February 1968
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amateur radio

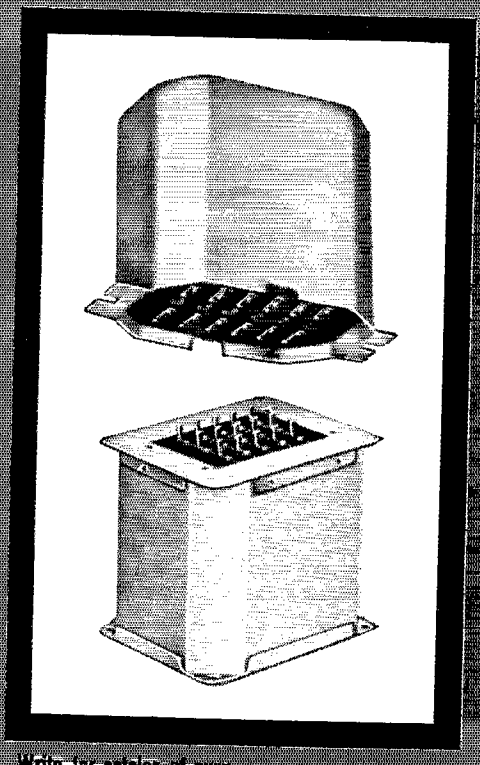
OFFICIAL JOURNAL OF THE ARRL

UTC PIONEERS IN MINIATURIZATION

"S" SERIES

AUDIO & POWER TRANSFORMERS & REACTORS

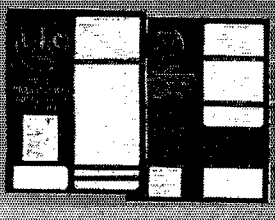
For Complete Ham Systems



Popular Priced
Matched Components
for
Power Supplies
Modulation
Pre-Amp &
Power Amplifiers
. . . for entire ham rigs

Thirty years of attention to ham requirements have resulted in a complete line of reliable, high quality components geared especially to your needs. The "S" series of audio and power transformers and reactors, designed specifically for ham and PA service, are completely matched for compatibility in constructing a rig. These are popular priced units which afford the ham the full benefits of UTC's established excellence for quality components coupled with high reliability.

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



UNITED TRANSFORMER CO. TRW

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

IN CANADA: A. C. SIMMONDS & SONS LTD., Agincourt, Ontario

10 reasons to buy Hallicrafters' new SR-400 Cyclone

FEATURE	Hallicrafters SR-400	Collins* KWM-2A	Drake* TR-4A
Power Input	SSB=400 watts CW=360 watts	SSB=175 watts CW=150 watts	SSB=300 watts CW=260 watts
Accessory "dual receive" VFO available	**Yes**	No	No
Noise Blanker	**Yes**	$135.00 Accessory	No
Receiver Incremental Tuning	**Yes**	No	No
Built-in notch Filter	**Yes**	No	No
Sharp CW Filter	**Yes** 200 cycles	No	No
Sensitivity	.3 uv for 10 db S/N	.5 uv for 10 db S/N	.5 uv for 10 db S/N
1 kHz dial readout	**Yes**	Yes	No
Carrier Suppression	60 db	50 db	50 db
Unit Price	**$799.95**	**$1,150.00**	**$599.95**

*Data from published specifications.

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

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

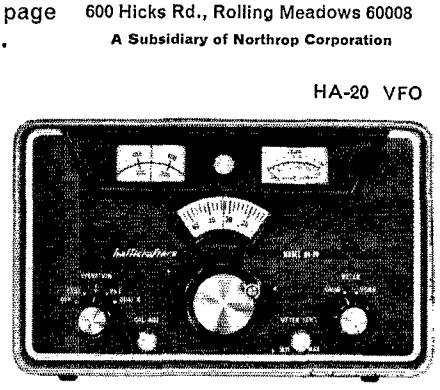
hallicrafters

600 Hicks Rd., Rolling Meadows 60008

A Subsidiary of Northrop Corporation

SR-400 Cyclone Transceiver

HA-20 VFO



Export: International Dept. *Canada:* Gould Sales Co.

Very Selective

In fact, the Collins 75S-3B Receiver now has the sharpest selectivity available in a ham receiver. Improved cross-modulation characteristics immunize it to nearby transmitters. CW DXers using the 75S-3B easily dig that one signal from a pileup. Mechanical filter options provide just the right degree of selectivity for operating conditions in SSB, CW, or RTTY. Have you tried the 75S-3B lately? See your Collins distributor.

COLLINS

QST

FEBRUARY 1968

VOLUME LII NUMBER 2

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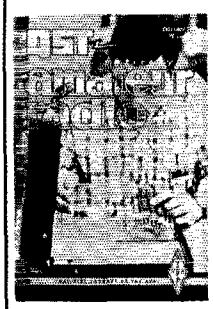


OUR COVER

Build your own RTTY Transmitter-distributor? Here's one that will fit into an Attaché Case. Integrated circuits make the compactness a reality. See page 29.

—CONTENTS—

SMALL PAIR BEATS A FULL HOUSE

One particular pair, **SB-34** sideband transceiver/exciter and **SB2-LA** gallon linear amplifier—are small enough to beat a full house. Or, for that matter, any no-room-for-passengers KW mobile installation.

Proof. Photograph shows **SB-34** and **SB2-LA** together as a complete 1KW, 4-band sideband station (including receiver of course) beating a full house handily. The two units placed end-to-end occupy less than 2 linear feet—just over 1 foot in depth, less than 6 inches high!

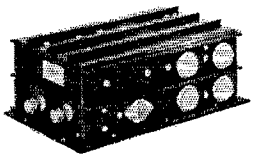
But SBE didn't set out to produce a miniature transceiver at the expense of undue component crowding—transistors and diodes aided by advanced bilateral circuits did it with room to spare.

SB-34 specifically, is advanced equipment—predominantly solid-state—in pace with the trend toward elimination of all tubes in a host of electronic gear. The SB-34 SSB transceiver costs only 395.00 (**with** 12V DC and 117V AC built-in power supply) and uses 23 transistors, 18 diodes, a zener, a varactor—and only 3 tubes!

Highlights: SB-34: 4-bands: 3775-4025 kc, 7050-7300 kc, 14.1-14.35 mc, 21.2-21.45 mc. • 135W p.e.p. input (slightly lower on 15) • Built-in dual 117V AC/12V DC supply (negative ground) • Collins mechanical filter • Panel selectable USB-LSB • 11¼"W, 10"D, 5"H. Weight: 19 lbs.

SB2-LA: 80-40-20-15 meters • Input SSB: 1KW p.e.p. AM: 300W. CW-FM-FSK: 400W. • Built-in 117V AC power supply • 12"W, 12½"D, 5¾"H. Weight: 40 lbs.

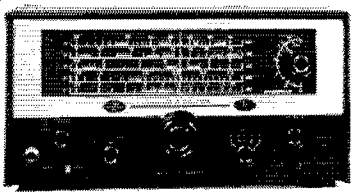
MODEL SB3-DCP INVERTER
Heavy-duty transistorized inverter for mobile operation of SB2-LA linear amplifier at 1KW input. Input 12-15V DC, negative ground. Output @ 13.5V DC input, 150 volts AC peak square wave at 250 cycles. 6"W, 12"D, 3¾"H. Weight: 17 lbs.



Write for new brochure describing SBE line.

RAYTHEON COMPANY
213 East Grand Avenue, South San Francisco, California 94080

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



MODEL R-5 ALLWAVE RECEIVER

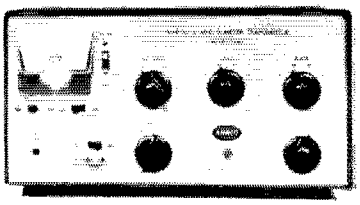
An exceptionally fine receiver for the short wave listener and beginning amateur operator. Fully transistorized—solid state. Covers .54 through 54.0 Mc in five continuous bands. Includes standard broadcast band, all foreign broadcast bands, all amateur bands from 160 through 6 meters, all 27 Mc CB Channels, all 2-way radio frequencies from 30 to 50 Mc including many police and fire departments. Controls include Variable Beat Frequency Oscillator, Noise Limiter, Bandspread. Compare with tube-type units costing as much!

Kit **$64.95**
Wired and tested **79.95**

VFO-621

VFO for 6, 2 and 1 1/4 meters. Transistorized oscillator plus built-in zener diode regulated power supply gives highest stability. Ideal match for TX-62 and other VHF transmitters.

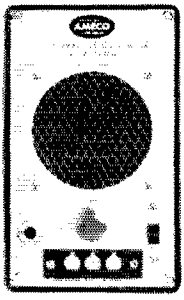
Wired and tested **$59.95**



TX-62 TRANSMITTER

In response to the demand for an inexpensive, compact VHF transmitter, Ameco has brought out its 2 and 6 meter transmitter. There's no other transmitter like it on the market. 75 watts input, phone and CW. Built-in solid state power supply. Broadbanded circuits make tuning easy. Uses inexpensive crystals or external VFO.

Wired and tested **$149.95**



MODEL OM

CODE PRACTICE OSCILLATOR AND MONITOR

A combination code practice oscillator and CW Monitor. No connection to transmitter required. Transistorized. Has built-in speaker, tone control and headphone jack.

Model OMK, Kit (less batteries) ..... **$ 9.95**
Model OM, wired and tested, (less batteries) **$15.20**

Similar unit, but without CW RF Monitor Feature.

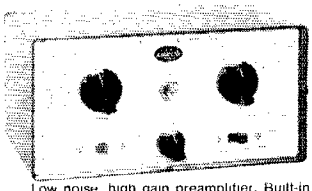
Model OCPK, Kit (less batteries) ..... **$ 7.95**
Model OCP, wired and tested, (less batteries) **$10.50**

AMECO

COMPLETE HAM RIGS

Receivers, transmitters, VFO, Pre-amplifiers, converters, code practice oscillators, code records, theory and license books.

160 THRU 6 METER TRANSCEIVER PRE-AMP



MODEL PT

Low noise, high gain preamplifier. Built-in power supply. Interconnecting cables included. Station power control center—one switch controls everything. Automatic changeover, transmit to receive. Feeds and mutes second receiver.

Wired and tested **$49.95**

PASS NEW ADVANCED AND EXTRA CLASS LICENSE EXAMS WITH NEW AMECO LICENSE GUIDES

New Ameco License Guides contain simple, detailed, easy-to-understand answers for FCC study questions, plus a sample FCC-type exam, using multiple choice questions.

Advanced Class Guide #16-01 (32 pages)..... 50¢
Extra Class Guide #17-01 (48 pages)..... 75¢

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Information included in new catalog.

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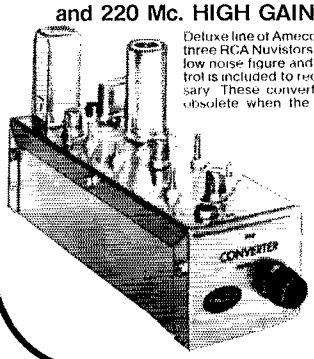
Write for name of your local Ameco dealer and free catalog

NUVISTOR CONVERTERS FOR 50, 144 and 220 Mc. HIGH GAIN, LOW NOISE



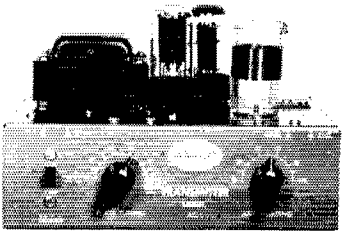
Deluxe line of Ameco VHF Converters uses three RCA Nuvistors to obtain an extremely low noise figure and high gain. A gain control is included to reduce the gain if necessary. These converters do NOT become obsolete when the receiver is changed.

Model CN-50W, CN-144W or CN220W wired, (specify IF)... $49.95

Model CN-50K, CN-144K or CN-220K in kit form, (specify IF) $34.95

PS-1 Power Supply, Wired and tested... $12.50

NOVICE TRANSMITTER KIT



MODEL AC-1

Ideal kit for the beginner who requires a reliable TVI-suppressed transmitter. Keying is clean and chirp-free. Kit is simple to build and easy to operate. Crystal Controlled, Pi-network Output. Includes AC Power Supply. For 40 and 80 meters CW. 15 Watts input.

Kit with coil for any 1 band, including tubes. **$21.95**
Extra coil kit for any 1 band, CK-1 ..... **$ 1.00**

Section Communications Managers of the ARRL Communications Department

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

ATLANTIC DIVISION				
Delaware	K3NYG	John L. Penrod	RFD 1	Townsend 19734
Eastern Pennsylvania	W3ELI	George S. Van Dyke, Jr.	4607 Convent Lane	Philadelphia 19114
Maryland D. C.	K3JYZ	Carl E. Andersen	14601 Claude Lane	Silver Spring, Md. 20904
Southern New Jersey	W2ZI	Edward G. Raser	19 Blackwood Drive	Wilburta Gardens, Trenton 08628
Western New York	K2HUK	Charles T. Hansen	Warner Gulf Rd.	Holland 14080
Western Pennsylvania	W3NEM	Robert E. Gawryla	1463 N. Allen St.	State College 16801
CENTRAL DIVISION				
Illinois	W9PRN	Edmond A. Metzger	1520 South 4th St.	Springfield 62703
Indiana	W9BUQ	William C. Johnson,	2838 Hillside Ave.,	Indianapolis 46218
Wisconsin	K9GSC	Kenneth A. Ebneter	822 Wauona Trail	Portage 53901
DAKOTA DIVISION				
Minnesota	WØTCK	Herman R. Kopischke, Jr.	RFD 2	Janesville 56048
North Dakota	WØDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58201
South Dakota	KØFXW	Seward P. Holt	Box 58	Clear Lake 57226
DELTA DIVISION				
Arkansas	W5DTR	Curtis R. Williams	10508 West 12th St.	Little Rock 72205
Louisiana	W5PM	J. Allen Swanson, Jr.	RFD 1, Box 354-E	Covington 70433
Mississippi	W5EMM	S. H. Hairston	1511-36th Ave.	Meridian 39301
Tennessee	K1RCT	Harry A. Phillips	5200 Oak Meadow Ave.	Memphis 38128
GREAT LAKES DIVISION				
Kentucky	WA4KFO	Lawrence F. Jeffrey	1605 Antler Ave.	Owensboro 42301
Michigan	W8FX	Ralph P. Thetreau	27209 W. Six Mile Road	Detroit 48240
Ohio	W8AL	Wilson E. Weckel	1317 Logan Ave., N.W.	Canton 44703
HUDSON DIVISION				
Eastern New York	W2EFU	George W. Tracy	1138 North Country Club Drive	Schenectady 12309
N. Y. C. & Long Island	K2IDB	Blaine S. Johnson	266 Cypress St.	Massapequa Park, L. I. 11762
Northern New Jersey	W2LQP	Louis J. Amoroso	180 Pleasant Ave	Bergenfield 07621
MIDWEST DIVISION				
Iowa	WØBDZ	Owen G. Hill	RFD	Gilman 50106
Kansas	KØBXF	Robert M. Summers	3045 North 72nd	Bethel 66009
Missouri	WØTPK	Alfred E. Schwaneke	Edgar Star Rte.	Rolla 65401
Nebraska*	KØOAL	V. A. Cashon,	334 Pine St., Box 488	Chadron 69337
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Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02185
Maine	K1DYG	Herbert A. Davis	RFD 1	Franklin 04634
New Hampshire W1SWX/K1DSA		Robert Mitchell	Box 137-A, RFD	Chester 03036
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	E. Reginald Murray	3 Hillcrest Drive	Montpelier 05601
Western Massachusetts	W1STR	Norman P. Forest	36 Valley Rd.	Springfield 01119
NORTHWESTERN DIVISION				
Alaska*	KL7AEQ	Albert F. Weber	Box 735	College 99735
Idaho	W7ZNN	Donald A. Crisp	3408-8th St. F	Lewiston 83501
Montana	W7TYN	Joseph A. D'Arcy	1916 Haggin Ave.	Anaconda 59711
Oregon	K7WWR	Dale T. Justice	2741 Firwood Lane	Forest Grove 97116
Washington	K7JHA	William R. Watson	1005 E. 1st Ave.	Ellensburg 98926
PACIFIC DIVISION				
East Bay	K6LRN	Richard Wilson	107 Cordova Way	Concord 94521
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Nevada	W7PBV	Leonard M. Norman	652 Utah St.	Boulder City 89005
Sacramento Valley	WA6JDT	John F. Minke, III	6230 Rio Bonito Drive	Carmichael 95608
San Francisco	WA6AUD	Hugh Cassidy	77 Coleman Drive	San Rafael 94901
San Joaquin Valley	W6JPU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno 93702
Santa Clara Valley	W6ZRJ	Jean A. Gmelin	10835 Willowbrook Way	Cupertino 95014
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South Carolina	K4LNJ	Clark M. Hubbard	124 Fant Lane	Union 29379
Virginia	W4SHJ	H. J. Hopkins	8600 Hammett Ave.	Norfolk 23503
West Virginia	W8JMI	Donald B. Morris	1136 Morningstar Lane	Fairmont 26554
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Colorado	KØFDH	Richard Hoppe	Star Route	Idaho Springs 80452
New Mexico	W5WZK	Kenneth D. Mills	Rt. 1, Box 654 F	Albuquerque 87102
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Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave	Casper 82601
SOUTHEASTERN DIVISION				
Alabama	K4WHW	Edward L. Stone	1806 Spring Ave., S.W.	Decatur 35601
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Eastern Florida	W4MVB	Jesse H. Morris	P.O. Box 1241	Jacksonville Beach 32050
Georgia	W4RZL	Howard L. Schonher	P.O. Box 1902	Columbus 31902
West Indies (P.R.-V.I.)	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073	Caparra Heights San Juan, P.R 00922.
Western Florida	W4RKH	Frank M. Butler, Jr.	323 Elliott Rd., S.E.	Fort Walton Beach 32548
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Los Angeles	K6UMV	Donald R. Etheredge	12040 Redbank St.	Sun Valley 91352
Orange	W6DEY	Roy R. Maxson	1434 South Olive St.	Santa Ana 92707
San Diego	WB6GMM	James E. Emerson, Jr.	6561 Foyle Way	San Diego 92117
Santa Barbara	WA6OKN	Cecil D. Hinson	1933 Coventry Court	Thousand Oaks, 91360
WEST GULF DIVISION				
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Oklahoma	W5PML	Cecil C. Cash,	1802 Smith Ave.,	Lawton 73501
Southern Texas	W5AIR	G. D. Jerry Sears	5634 Eskridge St.	Houston 77023
CANADIAN DIVISION				
Alberta	VE6TG	Harry Harrold	1834-5th Ave., N.	Lethbridge, Alta.
British Columbia	VE7FB	H. E. Savage	4553 West 12th Ave.	Vancouver 8, B. C.
Manitoba	VE4JT	John Thomas Stacey	19 Cottonwood Cres.	Brandon
Maritime	VE1MX	J. Harley Grimmer	40½ Rosedale Ave.	Fairview, Halifax Co., N. S.
Ontario	VE3BUX	Roy A. White,	5 Northwood Crescent,	Belleville
Quebec	VE2OJ	Jim Ibey	209 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

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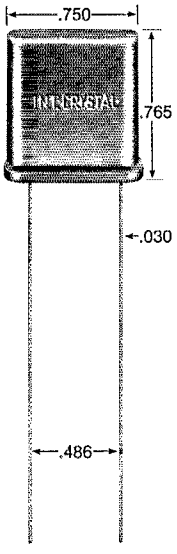
INTERNATIONAL PRECISION RADIO CRYSTALS

70 KHz to 160 MHz

HOLDER TYPES



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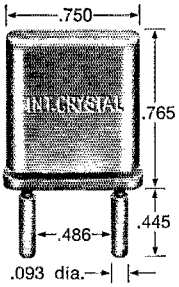

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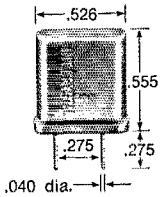
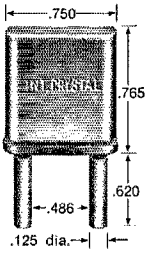


FI-4



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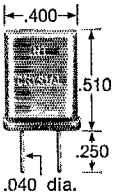

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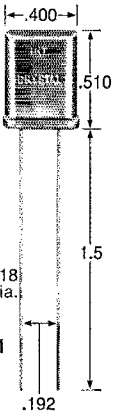
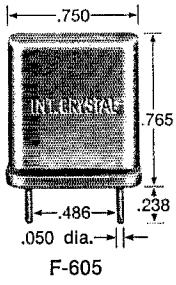
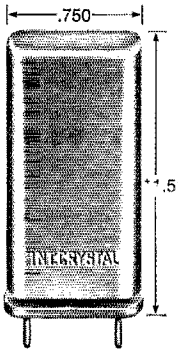


FM-1

International
Crystal Manufacturing Co., Inc.
guarantees
every crystal against defective materials
and workmanship for an *unlimited time*, when used in equipment for
which they were specifically
made.



F-605



F-13

Crystal Types:
(GP) for "General Purpose" applications
(CS) for "Commercial" equipment
(HA) for "High Accuracy" close temperature tolerance requirements

International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders.

Crystals for use in military equipment can be supplied to meet specifications MIL-C-3098C

WRITE FOR COMPLETE CATALOG.

INTERNATIONAL

CRYSTAL MFG. CO., INC.

10 NO. LEE • OKLA. CITY, OKLA. 73102

THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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"It Seems to Us..."

First of a series:

WHAT *IS* THE AMERICAN RADIO RELAY LEAGUE?

Who needs ARRL?

Amateur radio is unique in that it is predicated on international agreements, administered in the U.S. by the Federal Communications Commission and in Canada by the Department of Transport. These agencies exercise absolute control over amateurs by means of their licensing power and frequency allocation authority.

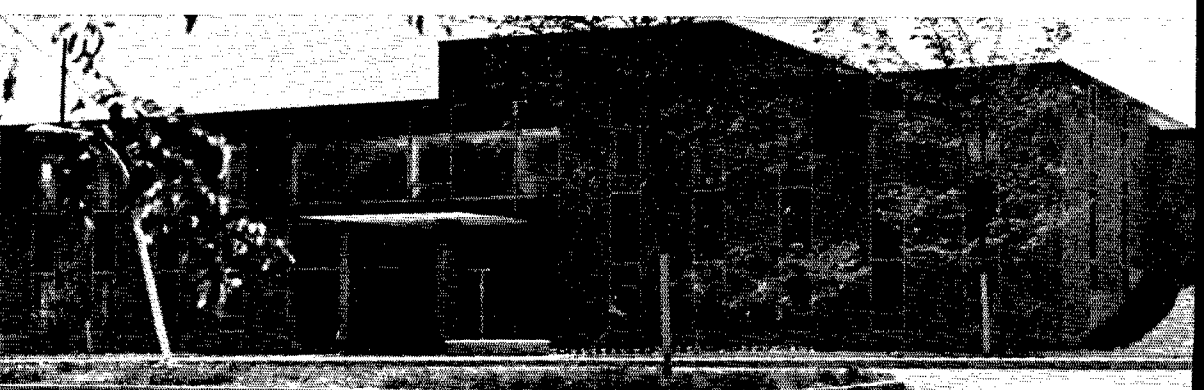
Amateurs have recognized from the very beginning an extraordinary need for an organized voice at the national and international levels. For more than fifty years they have maintained that voice through their elected ARRL Board of Directors and a headquarters staff who now manage an annual budget well in excess of a million dollars in their behalf.

The FCC says, and has always said, that frequencies are allocated to amateur use because the existence of this body of skilled operators, this source of technical development, and this vast channel for emergency communications, are in the public interest.

As amateurs know only too well, world-wide pressure for access to segments of the all-too-limited frequency spectrum is constantly increasing. And nowhere is it written that amateurs have a holy right to any particular bands or frequencies. Thus the preservation of amateur access to the bands has been, and is, a primary reason why all amateurs need ARRL.

In point of fact, it is the public service aspect of amateur radio that makes it such an exceptionally rewarding hobby. Amateurs have a unique opportunity to play a vital international role and to be involved in important activities at many quasi-official and private levels. The amateur operator possesses knowledge and skills that are admired and envied publicly and respected in the highest government circles.

Amateur radio is all this — and the never-ending personal thrill of those almost mystic contacts with others of a special fraternity everywhere, beyond the boundaries of language, politics and geography. QST



VE3DJK's Christmas Greeting to W1AW via RTTY used the printer bell to play the rhythms of not only Jingle Bells and Joy to the World, but also Rudolph the Red-Nosed Reindeer. No wonder W1WPR's ears rang for two days following.

Sorry if you've had difficulty getting one of the new License Manuals--distributors report first-day sellouts of initial orders, and we're humping to keep the pipelines filled.

You may have to look twice also for the 1968 Handbook when it appears early in February. It'll be there on distributors' shelves, but its cover design is brand-new to match the extensive revision on which W1CER has worked so hard this past year. Early in the press run we'll reach a total of 4,000,000 copies since "Handy's Handy Handbook" first appeared in 1926--so far as we know still the all-time record for any technical publication.

Publications seem our theme this month--a revised (by W1YDS) Mobile Manual will soon be going to press, and W1HDQ is putting in extra hours to complete a new edition of the VHF Manual--which gives a rough idea of the advance effort and time involved since the book won't appear until around May.

Speaking of VHF, we bang the drum again for more use of this area in short-distance contacts. Nothing is more wasteful of spectrum, nor a blacker eye for amateur radio's technical image, than cross-town ragchews on 20 meters Sunday mornings (or any other time). Power? It seems inherent in our makeup to boast of getting a "40 over 9" signal report when actually we should be ashamed in the knowledge that reduced power for an S8 signal would maintain adequate communication and relieve QRM for others. Let's use this precious space more intelligently!

Decisions, decisions--whether we 25-year Extra Class types should apply for 2-letter calls under the new rules. FCC has plenty of such applications, but W2ALS says he's forming a club of those eligible but preferring to stick to long-held 3-letter calls out of sentiment.

A letter from WØIYP in Correspondence this issue is one of many saying a visit to Hq. dispels any concept that 225 Main Street, Newington, is an impersonal, isolated ivory tower--but rather houses a group of hard-working (ahem!) and dedicated "just plain folks." Responsive to repeated suggestions, we this month (page 73) commence a series which will cover both individuals at Hq. and members of your Board of Directors. We hope you'll get to know us better.

Here's a low-cost transistorized receiver that almost anyone with basic electronics savvy should be able to build and get operating. The heart of the package is an 8-transistor broadcast-band receiver. The head end of the SSS 80-40 uses an FET mixer and a bipolar transistor oscillator. Another bipolar transistor is used as a 455-kc. b.f.o. This receiver can be used at home, in the mobile, or for portable/emergency operation.

The SSS 80-40

A Simple Solid-State Receiver

for "80" and "40"

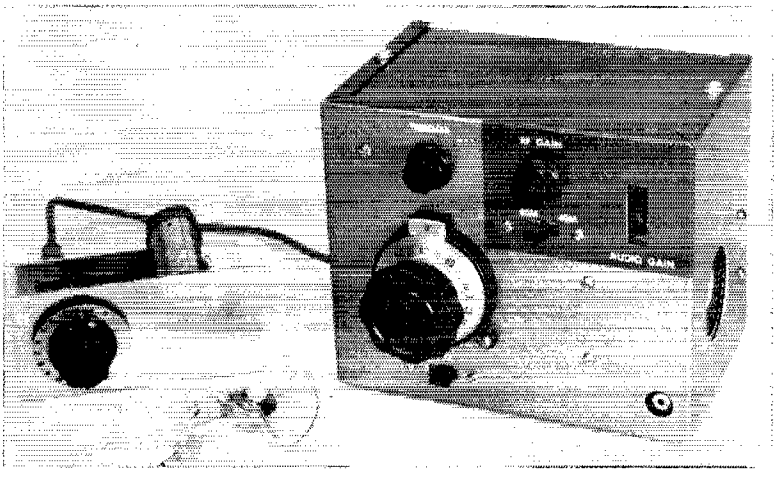
BY DOUG DeMAW,* W1CER

A PRACTICAL approach to small-receiver construction — especially where low cost is important to the builder — is the use of standard transistorized broadcast-band receiver of the "shirt-pocket" variety as the main part of the circuit. Most bargain-house 6- or 8-transistor radios cost under $10 and can be used as the i.f. and audio portions of a battery-operated ham-band receiver. Normally, these little radios have excellent sensitivity and fair-to-middlin' selectivity. If a simple home-built converter is added ahead of one of them, a low-cost double-conversion ham receiver can be realized with but a modest amount of workshop effort. If a b.f.o. is included in the package it becomes possible to receive c.w. and s.s.b. signals equally as well as with some medium-priced commercial receivers. This receiver is suitable for most non-stringent applications and makes a good companion unit for the simple transistorized c.w. transmitter described in an earlier issue of *QST*.[1]

Only a few circuit alterations are required to get the broadcast set ready for the circuit of Fig. 1. Most pocket-size transistor radios follow one basic design. It was learned while checking out six such receivers — each of different manufacture — that the circuits were similar enough to permit easy modification while following the instructions given in this article. Most imported receivers have a schematic diagram pasted inside the back cover. It would be prudent of the prospective buyer to check the diagram for similarity to that shown in Fig. 3. If the two are reasonably alike, modification should offer no significant problems. The little receiver used in this project was purchased from Radio Shack

* Assistant Technical Editor

1 "A Transistor 5-Watter For 80 And 40," *QST*, June 1967.



View of the completed receiver. A large knob has been added to the main-tuning vernier to provide a smoother "feel" All controls are accessible from the front panel of the case. The b.f.o. switch is directly under the main tuning control. A 4X5X6-inch aluminum Minibox is used as a cabinet. To the left of the receiver is a small antenna coupler that can be used to secure added "front-end" selectivity for the receiver. It is also useful for tuning short lengths of antenna wire to resonance. An 8-ohm earphone unit is shown in the foreground and can be plugged into the phone jack when speaker operation is not desired.

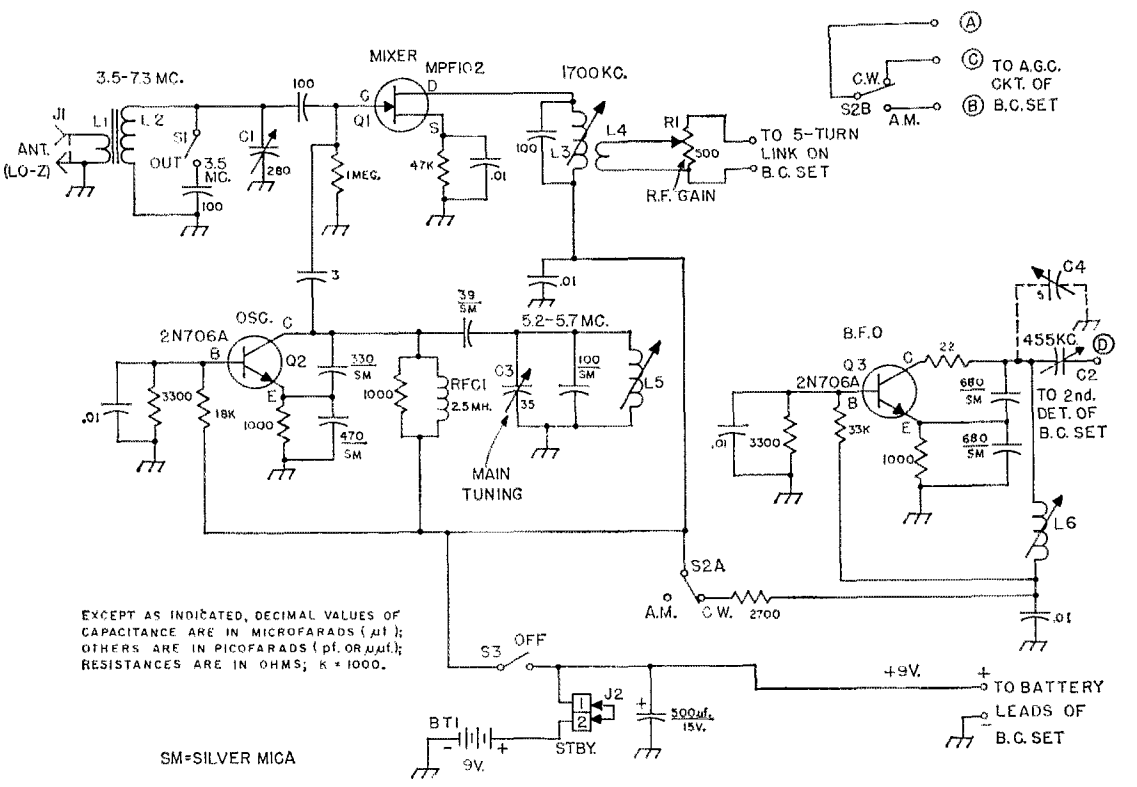


Fig. 1—Circuit of the converter and b.f.o. sections of the SSS 80-40. Capacitors with polarity marking are electrolytic, others are disk ceramic unless otherwise noted. Resistors are ½ watt composition.

