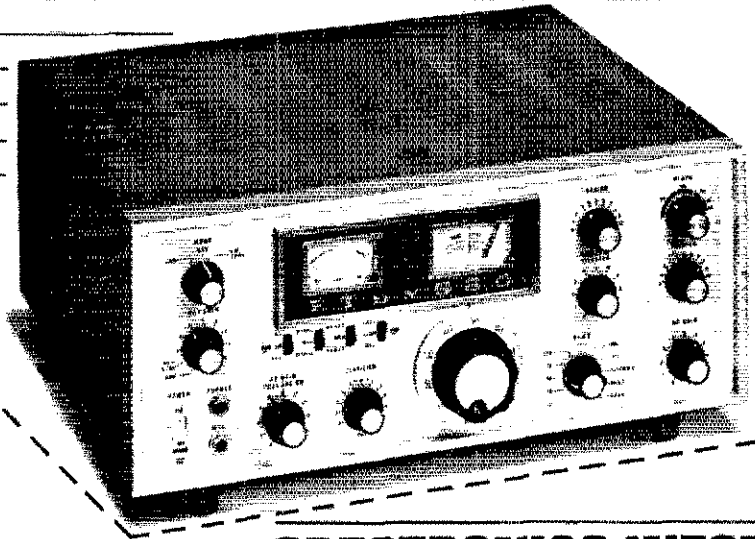
Street _____

City _____

State _____

Zip Code _____

Call _____



SPECTRONICS WEST

Box 338, Lakewood, Calif. 90714 / Telephone: (213) 421-6167

SPECTRONICS EAST

Box 1457, Stow, Ohio 44224 / Telephone: (216) 923-4567