BT_1—Six 1½-volt penlight cells, series connected to give 9 volts.

C_1—280-pf. padder with ¼-inch diameter shaft soldered to screw head (modified J. W. Miller 160-E padder). Miniature 365-pf. broadcast-type variable also usable.

C_2—Gimmick capacitor (see text).

C_3—35-pf. miniature variable (Hammarlund MAC-35B suitable).

C_4—Optional 5-pf. variable (see text).

J_1—Phono connector or similar.

J_2—Two-terminal connector (Millen E-302 or similar).

L_1— 5 turns insulated hookup wire over L_2. (Over ground end of L_2 if Miniductor stock is used.)

L_2—48 turns No. 22 tinned solid wire, ½-inch dia., spaced one wire thickness between turns. Full 2-in. section of Polycoils 1731 coil stock (6.8-µh.). If toroidal inductor is used, use 16 turns of No. 24 enam. wire wound on Indiana General CF-111 core (Q1 material), 14 turns No. 16 enam. wire on CF-114 core (Q1 material), or 30 turns No. 36 wire on CF-101 core (Q1 material) if subminiature inductor is desired.[2] When using a toroid inductor, wind L_1 to have 20 percent of turns used for L_2.

L_3—60 to 120-µh. slug-tuned inductor (J. W. Miller 4511 suitable). Ferrite broadcast-band loopstick also usable, but somewhat larger.

L_4—5-turn link of small-dia. insulated wire wound over one end of L_3.

L_5—3.6 to 8.50-µh. slug-tuned inductor. (J. W. Miller 42A686CBI used here.)

L_6—320- to 500-µh. slug-tuned inductor. (J. W. Miller 4514 or equal.)

Q_1-Q_3, inc. For text reference.

R_1—500-ohm linear-taper carbon control with switch.

RFC_1—2.5-Mh. miniature choke (J. W. Miller 70F253A1 suitable).

S_1—S.p.s.t. slide switch.

S_2—D.p.d.t. slide switch.

S_3—S.p.s.t. switch (part of R_1 assembly).

Corporation for approximately $7. It is an eight-transistor model and is sold as item 12-644.

The main considerations when selecting a receiver are its sensitivity, selectivity, and audio quality. By trying several models of 6- or 8-transistor radios it should be possible to come up with one that meets the basic requirements — good audio quality, good sensitivity on weak signals, and the ability to separate strong adjacent-frequency signals. It is best to choose a set which is so arranged as to make the on-off/audio-gain control, the headphone jack, and the speaker accessible to the operator once it is mounted in the main cabinet. Many layout

[2] Toroid forms listed in Fig. 1 are available from Termag Corp., 88-06 Van Wyck Expwy., Jamaica, N. Y. 11418. CF-101 core costs $1.10, CF-111 is $2.05, and CF-114 costs $2.20. Include postage with order.

schemes are possible as far as the finished product is concerned, and the builder will want to tailor his model to match up with the broadcast set he buys. If new components are used throughout, the cost of the SSS 80–40 should not exceed approximately $30. By using junk-box parts it should be possible to shave the cost by a considerable amount.

Circuit Information

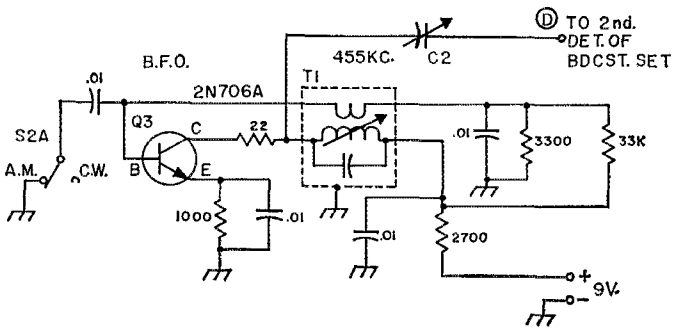
A high-Q input tuned circuit, C_1 and L_2 of Fig. 1, is used in this receiver. It is possible to tune both the 80- and 40-meter bands without changing coils. For 3.5-Mc. operation, a 100-pf. capacitor is placed in parallel with C_1 by means of S_1. L_1 and L_2 are wound on a common toroid core in the model described here. A toroidal-wound inductor was used because of its compactness and because it provides a high-Q input circuit which is helpful in rejecting unwanted signals (images) from outside the desired tuning range. Alternatively, a suitable length of Miniductor coil stock can be used at L_2 and will provide acceptable front-end selectivity. The unloaded Q of the toroidal inductor measured 475 on both bands. The Miniductor stock provided an unloaded Q of 225 — still enough to be practical. The higher the Q, the better will be the image rejection.

A JFET mixer, Q_1 (Motorola MPF102), is tuned to the incoming signal frequency by means of C_1. A field-effect transistor was selected for this part of the circuit in the interest of good immunity to cross-modulation and overloading of the input stage. The mixer's output tuned circuit is resonant at 1700 kc., the 1st i.f. of the receiver. L_4, the output link from the mixer, is connected to a 500-ohm control, R_1, which is used to regulate the r.f. gain of the composite receiver.

A local-oscillator frequency range of 5.2 to 5.8 Mc. is used for both bands. The oscillator operates *above* the incoming signal during 80-meter reception, and falls *below* the signal frequency on the 40-meter band. This technique is an old one, but is still desirable for use in simple circuits where only one oscillator tuning range is wanted. It results in an i.f. of 1700 kc. when receiving in the 80- and 40-meter bands. This receiver tunes from approximately 3.5 to 4.1 Mc., and from 6.9 to 7.5 Mc. An undesirable aspect of this arrangement is that the bandspread is considerably less for 40-meter tuning than it is on the lower band. Some compensation can be realized because CHU is in the tuning range (7335 kc.), and is the Canadian equivalent to our WWV — handy for time checks when afield.

A 2N706A is used for the tunable oscillator, Q_2. Other transistors can be used in the circuit and will provide comparable results. If substitute types are contemplated, select an n.p.n. unit whose beta is 30 or better, and whose upper frequency limit (f_T) is rated at 10 Mc. or higher. A 2N2925 proved to be a good substitute and worked nicely at Q_2 without the need for circuit changes. A high-C circuit was selected for the local oscillator so that good frequency stability would result over a wide range of operating conditions.

A second 2N706A is used at Q_3, the 455-kc. b.f.o. Other transistor types can be used in this circuit too, following the rules set forth in the foregoing text. The circuit of Fig. 1 is stable and is easy to adjust. An alternate b.f.o. circuit is given in Fig. 2. Both types were tried, both giving satisfactory results. The alternate circuit costs less to build, especially if an old transistor radio is handy for the "burgling" of T_1, a single-tuned 455-kc. i.f. transformer. Also, the circuit of Fig. 2 does not use silver-mica capacitors, thus paring the cost somewhat. We seldom get something for nothing, however, and this is true of the alternate "cheapie" circuit of Fig. 2. Because T_1 is a low-C tuned circuit, the oscillator is rich in harmonics — a somewhat undesirable condition. Also, if the b.f.o. is activated by means of turning its operating voltage on with S_{2A}, the change in transistor junction capacitance, as Q_3 reaches normal operating conditions, causes the b.f.o. to "creep" for approximately 30 seconds. For this reason, S_{2A} is used to place a 0.01-μf. capacitor across the feedback winding of T_1, stopping oscillation during a.m. reception. The collector voltage is always applied to Q_3, helping to maintain a constant junction capaci-



ALTERNATE B.F.O. CKT.

Fig. 2—Circuit of the alternate b.f.o. Component designators are the same as those listed in Fig. 1. T_1 is a single-tuned 455-kc. subminiature i.f. transformer. (J. W. Miller 8810 suitable, or i.f. transformer from junked transistor radio. Use low-resistance winding for secondary.)

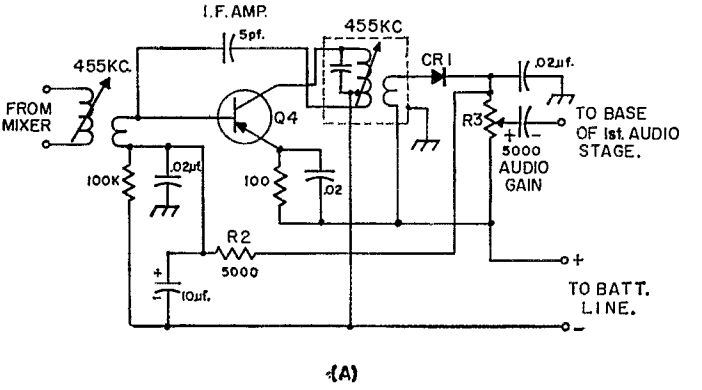
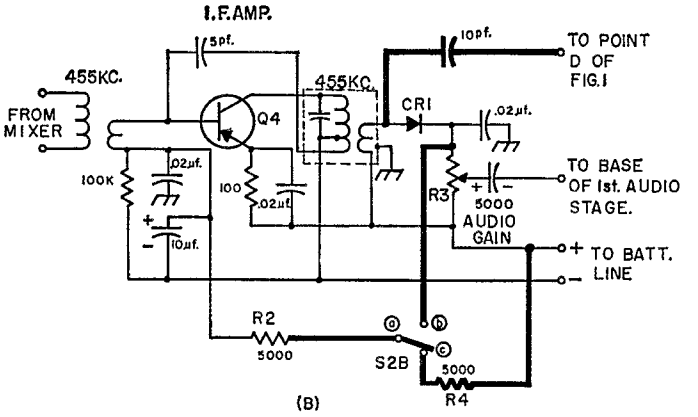


Fig. 3—Typical i.f. amplifier and second-detector hookup found in most transistor broadcast radios is shown at A. The heavy lines in the diagram at B indicate circuit changes which permit c.w. and s.s.b. reception. B.f.o. injection from Q_3 of Figs. 1 and 2 is fed into the circuit at CR_1. S_{2B} turns the a.g.c. on and off. R_4 was added to supply the 5000-ohm value provided by R_3, assuring that the bias network for Q_4 maintains a 10,000-ohm value whether S_{2B} is set for a.m. or c.w. Resistance in ohms. K = 1000.



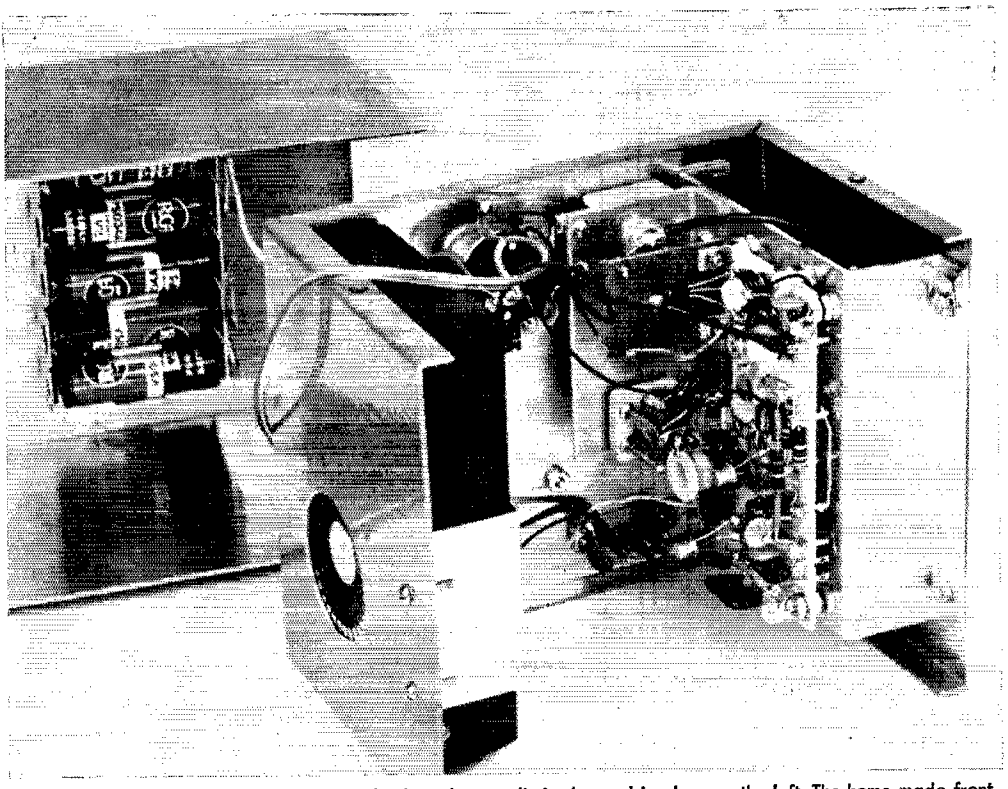
tance because of the steady flow of current through the transistor. Although the alternate circuit has these limitations, it should not be overlooked by the cost-conscious builder. A 22-ohm resistor is used in the collector lead of the b.f.o. This measure was necessary to stop parasitic oscillations, a frequent ailment of transistorized oscillators.

In the circuit of Fig. 1, C_2 is a "gimmick" capacitor consisting of a piece of insulated hookup wire wrapped around either lead of the 22-ohm parasitic resistor. The amount of coupling will depend upon the injection level needed by the broadcast receiver for c.w. reception. This adjustment is discussed later. A 5-pf. variable capacitor, C_4, is shown in dashed lines. It is offered as a circuit "option" for those who wish to tune the b.f.o. to either side of the i.f. passband. If s.s.b. reception is desired on *both* bands, C_4 should be added. Without it, the b.f.o. can be set for lower-sideband reception on one band only. This results from the local oscillator signal being above the incoming signal on one band, and below it on the other band. C_4 would permit the b.f.o. to be shifted to the proper side of the passband for s.s.b. reception on either band. If c.w. and a.m. reception will be the only modes used, C_4 need not be added. Switch S_{2A} turns the b.f.o. on and off. S_{2B}, the remaining section of the switch, is used to disengage the a.g.c. circuit of the broadcast set during c.w. reception. More on that later.

Modifying the Broadcast Receiver

Here's where a little bit of dexterity and imagination will be helpful. As stated earlier, most pocket radios have similar circuits. Some, however, may have an extra resistor or capacitor thrown in for good measure and will not be exactly like the model shown in Fig. 3. Some sets may use a.g.c. voltage on more than one stage —still no problem as far as conversion goes. The main object is to locate the diode detector, CR_1, and trace out the circuit to which it connects. After doing this, the a.g.c. line can be located and the changes indicated in Fig. 3B can be made. It is necessary to add the switch, S_{2B} after the bias resistor, R_2, thus assuring that a value of 10,000 ohms (R_2 plus R_3) remains in the bias circuit of Q_4 during normal operation, the *b* position of S_{2B}. When the a.g.c. voltage is removed from the a.g.c. line by placing S_{2B} in the *c* (c.w.) position, R_4 is connected in series with R_2 to provide the normal 10,000-ohm bias-resistance value. R_4 is a resistor which must be added to the circuit. Some sets may have different values of resistance than those shown in Fig. 3A. If so, R_4 should be selected accordingly.

In Fig. 3B a 10-pf. capacitor has been connected to the anode lead of CR_1. This is the point at which the 455-kc. b.f.o. signal is injected (from terminal *D* of Fig. 1 or Fig. 2). The capacitor is anchored to a flea clip which has been added to the receiver's circuit board. Flea clips were also used as tie points for terminals *a*, *b*, and *c* of Fig. 3B. A 5-turn winding of No. 24 enamel wire is wound over the receiver's built-



An interior view of the solid-state receiver. The broadcast radio is clamped in place on the left. The home-made front-end assembly, including the b.f.o., is built on a piece of perforated board which is mounted on a small aluminum subchassis (far right). Six penlite cells are used to power the receiver and can be seen in their holders on the inside surface of the box cover.

in ferrite-bar antenna. It connects to R_1 of Fig. 1. The larger the pocket radio, the more room there will be on its circuit board for the additions. For this reason the writer picked a receiver that was slightly larger than the run-of-the-mill pocket radios. The leads that connect to the modified circuit can be brought out of the plastic case through small holes drilled in the back cover, near the spot where the wires join the circuit board. The leads can then be routed to the converter chassis and soldered to the proper terminals there. Extensions should be added to the battery leads of the broadcast set, enabling the latter to reach the terminals of the new battery pack, BT_1.

Construction Notes

Although the model described in this article is housed in a 4 × 5 × 6-inch aluminum Minibox, there is no reason why a larger cabinet — or smaller one if you're a first-class packaging engineer — cannot be used. The exact layout details are not given here and are relatively unimportant as far as good performance is concerned. Layout will be governed by the type of broadcast set used, by the cabinet dimensions, and by the size of the dial mechanism employed for main tuning. It would be wise to point out here that the Japanese vernier drive shown in the photos is a very poor choice if smooth tuning is desired. Most of these drive units cannot stand much torque and will slip when used with a "stiff" tuning capacitor. A better choice would be a Jackson Brothers 4489 scale ball drive[3] or a National AM (3-inch diameter) vernier drive. If a calibrated dial scale is desired, a Millen midget panel dial, type 10039, will do the job in good style.[4] It should go without saying that smooth tuning is also dependent upon the quality of the variable capacitor used. A Hammarlund MAC-35B is shown here, but is a pretty tight-turning unit. It was chosen for its compactness and will hold its setting nicely, even when the receiver is dropped. A smooth-running double-bearing tuning capacitor such as the Millen 190353 can be used if added cost and size aren't objectionable. The Japanese vernier drive has a considerable amount of backlash too — another reason why it is not recommended.

The "front end" and b.f.o. are assembled on a small piece of perforated circuit board. Push-in flea clips are used as tie points for the various components. Point-to-point wiring is used be-

[3] Available from Arrow Electronics, Inc., Farmingdale, N. Y. 11735. Price is $3.95 each.

[4] Available directly from James Millen Mfg. Co., 150 Exchange St., Malden, Mass.

tween the tie points. The "perf" board is submounted on a small hand-made aluminum chassis which was cut from a piece of 1/16-inch thick stock. Heavy-gauge chassis stock was used to assure reasonably good mechanical stability. C_1 and C_3 are mounted on an aluminum angle bracket which was cut from the same type of stock. The angle bracket is bolted to the main chassis near the front panel of the Minibox. Holes are cut in the Minibox at appropriate places to provide accessibility to the headphone jack and the on-off/volume control of the pocket receiver. A 1½-inch diameter hole is cut in the side of the cabinet to provide an audio outlet for the speaker. The builder may wish to use a larger speaker to obtain better sound reproduction at high volume levels. If so, the alternate speaker can be mounted in a separate box and used as an auxiliary piece. It can be plugged directly into the headphone jack, thus disabling the regular speaker.

Six penlight cells, series-connected, are mounted on the inside of the back cover of the Minibox. Keystone 182 (4 cell) and Keystone 140 (2 cell) holders are used for this purpose. A polarized two-terminal plug-and-socket arrangement is installed in the battery leads to permit the two halves of the cabinet to be separated during servicing. Rubber feet are added to the bottom of the box to prevent damage to table tops. An aluminum bracket, lined with a thin strip of sponge rubber or similar material, holds the broadcast receiver firmly in place in the main cabinet. Since the pocket radio has a different power-supply polarity than the rest of the circuit, care must be taken to prevent its plus-9-volt buss from coming in contact with the rest of the equipment. Make sure that the headphone jack does not touch the Minibox. A ½-inch diameter hole is used in this model to allow ample clearance around the jack.

If a toroid is used for L_1-L_2, the completed inductor can be bolted to a small piece of insulating board and the assembly mounted vertically above the chassis (and near C_1) by means of two No. 6 spade bolts.

Getting the SSS 80-40 Working

First on the list of tuneup steps is the matter of retuning the pocket receiver for use on 1700 kc. Set the main-tuning dial for the high end of the broadcast band, about 1650 kc., and loosely couple a signal generator to its built-in ferrite antenna. Set the generator at 1700 kc. and adjust the oscillator trimmer (one of the two adjustments on the receiver's tuning capacitor) until the signal is heard. Adjust the remaining trimmer (mixer) for a peak in signal level. This will be the correct setting for using the receiver in the circuit of Fig. 1.

Set the signal generator at 3500 kc. and connect it to J_1. Place S_1 in the 3.5-Mc. position and adjust R_1 for maximum r.f. gain (maximum resistance). Turn the equipment to *on* and tune L_5 (C_3 fully meshed) until the signal is audible.

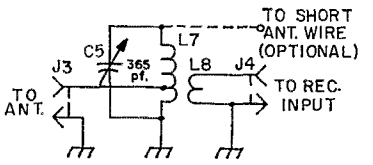


Fig. 4—Details of the auxiliary tuning device. When this circuit is used between the antenna feed line (low Z) and the input jack of the SSS 80-40, additional front-end selectivity results—an aid to image reduction. C_5 is a small broadcast-type variable. J_3 and J_4 are phono connectors. L_7 consists of 30 turns of tinned No. 20 copper wire, ¾-inch diameter, spaced one wire diameter between turns. (A 2-inch length of Polycoils 1742, B&W 3011, or Air Dux 616T coil stock is suitable.) Tap L_7 5 turns from ground end. L_8 is a 5-turn link of insulated hookup wire wound over the ground end of L_7. The tuner can be built on a small open chassis, or enclosed in a Minibox.

C_1 and L_3 can now be adjusted for maximum signal level from the speaker or phones. When tuning C_1, the peak should be *quite* pronounced. Conduct a similar test for 40-meter operation by applying a 6900-kc. signal at J_1 — same setting of C_3 — and switching S_1 to the *out* position. C_1 should provide a sharp rise in signal response near its minimum-capacitance setting. Adjusting C_3 to its minimum-capacitance setting should permit reception slightly above 4 Mc. and somewhere near 7.5 Mc.

In checking out the b.f.o., apply an unmodulated signal at J_1, turn S_2 to the *c.w.* position, and adjust L_6 until the beat note is heard. Its final setting can be made after tuning in a c.w. or s.s.b. signal, then adjusting it for the desired beat note, choosing the proper side of the i.f. passband for lower-sideband reception. R_1 should be adjusted for the lowest practical setting for good reception during c.w. and s.s.b. operation. The number of twists at C_3 will have to be determined experimentally. Use only enough b.f.o. injection to permit good c.w. reception with the r.f. gain control almost fully on (maximum sensitivity) while listening to a loud signal. If C_4 is used, L_6 should be adjusted for zero beat with the incoming signal with C_4 at half mesh. Once this is done, C_4 can be used to place the b.f.o. signal on either side of the i.f. passband, allowing both upper- and lower-sideband reception on either of the two bands.

In Conclusion

A standby connection is provided by J_2, a two-terminal connector. It can remain jumpered as shown in Fig. 1 if the operator wishes to monitor his own signal.

The circuit is arranged so that the "head end" can be turned off while the broadcast set remains on. This feature enables the user to listen to the broadcast band when he wishes to. It will be necessary to remove the Minibox cover for a.m. broadcast listening so that the incoming signals can be picked up by the receiver's built-in antenna.

(Continued on page 140)

A Zero-Beating Method

BY DAVID T. GEISER,* WA2ANU

This article describes a basic method of zero-beating for frequency measurement, but the ideas described can be used wherever precision setting of a frequency is desired.

THE basis of frequency measurement today is comparison with another frequency. This is usually done by subtracting a known frequency from an unknown frequency. The amateur usually does this by setting his receiver to a desired frequency and adjusting his v.f.o. either to maximize the S-meter or to zero-beat the b.f.o. that he has previously zero-beat (or should we say "zero-beaten"?) to the frequency of a station he wishes to contact.

The process of approximately zero-beating a signal is easy — as the v.f.o. or b.f.o. approaches the frequency of the desired signal the *pitch* of the beat tone drops, disappears, and then begins to rise again as the b.f.o. or v.f.o. moves away on the other side of the desired frequency. Approximately half-way between the appearance and disappearance of the tone the v.f.o. or b.f.o. equalled the desired frequency. The problem is to tell just where the frequencies were equal. (See Appendix A for a brief discussion of how the tone was generated, if you are curious.)

The "dead space" of most zero-beat attempts is not too important — after all, how important is 50 or 60 c.p.s. in setting or determining frequency? An s.s.b. signal is intelligible with this much error. Perhaps the only time a ham is interested in this accuracy is when he is engaged in moon-bounce, is an Official Observer, or is just trying to see how skillful he is. Not many of these hams tell their secrets. If you're interested, here's some ways I've found pretty successful.

Offset Zero-Beat

The one thing all conventional ham receivers have in common is that they have audio output. This means that while the ordinary receiver can't amplify zero frequency (and the ear certainly can't hear it), the receiver will have a reasonable output if a beat frequency falling in the audible range is obtained. If, for instance, a beat is obtained just 60 c.p.s. above the desired frequency, and another one just 60 c.p.s. below the desired frequency, I know the desired frequency is just half-way between. As I think this method is the simplest, it will be described in some detail. (Note that 400 c.p.s. or any other frequency could be used instead.)

*Snowden Hill Road, New Hartford, New York 13413.

I take the output of the receiver and feed it, after amplification, into the vertical plates of an oscilloscope, with 60 c.p.s. (or whatever the standard offset is to be) fed into the horizontal plates. When the beat frequency is very close to 60 c.p.s. the "picture" on the scope (Fig. 1) will move through a circle, ellipse, straight line, ellipse, circle, and repeat rolling through these patterns. When the beat frequency is *exactly* the standard offset, the pattern will become stationary. I do this once above and once below the frequency I wish to zero-beat, and average the results.

The method has an advantage that is not immediately apparent. Very few incoming signals are unmodulated or free of interference. This means that there is a great deal besides the desired beat hitting the vertical plates of the scope. Ordinary oscilloscope screens have a slow image decay, and the human eye and mind add still more persistence. The combination is able to see patterns where no electronic circuit can. Even when the desired signal is buried by noise perhaps 100 times stronger, it is possible (even easy) to detect the desired signal. Fig. 2 shows the extent to which noise can be stronger and a signal still recognized.

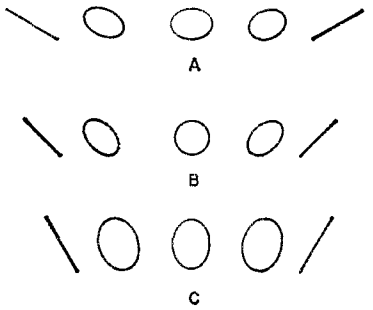


Fig. 1—Oscilloscope traces when vertical and horizontal oscilloscope frequencies are very nearly equal. (A) Horizontal input to oscilloscope is greater voltage than vertical input. (B) Input amplitudes are approximately equal. (C) Vertical input is greater than horizontal.

It is probable the v.f.o. or b.f.o. will not be well enough calibrated in terms of absolute frequency to give a really precise frequency determination. If more is wanted than just zero-beating two signals, it is necessary to use a frequency standard. The simplest standard is a crystal oscillator with 10-kc. multivibrator. This standard (if used in a circuit rich in harmonics) will give 10-kc.-spaced signals up to perhaps 30 Mc. No incoming signal, then, will be more than 5 kc. from such a

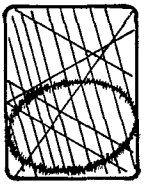


Fig. 2—How an extremely weak signal (the fuzzy ellipse) looks in the presence of saturating co-channel interference. The ellipse may move through any of the angles of Fig. 1, most probably 1A.

standard "marker" frequency. If your receiver b.f.o. is variable over a 5-kc. range, you then can swing your b.f.o. to zero-beat first the unknown frequency and then the nearest marker frequency. I put a vernier dial on my station receiver b.f.o. and calibrated it over the 6-kc. range it tunes. Note that the *absolute* frequency of calibration is not needed, only the *difference* between the frequency of two dial settings of the b.f.o. This can be done at a.f., but will not be discussed here (see Appendix B).

The "Chopped" Beat

If a v.f.o. is being used to zero-beat an incoming signal, it is possible to chop the incoming signal *or* the v.f.o. to turn one of these sources into just a pair of sidebands. Let us imagine that we are going to chop the v.f.o. I feed 60 c.p.s. into a pair of diodes (Fig. 3) to reverse the polarity of the v.f.o. signal at a 60-cycle rate. This makes a d.s.b. suppressed-carrier signal out of the v.f.o. signal, with sidebands spaced 120-c.p.s. centered on the original v.f.o. frequency. As I move the v.f.o. near the frequency of the signal I want to zero-beat, the 120-c.p.s. beat between the two sidebands of the chopped v.f.o. tends to disappear, and a 60-c.p.s. beat appears instead. Volume of the beat is not continuous, being a sort of a whah-whah-whah-whah sound, the frequency of the "whah"s indicating the difference between the v.f.o. and the unknown signal frequency. It is possible to get this difference down to less than one "whah" per second, though it is a tribute both to v.f.o. and signal stability and to the dial vernier on the v.f.o.

When the desired beat has been obtained, switch the v.f.o. chopper off, and the v.f.o. is "on frequency."

Sometimes, considering the relative strengths of the v.f.o. and the signal, it is better to chop one source in preference to the other. A good rule of thumb is to chop the weaker source. Note that it also helps to have a well-shielded receiver and v.f.o.

Automatic Zero-Beating

Those familiar with phase-lock techniques will note that the "chopped-beat" method above is the classical "phase lock on d.s.b." situation. We can make a phasing slicer (Fig. 4 and Appendix C) to "insert" a carrier between two sidebands. The phasing network is very simple in the examples above, as it has to give the 90° phase difference only at 60-c.p.s. instead of over a 300-3000 c.p.s. frequency range. If we wish, we can put the 60-cycle signal into the quadrature channel and leave the in-phase channel clear for the incoming signal. That way we do not even have to listen to a continual beat.

Mixed Systems

There is nothing that says that we cannot mix the systems within a single setup. It is quite possible, for example, to hold the station frequency standard in zero-beat with WWV with one receiver and a phase-lock system. It is advisable to use the 20- or 60-kc. standard signals

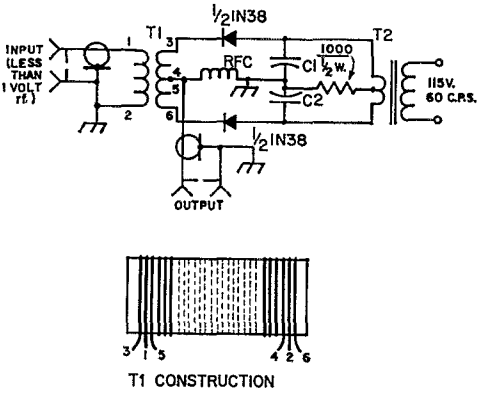


Fig. 3—Design of a simple chopper. T_2 is a center-tapped filament transformer; 6.3 or 12.6 volts satisfactory. All windings of T_1 have the same number of turns. Calculations for use with 50-ohm coax (may be scaled for other impedances) at the operating band: Inductive reactance of each T_1 coil: 500 ohms minimum. Reactance of *RFC*: 500 ohms minimum. Reactance of C_1 and C_2: 5 ohms maximum. Match the two capacitors as closely as practical. Resistor wattage and type: ½ watt composition.

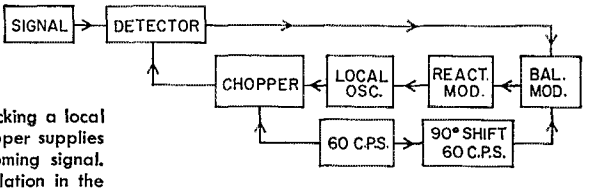


Fig. 4—Block diagram of a chopping system locking a local oscillator (v.f.o.) to an incoming signal. The chopper supplies sidebands which are detected against the incoming signal. The result is compared with the chopper modulation in the balanced modulator, whose output through the reactance modulator corrects the local-oscillator frequency and phase until no chopper sidebands are detected.

for this, as they are not as troubled with skip effects as are the high-frequency WWV emissions (Appendix D).

Conclusions

The three systems presented give some ideas other than the common "audible" or "S-meter" ways of zero-beating or measuring the frequency of signals. They are capable, if refined, of consistently getting zero-beats within one c.p.s. or so. Note that they do not insure the accuracy of a standard; they just offer a very good way of making the most accurate use of whatever standard you have. It is fun to try to do your best — accuracy of frequency setting with inexpensive equipment is a real challange.

Appendix A — Beats

There are many functions in electronics that are performed by mixers and detectors. The function of beating is perhaps one of the most important. The process is also called modulation, but actually the circuits involved are electrical multipliers.

These circuits are not amplifiers in the ordinary sense. An amplifier only increases the voltage or power of the signals that are fed into it. The modulator, mixer, or detector actually creates new frequencies and may include as output the input frequencies, besides. Let us call these circuits "multipliers".

The characteristic of a multiplier is that it gives at least the sums and differences of frequencies impressed on its inputs. Let us imagine that one of its inputs is a sine wave of frequency f_1, and its other input a sine wave of frequency f_2. The output frequencies will include at least f_1 plus f_2 and f_1 minus f_2. If the two input frequencies are close together, f_1 minus f_2 will be a low frequency, perhaps in the audible range. If so, headphones or a speaker will respond to it, while they are insensitive to the sum of the frequencies.

An amplitude-modulation receiver has at least one circuit that acts as such a multiplier, and two frequencies close to each other in such a receiver will yield a tone. The voice sidebands of an a.m. signal beat against the carrier, and the result is the voice tones. A b.f.o. will beat against an incoming radiotelegraph signal, resulting in the interrupted whistle.

Product detectors are constructed to beat incoming carriers against a receiver b.f.o., not against each other, so some extra steps may be necessary to beat an external v.f.o. against an external signal.

When two signals are brought near each other in frequency, the pitch (not necessarily volume) of the difference frequency drops. Of course, ear sensitivity also drops with pitch frequency, so the tone seems to disappear. When the two signals have no frequency difference, there is a very definite detector output — zero frequency, or d.c. The value of the d.c. output will depend on the type of detector and the phase and relative strengths of the two initial signals. This is why, as two signals approach each other in frequency closely, the S-meter may begin a rather wild swinging. When the signals are exactly equal in their strength, a maximum swing will be seen. (Of course, it is very difficult to tell what signal is making a meter swing if the pitch is low enough for a meter to follow, because such low frequencies can't be heard. If one of the incoming signals is radiotelegraph, the meter will jump with each make and break. That *is* frustrating.)

The systems described in the article work in spite of not directly zero-beating, because they use known offsets from exact zero beat, and because the resulting receiver output is easier to use than a true zero-beat indication.

Appendix B—Measuring Audio Frequencies

So far in the discussion it has been tacitly assumed that an oscilloscope was available to the person wanting to measure frequency. It is possible to use the scope to make accurate calibrations of two a.f. sources against each other, if one is variable.

The scope method is much like Fig. 1, which shows a 1:1 frequency relationship. This method had been used for many years, particularly in the old General Radio frequency measuring system. Here the beat tone (against your 10-kc. multivibrator harmonic) coming out of your receiver would go into one set of the scope plates, and the output of the audio oscillator ("almost zero" to 5 kc.) would be adjusted to give a 1:1 indication on the scope. The method suffers from possible inaccuracy of the a.f. oscillator; 1 percent accuracy is about maximum for the inexpensive models (50 cycles at 5 kc.), and the good oscillators like GR sell *on surplus* for between $100 to $300.

Another scope method may be used. The oscilloscope gives understandable patterns for such ratios as 3:2, 2:1, 7:3, and any other pattern that you can hold still on the scope. A standard frequency is fed into one set of plates, and the variable "unknown" into the other. To calibrate the unknown, adjust it for a stationary pattern on the scope. Let us assume the standard is fed into the horizontal deflection plates and the oscillator to be calibrated into the vertical deflection plates. Count the total number of pattern bumps touching the top and bottom lines of the pattern, and divide this number by the total number of bumps touching the right and left sides of the pattern. The result is the *ratio* of the unknown frequency to the standard frequency.

The average amateur has several a.f. standards available. Perhaps the most obvious and constant is the 60-c.p.s. commercial power source. It has the twin advantages of a good waveform with little interference, and lots of available voltage. If a receiver covering WWV is available, the 440- and 600-c.p.s. tones are useful, particularly in the 500-5000 range of calibrating. (It is pretty hard to calibrate above a 10:1 frequency ratio with a scope.)

There are a.f. devices other than oscillators that can be calibrated. The Selectoject can be calibrated, though the result is pretty sloppy (accuracy-wise), and very high and very low audio frequencies are omitted.

A simple phase-detector frequency meter can be made with a choke, a resistor, and an assortment of capacitors. Connect the choke, a capacitor, and the resistor in series, and connect the combination in shunt across the a.f. source. Feed the source into one set of scope plates, and the voltage developed across the resistor into the other. If the scope has practically zero phase shift between the two channels at the necessary gain settings and frequency, the pattern will be a straight diagonal line at the resonant frequency of the choke and capacitor. This phase-detection method of determining frequency is much more sensitive than looking for the voltage peak across the resistor. For reasonable phase sensitivity, the total d.c. resistance of the choke and the resistor should be about 10 percent of the induc-

(*Continued on page 146*)

Modern Power-Supply Design

By means of a series of simple charts, the author shows how to select suitable components and silicon-diode ratings to obtain a desired output voltage and load-current capability. The suppression of transients that can cause diode failure is also treated.

Easy Step-by-Step Procedure

BY JACK ALTHOUSE,* WA6CEZ

Power supplies, nowadays, aren't built the way they used to be. It's not that the principles of power-supply design have changed. They haven't. The change is in the component parts available. Most important has been the advent of silicon rectifiers and large-value reasonably-priced electrolytic capacitors. The swinging choke, the oil-filled capacitor, and the blue flash of the mercury-vapor rectifier have given way to the silicon-rectifier capacitor-filtered supply that makes the "table-top kilowatt" possible.

Progress is fine, but it's not all a bed of roses. Silicon rectifiers don't give anyone a second chance. One fraction-of-a-second overload and they are gone without warning. And overloads are easy to come by with capacitor-input filters.

This article provides design data, in easy-to-use graphical form, for the four most-useful rectifier circuits, and describes how to prevent loss of rectifiers from overload and transients.

The Silicon Rectifier

The important specifications of a silicon diode are:

1) P.I.V. (or p.r.v.), the peak inverse (or peak reverse) voltage,

2) I_O, the average d.c. current rating,

3) I_{REP}, the peak repetitive forward current, and

4) I_{SURGE}, the peak one-cycle surge current.

The first two specifications appear in most catalogs. The last two often do not, but they are very important.

Since the rectifier never allows current to flow more than half the time, when it does conduct it has to pass at least twice the average d.c. current. With a capacitor-input filter, the rectifier conducts much less than half the time, so that when it does conduct, it may pass as much as ten to twenty times the average d.c. current, under

* Route 3, Box 744-B-2, Escondido, California 92025.

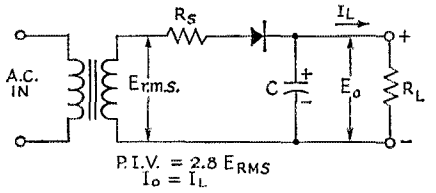


Fig. 1—The half-wave rectifier circuit.

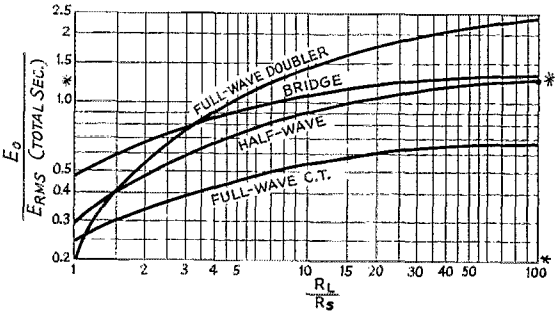


Fig. 2—These curves are used to determine the value of series resistance, R_S, required to obtain the desired d.c. output voltage with a given transformer, as described in the text. (Asterisks indicate reading points for the example in the text.) The increase in voltage output with ratios R_L/R_S greater than 100 is about 10 percent for the full-wave doubler circuit, and less than 10 percent for the other circuits, while I_{REP} increases significantly. (See Fig. 3.)

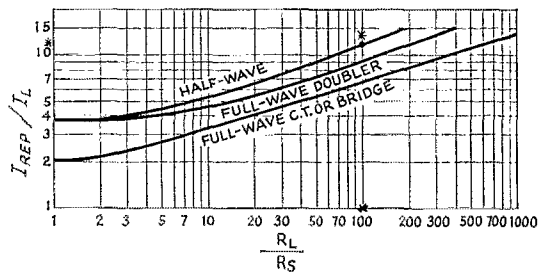


Fig. 3—These curves are used to determine I_{REP}, as described in the text. (Asterisks indicate reading points for the example in the text.)

certain conditions. This peak current is I_{REP}, the peak repetitive forward current.

Also, when the supply is first turned on, the discharged input capacitor looks like a dead short, and the rectifier passes a very heavy current. This is I_{SURGE}. The maximum I_{SURGE} rating is usually for a duration of one cycle (at 60 cycles), or about 16.7 milliseconds.

If you don't have a manufacturer's data sheet, you can make an educated guess about your diode's capability by using these rules of thumb for silicon diodes of the type commonly used in amateur power supplies:

Rule 1) The maximum I_{REP} rating can be assumed to be approximately four times the maximum I_O rating.

Rule 2) The maximum I_{SURGE} rating can be assumed to be approximately twelve times the maximum I_O rating.[1]

The Half-Wave Rectifier

The half-wave circuit is shown in Fig. **1**. It is the simplest rectifier system and is often used for bias and other low-current supplies. We'll use it here to illustrate a typical power-supply design.

In this circuit, the p.i.v. is 2.8 times the transformer voltage, E_{RMS}, and the capacitor voltage rating must be at least 1.4 times E_{RMS}. I_O, the average d.c. current through the rectifier, is the same as the load current, I_L.

As an example, let's say that we have a 100-volt transformer and that we'd like to get 130 volts d.c. at 100 ma. from the supply.

We know right away that the rectifier p.i.v. must be 2.8 times 100 volts, or at least 280 volts. The capacitor must withstand 1.4 times 100 volts, and therefore its rating should be at least 140 volts, and I_O is 100 ma.

The load on the power supply, R_L, is the output voltage (volts) divided by the output current (amperes). In our example, that's 130/0.1, or 1300 ohms.

Output Voltage: The output voltage of the power supply depends upon the load, R_L, and the current-limiting resistance, R_S, as shown in Fig. 2. We want 130 volts from our supply, or 1.3 times the transformer r.m.s. voltage. Fig. 2 tells us that for a half-wave rectifier, R_L/R_S must equal approximately 100. Since R_L is 1300 ohms, R_S will have to be 1300/100, or about 13 ohms.

Peak Repetitive Current: Once we know R_L/R_S, we can find the peak repetitive current directly from Fig. 3. For a half-wave rectifier, and R_L/R_S = 100, it is 12 times the load current, or 1200 ma.

Surge Current: The peak one-cycle surge current can go as high as 1.4 E_{RMS}/R_S. In our example that's 140/13, or almost 11 amperes.

The fact of the matter is that the transformer leakage reactance will limit I_{SURGE} to something less than that. Still, it's better to be safe than sorry. If you make a mistake with a rectifier tube,

[1] This should provide a reasonable safety factor. Silicon rectifiers with 750-ma. d.c. ratings, as an example, seldom have 1-cycle surge ratings of less than 15 amperes; some are rated at 35 amperes or more. — *Editor*.

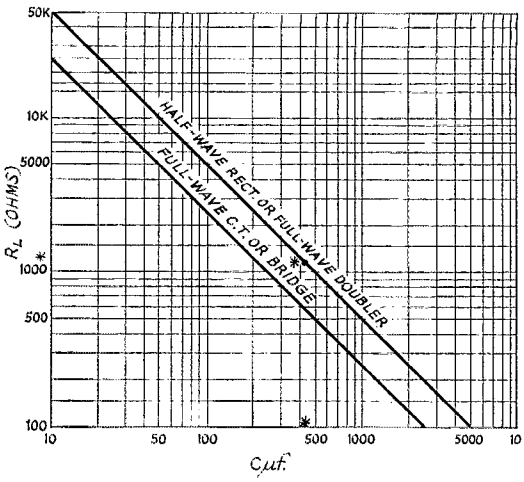


Fig. 4—These curves are used to find the filter capacitance required to reduce output ripple to 1 percent, as described in the text. (Asterisks indicate reading points for the example in the text.)

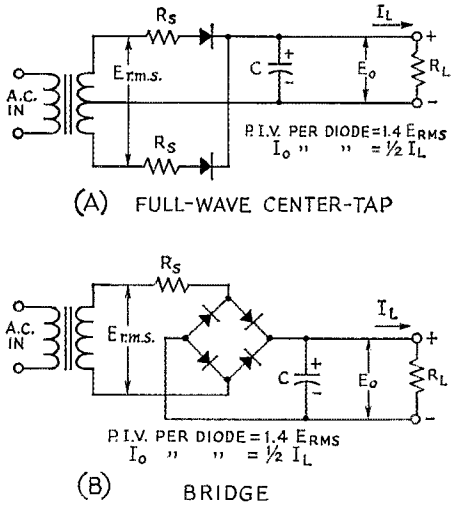


Fig. 5—Full-wave center-tap and bridge rectifier circuits.

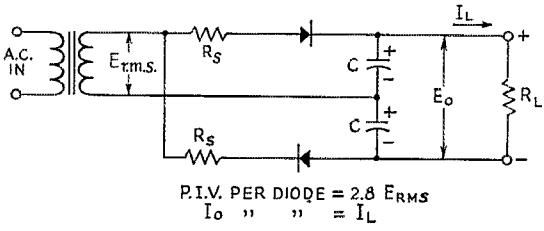


Fig. 6—The full-wave voltage-doubler circuit.

you at least get something for your money — cherry-red plates, blue flashes, sputtering arcs. But silicon diodes just silently fade away.[2]

Rectifier Rating: The average d.c. current, I_O, through our power-supply rectifier is 100 ma. But I_{REP} is 1200 ma. Rule 1 indicates that the rectifier I_O rating should be 1200/4, or at least 300 ma. However, I_{SURGE} is 11 amp. From Rule 2, we see that the rectifier I_O rating should be 11/12, or approximately 1 ampere.

In this particular example then, I_{SURGE} determines the rectifier size. Our 100-volt 100-ma. supply needs a rectifier with ratings of at least 1 amp. and 280 volts p.i.v.[3] The moral here is that it is unwise to pick a silicon rectifier on the basis of the d.c. load current alone. Always check the peak repetitive and peak surge currents.

Ripple: There is still one item missing from our design — the size of filter capacitor C. Fig. 4 shows the value needed to reduce ripple to 1 percent. In our example, R_L was 1300 ohms. C should be about 400 μf. (from the half-wave graph).

If C is large enough to reduce ripple to 1 percent, making it still larger does not change the output voltage or peak rectifier current. But it does reduce ripple. For example, make C twice as large to get ½ percent ripple, or ten times as large to get 0.1 percent ripple. Larger capacitance also improves voltage regulation.

Full-Wave Center-Tap and Bridge Circuits

These circuits are shown in Fig. 5. For the same total transformer voltage, the maximum output voltage with the bridge circuit is approximately twice that obtainable with the center-tap circuit. However, the *power* that a given transformer will handle remains the same. Thus, the load-current rating of a center-tapped transformer must be reduced approximately 50 percent if the bridge circuit is substituted.

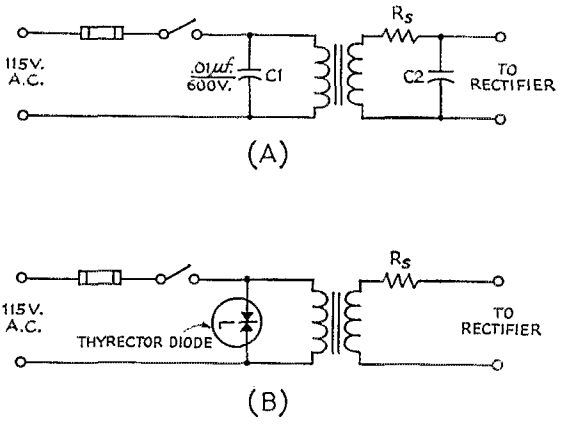


Fig. 7—Methods of suppressing line transients. See text for details.

The design procedure using either circuit is similar to that for the half-wave circuit, using the appropriate curves in Figs. 2, 3, and 4 after determining R_L. It should be noted, in using the center-tap curve of Fig. 2, that E_{RMS} is the *total* secondary voltage (as indicated in Fig. 5A), not the voltage each side of center.

The p.i.v. for *each* rectifier in either circuit is 1.4 E_{RMS}, and the average current, I_O, for each diode is one half the load current. When using the center-tap circuit, the minimum filter-capacitor voltage rating is 0.7 E_{RMS}, and the surge current is 0.7 E_{RMS}/R_S. With the bridge circuit, the minimum capacitor voltage is 1.4 E_{RMS}, and the surge current is 1.4 E_{RMS}/R_S.

Full-Wave Voltage Doubler

This useful circuit is shown in Fig. 6. It uses

[2] Some checks on total transformer series impedance show values ranging from about 50 ohms for a typical TV power transformer to about 500 ohms for a 6000-volt center-tapped 500-ma. plate transformer. These values would drop to between one half and one third for a full-wave center-tap rectifier.

An approximation of the transformer series impedance is given by:

$$R_T = R_{SEC} + N^2 R_{PRI},$$

where R_{SEC} and R_{PRI} are the d.c. resistances, respectively, of the secondary and primary, and N is the turns ratio (or voltage ratio) of the transformer. In the case of a full-wave center-tap rectifier, N is the ratio of primary to one-half secondary. This yields results on the conservative side, since it does not include leakage reactance. The latter, however, is usually low compared to the resistance, in transformers likely to be used by amateurs — *Editor*.

[3] This is a result of working close to the peak transformer voltage (1.4 E_{RMS}), but it does illustrate a condition that could exist, which is probably what the author had in mind in choosing the example. Sufficient series resistance to limit the surge current to a lower value cannot be used without also dropping the output voltage. If a 125-volt transformer (instead of a 100-volt transformer) had been used, similar calculations would result in a surge resistance of 65 ohms, which would limit the surge current to 2.7 amperes. I_{REP} would be reduced to 700 ma. The diode d.c. current rating could then be reduced to 700/4, or 2700/12, or about 200 ma., by either criterion. The rectifier p.i.v. would be increased to 350 volts.

On the other hand, it is usually undesirable, as well as uneconomical, to use a transformer delivering a much higher voltage than is necessary to obtain the desired d.c. output voltage, since the dropping resistance impairs voltage regulation. Also, the capacitor-voltage and rectifier p.i.v. ratings are increased unnecessarily. For these reasons, the use of a series resistor may not be a particularly desirable method of adjusting the output voltage, in many cases. With this consideration removed, the function of the series resistor would be reduced to that of limiting the surge current to within the surge-current rating of the diode. The value of the series resistance would then be simply the transformer secondary peak voltage divided by the allowable surge current in amperes. (Half of the total secondary voltage would be used in the case of a full-wave center-tap rectifier.) If the author's rule of thumb is used, this allowable surge current would be 12 times the d.c. rating of the diode. The transformer series impedance (see Footnote 2) could be included as part of the surge resistance calculated above. If the transformer impedance exceeds the calculated surge resistance, no external resistance would be required. There will probably be many instances, however, where the use of the full calculated value of surge resistance externally (thereby neglecting the transformer impedance) will not add sufficient resistance to affect the voltage regulation significantly. In such a case, the additional resistance will provide an extra margin of safety, as suggested by the author. If the calculated resistance appears to be great enough to impair voltage regulation seriously, its effect can be eliminated by placing an equivalent resistance in the primary circuit of the transformer, and shorting it out with a relay (see McCoy, "Use Surplus and Save," *QST*, October, 1967). Thermistors or "Surgistors" have also been used for the purpose (see "Hints & Kinks," *QST*, October, 1962).— *Editor*.

only two diodes, does not require a center-tapped transformer, and has good efficiency. When all factors are considered, this is the best all-around circuit to use with silicon rectifiers. However, as mentioned in reference to the bridge circuit, the *power* that a given transformer will handle remains the same, regardless of the rectifier circuit used. As an example, if we have a center-tapped transformer rated at 500 volts each side of center, at 200 ma., the maximum output, within ratings, will be 500 × 0.2 = 100 watts. With the bridge rectifier across the full secondary, the maximum output within rating will be 1000 volts at 100 ma. With the voltage doubler, it will be 2000 volts at 50 ma.

The p.i.v. *per rectifier* with the voltage doubler is 2.8 E_{RMS}, and the average current, I_O, per rectifier is the same as the load current. The minimum filter-capacitor voltage rating is 1.4 E_{RMS}, and I_{SURGE} is 1.4 E_{RMS}/R_S. I_{REP}, R_S and C may be determined from the appropriate curves of Figs. 2, 3 and 4, after determining R_L.

Transient Problems

In this section we'll discuss some situations where the applied p.i.v. can be higher than expected.

A common cause of trouble is transient voltages on the a.c. power line. These are short spikes, mostly, that can temporarily increase the voltage seen by the rectifier to values much higher than the normal transformer voltage. They come from distant lightning strokes, electric motors turning on and off, and so on. Transients cause unexpected, and often unexplained, loss of silicon rectifiers.

It's always wise to suppress line transients, and it can be easily done. Fig. 7A shows one way. C_1 looks like 280,000 ohms at 60 cycles, but to a sharp transient (which has only high-frequency components), it is an effective bypass. C_2 provides additional protection on the secondary side of the transformer. It should be 0.01 μf. for transformer voltages of 100 or less, and 0.001 μf. for high-voltage transformers.

Fig. 7B shows another transient-suppression method using selenium suppressor diodes. The diodes do not conduct unless the peak voltage becomes abnormally high. Then they clip the transient peaks. General Electric sells protective diodes under the trade name, "Thyrector." Sarkes-Tarzian uses the descriptive name, "Klipvolt."

Transient voltages can go as high as twice the normal line voltage before the suppressor diodes clip the peaks. Capacitors cannot give perfect suppression either. Thus, it is a good idea to use power-supply rectifiers rated at about twice the expected p.i.v.

Diodes in Series

Where the p.i.v. rating of a single diode is not sufficient for the application, similar diodes may be used in series. (Two 500-p.i.v. diodes in series will withstand 1000 p.i.v., and so on.) When this is done, a resistor and a capacitor should be placed across each diode in the string. Fig. 8 illustrates the reason. In Fig. 8A, we have a half-wave rectifier operating from a 70-volt transformer. The output voltage with light loading is 100 volts (1.4 E_{RMS}). So is the peak transformer voltage. The p.i.v. required in this half-wave circuit is 200 volts (2.8) E_{RMS}). We might consider using two 100-p.i.v. rectifiers. In Fig. 8B, we see what might happen. Even though the diodes are of the same type, same p.i.v. and all, when they are cut off they may have widely-different back resistances. In our example, one diode has a back resistance of 1 megohm and the other, 3 megohms. The inverse voltage divides according to Ohm's Law. The

(Continued on page 134)

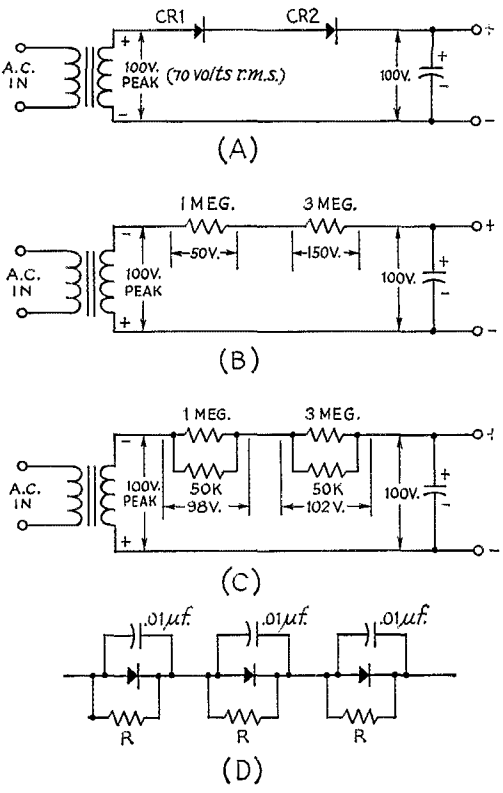


Fig. 8—A—Half-wave rectifier circuit with two diodes in series. B—Equivalent circuit when diodes are not conducting. The inverse voltage does not divide equally. C—Voltages are equalized by shunting the diodes with equal resistances of value low compared to the diode back resistances. D—Capacitors are added across each diode to distribute transient voltages equally, as described in the text.

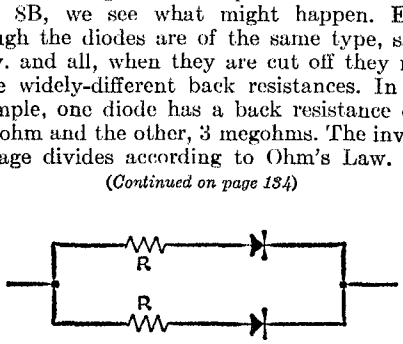
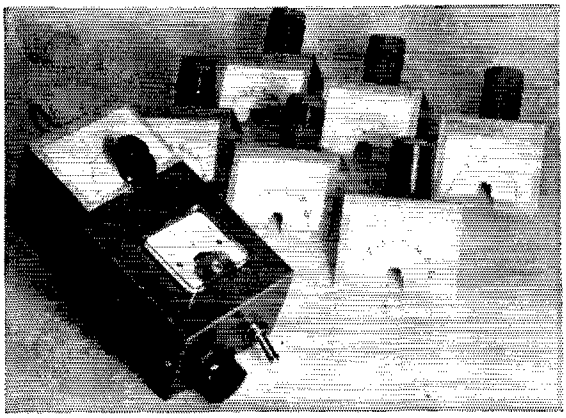


Fig. 9—Diodes in parallel should have equalizing resistors. See text for appropriate value.



Here is the completed FET Dipper. Clear plastic lamination sheet, available at any stationery store, is used to protect the calibration charts.

A Field-Effect Transistor Dipper

BY LEWIS G. McCOY,* W1ICP

If you like to experiment, to build your own gear, or to do your own trouble-shooting, one test instrument that is very handy is a grid-dip meter. A grid-dip meter is basically an oscillator capable of being tuned continuously over a wide range of frequencies, usually from about 2 Mc. up through the v.h.f. region. Plug-in inductors are generally used for covering this wide tuning range. To check the frequency of an "unknown" tuned circuit, the plug-in coil is coupled to the coil in the unknown, and the variable capacitor in the grid-dip meter is tuned through its range. At some point in the range the meter in the grid-dip unit will show a "dip." The reason for this is that some r.f. power from the grid-dip oscillator is absorbed by the tuned circuit being checked when the two circuits are in resonance. There is therefore less r.f. power in the grid-dip circuit, and the indicating meter shows a corresponding dip or drop in reading.

The unit described in this article cannot truly be called a "grid-dip" meter because a field-effect transistor is used in the oscillator, and a transistor doesn't have a grid. Using a transistor for the oscillator makes it possible for the dipper to be completely contained with power supply (a 9-volt battery) in an easily-held unit.

* Novice Editor

One of the handiest gadgets around a station is the grid-dip meter. This solid-state version, using a field-effect transistor, is easy to build and get working.

Circuit Details

The circuit diagram of the FET dipper is given in Fig. 1. The tuned circuit consists of L_1 and C_1. L_1 is plug-in, and eight coils are required for covering 1.8 to approximately 150 Mc. Power from the oscillator is coupled to the metering circuit via C_4, then rectified to d.c. by CR_1. The rectified d.c. current is read on M_1, a 0-50 microammeter. The current level can be set by the sensitivity control, R_3.

Construction

An etched board is used for most of the circuit. The circuit board and all other components are mounted in a $2\frac{1}{8} \times 3 \times 5\frac{1}{2}$-inch aluminum Minibox. The only critical point in construction is the mounting of C_1. In the bottom-view photograph you'll see that C_1 is mounted so that the leads from the rotor and stator to the etched circuit board are as short as possible. The shaft hole for the rotor of C_1 is exactly $1\frac{1}{2}$ inches from the L_1 end of the box and is centered between the two edges. The arrangement of S_1, R_3, B_1, and M_1 is not critical. Just be sure to leave enough room around the edges of these components so that the bottom of the box will clear them when it is installed.

The Etched Circuit Board

By using an etched circuit board lead lengths and stray inductances can be held to a minimum, permitting the oscillator to work in the v.h.f. region, up to 150 Mc. The etched circuit board measures $2\frac{3}{4}$ by $1\frac{5}{16}$ inches. Fig. 2 is a full-size template. In the photograph you'll see that there is a 1-inch diameter hole in the center of the

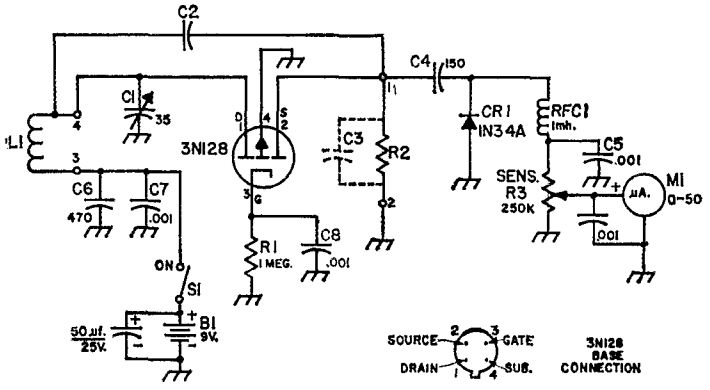


Fig. 1—Circuit diagram of the FET dipper. Resistances are in ohms; all resistors are ½-watt. Decimal-value fixed capacitances are in μf. (these capacitors are disk ceramic), all others (mica) are in pf. Circuit designations are for text and etched circuit-board reference.

B_1—9-volt battery.
C_1—35-pf. variable (Millen 20035, or similar).
M_1—0-50 or 0-100 microammeter (Lafayette 99H5049, or similar).
R_3—250,000-ohm control.
S_1—Single-pole, single-throw toggle.

board; this hole is just large enough to clear the base of the coil socket. When the circuit board is mounted in place it is held by the same screws that hold the coil socket. It is mounted ⅜ inch from the edge of the Minibox.

There are several etching kits on the market. These contain all the material you need for making several etched circuit boards, plus detailed instructions. Well-suited for ham use are the Amitron P.C. kit, the P/M Electronics kit No. EP2K, Veroboard BK-6, and the Vector kit No. 27XA.[1]

[1] These kits are available from the following dealers: Arrow Electronics Inc., 900 Route 110, Farmingdale, N.Y. 11735; Harrison Radio, 20 Smith St., E. Farmingdale, N. Y. 11735; Hatry of Hartford, 100 High St., Hartford, Conn. 06103; World Radio Labs, 3415 West Broadway, Council Bluffs, Iowa 51501.

The method used in making the circuit board described in this article was quite simple. Common masking tape was used to cover the part of the board that was *not* to be etched away. To make cutting easy, the masking tape was first applied to ordinary waxed paper; the pattern was then cut out and the waxed paper removed just before applying the tape to the circuit board. Clean the copper first with fine steel wool, and press the tape firmly in place to insure good contact. Once the board is etched, holes for the component leads can be drilled in the board as shown in Fig. 2.

Wiring the Etched Board

Some precautions should be observed in wiring the components on the circuit board. The 3N128 transistor is packed with its four leads inserted in a small metal ferrule. *Don't* remove this collar while handling the transistor! There is a micro-thin insulating film between the gate and the rest of the transistor, and it can easily be punctured by static voltage. The collar is used to keep all the transistor elements at the same potential. However, before soldering the unit into the circuit the collar must be removed. The simplest way to protect the transistor while soldering it is to wrap three or four turns of fine wire around the four leads right at the base of the transistor, before remov-

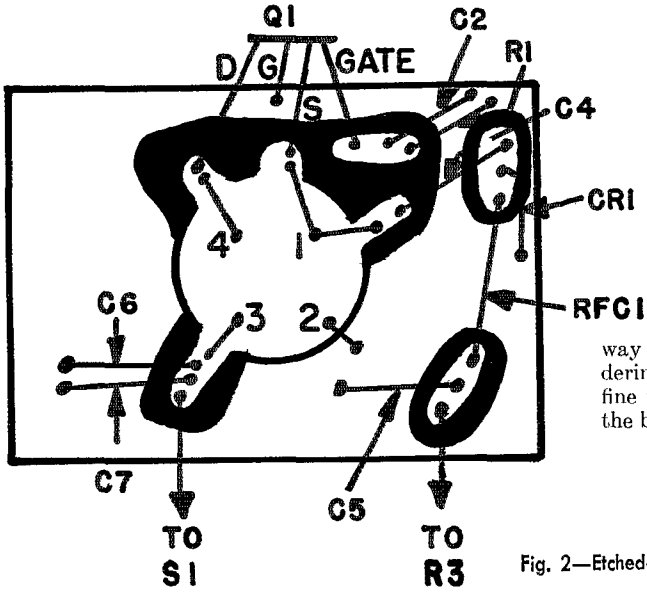
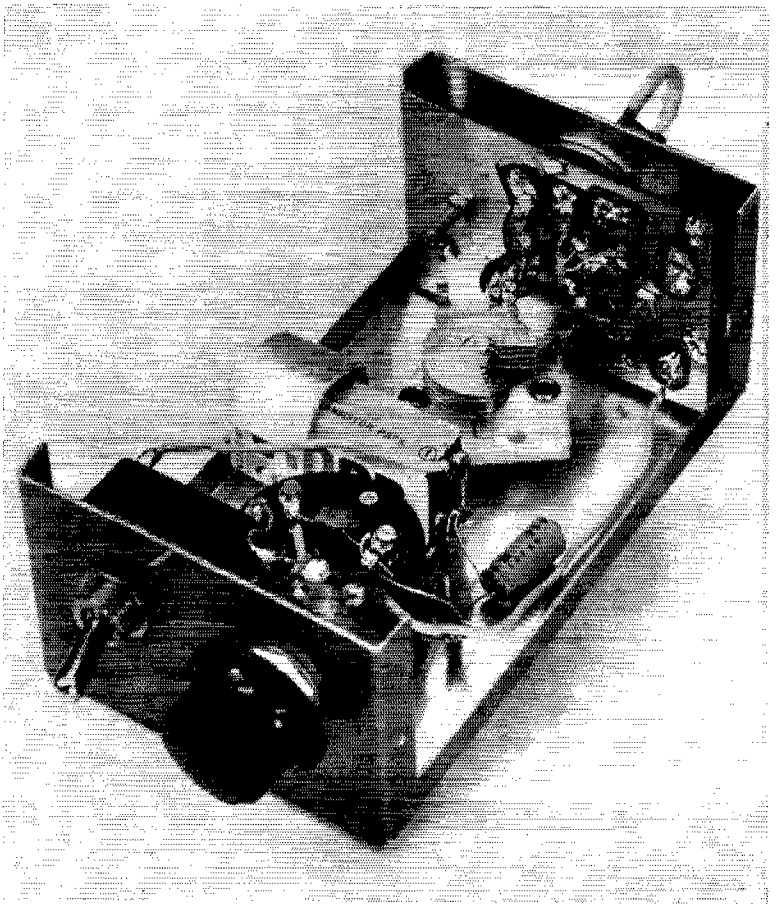


Fig. 2—Etched-circuit template. The dark lines show the component connections.



This bottom view shows the mounting of the circuit board. Note the mounting arrangement of C_1.

ing the collar. A short length of any bare, fine wire can be used — for example, a single strand from stranded hook-up wire. After the leads are wrapped and the collar removed, the leads can be spread out to fit the holes in the circuit board. The wire wrap will also serve as a heat sink when making the soldered connections. Once the connections are made the wire can be unwrapped.

When soldering CR_1 to the board, use a heat sink between the body of the component and the point being soldered. Too much heat can ruin the diode.

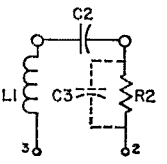


Fig. 3—This shows the coil and component connections for the plug-in coils as viewed from the bottom. C_2 connects to pin 4 (left) and and pin 1 (right).

Making The Coils

The coil information is given in the coil table. Additionally, Fig. 3 shows the connections for the components that are mounted inside the coil forms. The numbers inside the 1-inch diameter cutout of the circuit board show the connections to the coil socket. The four-pin coil forms have two large-diameter pins and two small ones. The coil socket should be mounted so that Pins 1 and 4 (the large ones) are adjacent to the corresponding circuit-board connections shown in Fig. 2.

Before attempting to solder the coil, capacitor, and resistor leads to the coil-form pins, the ends of the pins should be filed slightly to remove the nickel coating, as it is very difficult to solder the nickel. When installing C_2 and R_2 in the coil forms, push the component leads all the way through the pins so that the components rest on the inside bottom of the form. After the coils are wound, it is a good idea to spray the windings with clear acrylic spray to hold the wires firmly in place.

Fig. 4 is a drawing of the metal calibration plates that are attached to the bases of the coils. It would be possible to eliminate these and put eight bands of calibration markings above the C_1 tuning knob, but the printing would have to be very small and it would be difficult to read. By using the plates with each coil there is plenty of space for the calibration.

Freq. Range	*Turns*	*Wire Size*	*Turns Per Inch*	C_2	R_2
1.7– 3.0 Mc.	115	30 enam.	Close-wound	22 pf.	3300 ohms*
3.0– 5.0 Mc.	60	26 "	" "	22 pf.	3300 ohms
4.5– 7.4 Mc.	40	26 "	" "	18 pf.	2700 ohms
6.3–11.0 Mc.	28	20 "	" "	10 pf.	1500 ohms
11.0–25.0 Mc.	10	20 "	" "	10 pf.	1500 ohms
19.0–32.0 Mc.	6	20 "	" "	10 pf.	1000 ohms
32.0–62.0 Mc.	4	20 "	Spaced over 1 inch	5 pf.	1000 ohms
50.0–150 Mc.	See below.				

All coils are wound on or mounted in Millen type 45004 coil forms, 1-inch diameter. Coil socket is Millen 4-pin ceramic, type 33004.

L_1 for the highest range is a 4⅝-inch long piece of No. 12 solid wire bent to form a "hairpin" ½ inch wide. The ends of the hairpin are pushed into the coil pins until they are flush with the ends and then soldered. The loop should be insulated with a piece of spaghetti. C_2 is 5 pf., R_2 is 470 ohms.

* 50-pf. mica (C_3) connected in parallel with R_2 on 1.7–3.0-Mc. coil only.

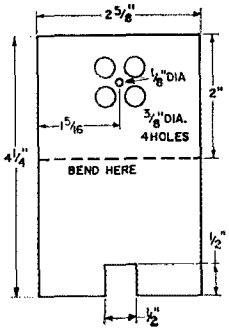


Fig. 4—The metal calibrating brackets can be made from any thin aluminum or other metal stock. The bottom center of each coil form should be drilled to take a No. 4 screw, ½ inch long. The screw is used to hold the bracket to the coil form. Be sure that the ⅜-inch diameter holes completely clear the coil-form pins before tightening the screw and nut.

Calibration

The simplest method of calibrating makes use of your receiver. A general-coverage receiver is best because it will provide a large number of calibration points. If you don't have one, you may know another ham who does. In any case, you can calibrate for the ham bands quite easily. For example, plug the 80-meter coil in the dipper, turn the unit on, and tune your receiver to 3500 kc., with the b.f.o. on. Then tune the dipper capacitor, C_1, to the point where you hear a signal from the dipper and make the calibration mark for this frequency. Next, tune the receiver to, say, 3600 kc., find the dipper signal by tuning C_1, and repeat. Go through each of the coils in this manner until the unit is calibrated throughout its range. Of course, if you can borrow another grid-dip meter you can get your calibration points by coupling the two together (with one turned off) and getting a dip.

Which leads us up to how to use the dipper in some of its applications.

Using the Dipper

As we said earlier, when the L_1C_1 circuit is coupled to another circuit tuned to the same frequency, power is absorbed by that circuit, reducing the r.f. voltage in the dipper itself and thereby reducing the current reading. The "dipping" effect can easily be observed by turning on S_1, setting R_3 so that M_1 reads about half scale, and then touching L_1 with your finger. This stops the oscillator, and the reading should drop to zero.

One thing to keep in mind is that the tighter the coupling to the circuit being checked, the less accurate the reading. Once you find the dip, gradually move L_1 away from the circuit being checked until the dip is just perceptible, as this will improve the accuracy of the reading. However, the dipper at best is not a highly accurate frequency meter; it will tell you what band a circuit is tuned to and, in some cases, what portion of the band. One way to increase the accuracy is to get a dip using the loosest possible coupling and then, without touching the tuning of the dipper, tune in the dipper signal on your receiver. The receiver dial reading will provide a fairly accurate reading if the receiver calibration is good.

Probably the most popular use of the instrument will be in checking tuned circuits when building a receiver or transmitter. You can quickly check the range of a tuned circuit to see if it covers the desired frequency band.

The dipper can also be used as a simple signal generator. Many times in your ham work you'll need a signal of known frequency, possibly to tune up a receiver, or even to check if a receiver is working. The dipper will serve the purpose quite adequately in many cases.

Still another use is in checking the resonant frequency of an antenna. If the dipper is coupled to a low-impedance point in the antenna it will show a dip at resonance. By the same token, the dipper can be used to check resonance in guy lines or, for that matter, any lines or wiring around a station.

As you use the instrument, you'll quickly come to the conclusion that it is indispensable. QST

C and *L* Measuring Gimmick

BY FRANK W. NOBLE,* W3QLV

THE box to be described will measure capacitance from 800 pf. to 0.8 μf. and inductance from 80 mh. to 80 h. when used with a calibrated audio oscillator and either an a.c. v.t.v.m. or an oscilloscope, hereafter referred to as the "detector." The device has no variable controls and is very easy to build and use.

The idea is to find the frequency at which the reactance of an unknown coil or capacitor is 10,000 ohms. Referring to the circuit, Fig. 1, the input from the oscillator, E_i, feeds a 10K resistor, R_1, in series with the unknown coil or capacitor. The oscillator frequency is varied to find the value at which the output voltage is 0.707 E_i corresponding to a reactance of 10K. Since the output voltage of inexpensive oscillators will vary with the load, and since the load always has a reactive component and hence varies with frequency, the oscillator output can be expected to vary with frequency. To facilitate matters, the voltage divider made up of R_2, R_3, and R_4 always produces an output of 0.707 E_i regardless of variations in E_i. With the switch in the "set" position, the operator adjusts the oscillator amplitude and detector gain to a convenient reading. The switch is then thrown to the "test" position and the oscillator frequency is varied to obtain the same reading. As the reading is approached, the switch is thrown back and forth as small changes are made in the frequency until the point is reached where the detector reads the same with the switch in either position. The oscillator frequency is then read and substituted into the appropriate equation:

$$C = \frac{15.9}{f}\ \mu f. \qquad (1)$$

$$L = \frac{1590}{f}\ \text{henrys} \qquad (2)$$

where f is the balance frequency in cycles per second.

Alternatively, the unknown value may be obtained from the graph, Fig. 2. The location of the decimal point is facilitated by reference to Table I.

If non-inductive (i.e. not wire-wound) resistors of the specified tolerances are used, the accuracy will be limited primarily by the accuracy of the oscillator frequency calibration. QST

* 10004 Belhaven Road Bethesda, Maryland

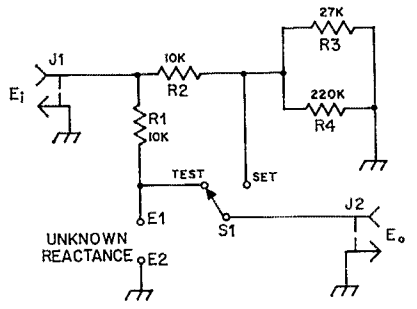


Fig. 1—Electrical schematic. All resistors are noninductive—i.e. not wire-wound.

E_1, E_2—Binding posts.
J_1, J_2—Phono jacks.
R_1, R_2, R_3—1% tolerance, ½ watt.
R_4—5% tolerance, ½ watt.
S_1—S.p.d.t. rotary or toggle.

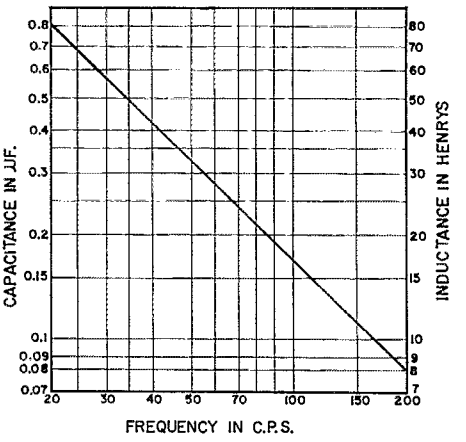


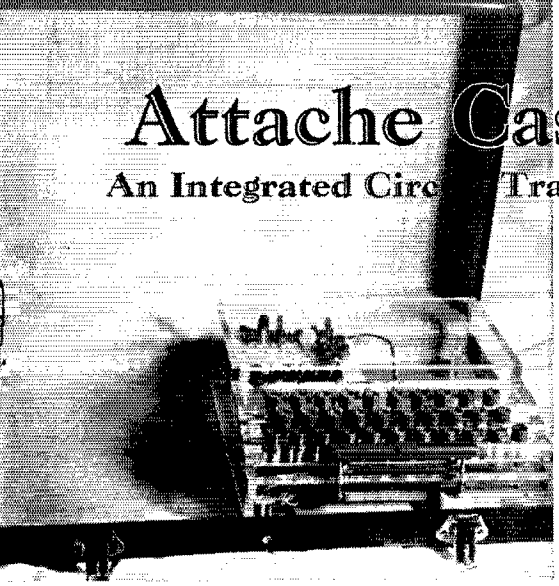
Fig. 2—Graph of unknown C or L vs. balance frequency. For decimal point, refer to Table I. E.g., if the balance frequency is 350 c.p.s. the frequency is between 200 and 2000 c.p.s., so the capacitance is between 0.0795 and 0.00795 μf., or the inductance is between 7.95 and 0.795 henrys. The values at 350 c.p.s. therefore would be 0.045 μf. or 4.5 henrys.

f, *c.p.s.*	*C*, *μf.*	*L*, *henrys*
20	0.795	79.5
200	0.0795	7.95
2,000	0.00795	0.795
20,000	0.000795	0.0795

Table I—Unknown Capacitance and Inductance over the usual frequency ranges of audio oscillators.

Attache Case RTTY

An Integrated Circ[illegible] Transmitter-Distributor



BY DAVID M. KRUPP *

IN the past few years the only contribution of note in the field of amateur radioteletype has been the "MAINLINE TT/L converter." [1] Most amateurs have steered clear of teletype either from lack of technical knowledge of teletype, or because too few machines were available — usually at too high a cost, not to mention the drawbacks of bulk, weight, and noise. If you've been stalling on account of one of these reasons, *arise!* With any kind of junk box or scrounging ability this unit can be built for less than 50 dollars, weighs 3 lbs., runs off three size D cells, and is quieter than a "Bulls" clock.

In this paper I will discuss the keyboard and transmitter-distributor of such a system. Bolt-on accessories such as a strip tape printer, tape reader, an answer-back or "auto-call" system, and a TWX acoustical adapter are in various stages of consideration or construction. The advent of low-cost integrated circuits make such systems not only plausible but practical.

First, let's look at the functional sequence chart (Chart I) for a model 19 keyboard and transmitter.[2] Simply depressing a key sets the code into the mechanical memory, locks the keyboard, and starts the selector cam rotating. The code is translated to a composite character by the rotating selector arm and at the completion of one rotation the cam stops. As the cam comes to rest the keyboard is unlocked and ready to go again. The operation of the integrated-circuit transmitter distributor, shown in Chart II, is derived from this sequence.

At first glance the sequences bear very little resemblance to each other, but under closer scrutiny — and with allowances for the conversion of mechanical "logic" to electronic — a very close parallel appears. Simply, the operation of the IC t.d. is as follows (Fig. 1A): A key is depressed and the START MEMORY turns on the clock pulse-generator (hereafter termed "the clock") through the CLOCK-CONTROL flip-flop. Pulses from the clock feed into the COUNTER and are decoded into eight separate pulses by the COUNTER MATRIX. On [illegible] pulse, the output of the keyboard is fed [illegible] the READ GATE into the MEMORY where the code is stored until the completion of the character being formed. On pulses 2 through 6 the counter matrix samples the output of the memory and feeds the composite character to the [illegible]. On the seventh pulse, the STOP GENERATOR comes on and resets the memory and the counter, stops the clock, and prevents the [illegible] beginning a new character until the end of the stop period.

Start Logic

The clock-control system, Fig. 2, consists of an RS flip-flop, start memory, an AND gate, and an RS flip-flop as the clock switch. Depressing a key connects the supply through a start diode, D_1, to point A. For single characters, C_1R_5 differentiates the pulse at A and D_1 passes the positive half to set the start memory, RS_6. In the case of repetitive characters — space, for example — the C_1R_5 combination is bypassed and connection of the start diode to B will hold RS_6 set until the key is released.

AND Gate and Clock Control

D_2, D_3, and D_4 form a three-input AND gate, AND_9, whose output feeds the clock control, RS_7. If the clock control is OFF, pin 7 of RS_7 will be high. If MS_1, the stop generator, is at rest, the stop-not output, MS_1 pin 7, will be high. When these two conditions are met and a key is depressed making the "1" output (RS_6, pin 7) of the start memory high, the output of AND_9 will go high and set the clock-control flip-flop, RS_7.

Setting RS_7 lowers the D_4 input to AND_9, hence the output of the gate is terminated. The length of the set pulse is on the order of a fraction of a microsecond. The clock is started and stopped by the "1" and "0" outputs of the clock control, RS_7.

Time-Base Generator

The time base generator, or clock, Fig. 3, is basically a clamped, non-saturating, astable multivibrator utilizing a μL914 integrated circuit.

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

[2] Army TM 11-2216, Teletypewriters TT-7/FG and TT-8/FG, October 1951, p. 130.

[3] Lancaster, "Using New Low Cost Integrated Circuits," March 1966, p. 50.

CHART I

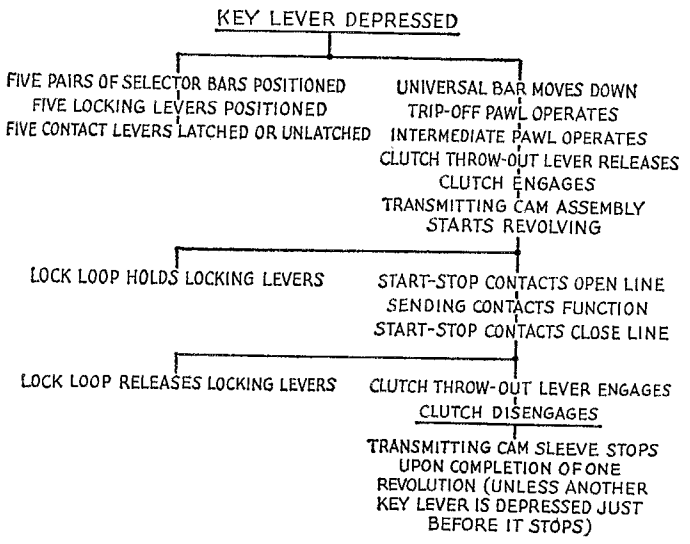


Chart I—Functional sequence chart for a Teletype mechanical transmitter.

CHART II

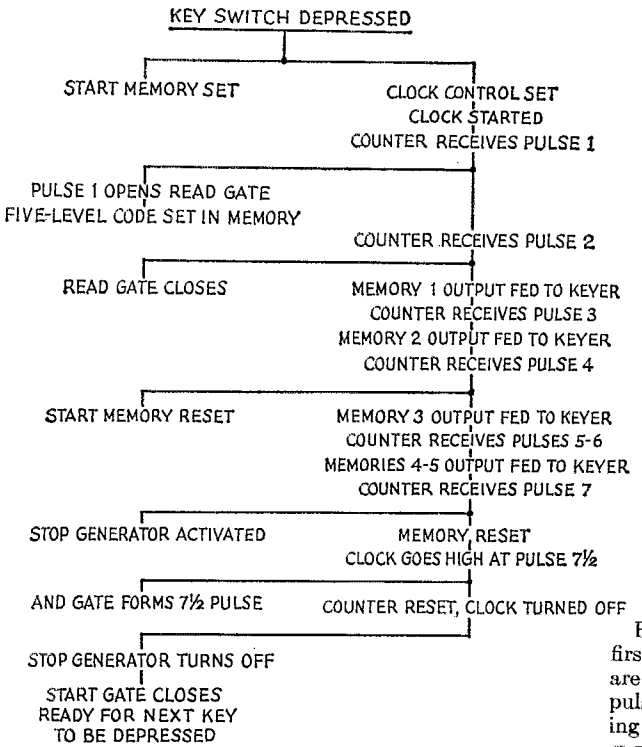


Chart II—Functional sequence chart for the electronic keyboard transmitter.

R_{13} and R_{14} limit the charging current of C_3 and C_4, respectively, to reduce frequency drift with supply-voltage changes and to square off the output somewhat. Clamp diodes D_6 and D_7 are referred to a 2.7-volt Zener diode, D_Z. AS_1 will free-run until Q_1 is turned on by the "0" output of RS_7 going high. When Q_1 conducts the clock stops, AS_{1B}'s base is held just below the switching point at about 0.45 volt by D_5 and the collector-emitter junction of Q_1. D_5 is needed because the base of AS_{1B} goes negative when the clock is running and Q_1 would conduct on this spike, clipping it and ruining the stability of the oscillator.

Depressing a key will make the "0" output of RS_7 low which turns Q_1 off. The base of AS_{1B} charges to 0.6 volt, where it fires, and the clock is off and running. Only one problem remains: the time it takes for the base to charge from 0.45 volt to the firing point results in a little end distortion. In compensation the "1" output of RS_7 is differentiated by C_2R_{10} and turns on AS_{1A}, which force-starts the clock.

D_{50}, D_{51}, and R_{36} form a two-input AND gate (AND_{11}) from the collectors of AS_1. During the "stop" period pin 7 of AS_1 is high, as pin 1 is grounded by Q_1. If both collectors should be high — a condition when the clock is locked-up and can't start — the output of the gate goes high, which turns on AS_{1D}, pulling AS_1 pin 6 back down to ground. If pin 6 is not at ground when the clock is stopped, it won't start.

Modulo-8 Counter

The output of the clock goes through inverter I_{2A}, Fig. 4, to a modulo-8 counter[4] employing three μL923 JK flip-flops. The 923's are of the "negative logic" type; that is, a negative transition from +1.5 volt to ground on the toggle input (pin 2) is required to make them toggle, provided the set (pin 1) and clear (pin 3) inputs are grounded. The divide-by-2 output of JK_1 is fed to the toggle input of JK_2, and the output of JK_2 is fed to the toggle input of JK_3. The result is a total division of the clock frequency by 8.

Counter Matrix and Pulse 1

Referring to Fig. 5 and Chart III, on the first pulse from the clock waveforms *b*, *c*, and *d* are high. Diodes D_{28}, D_{29}, D_{30} and R_{27} form the pulse 1 AND gate, whose output is high during pulse 1 only. The same action takes place

[4] Irwin, "Using the J-K Flip Flop in Small Modulo Counters," Fairchild Application Bulletin, April 1966, App. 102/2.

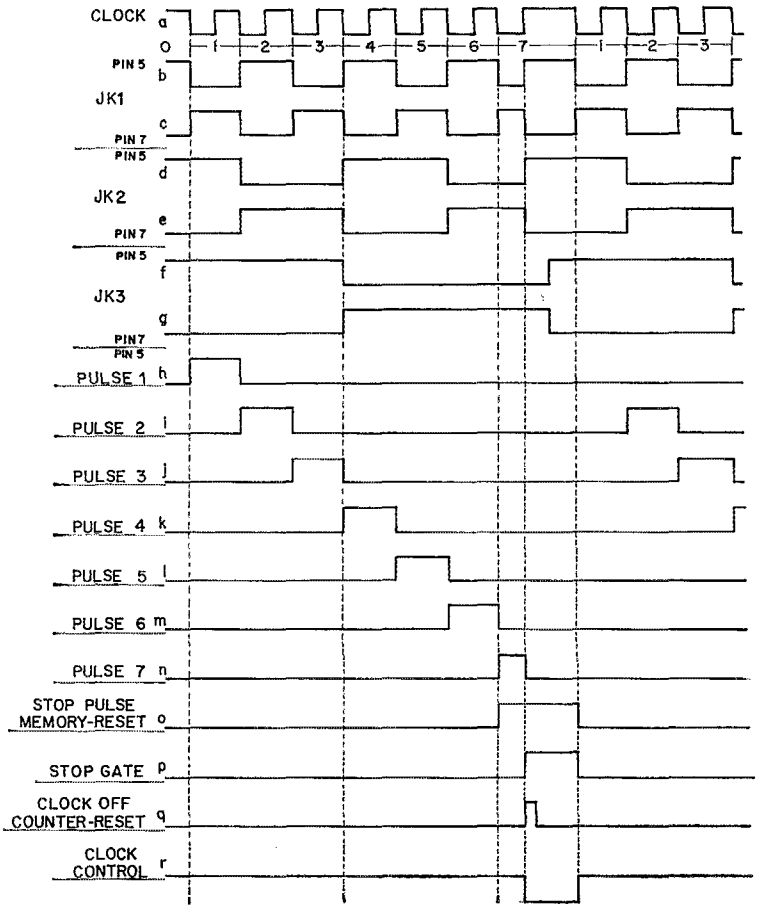
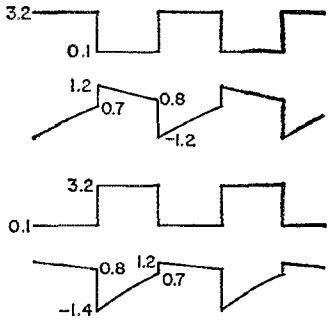


Chart III—Pulse waveforms at various points in the distributor circuit.

on pulses 2 through 7 with diodes D_{31} through D_{48} (see Fig. 12). (Diodes D_{22} through D_{27} form an OR gate, but more about that later.) The output of the start (pulse 1) AND gate is shaped by inverter I_{1A} and the read gate is driven by I_{1B} through I_{1A}.

Read Gate and Pulse 1

The read gate, Fig. 6, is formed by the keyboard and D_{12} through D_{16}. The keyboard matrix supplies the standard five-unit code broken down on five different lines whose outputs are high on mark. The five outputs set the five-unit memory, RS_1 through RS_5, through the read gate during the start pulse. When a key is depressed, the diode in the keyboard matrix conducts from the supply through R_{21},D_{12} and the collector-emitter junction of I_{1B}. As I_{1B}'s base is high from I_{1A} the voltage at T is about 0.35 volt, not enough to set RS_1. If the input to I_{1A} goes high I_{1B} will be off, so point V will be high and D_{12} will be back-biased, allowing T to rise to the supply voltage minus the slight drop through D_A and R_{21}. The pulse at T is now large enough and does set RS_1. R_{37} provides a load for the back-biased diode to look into. Similar action takes place for RS_2, RS_3, RS_4 and RS_5. At the end of



pulse 1 the gate opens and the character cannot be changed by pressing an incorrect key.

Pulses 2, 3, 5, 6

For pulse 2, diodes D_{31}, D_{32}, D_{33}, and R_{29}, Fig. 7, form the basic pulse-encoding AND gate. The only difference between the pulse 2 and pulse 1 gates is the addition of D_{17} from the "0" output of RS_1. With this fourth diode, the output of the pulse-2 AND gate will be high only if there was no mark signal from the keyboard to set RS_1. The same holds true for pulses 3, 5, and 6.

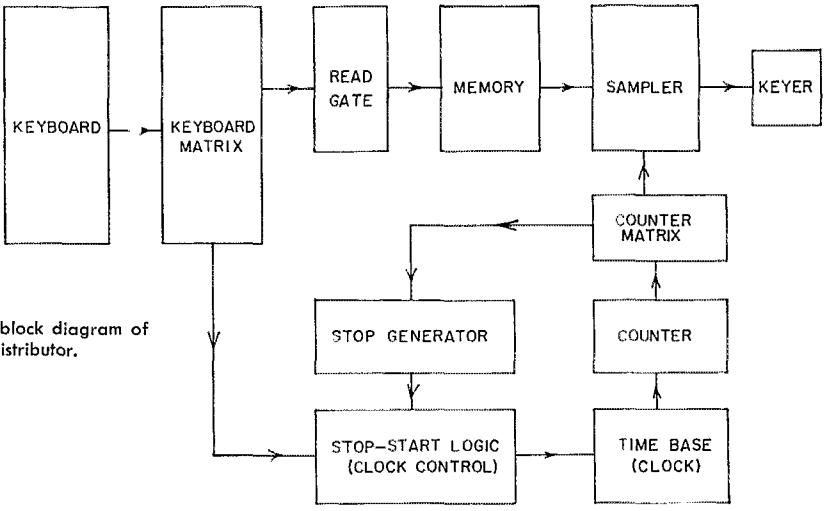


Fig. 1A—Simplified block diagram of transmitter-distributor.

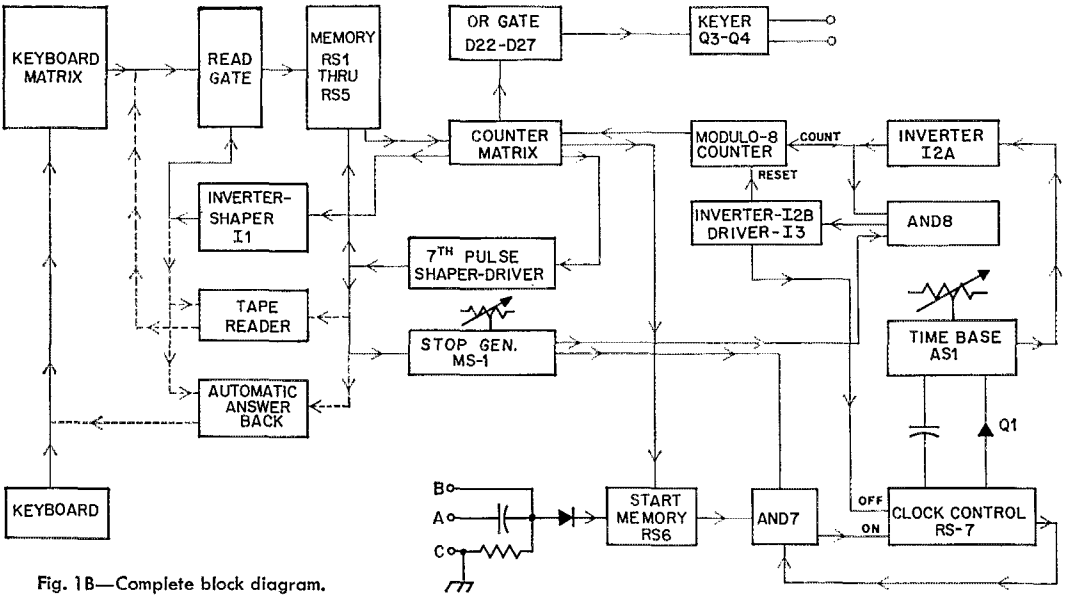


Fig. 1B—Complete block diagram.

Pulse 4

Diodes D_{37}, D_{38}, D_{39} and resistor R_{30}, Fig. 8, make up the pulse 4 encoding AND gate. The difference between the arrangement for Pulse 4 and the rest is that Pulse 4 is used to reset the start memory, RS_6. D_{19}, D_{49} and resistor R_{34} form a two-input AND gate (AND_8) from the output of the pulse 4 gate and the "0" output of RS_3. If RS_3 receives a "space" from the keyboard and pulse four is there, the AND_8 gate's output will be high.

OR Gate and Keyer

The outputs of AND gates 1 through 6 are summed in a six-input OR gate (OR_1) D_{22} through D_{27}, Fig. 9. The output of OR_1 is low for mark and high for space, just the opposite of conventional presentation. Why? In the formation of the stop interval, a low-level signal is much easier to come by.

Q_3 shapes and inverts OR_1's output to the conventional mark-high presentation. The slight storage effect of Q_3 is used to fill in any small holes that might appear between pulses. Q_4 and Q_5 make sort of a Darlington arrangement with an SE6002 feeding an SE7005 as the loop keyer. BG_1 serves to prevent damage to Q_5 if the loop voltage is applied backwards.

Stop Generator

The stop generator, MS_1, is a monostable (one shot) multivibrator, Fig. 10, using a Fairchild

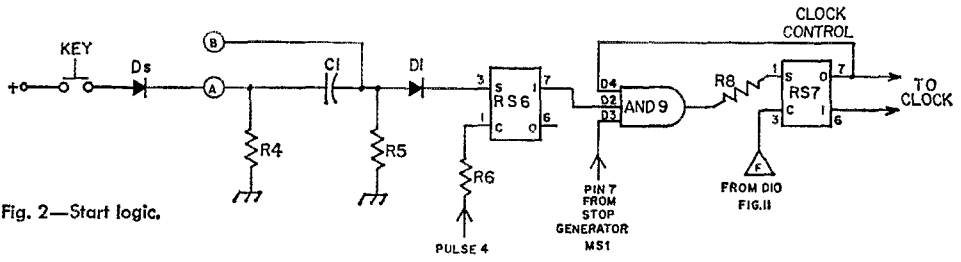


Fig. 2—Start logic.

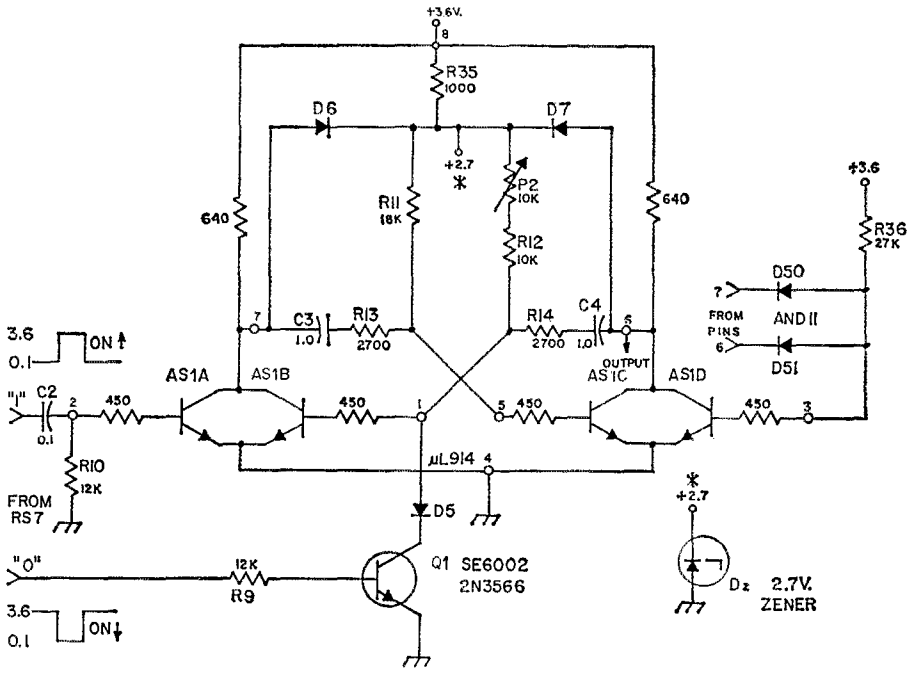
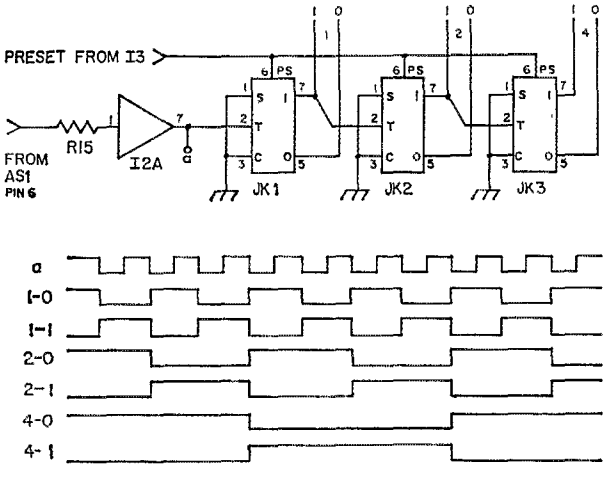
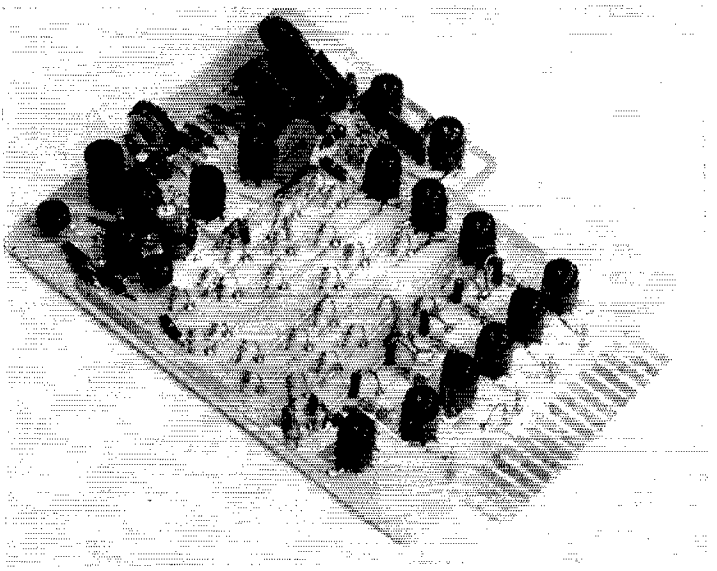


Fig. 3—Clock circuit. Numbered terminals are those of the integrated-circuit package. The Zener diode (in d.c. power supply, not shown in Fig. 12) is used to hold the junction of R_{35}, D_6, D_7, etc. low enough so that terminals 6 and 7 will be at least 0.2 volt less than the 3.6-volt supply. If D_6 and D_7 are germanium diodes the collectors will be clamped at 3.05 volts when the voltage at (*) is 3.0 volts (a 2.7-volt Zener regulates at approximately 3 volts because of the "soft-break" characteristic of low-voltage Zeners). The voltage at (*) must be at least 2.8 volts for stable clock operation.

Fig. 4—Counter circuit. Waveforms at lines 1, 2 and 4 are shown in the lower drawing.





Close-up view of the etched circuit board, which plugs into a connector mounted on the vertical partition in the case. The potentiometer at the top in this view is the speed control, P_2; the other one, to its left, is the stop-period control, P_1.

μL914. C_6, R_{18} and P_1 form the timing network while R_{19} limits the capacitor charging current and squares off the output somewhat.

Seventh Pulse Interval

The seventh pulse AND gate (AND_7), consisting of D_{46}, D_{47}, D_{48} and R_{33}, Fig. 12, feeds inverter shaper Q_2 and then inverter driver I_4, a μL900. The output of I_4 clears RS_1 through RS_5 and starts the stop-pulse generator, MS_1.

The stop pulse taken from MS_1 pin 6 feeds a two-input AND gate (AND_{10}) formed by D_8 and D_9. The other input to AND_{10} is the clock signal from I_{2A} (see waveforms *a* and *n*, Chart III). When the seventh pulse begins, the clock output is low. As the clock output goes high, one-half pulse later, the gate output goes high. The output of the gate is shaped by I_{2B}, which feeds pulse narrower $I_3C_5R_{17}$ (see Fig. 11).

Pulse Narrower

The base of I_{2B} goes high and collector low (waveform *p*). C_5 differentiates the pulse (waveform *s*). R_{17} holds I_3 on and its collector low. The differentiated pulse from C_5 turns I_3 off until C_5 recharges to 0.6 volt, whence I_3 conducts hauling its collector down again (waveform *q*). The maximum output-pulse width is that of the input, and with careful selection of the values of C_5 and R_{17} a pulse of any desired width (but narrower than that of the input) can be achieved. The output pulse width in the t.d. is about two milliseconds.

Counter Reset and Clock Stop

The reset pulse from the output of the pulse narrower is fed (Fig. 12) to the preset inputs (pin 6) of JK_1, JK_2 and JK_3, resetting the counter to 0-0-0. The reset pulse also is fed to the clock-control flip-flop to stop the clock. Diodes D_{10} and D_{11} isolate the counter from the clock control.

At the end of the stop period the "0" output of MS_1 goes high, allowing the t.d. to start when the next key is depressed.

Power Supply

The power supply will not be discussed as it is

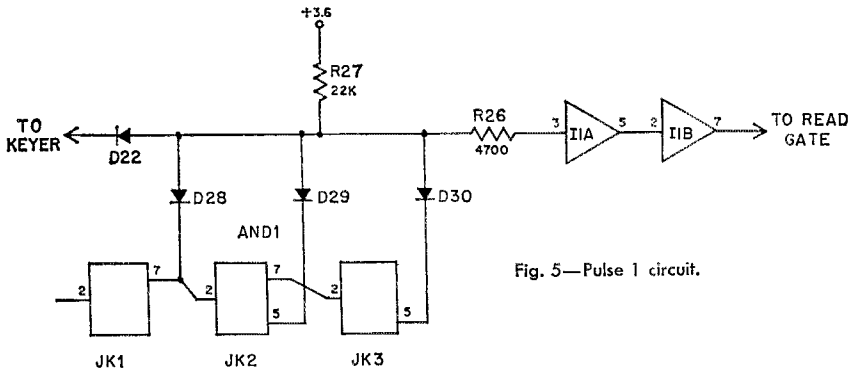


Fig. 5—Pulse 1 circuit.

of the conventional series-regulation type, and the individual will probably want to construct one to meet his own operational environment. The keyboard requirements are 3.6 volts at about 185 ma., well regulated.

Check-Out

Check-out procedure is simple but somewhat lengthy. To make life easy a triggered-sweep scope is necessary, and a dual-trace pre-amp would help. I realize not all hams have such, but many know of equipment that can be "used."

1) Unplug RS_1, RS_2, RS_3, RS_4, RS_5 and RS_7, but leave RS_6 in. Removing RS_7 will allow the clock to run free.
2) Lift one end of D_{10} and D_{11}. Lifting D_{10} removes the clock stop signal, and lifting D_{11} will prevent the counter from being reset. Check all waveforms in the following order:
3) Set the scope to 10 ms. per division and connect a 10-megohm probe to pin 2 of JK_1. You should see a continuous train of 22-ms. square waves about 1.5 volts peak-to-peak. If the period is not 22 ms. set the scope to 5 ms./div. and adjust P_2 for a period of 4.4 divisions.

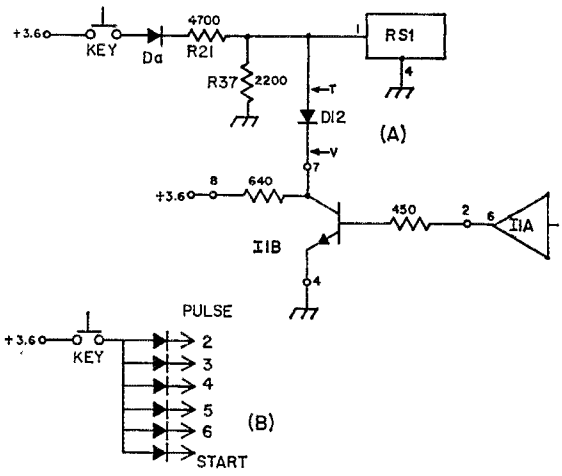
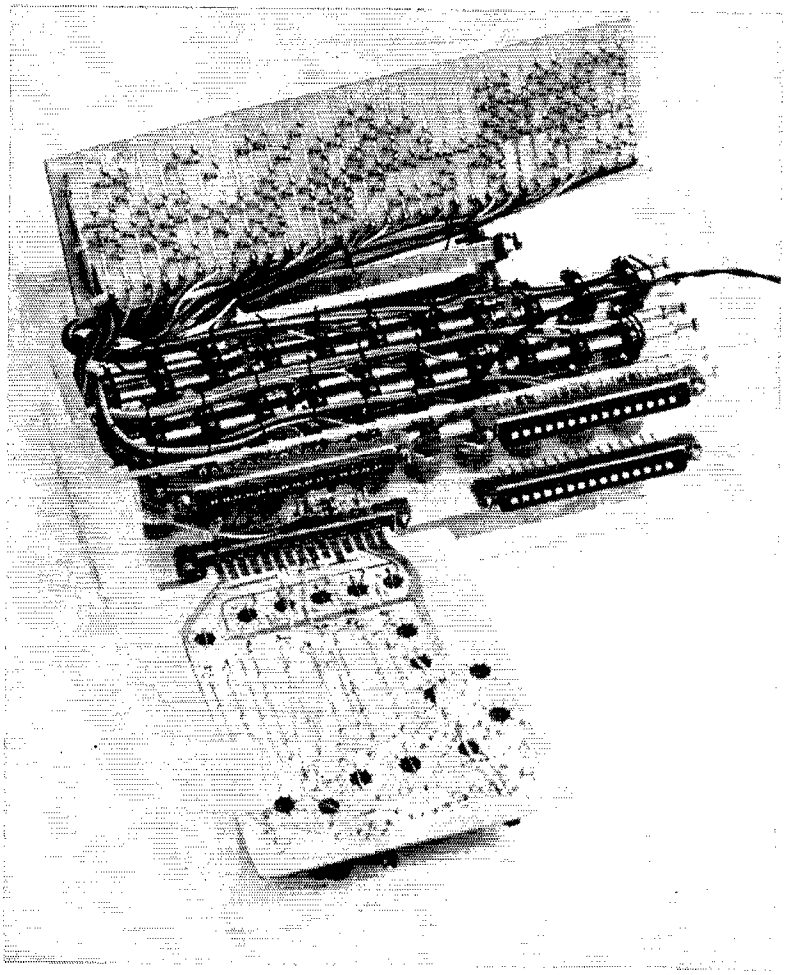


Fig. 6—Read gate. D_a represents any of the diodes associated with a particular key in the keyboard matrix (Chart IV). The "Ltrs" combination is shown at B for illustration.



Removing the bottom of the case exposes the circuits for servicing, should any be needed. The keyboard matrix, at the top, lifts out with its leads attached. Two of the three rows of microswitches are visible in this view (the third is hidden by the connectors on the center partition); switches in each row are supported by long threaded rods with tubular spacers between switches.

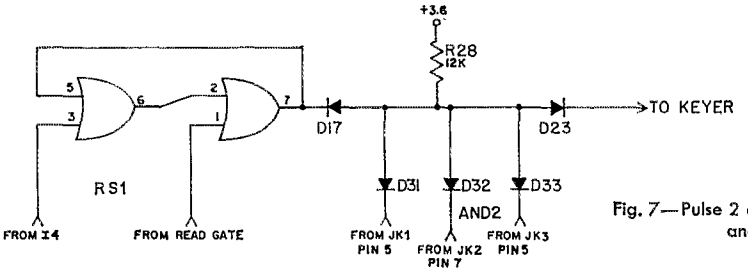


Fig. 7—Pulse 2 circuit. Circuits for Pulses 3, 5 and 6 are similar.

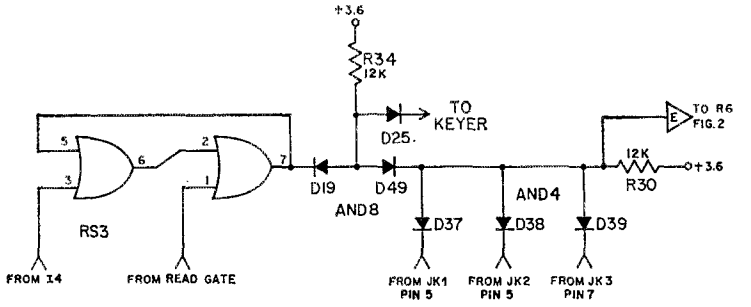


Fig. 8—Pulse4 circuit.

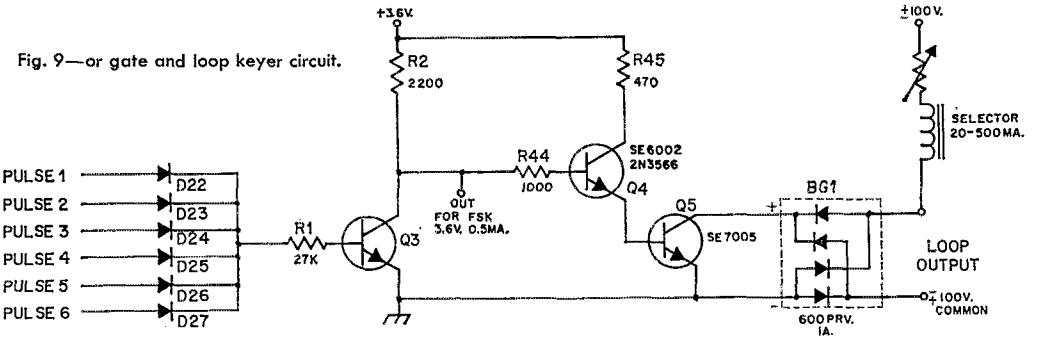


Fig. 9—or gate and loop keyer circuit.

4) Set the sweep for 22 ms./div. using the waveform at JK_1 pin 2 as a reference, and trigger the scope on the rising edge of that waveform.
4) Now look at pin 7 of I_{1B}. A 22-ms. pulse (pulse 1) every 8 divisions should be seen.
6) Use the rising slope of Pulse 1 to trigger the scope through its external trigger jack. Adjust the trigger point so that the leading edge of Pulse 1 is at the far left of the graticule. Now everything viewed will be referred to the beginning of a hypothetical character. Leave the scope triggered this way unless otherwise instructed.
7) Go back to JK_1 pin 2 and mark the leading edge (negative slope) of each pulse and label the areas in between 1 through 8 with a grease pencil.
8) Now check the waveforms at pins 5 and 7 of JK_1 through JK_3 to make sure they are right. The trailing edge from pin 7 should trigger the next JK.
9) Check pulse 2 at the anode of D_{17} to conform with waveform *i*.
10) Check pulse 3 at the anode of D_{18} for waveform *j*.
11) Check pulse 4 at the cathode of D_{49} for waveform *k*.
12) Check pulse 5 at the cathode of D_{20} for waveform *l*.
13) Check pulse 6 at the cathode of D_{21} for waveform *m*.
14) Check pulse 7 at I_4 pin 5 for a 22-ms. pulse in the box marked 7.
15) Look at the cathode of D_9 and set P_1 for a 31-ms. period. The pulse should start at the beginning of the pulse 7 period.
16) Look at the junction of D_8 and D_9; you should see waveform *p*.
17) Look at I_3 pin 5 for waveform *q*.
18) Reconnect D_{11}.
19) Look for pulse 1 at I_{1B} pin 7. It should now occur every seventh division instead of every eighth.
20) Repeat steps 8–16 to make sure they still conform.
21) Reconnect D_{10}.
22) Repeat Step 19.

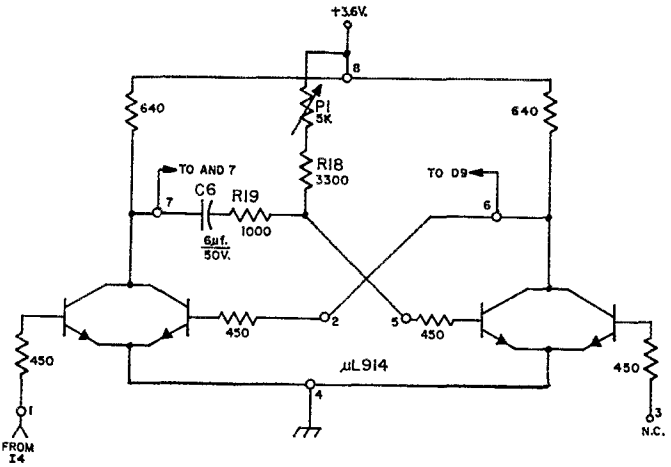
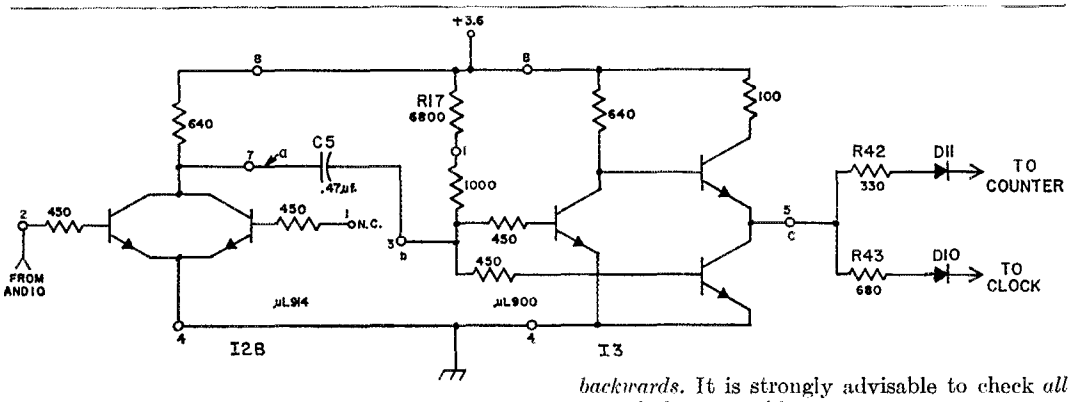


Fig. 10—Stop generator (MS_1) circuit.



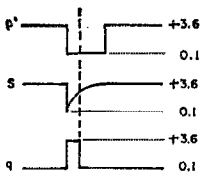


Fig. 11—Stop logic pulse narrower. Waveform *p* is at point *a* when pin 2 is high. Simultaneously, waveform *s* occurs at point *b*, and waveform *q* at point *c*.

23) Look at RS_6 pin 7 and press a key. RS_6 pin 7 should go high during pulses 1 to 3 and low again at the beginning of pulse 4.
24) Reinsert RS_7.
25) The clock should have stopped. Press a key with the probe at JK_1 pin 2 and waveform *a* should appear or a normal train of six pulses and ½ of a seventh.
26) Recheck steps 8–16 for no drastic changes, you have to press a key each time.
27) Replace RS_1, RS_2, RS_3, RS_4, and RS_5.
28) Look at the collector of Q_3.
29) Press the keys one at a time and check the characters formed against those in Chart IV (p. 41).

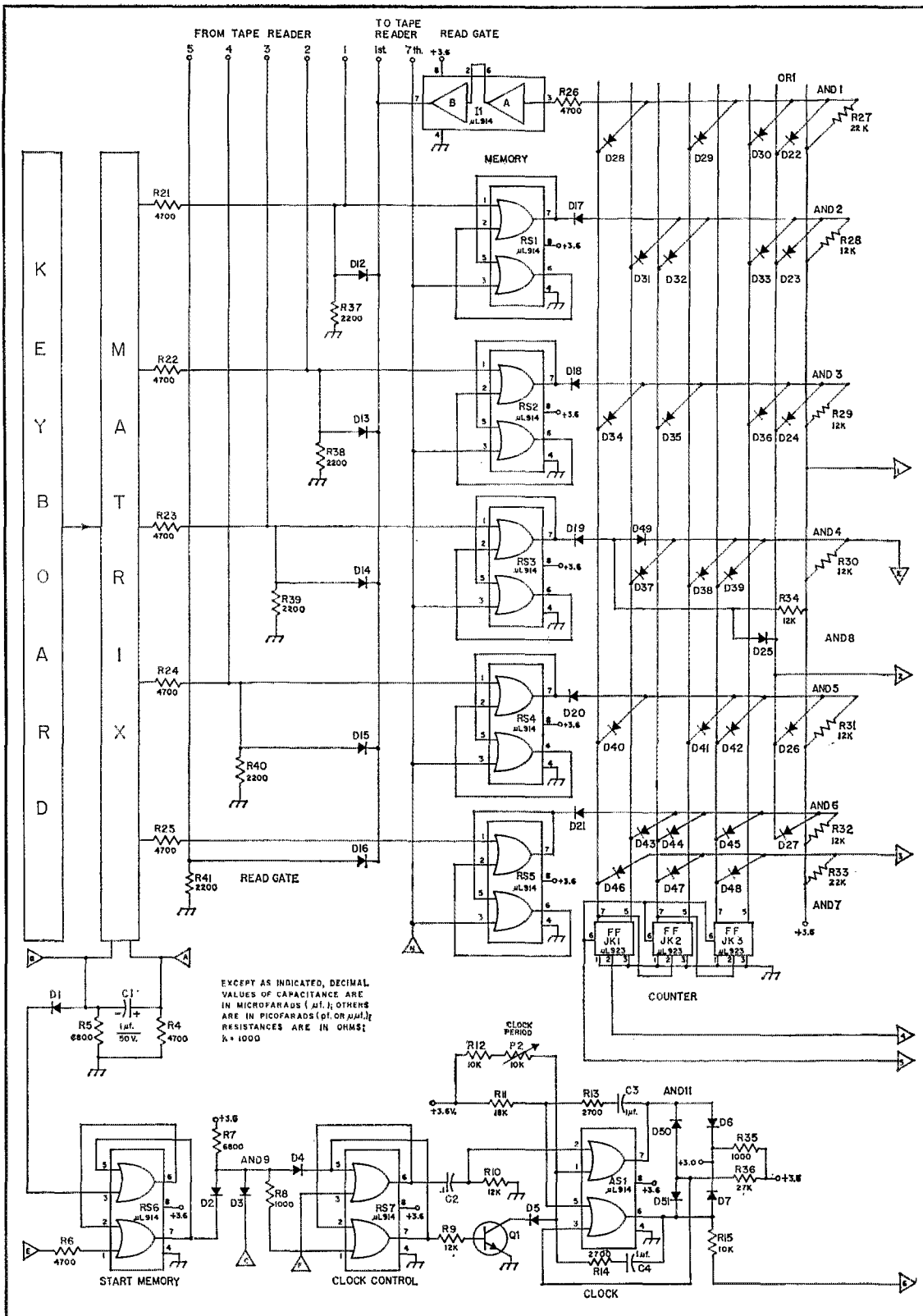
If the circuit is followed, no problems should arise, but if they do, start from the beginning again and consult the detailed discussion of the theory of operation. Two units have thus far been built and the only problems were caused by bad diodes, both open, shorted, and *color coded backwards*. It is strongly advisable to check *all* parts before assembly.

The resistors used were ¼-watt 5% units to keep the size small, but 10% ½-watt units shouldn't cause any problems.

Keyboard

There are several ways that the keyboard can be constructed. One is to use Lafayette push-button switches at 21 cents a throw with the keytops glued on, as was done by W2QYW.[5] Or, if you have a spare model 19 or 28 keyboard, floating around somewhere, dismantle the thing and then tie 31 microswitches side by side. Bolt the assembly on the keyboard frame so that the switch buttons just touch the key levers. Depressing a key will shove its lever up and strike the switch. But life isn't quite that simple — the switches are too wide. Tabs have to be soldered to two out of three key levers as shown in Fig. 13. If you're brave you might tear into that new portable typewriter that the wife bought with her life savings of green stamps and employ the same technique. Should you have nothing to do with about a week of spare time, send the family on a short vacation and consider the construction of a keyboard like mine. I won't go into very many details as they will be totally ignored by all but a few beginners. A picture is worth a

[5] Horowitz, "Perfect Code at Your Fingertips," *QST*, August, 1965.


FROM TAPE READER
TO TAPE READER
READ GATE
MEMORY
KEYBOARD
MATRIX
COUNTER
CLOCK
START MEMORY
CLOCK CONTROL
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µf.); OTHERS ARE IN PICOFARADS (pf. OR µµf.); RESISTANCES ARE IN OHMS; k = 1000

thousand words so refer to them for most of the information.

Layout of the keyboard top is shown in Fig. 14. Materials were ¼ inch Plexiglas stock for the sides and the five layers of the keyboard proper. One-eighth inch stock was used for everything else. Do *not* use full-strength glue for the Plexiglass; use a 50/50 mix. The full-strength stuff takes about one-half the time to dry that it takes to align the parts you're assembling. The 50/50 takes about two minutes. Consult your local plastics dealer. I used key tops from an old model 28 keyboard kindly donated to the project by Elliot Buchanan, K6VPC.

Serious consideration should be given to the type of key tops to be used, as they determine the exact dimensions of the keyboard. Square drills, although good for wood, seem to chew up Plexiglas, so round key tops are advisable. Using the little microswitches and ¾ inch centers between keys will require slight filing on the corners of the microswitches, as they are just a little too big. The support rods for the switches were No. 2 unthreaded stock purchased from a model train shop, and are available under the name of Morris Brass Rod at about two bits apiece. Threaded stock runs about $1.50 per foot, so the necessary threading was done with a borrowed die.

Keyboard feel was simulated by using ⅜-inch diameter, ¼-inch high pieces of plastic sponge of very fine hole type, as shown in Fig. 13. They were cut with a piece of ⅜-inch i.d. steel tubing filed sharp on one end.

Minimum tools to construct my version were one hacksaw, one vise, one drill press, one ½-inch drill (very sharp), one saber saw, one file, sandpaper, and one bunch of patience.

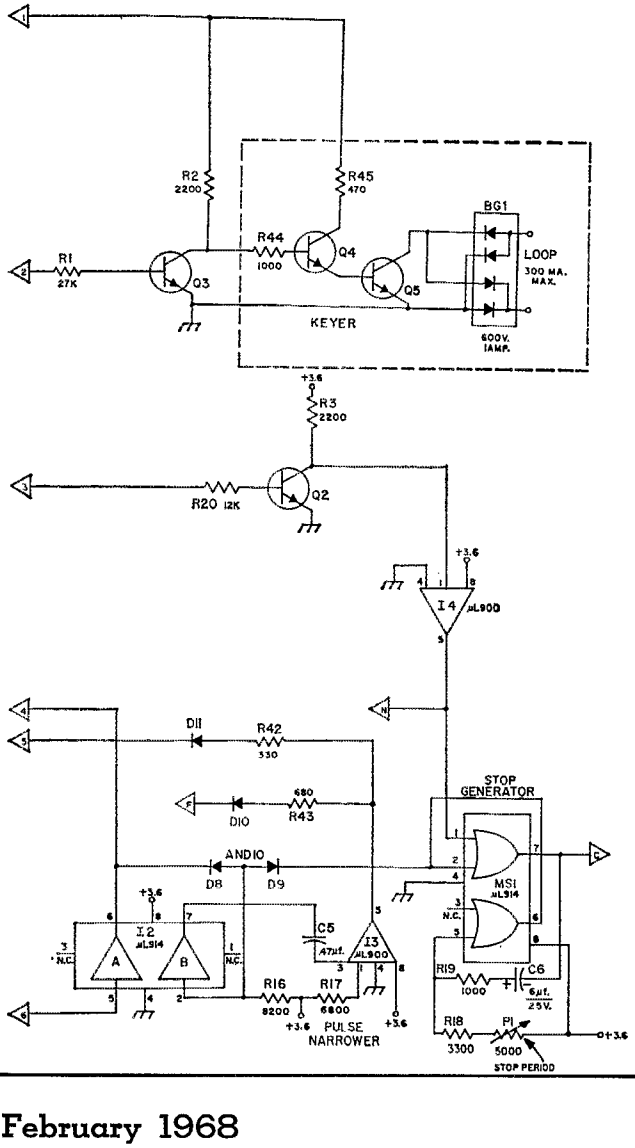


Fig. 12—Circuit diagram of the transmitter-distributor. Section enclosed in dashed lines is not included on the etched board shown in the photographs; it is assembled separately to keep loop-current transients out of the logic circuits. Fixed resistors are ¼ or ½-watt composition, 10% tolerance.

BG_1—Bridge rectifier, 1 amp., 600 volts p.r.v.

C_1—1-μf. electrolytic, 50 volts.

C_2—0.1-μf. disk ceramic, 50 volts.

C_3, C_4—1 μf. (two 0.47-μf. ceramic in parallel), 25 volts.

C_5—0.47-μf. ceramic, 25 volts.

C_6—6-μf. electrolytic, 25 volts.

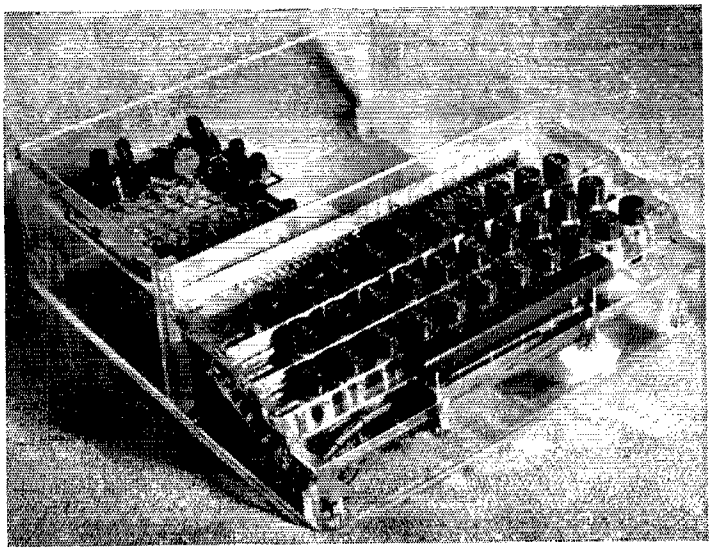
D_1—D_{51}, inc.—Germanium, general-purpose type (1N37, etc.)

P_1, P_2—Miniature potentiometer for etched-board mounting, linear (CTS ELS-10, Mallory MTC-1, or equivalent).

Q_1—Q_4, inc.—SE6002/2N3566 (Fairchild) or equivalent.

Q_5—SE7005 (Fairchild) or equivalent.

Information on nearest distributor of Fairchild integrated circuits (μL900, μL914 and μL923) and other semiconductor products may be obtained from Fairchild Semiconductor, Marketing Services Department, P. O. Box 1058, Mountain View, Calif. 94040.



Keys are set in terraced plastic strips running the width of the case. The printed-circuit board in the rear section contains the electronics shown in circuit form in Fig. 13. The keyboard matrix, Chart IV, is assembled on a strip extending the width of the keyboard. Its one end is just visible at the bottom of the case.

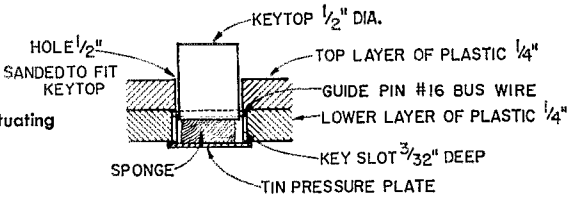


Fig. 13—Key construction and method of actuating microswitches.

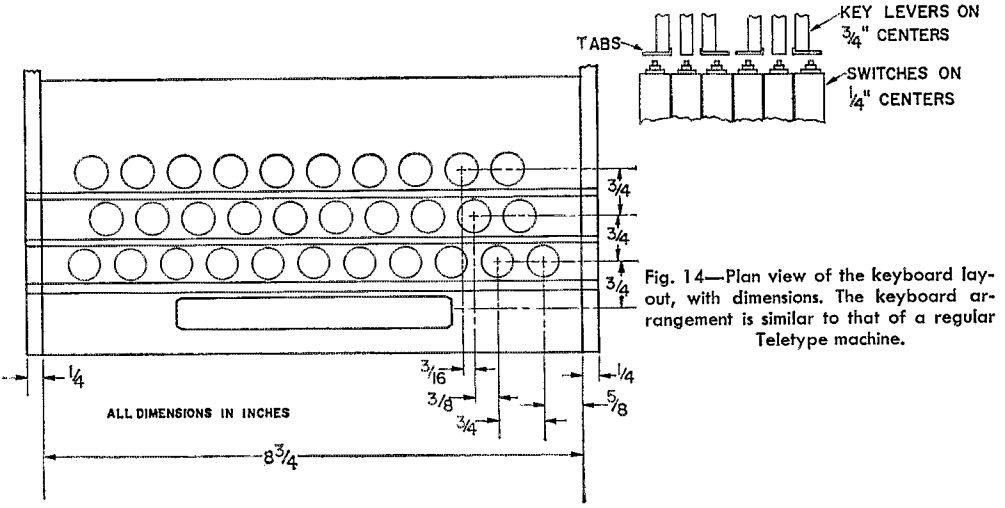


Fig. 14—Plan view of the keyboard layout, with dimensions. The keyboard arrangement is similar to that of a regular Teletype machine.

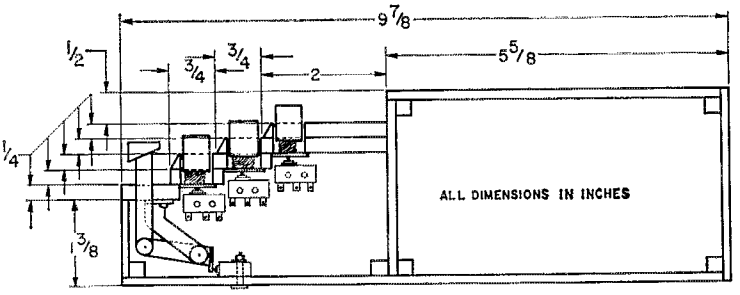


Fig. 15—Side plan of the keyboard, showing key rows and space bar. Case dimensions also are shown.

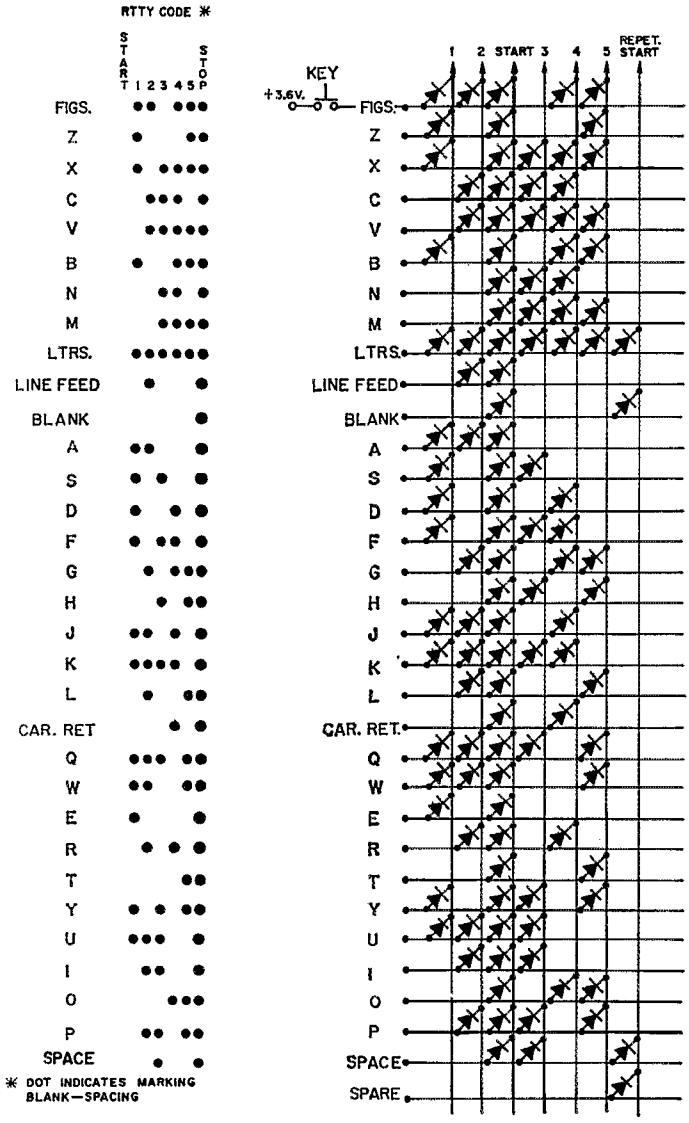


Chart IV—Teletype code and keyboard matrix wiring. A diode is used (1) for every *mark* pulse, (2) for each *start* trigger, and (3) for a *repetitive start* trigger. In the wiring shown, the "LETTERS," "BLANK," "SPACE" and "SPARE" keys have repetitive-start diodes; these characters will repeat automatically as long as the key is held down. The builder can choose whichever keys he wishes for repetitive start. A momentary-contact switch connected between the "start" and "repetitive start" lines will permit any character to be sent continuously by the following procedure; 1) hold down switch; 2) press key desired; 3) release switch; 4) release key. Diodes (germanium) for the matrix should be carefully checked for quality and polarity before installation.

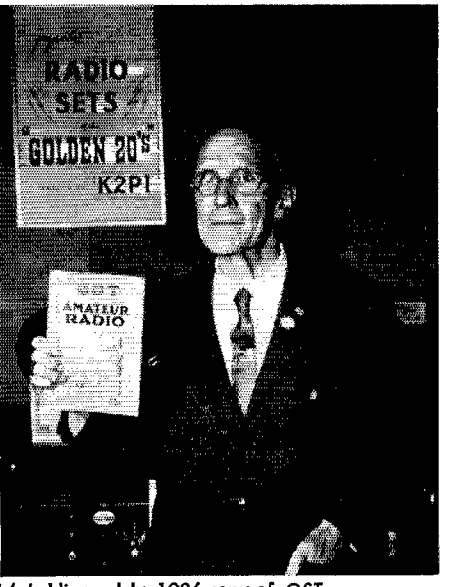
Conclusion

In summing up, many fields are opened up by such a unit. For instance, air mobile teletype; seriously, how many can show a log with *that* notation? The breadboard was tested at a clock rate of 100 kc/s., which works out to a neat 120,000 words per minute! I know of few that can type that fast and fewer with equipment to print it out. To change the speed it is only necessary to change the timing capacitors of AS_1 and MS_1 to suit.

Much credit goes to the following individuals for their undying faith in the project and their "first the Wright brothers and now you" encouragement. They are Elliot Buchanan, W6VPC,[6] Will Alexander, WA6RDZ, and a host of "not yet" amateurs too numerous to mention here. QST

[6] The double-sided etched circuit board holding the logic circuits shown in Fig. 12 (excluding the part in the dashed enclosure) will be made available through W6VPC should enough interest be shown.

Strays



At the first annual South Jersey Hobby Show recently held at the Morristown Mall, Morristown, N. J., K2PI had one of the prize winning exhibits in the collections category. Shown left is the exhibit featuring a dozen of the most popular radios of the 1925 era. An a.c. operated Atwater Kent model 82 was in operation tuned to a local station. Right is K2PI, a ham since 1914, holding a July, 1926 copy of *QST*.

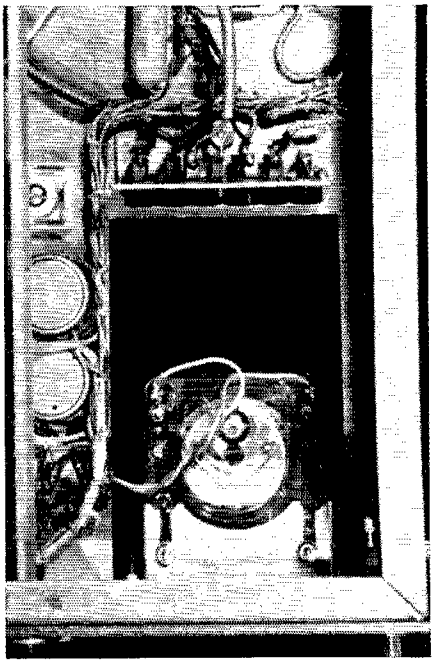
A Picture Story Showing Modular Construction Of A Ham Receiver

BY JIM RUSH,* W4EWL

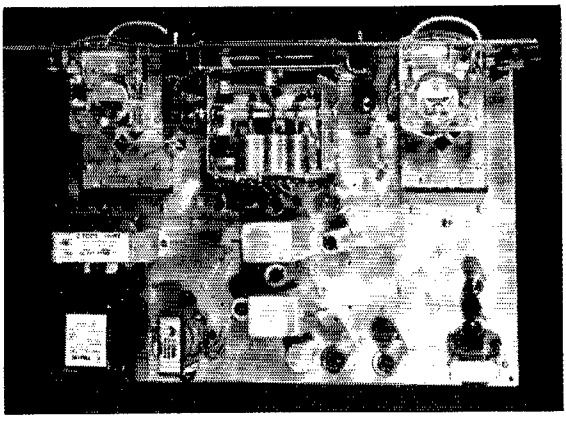
IN the neat-appearing receiver shown above, modular plug-in units are visible at the left- and right-hand sides of the panel. This receiver has a tunable i.f. of 200 to 600 kc., a second i.f. of 100 kc., and uses plug-in crystal-controlled front-end modules. Modular format has also been used for the product and a.m. detectors. This receiver offers considerable flexibility for circuit experimenting.

* 1422 Maycrest, W., Owensboro, Ky. 12301.

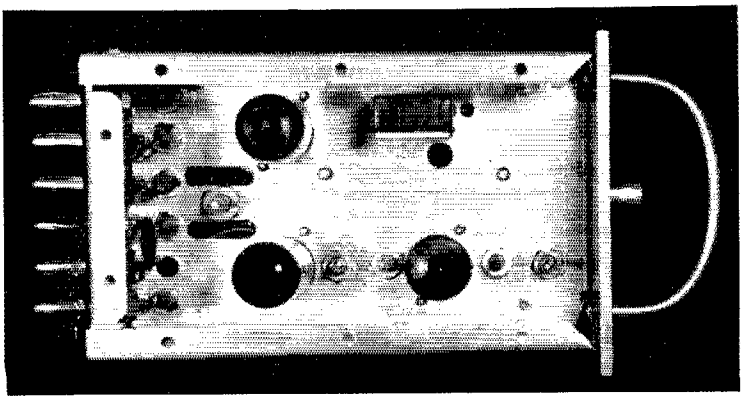
A view of the inside of one of the detector modules. Banana plugs are mounted on the rear of the plug-in chassis and mate with banana jacks on the main chassis of the receiver to provide circuit connections.



Home-made jack bar (upper center) into which the plug-in assembly is mated. Module is not plugged in as indicated by dark area.

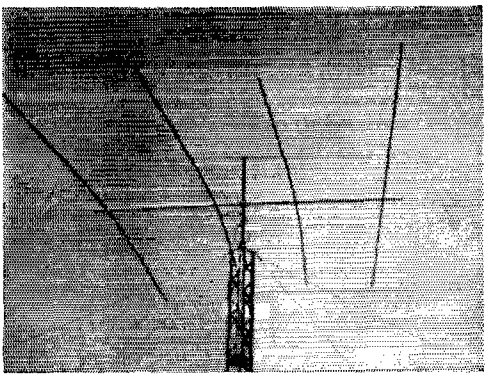


A top-chassis view of the W4EWL experimental receiver. The plug-in converter and detector assemblies are visible at the upper left and upper right of the photo. The r.f., mixer, and oscillator assembly for the tunable i.f. was taken from an a.m. tuner and is mounted between the plug-in units.



A look at the inside of one of the crystal-controlled plug-in converters. A handle on the front of the module aids the user when removing it from the main chassis.

The Wooden Yagi



Ten-meter Wooden Yagi installed on top of a tower. The beam is easy to construct; it can be put together with hand tools in only two hours.

A 4-Element Beam For 10-Meters

BY CHRIS SHARO,* VE2DBS

COMMERCIAL beams are quite expensive here in Canada. A three-band, three-element trap beam, which sells for $77 in the States, costs $129 in Quebec. However, home-brew antennas can be built for considerably less. For example, the four-element 10-meter "Wooden Yagi" shown in the photograph costs only $6.88 to construct.

As its name implies, the Wooden Yagi is constructed primarily of lumber. The boom and element supports are made of British Columbia fir, and the four elements are made of No. 8 aluminum ground wire. British Columbia fir was chosen because of its low cost, fine straight grain, strength, and light weight.

The author's Wooden Yagi was cut for 28.8 Mc. using the data given on pages 113, 164, and 165 of the Tenth Edition of the *ARRL Antenna Book*. A folded dipole is used as the driven element. The two directors are five percent shorter than the dipole, and the reflector is five percent longer. Spacing between the reflector and driven element is 0.2 wavelength, between the driven element and first director is 0.15 wavelength, and between the first director and second director is 0.16 wavelength.

Construction

Obtain one 18-foot length of 1⅝-inch diameter stair railing for the boom, two 18-foot lengths of ¾-inch diameter dowel for the reflector and driven element supports, and two 16-foot lengths of ¾-inch diameter dowel for the director supports. In some locations, long lengths of ¾-inch wooden dowel may not be available. Fiber glass tubes, bamboo poles, or plastic rods should make suitable substitutes. Other items that need to be purchased include a 100-foot roll of No. 8 aluminum ground wire, three dozen zinc-plated screw eyes with holes that are approximately ⅛ inch in diameter, and one TV-type U-bolt with a jagged fitting.

Once the materials have been obtained, locate a large, clean, flat surface upon which to construct the antenna. Such an area should make it easy to do precise work. I used my cement patio.

Cut the 18-foot driven element support to one-half wavelength at the operating frequency (28.8 Mc. in my case), and cut the reflector support so that it is five percent longer. Trim the two director supports five percent shorter than the driven element support. Mark the exact center of each dowel so that the dowels can be lined up on the boom, and label each dowel as to its function.

Starting at about 6 inches in from one end, measure and mark the 1⅝-inch diameter stair railing for the element spacings mentioned earlier. Allow the boom to extend about 6 inches beyond the final mark. The extra length at each end of the boom will add much strength to the stress points of the reflector and second director supports; without it, the boom ends may split

Want to beat the high cost of a commercial Yagi? Here's a homemade job that can be built for under $7.

*4355 Orchard Street, St. Hubert 1, Quebec, Canada.

if the wind velocity is high. Label each spacing mark as to what element it refers to so that the elements can be properly placed.

Draw a line down the length of the boom. At each of the four intersections of this line and the spacing marks, drill a ¾-inch diameter hole part way through the boom. Stop just before the bit breaks through the boom, and finish each hole by drilling through the reverse side. In this way, you will avoid chipping the wood. Make sure that these holes are straight and true, as they determine to a large extent the final appearance of your antenna. Whether you use a drill press or a bit brace, it will pay you to take your time.

Insert in the boom the previously cut and center-marked dowels. Try for a snug fit, but don't force the dowels so as to split the boom. If you find it difficult to install the dowels, take a small round file and remove a slight amount of wood from the holes that are too small. Once the dowels fit the boom, line up all the element-support center marks with the center of the boom. The whole unit should resemble a conventional Yagi with one exception: it's all wood.

Lay the Wooden Yagi on a flat surface and twist into the boom one screw eye at each of the four intersections of the element supports and the boom. Turn the screw eyes until only the eyes rest above the surface of the wood. Facing either end of the boom, mark off on the elements supports a distance of about 2 feet to the left and right of the four screw eyes. Continue making a mark every 2 feet until the ends of each element support are reached. At each mark, twist a screw eye into the wood so that only the eye is visible. Then place a screw eye in the center of each end of the element supports.

If you wish to use a T match or a gamma match, no more screw eyes will be needed. However, if the driven element is to be a folded dipole, proceed as follows: Turn the Wooden Yagi over, measure on the driven element support a distance of about 1½ inches to the left and right of the center of the boom, and place a screw eye at each mark. Then, as you did when the antenna was right side up, install a screw eye every 2 feet until the ends of the driven element support are reached. Then turn the Wooden Yagi over again.

My antenna was constructed without the benefit of being weather-proofed. You can do the same with yours if you like, or you can add strength and weather protection by applying two heavy coats of spar varnish.

After the wood is coated, adjust the screw eyes if necessary so that the eyes (holes) face the boom. Then take a roll of No. 8 aluminum ground wire and, starting with the second director support, feed the wire through the screw eyes in the same way that you would feed line through the guides of a fishing rod. Allow an excess of about 3 inches of wire to extend past each end of the support. In like manner, wire the first director, reflector and, if you intend to use a T or gamma match, driven element. However, if like myself you prefer low-loss line and a folded dipole, proceed as follows: Cut off a length of No. 8 wire equal to twice the length of the driven element support plus about 8 inches. Feed the wire through the top screw eyes and center the wire. At each end of the support, carefully bend the wire and feed it through the bottom screw eyes toward the center of the boom. In the process of making the dipole, try to keep kinks from forming, and straighten any that appear.

Starting with the second director, wrap the excess wire at one end around the screw eye at that end, and pinch the wire tight with a pair of pliers. Do the same to the first director, reflector and, if a T or gamma match is to be employed, driven element. If a folded dipole is used, wrap one of the free ends of the element around the appropriate underside screw eye 1½ inches from the center of the boom. After one end of each of the elements has been tied down, proceed to secure the other end of each wire. This time, before wrapping an element wire around a screw eye, exert a slight amount of tension on the wire to strain the dowel. As a result, the elements will act like guys and add strength to the supports.

Once the elements have been wired, connect the feed line to the driven element. I used solderless wire connectors to attach 300-ohm transmission line to the folded dipole.

Next, locate the balance point of the antenna, and attach the boom to the mast. My first attempt was not successful, because I drilled the holes for the U-bolt in the wooden boom rather than in the aluminum mast. As a result, when it rained, water got into the holes, and the antenna changed position. To insure a secure mounting, drill the two U-bolt holes in the aluminum (or steel) mast so that the U-bolt can enter with its legs one above the other rather than side by side. In addition, you may use an 8- or 10-inch length of pipe cut lengthwise and placed over the boom and under the U-bolt. If the boom needs to be strengthened, allow the mast to extend about a foot above the boom and run a guy wire from each end of the boom to the top of the mast.

Results

I hope that anyone who builds the Wooden Yagi enjoys its performance as much as I did last winter on 10-meter phone. It has given me many S9 signal reports and has introduced me to a great bunch of fellows. The antenna underwent a good test last year with 50 m.p.h. winds and heavy icing. However, if the wind or ice should bring it down, I will have one thing for sure: a darn good pile of firewood! QST

Strays

The Radio Society of Great Britain requests that all correspondence to them still be addressed to their headquarters at 28 Little Russell Street, London, W.C. 1. As announced in *QST* for December 1967, they have acquired a new building at No. 35 Doughty Street, London, W.C. 1, but will not occupy the premises for several months. *QST* will announce the change of address when it occurs.

An Unusual R. F. Amplifier Circuit

The unorthodox amplifier circuit described here is the work of Eric Carlson, W3MOO. It has been incorporated in a number of low-power transistor transmitters, one of which has been given a thorough workout by Paul Peterson, W3BV, on 80, 40 and 20 meters. European DX has been worked on the latter band with only a couple of watts total input.

EVER wished for an r.f. power amplifier in which the d.c. input would *drop* when the tank circuit was tuned off resonance? Fig. 1 is such a circuit.

The unconventional thing is the *series*-tuned tank circuit connected between the emitter of Q_2 and common ground. The collector output is taken through a tapped coil for matching into a 50-ohm line. When the tank is tuned to resonance (by C_1) at the driving frequency the impedance between emitter and ground is very low and Q_2 resembles a grounded-emitter amplifier. However, when C_1 is tuned away from resonance the impedance between emitter and ground rises rapidly, and a feedback voltage is developed which reduces the drive and consequently the d.c. input to the collector. The r.f. output changes similarly.

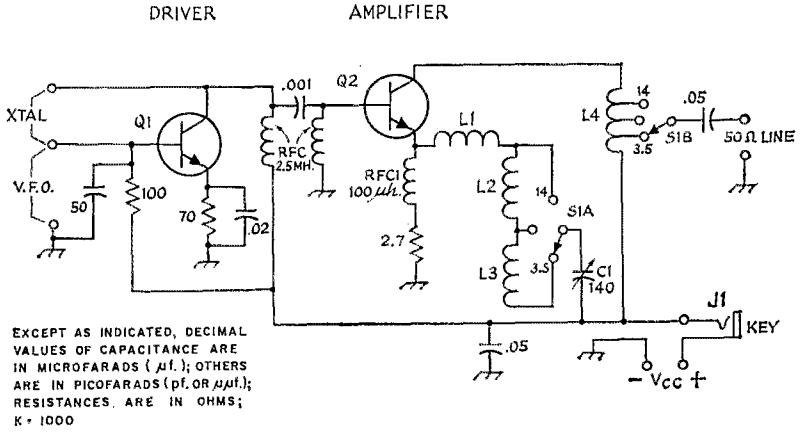
The driver in Fig. 1 can be used either as a Pierce-type crystal oscillator or as a v.f.o. amplifier. Its output is choke coupled to the base of the amplifier.

The amplifier tank coils, L_1, L_2, and L_3, should have reasonably good Q and the inductances should be such that, with C_1, L_1 will tune to 14 Mc., L_1 and L_2 in series will tune to 7 Mc., and all three in series will tune to 3.5 Mc. The coils were small toroids in a breadboard transmitter that W3MOO sent us to try out, but since the cores were homemade from powdered-iron slugs of unknown characteristics, they are probably not reproducible. The transmitter at W3BV uses a single tank coil, tapped for the two higher bands. It has 40 close-wound turns of No. 26 enameled wire on a National XR-50 form, tapped at the 30th turn for 7 Mc. and the 20th turn for 14 Mc. The entire coil is used for 3.5 Mc. In general, circuit values are not critical, as shown by the fact that they have been varied in several different models that have been assembled using the basic circuit. A heat radiator such as the Wakefield type NF207 (fits TO-5 case) should be used on Q_2.

Concerning setting up the transmitter, W3MOO writes:

"Before placing in service, the following checks should be made. They may save transistor damage. Place the transistors in their sockets and connect an ohmmeter to the positive and negative supply terminals and close the key. Read the resistance on the 100X scale. With one

(Continued on page 144)



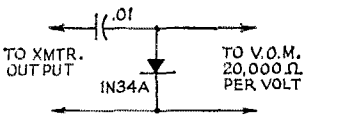
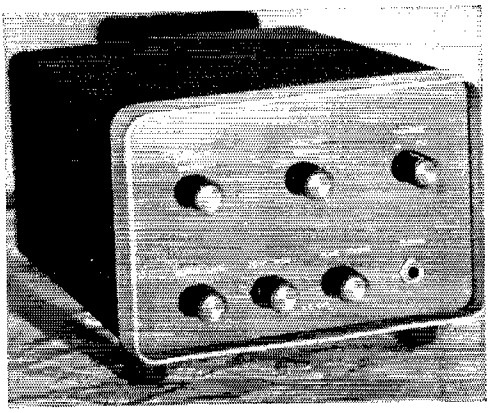


Fig. 1—The transmitter circuit. Capacitors are disk ceramic; resistors are ½-watt composition.

C_1—140-pf. midget variable.
J_1—Open-circuit jack (insulated if on metal chassis).
L_1, L_2, L_3—See text.
L_4—20 turns No. 26 enam. close-wound on ¼-inch diam. powdered-iron core 1⅛ inches long (core removed from V6 Superex choke); tapped 10, 13 and 16 turns from supply end (3.5, 7 and 14 Mc. respectively).
Q_1, Q_2—2N3053 or equivalent.
RFC_1—App. 100 μh.; 100 turns No. 26 enam. scramble-wound on same type core as L_4.
S_1—Rotary, 2 poles, 3 positions. Separate switches may be used (see text).

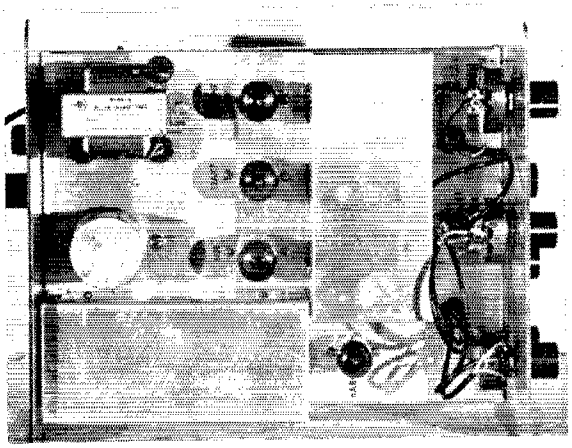
A Filter/Monitor for the C.W. Man



A close-up look at the front panel of the Filter/Monitor. Decals are used to identify the controls. The cabinet is home made.

BY CLARK HATCH,* KØKED

Many modern-day s.s.b./c.w. transceivers lack sufficient c.w. selectivity for digging deep into the QRM for a weak signal. One solution to the problem is to add an accessory unit of some kind rather than attempting to modify the selectivity-determining circuits of the transceiver. With that end in mind, the author designed this audio filter assembly. The box includes a limiter and a c.w. monitor. Although designed for use with transceivers, this unit can be connected to any receiver that needs "sharpening up" on c.w.



Top-chassis view of the completed unit. The power supply is at the upper left. Filters FL_1 and FL_2 are housed in the Minibox enclosures that are mounted on the main chassis.

It is not unusual for a ham to go out and buy an s.s.b./c.w. transceiver, only to discover that the 2.1-kc. i.f. bandwidth left a great deal to be desired during the reception of c.w. signals. When the QRM level is high, the usual s.s.b. i.f. passband just isn't adequate for the average c.w. operator. Another feature that is often left out of transmitting equipment is a c.w. monitor, another much needed tool for some c.w. operators. This filter/monitor box solved these problems for the author. It was not difficult to build and get operating, nor was it an expensive project. The selectivity possible with this unit should be of value to the weak-signal v.h.f. operator too. In moonbounce communications, such a filter is usually a permanent part of the station equipment.

Audio Filtering

There are some features about audio selectivity that require special treatment if satisfactory results are to be had. Some form of limiting is usually included in the circuit, before or after the filter section. The limiter serves as an a.g.c. device to level off the amplitude of the signals before they reach the speaker or headphones. If this measure isn't taken, loud signals can reach the operator in ear-shattering fashion as he tunes across the band. A limiter is also helpful in the reduction of man-made pulse noises.

Unlike r.f. selectivity, audio selectivity requires that the operator listen to a constant tone — approximately 700 c.p.s. in this case — which can become somewhat monotonous after an extended period of operating. Unfortunately, the only recourse is to alter the peak frequency of the filter by switching in a different set of L/C values, a rather complex solution, indeed. Therefore, most operators learn to live with a single tone, using the audio filter when the going gets

* Route 3, Salina, Kansas 67401.

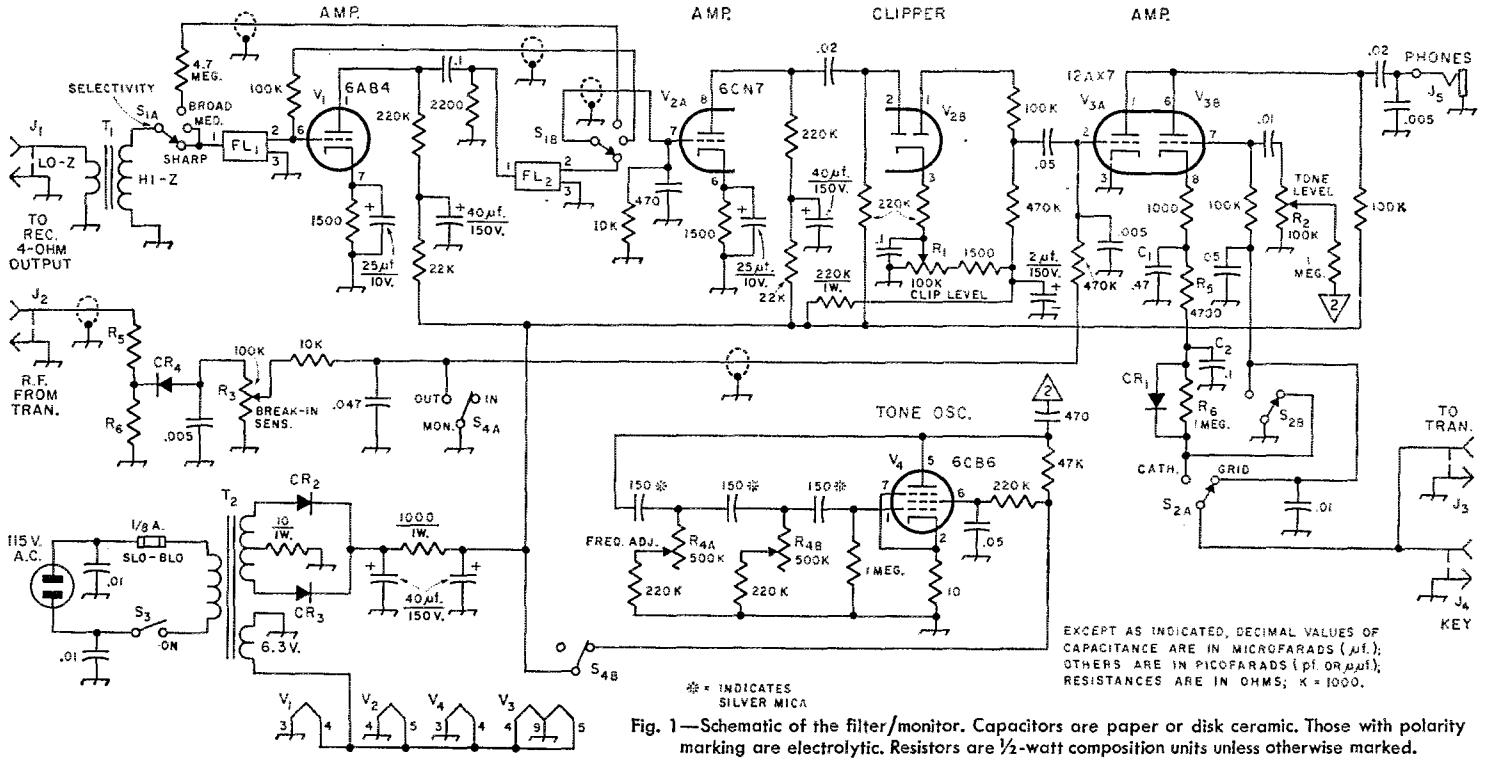
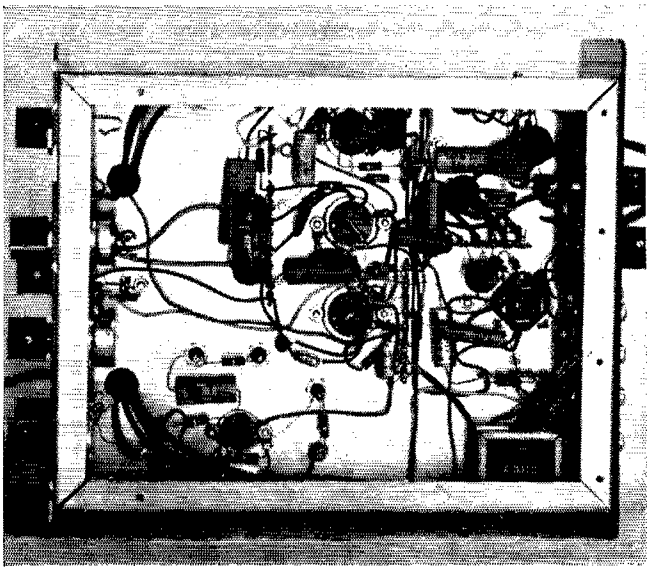


Fig. 1—Schematic of the filter/monitor. Capacitors are paper or disk ceramic. Those with polarity marking are electrolytic. Resistors are ½-watt composition units unless otherwise marked.

CR_1, CR_2, CR_3—Top-hat silicon diode. 400 p.r.v. at 100 ma. suitable.
CR_4—1N34A or similar.
FL_1, FL_2—See text and Fig. 2.
J_1-J_4, inc.—Phono connector.
J_5—Phone jack.
R_1-R_2, inc.—Linear-taper carbon control.
R_2—Audio-taper carbon control.
R_4—Dual 0.5 megohm linear-taper carbon control.
R_5, R_6—Selected to give 50 r.f. volts at CR_4.
S_1—Phenolic rotary, 1 section, 2 poles, 3 positions.
S_2—Phenolic rotary, 1 section, 2 poles, 2 positions.
S_3—Control switch (part of R_2.)
S_4—Same type as S_2.
T_1—Audio transformer, 2000-ohm primary, 3.2-ohm secondary (Stancor A-3332 suitable.)
T_2—Power transformer. 250 volts c.t. at 25 ma., 6.3 volts at 1 ampere (Stancor PS-8416.)



Looking into the under side of the chassis the power-supply is at the upper right, the input transformer, T_1, is at the lower right, and the front panel is at the left.

rough, then switching the filter out of the circuit for normal c.w. operation.

The Circuit

Audio output from the station transceiver, or receiver, is fed into the filter/monitor circuit at J_1, Fig. 1. A three-position selectivity switch, S_1, routes the audio around both filter sections of the circuit when placed in the BROAD setting. When switched to MEDIUM, S_1 places the first filter, FL_1, in the circuit. In the SHARP mode, S_1 adds V_1 and FL_2 to the circuit, for maximum selectivity and added audio gain. The audio signal is amplified by V_{2A} and is fed to V_{2B} where it is clipped. R_1, the bias control for V_{2B}, is adjusted for the desired clipping level. Additional audio amplification takes place at V_{3A} before the signal reaches the headphones at J_5.

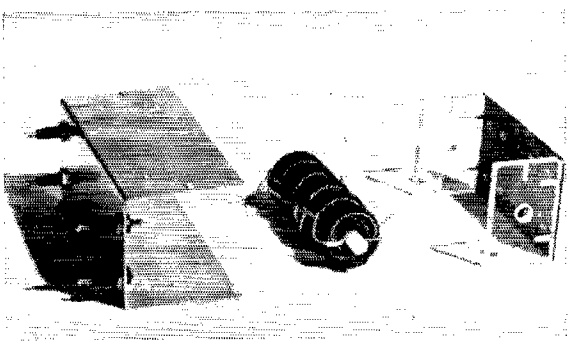
A phase-shift oscillator, V_4, generates an audio tone whose frequency is determined by the setting of R_4. Output from V_4 is amplified to headphone level by V_{3B}. V_{3B} is keyed simultaneously with the transmitter when the key is plugged into J_4 and when J_3 is connected to the keying terminals of the transmitter. When the transmitter is activated, its r.f. is sampled and fed into J_2. The r.f. level is set by adjusting R_3. CR_4 rectifies the r.f., developing a negative bias voltage which turns V_{3A} off each time the transmitter is keyed. This prevents the receiver audio output from reaching J_5 and combining with the sidetone signal.

Depending upon the keying circuit of the transmitter, grid-block or cathode keying, the proper conditions are set up by the position of S_2. Because of key clicks from V_{3B}, it was necessary to add R_5 and C_1 to eliminate the problem. When the transmitter was connected to the circuit, additional shaping became necessary and CR_1 was installed. Because the note seemed a bit "mushy", R_6 was added. Its value should be determined experimentally and will depend on the transmitter that is being used with the monitor. It should be selected to give a pleasing note — determined by the operator's preference.

The power supply is of ordinary design and uses solid-state rectifiers. A ½-ampere slo-blo fuse protects the power supply in the event of a short circuit or excessive current drain.

Filter Construction

A total of ten toroidal-wound inductors is used in the filter sections of the circuit. Each



A breakdown view of the toroid filter mounting hardware and box. In this photo there are four feedthrough terminals shown. Only three of them are used for circuit connections. The fourth terminal serves as a fourth mounting point for the Minibox.

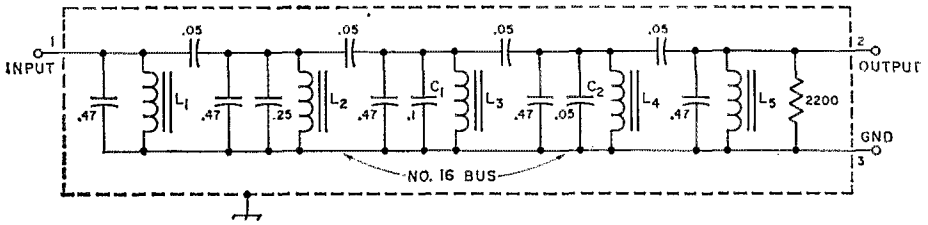


Fig. 2—Schematic diagram of the two filter assemblies. Both filters are identical. Capacitors are paper or disk ceramic. Capacitance is in μf. Resistor is a ½-watt composition unit. C_1, C_2—50-volt disk ceramic type. L_1-L_5, inc.—88-mh. telephone toroid inductor. If type used has two separate windings, join one pair of adjacent wires to put the windings in series.

filter, FL_1 and FL_2, contains five 88-mh. toroids[1] which when combined with the fixed capacitors shown in Fig. 2 form a bandpass filter. Each filter is housed in a 2¼ × 2¼ × 5-inch Mini box. Plexiglas end plates are used to support each bank of toroids as shown in the photo. Insulating board is bolted to the end plates and is used for mounting the capacitors that go with the filters. Metal eyelets were added to the capacitor board in this model, serving as tie points when soldering the capacitors and coils together. The completed network assembly must be small enough to fit into the Minibox. Feedthrough terminals are mounted on the bottom cover of the Minibox. Circuit connections to the filters are made at these fittings. A piece of 5/16-inch diameter dowel rod can be passed through the centers of the toroids to support them between the two Plexiglas end plates.

General Construction

A 7 × 9 × 2-inch aluminum chassis is used as a foundation for the filter/monitor unit. The cabinet is home made, its design being based on ideas taken from a *QST* article.[2] Because there is nothing critical about the layout of the circuit, it is not mandatory that the parts be placed exactly as shown in the photos. The primary consideration should be the reduction of hum pickup in the audio circuits. This can be accomplished best by keeping the power supply as far away from the audio section as possible. The use of shielded cable in the low-level audio circuits will also help.

Operation

After making sure that there are no wiring errors or short circuits in the completed assembly, turn it on and allow a few moments for the filaments to warm up. If it passes the "smoke test," final checkout can begin.

With the filter/monitor connected to the receiver, set the CLIPPER LEVEL control to minimum and tune in a c.w. signal of medium strength. The next step is to adjust the receiver's audio gain control to a setting that gives from six to ten decibels more gain than is normally used for comfortable listening. After doing that, adjust the CLIPPER LEVEL for normal listening volume. Once the desired settings are obtained, do not use the receiver's audio-gain control. If more volume is needed, reduce the clipping level slightly and repeat the initial adjustment process.

When setting up the break-in sensitivity of the unit, turn the monitor switch to OUT and adjust the BREAK-IN SENSITIVITY control to minimum (counter clockwise). Tune the receiver to the transmitter's frequency. Turn the monitor switch to the IN position, key the transmitter while running normal power, and adjust the break-in sensitivity until the tone from the receiver is muted. Keep the TONE VOLUME turned down while making this adjustment. Key the transmitter a few times to make certain that muting occurs each time the key is closed. If not, advance the sensitivity control slightly. If you want to monitor your sending directly from the receiver, simply switch the monitor to the OUT position. The TONE FREQ. control should be adjusted to the peak frequency of the audio filters in the unit. In doing this, the selectivity control should be set to MEDIUM or SHARP. While keying the transmitter, adjust the receiver tuning dial, slowly, until the amplitude of the note reaches a peak. Next, advance the TONE VOLUME control until the monitor's tone is about the same level as that from the receiver. Now, adjust the TONE FREQUENCY until the two notes are at zero beat. The monitor switch must be turned to the IN position during these adjustments.

When connecting the filter/monitor to the transmitter, the transmitter keying terminals are connected to J_3 of the monitor with a shielded lead. The key is plugged into J_4, and the keying switch, S_2, (rear apron of the chassis) is turned to CATHODE or GRID, depending upon the type of keying circuit employed in your transmitter.

With a little practice, the tuning in of c.w. signals can be mastered. Because the selectivity is quite sharp, it is best to practice tuning with the selectivity switch in the MEDIUM position. The crystal calibrator, if your receiver has one, is useful in producing a practice c.w. note.

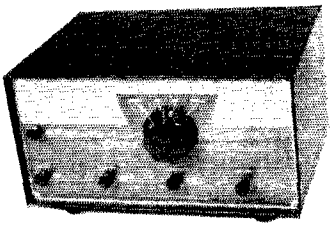
For those who desire better c.w. selectivity, this unit should be a welcome addition to the shack equipment. If a monitor isn't needed, that portion of the circuit can be eliminated and the entire package made smaller. The author suggests that you try this circuit if your c.w. reception could stand "sharpening up." QST

[1] Available as surplus from various outlets. Five for $2.50 from WA6FKN, Box 34, Dixon, California. — *Editor.*
[2] Peck, "Home Brew Custom Designing," *QST*, April 1961.

Recent Equipment

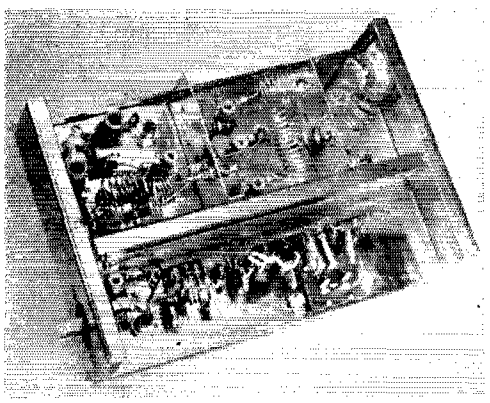
To acquaint you with the technical features of current amateur gear.

Drake V.H.F. Converters and Accessories



Most v.h.f. enthusiasts feel that a converter-receiver combination is the best way to take care of the receiving job at 50 Mc. and higher frequencies, except perhaps in the case of a mobile or portable installation where compactness makes the one-package transceiver attractive. But where operation on more than one band is planned the use of converters tends to create a clutter in the v.h.f. station. Band changing may be complicated by the necessary patch cables, to the extent that it may be more time-consuming than the work involved in switching transmitters.

The Drake SC-2 and SC-6 FET converters are designed to do the receiving job well, and in addition to be integrated into a one-package v.h.f. receiving unit for up to three bands. The CC-1 Converter console (see first photograph) does away with the cable changing usually involved in moving from one v.h.f. band to another, and also makes provision for the matching CPS-1 Power Supply and the SCC-1 V.h.f. Crystal Calibrator. If separate antennas are used for each v.h.f. band, changing from one band to another may be done entirely from the console's front panel. The calibrator and power supply are similarly front-panel controlled. Any of the units may be used without the console, if so desired.

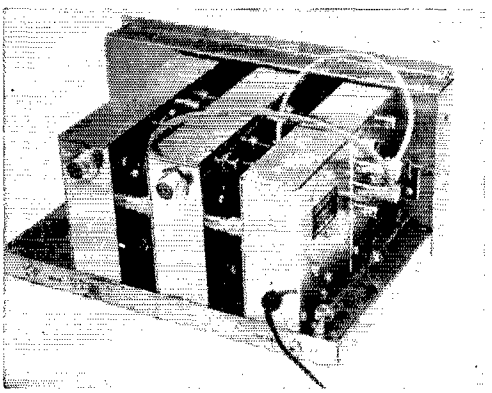


Interior of the Drake SC-2 144-Mc. Converter. The oscillator and multiplier stages, lower portion of picture, are separated from the r.f. circuits by a full-length shield. The r.f. circuits are also isolated from one another by three smaller shields. The input circuit is at the upper right. Bandpass circuits are used for interstage coupling, center, and mixer output, left.

Converter Details

The Drake SC-2 uses four transistors: TIS34s for the neutralized r.f. amplifier and mixer, a 2N3394 crystal oscillator on 43.333 or 43.666 Mc., and a 2N3663 tripler to 130 or 131 Mc. The use of two crystals, selected by a small slide switch, permits use of a ham-bands-only communications receiver, with 14 Mc. giving either 144- or 145-Mc. coverage. Both the interstage coupling and the mixer output circuits are designed for band-pass response. Voltage fed to the oscillator and multiplier stages is Zener-regulated, for good frequency stability.

The SC-6 is very similar in circuit and design, except that only three transistors are needed for the lower band. The r.f. and mixer transistors in the SC-6 are TIM12s. Slug-tuned circuits are used in the 6-meter converter, and there are five of them in the bandpass coupling between the r.f. amplifier and mixer, resulting in excellent rejection of unwanted signals. The freedom from over-



Interior of the Drake CC-1 Converter and Accessory Console, showing converters for 50 and 144 Mc., left and center, and power supply and crystal calibrator, right.

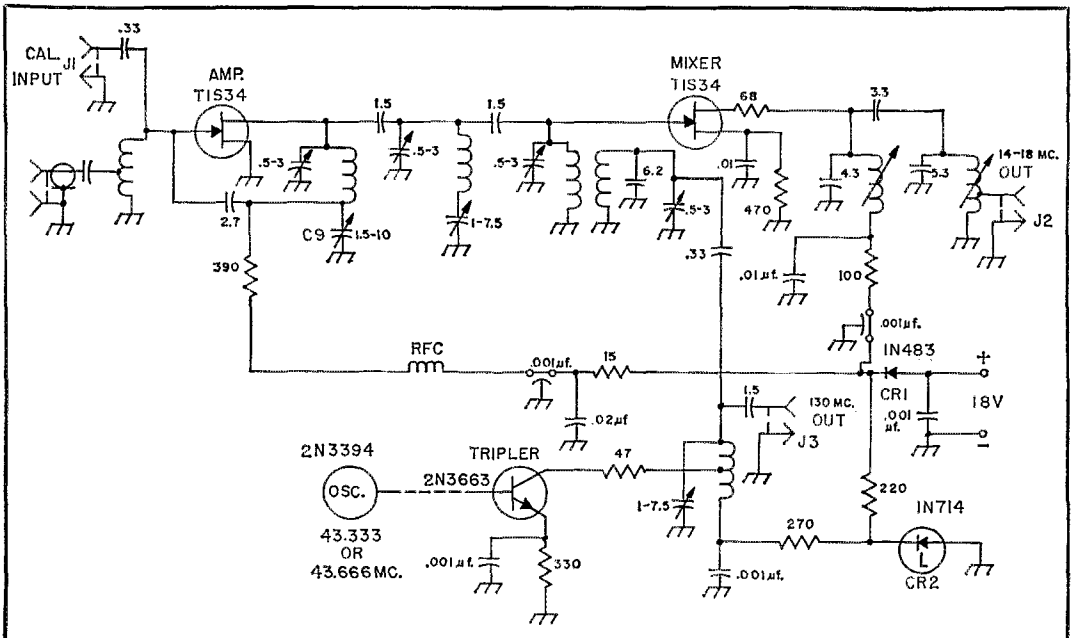
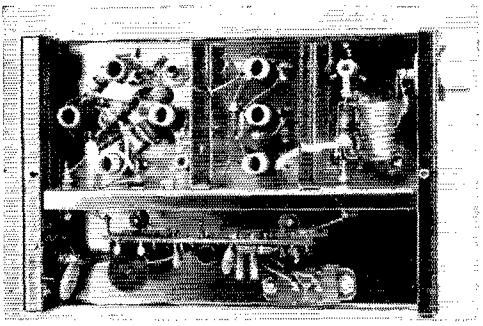


Fig. 1—Partial schematic diagram of the Drake 2-meter converter, showing details of the bandpass coupling circuits. Provision is made for coupling the calibrator signal into the converter input (J_1,) and for taking energy out at the injection frequency (J_3) for driving a transmitting mixer. Circuit of the 50-Mc. converter is similar, except for elimination of the tripler stage and use of a slightly different transistor lineup.

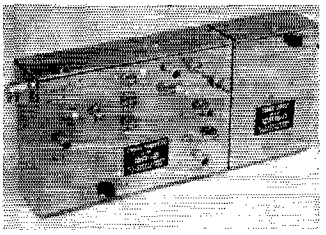
loading and cross-modulation that is characteristic of the FET transistor, combined with the bandpass circuitry, makes for v.h.f. reception as free of spurious signals as any we've seen.

Two simple additions to the Drake converters, requiring little more than two phono jacks and two coupling capacitors each, extend their usefulness at little cost. One jack (J_3) permits taking off the injection voltage for use in a transmitting converter. Another (J_1) is for coupling a crystal calibrator output into the r.f. stage. Drake supplies the SCC-1 calibrator for this purpose, but you are welcome to use the idea in your own setup. It would be well if more of us did it this way, instead of relying on the 100-kc. calibrators in our receivers!

If your receiver is for the amateur bands only, the SC-2 will give you coverage of 144.0 to whatever the tuning range of the receiver allows, and 145 Mc. up, by the same amount, with the crystals normally supplied with the converter. The SC-6 is supplied to cover 50.0 up and 50.5 up, depending on the position of the crystal switch. Crystals for other tuning combinations and various intermediate frequencies can be supplied on order, in addition to the 14-Mc. i.f. version described, which is for receivers having 500-kc. tuning ranges.



Interior of the SC-6 50-Mc. Converter. Slug-tuned circuits are used, but otherwise the converter is quite similar to the 144-Mc. model.



The Drake SC-2 2-Meter Converter and CPS-1 Power supply, shown plugged together for one-band operation. The same components mount separately in the CC-1 Console.

Drake V.h.f. Converters and Accessories

	SC-6 *Converter*	SC-2 *Converter*	CC-1 *Console*	CPS-1 *Supply*	SCC-1 *Calibrator*
Height:	1¾ in.	1¾ in.	5½ in.	1¾ in.	1¾ in.
Width:	4 in.	4 in.	10¾ in.	4 in.	4 in.
Depth:	6 in.	6 in.	8 in.	3 in.	3 in.
Weight:	1½ lb.	1½ lb.	10 lb.*	1 lb.	1 lb.
Power Req.:	18 v., 40 ma.	18 v., 40 ma.	——	115 v. a.c.	18 v., 40 ma.
Price:	$64.50	$69.00	$24.50	$12.50	$24.50

Manufacturer: R. L. Drake Company, Miamisburg, Ohio 45342.

* With two converters and accessories

SCC-1 V.h.f. Crystal Calibrator

In v.h.f. work it is often helpful to know exactly where a station will be found on the dial. In keeping skeds with a distant station whose signal may not be heard much of the time, it is a must. Yet nearly everyone relies on the calibrator in his receiver, the markings on a crystal, or some other inexact device. The Drake SCC-1 calibrator puts the marker signal into the converter, rather than into the receiver proper, and thus eliminates two sources of inaccuracy in v.h.f. receiver calibration. It provides marker signals at 50-kc. intervals throughout the v.h.f. range, and up through at least the 420-Mc. band.

The calibrator uses a TIS34 FET 100-kc. crystal oscilltor, a 2N3394 trigger and two Fairchild integrated circuits, a 923 frequency divider and a 914 amplifier and shaper. There are four output connectors: one each for 50 and 144 Mc., another for any additional converter, and one for direct feed of the calibrator signal to an h.f. receiver. All desired outputs can be left connected at one time.

The Drake v.h.f. calibrator is assembled mainly on a circuit board, seen at the bottom of this interior view, with its 100-kc. crystal at the left.

The calibrator is designed for operation with the CPS-1 power supply, but may be used with any d.c. source of 14 to 18 volts at 40 ma. A clearance hole in the case is provided so that the frequency of the crystal oscillator can be zeroed to WWV or other frequency-standard signal.

CPS-1 Power Supply

The power supply is built in the same form and with the same finish (chrome-plated steel) as other units of the Drake v.h.f. line, but it could be used for any purpose where an 18-volt d.c. supply is required. In one of the photographs it is shown with the SC-2 Converter, with the bonding clip supplied for holding the two units together. The on-off switch, like that on all other units of the system, can be actuated by a control on the console unit.

CC-1 Converter Console

Thanks to the compact design of the Drake converters and accessories, the complete line can be put into one neat package that is little larger than most v.h.f. converters used to be. The switching system, combining mechanical and electrical devices, should do much to clean up the haywire so often a part of even the neatest multiband v.h.f. receiving setups. The console houses and provides for the operation of the 2- and 6-meter converters described above, along with the calibrator and the power supply, leaving room for a third converter that may be added in the future.

Turning the various converters and accessories on or off is done by means of simple mechanical linkages that actuate their slide switches. The range selector switches on the converters are similarly actuated. An i.f. output switch connects the desired converter to the communications receiver, or permits the h.f. antenna to be connected to the receiver input. Thus, if separate coaxial lines are run to the converter antenna jacks, selection of any of three converter ranges, or direct h.f. reception, is possible by panel switches alone, with no degradation in performance compared with that obtained with each individual unit, directly connected.

—*W1HDQ*

Technical Correspondence

MORE ON CHOOSING BATTERIES

Technical Editor, *QST:*

In his informative survey of batteries (*QST*, September, 1967), Edward P. Tilton mentions the impossibility of rating a carbon-zinc cell just by one number of ampere-hours. He cites the book *Eveready Battery Applications and Engineering Data* which gives a separate page full of lifetime data for each battery. However, for most purposes only approximate lifetimes are needed. Then it turns out that at least part of the Eveready data has a simple structure. The part to be considered here describes tests in which I milliamperes are drawn from a battery for a two-hour period once each day. The lifetime of interest will be the total operating time. T hours, required for the battery voltage to drop to two thirds of its original value. I believe that the kind of simplification which follows does not require the test period to be two hours nor the voltage ratio to be two thirds, but some details will change if these numbers are changed.

To obtain a given lifetime T, one would expect to have to draw more current from a 2-ounce battery than from a 1-ounce battery, perhaps twice as much. To remove some of the influence of battery size one may rescale the Eveready data using the ratio x of current to weight instead of the current I itself. T depends on x in roughly the same way for all cells. The similarity becomes more striking if one computes x by dividing I by a weight W which need not be the true weight of the cell but which is deliberately chosen to obtain good agreement.

Fig. 1 shows some of the Eveready data plotted after scaling. The points represent the combined data for the general-purpose N, AAA, AA, C, and D cells. Other cells for which Eveready gives 2-hour test data fit about as well after scaling. Table I gives weights W to be used for some popular batteries. The table also shows the true weight in parentheses whenever the true weight differs from W. Some 3-, 4.5-, 6-, and 9-volt batteries appear in the table. These also fit if one computes x as the current per ounce of a *single* cell of the battery. Thus, for a 1.5n-volt battery (n cells in series) use $x = nI/W$. — *Edgar N. Gilbert, WA2ZTZ, 30 Knollwood Road, Whippany, New Jersey 07981.*

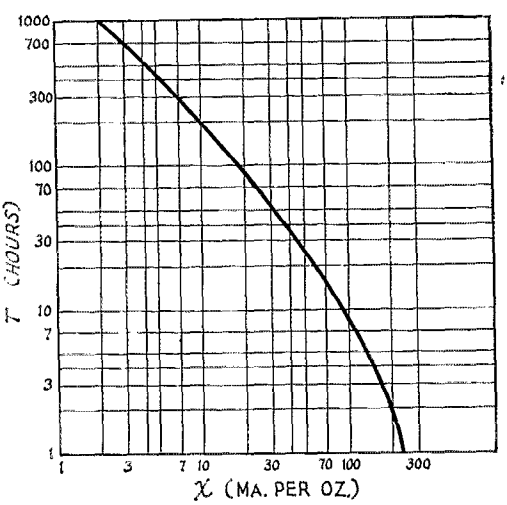


Fig. 1—Empirical curve for determining approximate life of carbon-zinc dry batteries on the basis of two-hours-per-day use.

TABLE I

Battery	*Voltage*	*W (ounces)*
904 (N)	1.5	.25
912 (AAA)	1.5	.3
915 (AA)	1.5	.6
1015 (Energizer AA) P	1.5	.8 (.6)
935 (C)	1.5	1.4
950 (D)	1.5	3
964 (G)	1.5	5.9
6	1.5	21 (34)
750	3	1.2 (2)
703 and 781	4.5	2.8 (5)
706	6	72 (94)
206	9	1.4 (1.2)
226	9	2.4 (2)

FORTY-METER BEAM HINTS

Technical Editor, *QST:*

After two years of using a two-element commercial 40-meter beam I decided to try my hand at a full-size homebrew. The main reason was the poor mechanical performance of the commercial beam; I had to repair it six times during the two-year period.

A full-size 3-element 40-meter beam, cut to the formulas in the *Handbook*, on a 46-foot boom was tried for the next two years. This beam never seemed to come up to expectations.

During the past spring and summer, the tower was raised from 70 feet to 100 feet with the idea of getting the 40-meter beam farther away from surrounding power lines and such, in the hope it would improve the performance. After checking the element length, the beam was raised with high hopes, but the beam turned out to have very little, if any, front-to-back ratio and little gain.

A check with a local ham confirmed this. Starting at 7300 kc., the front-to-back ratio was approximately 15 db. As the frequency was dropped in 50-kc. steps, the front-to-back ratio and signal strength kept dropping until at 7020 kc. (the frequency the beam was cut for) the front-to-back ratio and gain were almost nil. In fact, the antenna worked more like a poor ground plane.

The elements are constructed with a center piece of 1¾-inch (0.058 wall) with two 1⅝-inch tips, then reducers to accommodate two 6-foot lengths of ¾ inch, two 6-foot lengths of ⅝-inch, and finally ½-inch (the latter 0.035 wall).

Remembering the article, "The Driven Beast,"[1] in *QST* some years back, in which the author stated that tapering the elements had a decided effect on the resonant frequency, I was becoming suspicious even though the s.w.r. was quite low.

I wrote to W3MSK asking advice. Ed was very helpful. He stated I'd probably find, as he had, that the best front-to-back ratio would be around 7400 kc. or even as high as 7500 kc. I could then figure out how much to lengthen the elements. The result was:

[1] Clement, "The Driven Beast," *QST*, May, 1958.

Reflector lengthened 3 feet 10 inches (to 75 feet)
Antenna lengthened 3 feet 10 inches (to 71 feet)
Director lengthened 3 feet 6 inches (to 67 feet 6 inches).

As for results, the front-to-back ratio now appears more in line with the published figures for a 3-element beam. I estimate between 25 and 30 db. during the evenings and 15 to 20 db. during the day when skip is shorter.

The results of all this work have been most gratifying. I was one of the first to work VU2FW on 40-meter c.w. This is the toughest part of the world to contact from W3-land. JAs can be heard and worked with comparative ease. It is not unusual to work European stations for an hour or so with one CQ.

The above construction does make for a rather droopy element, about 8 feet sag, but the elements do give and ride the wind quite well.

Costwise, the beam came to about $200 as compared to $700 for a similar commercial beam. — *James C. Berger, W3MWC, 6615 Silverwood St., Philadelphia, Pa. 19128.*

25-KC. MARKERS

Technical Editor, *QST:*

With the new band subdivisions there are going to be many people wanting to know how to build or modify their calibrators to mark the edges. The circuit of Fig. 2 uses one $2.35 integrated circuit (two interconnected flip-flops) and your receiver's old 100-kc. oscillator to give 25-kc. markers simply, cheaply and compactly without special adjustment or possible error such as might occur when you use a synchronized astable multivibrator.

The Motorola MC778P flip-flop is two type D flip-flops; in order for a type D to toggle (divide by two) when a pulse is applied to the T input the Q output must be connected to the S terminal; other than that, the circuit is straightforward. Flip-flops such as the Fairchild 923 or Motorola dual 790P unit are not recommended because their slight advantage in cost (35 cents) is offset by more severe power requirements; also, they require a faster pulse on the toggle terminal (about 0.1 μsec fall time) than an ordinary 100-kc. oscillator might supply. The MC778P gave easily-distinguished 25-kc. markers through 28 Mc. with 1.5 volts, although they were not loud. Using 3 volts gave even better results. The IC is made to work with 3.6 volts nominal.

A voltage divider can be used from a higher voltage power supply (B) to get the necessary 6 ma. or so to drive the IC; switch only at the high side of the supply in this case and put a transient suppression capacitor across the IC. Since there will be no output when there is no 100-kc. input you can just keep the old 100-kc. oscillator switching arrangement and let the IC run continuously. By the way, the divider will work well to several megacycles if you want to divide some other frequency by four. — *John K. Green, WØKPZ, Box 1038, Boulder, Colorado 80302.*

P.S.: Use care and a small (22 w.) iron when soldering to IC pins.

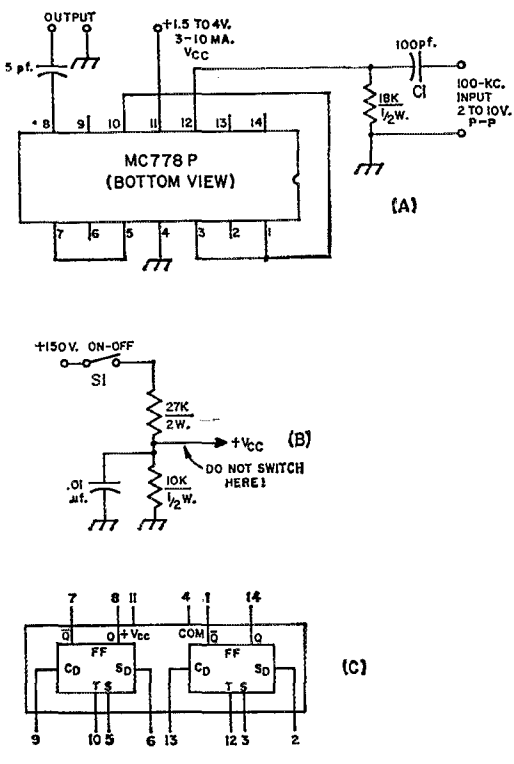


Fig. 2—(A) Divide-by-four circuit using a Motorola MC778P dual flip-flop integrated circuit. (B) Using the regulated 150-volt receiver supply to obtain operating voltage for the IC. (C) Functional drawing of the MC778P.

Fig. 3

OR IS IT A UFO?

Technical Editor, *QST:*

The picture on page 88 of December *QST* reports that the unusual object in the sky is a meteor. Close examination of the original negative will probably reveal that the object is a "kink mark." This phenomenon is a common problem in the photographic industry and is a result of the fact that silver halide is sensitive to pressure as well as light. When the plastic base on which the light-sensitive layer (usually silver halide) is coated becomes deformed by a sharp bend or fold, the resulting localized pressure makes the silver halide developable without exposure to light. The result is very often like the object in the "meteor" photograph.

Included is an example of a kink mark. This piece of film was never exposed to light, only accidentally kinked before development. Additional proof of presence of a kink can be obtained by viewing the original negative by reflected light. Often a physical deformity in the plastic base can be seen in the problem area. — *Robert L. Appleby, K2VVE, Edison, New Jersey.*

[EDITOR'S NOTE: Fig. 3 is a reproduction of a print made from K2VVE's negative.]

Hints and Kinks For the Experimenter

FINDING WIRE LENGTH FOR HELIX ANTENNAS

How much copper tubing or wire L will you have to purchase to make a helix antenna (Fig. 1) when the coil length a, coil diameter d, and number of turns n are known? Answer:

$$L = \sqrt{a^2 + (n\pi d)^2}$$

— *W1CUT*

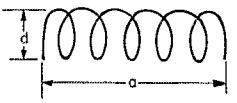


Fig. 1—Coil dimensions used in the formula for finding the wire length of a helix antenna.

IMPROVED PERFORMANCE FOR THE HD-10 KEYER

The Heath HD-10 is an inexpensive, dependable, compact and good-looking solid-state keyer. When the Heath unit came on the scene a year or two ago, I threw caution to the wind and retired my 25-year old semiautomatic speed key. KH6IJ's suggestion,[1] that a few weeks of practice is needed with any keyer before an on-the-air trial, was followed.

Success was immediate, and soon my sending speed with the HD-10 was faster than with the old bug. However, some errors did occur. Although the frequency of mistakes decreased with practice, I felt that too much time and concentration was being required to achieve errorless sending; at times I was even tempted to try s.s.b.

My trouble turned out to be a variable dot-to-space ratio. The dot-width and space-width controls on the HD-10 are concentric variable resistors that are connected by friction. A single knob controls both potentiometers. Not only does the dot-to-space ratio change somewhat with the rotation of this knob but, furthermore, the friction connection is overridden when the knob is turned fully counterclockwise.

To overcome these difficulties, it seemed best to mechanically divorce the two concentric potentiometers and to use two control knobs instead of one. Then a dot-to-space ratio of 1:1 or any other ratio could be employed. Since the concentric potentiometers in the HD-10 could not be taken apart and used separately, the volume control was replaced with a 1000-ohm resistor, and a new 100,000-ohm space potentiometer was installed in the volume-control location. Although the monitor now operates only at full volume, the speaker can be disabled by plugging a headset in the PHONES jack. The shafts of the two potentiometers were fitted with dial scales and pointers, and then the dials were calibrated. The instruction manual tells how this can be done for a 1:1 dot-to-space ratio.

Before the keyer was modified, the dot-to-space ratio was apparently less than 1:1 at times. After the changes, a surprising improvement in my sending skill was noticed when dot-to-space ratios of 1:1 or 1.2:1 were tried. I had a much wider range of errorless code speeds, and the stuff spewed out correctly with little concentration on my part. My microphone has been gathering dust ever since. — *John S. Reddie, W7FVI*

[1] Nose, "High Speed Code," *QST*, November 1965.

STORING HUSTLER RESONATORS

I have a Hustler mobile antenna which consists of a 54-inch mast and separate resonators for each of the amateur bands from 10 through 80 meters. To keep the unused resonators from getting damaged, I store them as shown in Fig. 2. Small clips for holding the shorter coils are mounted on the door post, and a large clip for holding the 80-meter coil is mounted on the rear base of the front seat. The clips, which can be found in most hardware stores, are normally used to mount broom handles and the like. — *Richard Werner, WAØDKQ*

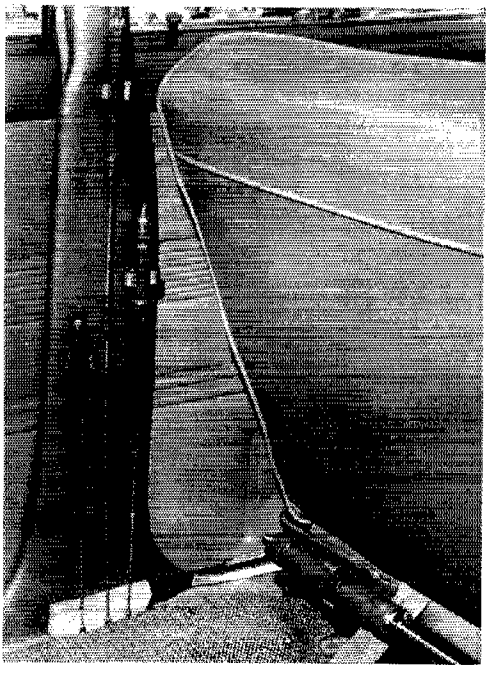


Fig. 2—System used by WAØDKQ to store the unused resonators of his Hustler antenna.

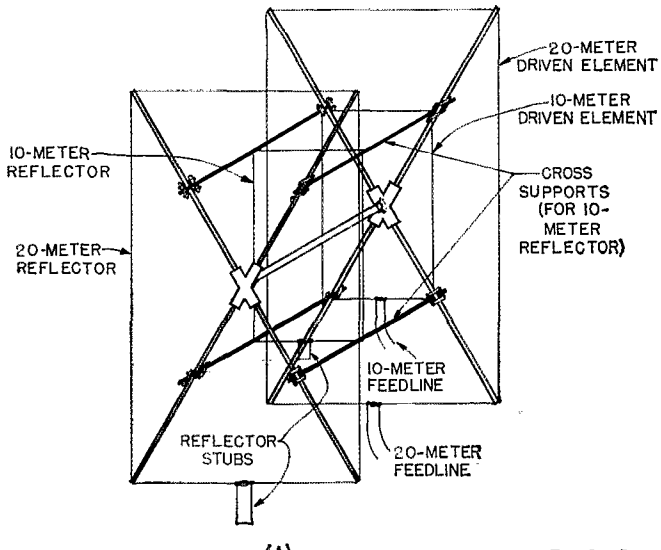


Fig. 3—Details of the quad modification. A—corner view of antenna; B—side view of quad; C—end view of dowel mount; D—side view of dowel mount.

CONVERTING A MONOBAND QUAD TO A MULTIBAND ANTENNA

With the opening of the 10-meter band, I decided to add 10-meter elements to my 20-meter quad. I wanted to have optimum spacing of the 10-meter elements, but not at the expense of rebuilding the original structure. I finally found an excellent way to achieve this. As shown in Fig. 3, four dowels were attached with pipe clamps to the spreader arms. Then the 10-meter reflector was added, and the dowels (cross supports) were adjusted to center the element. Finally the 10-meter driven element was strung in the same plane as the 20-meter radiator. Note that the cross supports required to modify the quad add strength to the whole structure, and that optimum-spaced 15-meter elements can be installed by using the same method. — *Jim Brenner, W1GNEV*

COAXIAL SWITCH

When constructing a coaxial switch like the one described in the article "A Really Rugged Coaxial Switch" in *QST*, January 1967, do not use only one type of connector. Invariably you will want to use a different type of fitting later. I constructed a similar switch sometime ago, made three connectors alike, and then added one type N and one type BNC fitting. It is surprising how handy it has been to have various types of connectors available on the switch. — *Lester Harlow, W4CVO/6*

HQ-180C CLOCK

For meteor-scatter schedules, timing is of the utmost importance. Did you ever try to set the clock on the HQ-180C without shutting off the receiver and therefore the time signals needed to set the clock? It's a rough job. I solved the problem by installing a toggle-type microswitch in series with one side of the a.c. line and the clock. So that no holes would have to be drilled in the receiver, I mounted the switch on an L bracket and fastened the assembly to the inside of the receiver with one of the screws used to bolt the clock to the front panel. — *From K2DNR's OVS report*

EQUIPMENT CABINET

The next time you need a small cabinet for a portable or mobile rig, try a child's lunch box. To protect the components that protrude from the front of the container, handles can be installed as shown in Fig. 4. In order to service the unit, it is only necessary to unsnap the fasteners on top of the box. — *Mike Bailey, WB4DCW*

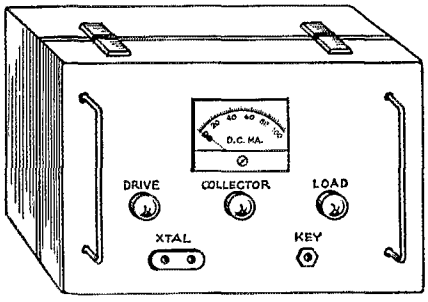


Fig. 4—A child's lunch box used as a transmitter cabinet.

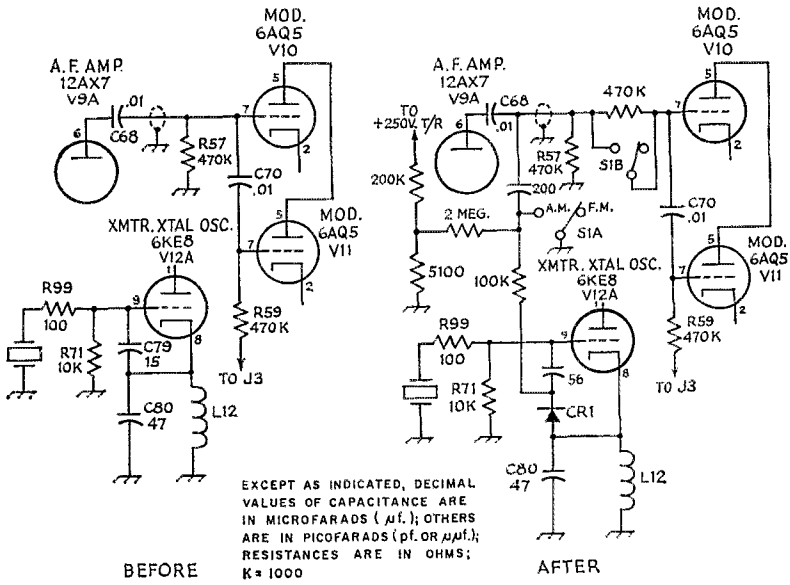


Fig. 5—Modifications to the Clegg 22'er for f.m. operation. With the exception of CR_1, a 1N2071 or 1N3182 diode, and S_1, a d.p.d.t. toggle or slide switch, components with designators are original parts. Resistors are ½-watt composition, and capacitors are disk ceramic.

F.M. FOR THE CLEGG 22'ER

ADDING f.m. operation to the Clegg 22'er is very easy. Fig. 5 shows how the transceiver is modified to permit frequency modulation of the transmitter crystal oscillator. Instant selection of a.m. or f.m. can be achieved by installing a slide or toggle switch under the accessory control jack, J_2, on the rear of the 22'er. No changes to the receiver are necessary to copy f.m. signals; slope detection can be accomplished by careful tuning. — *Dave Porter, K2BPP*

ANTENNA INSULATOR

I HAD been having difficulty locating a suitable base insulator for the 40-meter vertical I was constructing. Then I came across a large ceramic four-pin tube socket that I had used with a 250TH. By removing the four contacts, I had an excellent insulator for the 1¾-inch diameter aluminum tubing that would make up the antenna. As shown in Fig. 6A, the bottom end of the tubing fits nicely inside the socket. Note that as illustrated in Fig. 6B, guy wires or a support must be used with the antenna. — *Jim Brenner, W1A6NEV*

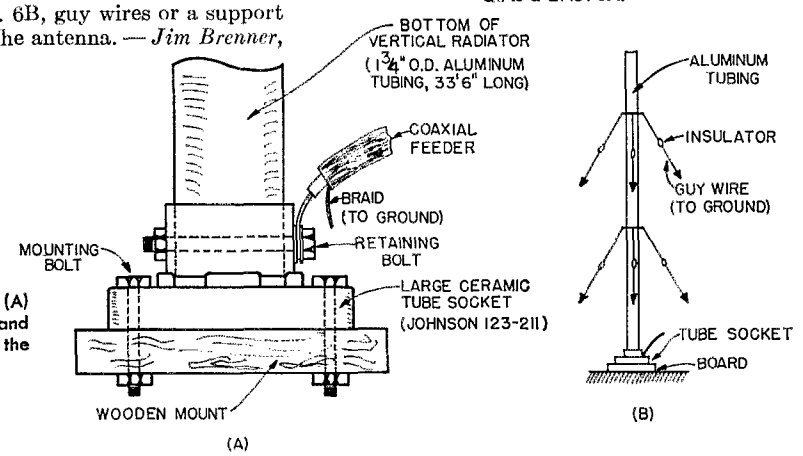


Fig. 6—Base insulator (A) for a 40-meter vertical and guy locations (B) for the same antenna.

PROTECTING THE TRANSISTOR SWITCH IN THE HD-10 KEYER

IN the instruction manual for the Heath HD-10 electronic keyer, it states that the open circuit or spike voltage across the keyed line should never be allowed to exceed 105 volts, or the 2N398A transistor switch, Q_8, may be damaged. A simple and effective means of protecting Q_8 is shown in Fig. 7. The installation of CR_1, a 91-volt Zener, prevents the collector-to-emitter voltage rating of the 2N398A from being exceeded. — *Gilbert A. Herlich, W2AZG/6*

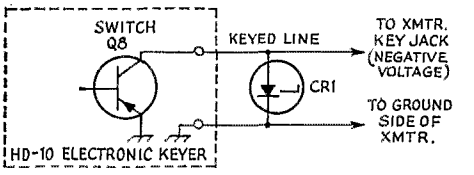
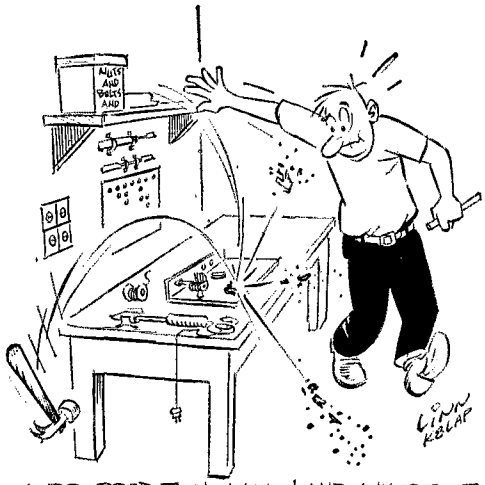


Fig. 7—CR_1 is a 91-volt Zener (1N3043 or equivalent) and Q_8 is a 2N398A.

Edsel Murphy's Laws

Murphy's General Law as Applied to Amateur Radio



A DROPPED TOOL WILL LAND WHERE IT CAN DO THE MOST DAMAGE. (ALSO KNOWN AS THE LAW OF SELECTIVE GRAVITATION.)

BY MYRON E. LAWSON,* W5ACL

PRACTICALLY the entire scope of our hobby is under the influence of Edsel Murphy's Laws. Without a thorough understanding of his principles one cannot derive maximum pleasure from his work. In fact, you can't even get started.

His basic law is: "If anything can go wrong, it will." Or to state it in more exact mathematical form: 1 + 1 = 2 where = is the mathematical symbol for hardly ever.

To show the all-pervasive nature of Murphy's work, here are a few corollaries of his basic law which are applicable to ham radio:

A. — *Design*

1) In any given price estimate, cost of equipment will exceed estimated expenditure by a factor of 3.

2) Dimensions will always be expressed in the least usable term. Velocity, for example, will be expressed in furlongs per fortnight.

3) If the breadboard trial model functions perfectly, the finished product will not percolate.

4) In a mathematical calculation, any error that can creep in, will. It will be in the direction that will do the most damage to the calculation.

5) In any given computation, the figure that is most obviously correct will be the source of error.

6) The probability of a dimension or value being omitted from a drawing is directly proportional to its importance.

7) In specifications, Murphy's Law supersedes Ohm's.

B. — *Assembly*

1) If a project requires n components, there will be $n-1$ components available.

2) Interchangeable parts won't.

3) Components that must not and cannot be assembled improperly will be.

4) The most delicate component will be dropped.

5) The construction and operating manual will be discarded with the packing material. The garbage truck will have picked up five minutes before the mad dash to the rubbish can.

6) The necessity of making a major design change increases as assembly and wiring of the unit approach completion.

7) A dropped tool will land where it can do the most damage. (Also known as the law of selective gravitation.)

8) A component selected at random from a group having 99% reliability will be a member of the 1% group.

9) Tolerances will accumulate unidirectionally toward maximum difficulty of assembly.

10) The availability of a component is inversely proportional to the need for that component.

11) If a particular resistance is needed, that value will not be available. Further, it cannot be developed with any available series or parallel combination.

12) After an instrument has been fully assembled extra components will be found on the bench.

C. — *Wiring*

1) Any wire cut to length will be too short.

2) Milliammeters will be connected across the

(Continued on page 136)

*4010 River Drive, Houston, Texas 77017

There have been attempts recently in several publications to obtain a unified theory of the behavior of inanimate objects. These articles represented dissatisfaction with the predictability of the perversity of matter. All treatments of this subject included contributions from one Edsel Murphy, the infamous rapscallion, and scalawag, who related in his thesis the basic laws relating to the behavior of inanimate objects. Our author, having had 44 years of experience in building amateur radio equipment, has compiled in the accompanying article a sample of the application of Murphy's laws to amateur radio engineering.

Semi-Automatic Key Adjustment[1]

BY BRIAN MURPHY,* VE2AGQ

Although the use of electronic keyers is increasing, many c.w. men would prefer to keep their "bugs," especially if they could make them perform as well as, or better than, keyers. The performance one gets with a bug depends greatly on the adjustment, and no amount of skill can make up for a poorly adjusted bug. It has been my experience that there is a tremendous lack of understanding among amateurs over the maze of adjustments found on most bugs. There is also the belief that the adjustments are solely for one's individuality, and we therefore hear a lot of signals with choppy dots, poor ratio of dot length to dash length, and poorly timed spacing between dot groups and dashes (eg. ".. ——" for the number 'two'.)

The following will describe some techniques to use in adjusting your own bug, together with some hints on good character formation and better, error free sending.

General

Although different manufacturers have a few more or a few less adjustments on their bugs, most have the ones shown in the diagram in Fig. 1, together with various types of spring tension controls. Admittedly, some of these adjustments have to be made by trial and error according to instinctive feel, but we will outline the general objectives:

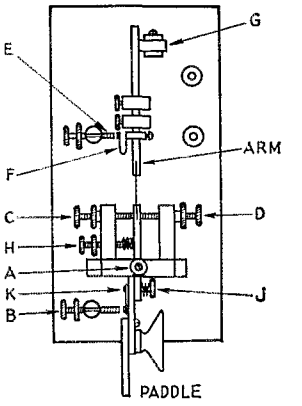
1) To make dots of correct length with correct ratio of dot to space length.
2) To prevent high frequency vibrations of the moving dot contact F with resultant scratchy dots.
3) To prevent any other undue motion (unwanted bouncing) of the dot contact (F).
4) To keep the time between dot groups and dashes down to its proper level (the length of one dot).
5) Proper mating of contacts.

Procedure

The first adjustments to play with are C, D, and G on the diagram. The shock absorber, G, may be non-adjustable on some Vibroplex bugs, in which case D should be adjusted as follows:

Clear D, C, and E away so that the arm comes completely to rest against the shock G. Then advance D so that it *slightly* pushes away the lever, but not enough to clear the arm away from the shock. The result is correct if, when the arm springs to rest against the shock G, and D, there is absolutely no visible bounce. This is to ensure that when another group of dots is started, the arm is not still vibrating. If G is also adjustable, there is just this much more latitude in making the alignment.

With E still clear, adjust C for optimum distance between D and C. This is probably the most difficult adjustment to make because some experimenting is required. When the paddle is pushed for dots, the lever butts up against C, which sets up the oscillations of the arm. Moving the lever from D to C takes time, so that transforming from dashes to dots is faster, and therefore smoother, if the distance is kept small; but then, unfortunately, the arm does not gain enough momentum to make long slow dots. This is where many hams fail to make the best compromise, and end up with very poor dots at speeds below 25 w.p.m. Since there is seldom any problem in getting fast dots on a bug, it is best to start with the D to C distance quite large. This will feel awkward, but try it with the weight set for the slowest possible speed after setting up the dot contacts. The moveable contact F on the arm should mate evenly with its counterpart E. After checking this, adjust E so that E and F just barely short together after making a string of dots. Lock E, and now connect an ohmmeter across the bug terminals. While making a



A–*Main Pivot*
B–*Dash Contact*
C–*Dot Lever Stop*
D–*Dash Lever Stop*
E–*Dot Contact*
F–*Hair Spring*
G–*Shock Absorber*
H–*Dot Lever Tension*
J–*Dash Lever Tension*
K–*Dash Lever*

* 17 Claremont Ave., Pointe Claire, Que., Canada.

[1] Reprinted with permission from *MARCOGRAM*, June-July 1967.

string of dots, the *average* deflection of the meter should be mid-scale ± 10% for both slow and fast speed settings. The reading should be taken for the first five or ten dots only, because after that it will start to change, depending on the E setting. It is typical to have too low a reading and, hence, have choppy dots. Too high a reading will probably result in mushy dots. Of course, adjust the screw E closer or farther as required. In case your meter has a poor transient response, a good ear is the final check for this test.

Now, if the arm oscillations die out too quickly with slow dots, C has to be adjusted to increase the D to C distance and, hence, the lever momentum. This is also true if the dots cannot be made slow enough, say, 15 w.p.m.

If C is changed, E must be re-set before further testing; and so these comprise the bulk of the adjustments which affect your fist. If D to C is too large, one will find it too difficult to switch from dots to dashes smoothly, and vice-versa.

At this point, another problem occurs with many bugs: contact D is usually mounted on a hairpin spring which sometimes has a high-frequency vibration, visible after some dots are made when the arm comes to rest. This vibration will make the next dot scratchy. A good cure for this problem is to cut out a small cubicle of fine grain, soft, synthetic sponge and fit it snugly — but not too tightly — inside the hairpin behind the contact, so that the vibrations are damped out. Use a small dab of glue on the back side to hold it in place.

The dash contact spacing B can be set to personal preference. Too wide a spacing and too much spring tension will result in jerky dashes, while small spacing and low tension may cause an occasional joining of what was intended to be two dashes. Contacts should mate perfectly for maximum life and may be cleaned with good silver polish; or they may be lightly scuffed with the very slightly abrasive material used to clean relay contacts, if they have become pitted. *Do not* use emery paper or sandpaper, as these leave an unwanted residue on the surfaces and can also excessively wear down the surface.

Operating

When using a bug, it is essential that it be firmly mounted, even if it is heavy and has rubber feet. It is sometimes inconvenient to attach it directly to the table top; instead, small finishing nails can be driven in around the sides. Or, if the table top is smooth, suction cups with protruding studs are available at hardware stores that can be stuck on the table around the sides of the bug, so that the studs keep the bug from sliding sideways.

The following will describe some ideas on how to send, at the risk of fiery disagreement from A1 operators across the land. Most surely, this is not the only way; but the basic ideas might lead one to recognize a weakness in his own method.

The hand should rest on the table, with the paddle located between the print of the thumb and the side of the index finger. Using the tip or the print of the index finger is all right provided that wrist action, not finger action, is maintained on dashes. Dashes should be made by rocking the wrist with the fore-arm resting on the table. No part of the hand, wrist or arm should feel constricted. When a row of dashes is made, the side of the index finger should remain in contact with the paddle, while the wrist is rocked back and forth, with no slipping on the table. This helps the continuity of the row. Rather than hold the remaining fingers outstretched in mid-air, curl them under so that they may rest on the table. Most of this comes naturally; but it is mentioned to prevent beginners from starting off completely wrong.

There is a great tendency to set the dot speed too fast. Concentrate on sending good code at the slowest dot setting possible which should be at least down to 15 w.p.m. A technique which produces amazing results is to send as slow as absolutely possible for one QSO, then, as fast as you are able for the next QSO. The effect of sending slow engrains good ratio, spacing and general good form, while sending fast gives practice in timing and muscle control. I would strongly discourage sending with the speed control always set to the favorite spot, because this seems to lead to the freezing of bad habits, and definitely results in poor ratio when trying to vary the speed by varying the dashes only. On a bug, or a keyer, variation of speed is the key to learning control.

For good practice, open up the telephone book at some page other than Smith, and send the names, addresses and phone numbers at slow, fast, slow, fast . . . speeds. Ten sets at 15 w.p.m. and 30 w.p.m. without one error is excellent. Those numbers are terrific practice for dashes! QST

Strays

QST congratulates . . .

Hugh A. Cassidy, WA6AUD, San Francisco Section SCM, recently nominated by President Johnson as postmaster of San Rafael, Calif.

Don Falk, WN3GYM, who was a semi-finalist in the National Merit Scholarship exam.

Ed Mehnert, W3JZJ, former Assistant Managing Editor of *QST*, on his appointment as Command MARS Director, Air Force Communications Service.

Pressley B. White, W4OM, who was appointed Municipal Court judge in Virginia Beach, Va.

Robert W. Paulson, W4TC, Major General USAF, who assumed command of the Air Force Communications Service.

A. Norman Into, K2IEO, on his promotion to Vice-President of Marketing at Computer Test Corporation, Cherry Hill, N. J.

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Feedback

We failed to record last month that the excellent picture of the festivities in Liberia (see p. 77, January *QST*) was taken by Glee Miller, **EL2NA.** Our apologies.

DXpedition Logistics

Some Tips on Planning a DX Trip

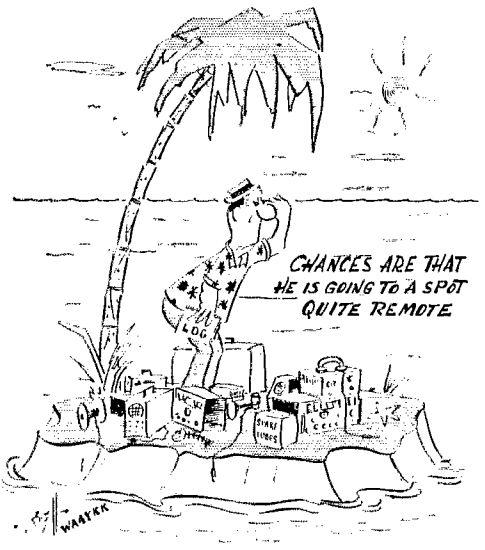
BY G. E. CUSHING,* W4QVJ

RECIPROCAL operating shows signs of allowing many amateurs the opportunity of operation from once-dreamed-of spots in far away places. Now that permission may be possible, it is not too early to become more familiar with the logistics and planning involved with a venture of this type.

Operations divide easily into two classes — an adjunct to a vacation trip or an all-out DXpedition. There are several facets of the overall planning common to each objective. Naturally, if one is going on a vacation with the family, the equipment required for radio operation wouldn't approach the needs encountered by the DXpediter going thousands of miles to an extremely remote spot.

For the Casual Traveller

Transmitting and receiving equipment should be as small, light and portable as possible. You will more than likely have enough personal and



family gear to make you into a baggagemaster anyway, and to complicate the radio facet would only detract from its pleasure. Depending upon the equipment available at home, you should plan for a separate receiver, or at the very minimum, some form of crystal control or separate v.f.o. control if you plan to use a transceiver. This speeds operations and is well worth the extra equipment. Carefully investigate to determine what voltages will be encountered and prepare yourself for 220-volt power as it is almost universal overseas. A step-down transformer of sufficient wattage would be an excellent investment.

Build dipoles for the bands you intend to operate and test them at home prior to departure. More than likely you will settle for a hastily draped inverted-vee skywire and it would be best that you home test the antenna in that configuration. Consider making the antenna from easily obtainable 4-conductor rotator cable. No trick here to put two or three antennas up at the same time and have them cut to your proposed operating frequencies. Allow yourself the luxury of enough light coaxial cable to make a long run from antenna to transmitter. Not knowing the exact specifications of your proposed operating site makes this almost a necessity. It could enable you to get that antenna way up in the clear as well. If at all possible bring a light 2-element beam.

Tools

A few simple tools will be necessary. A pocket knife heads the list followed by pliers, screwdrivers (regular and Phillips), a folding carpenter's rule (6 feet) or a steel tape, some cube taps, lengths of a.c. line cord, a heavy-duty extension cord of 25 feet or so, yellow light bulbs (for bug prevention), solderless connectors, crimping tool, light soldering iron, solder, handful of coax connectors and phono plugs. It is a good idea to have reasonable lengths of light coax made up with coax connectors and/or phono connectors at each end. Precabling of the equipment is a real time saver. Remember, when you get there you will be anxious to get started and time saved by preplanning is operating time once you arrive!

Throw in a few egg insulators as these can be used in sundry ways. Also, consider about 100 feet of very light wire such as soft drawn No. 18. Don't forget that antenna lengths are not likely to approximate what you have had in the back yard at home. Bring various lengths of light nylon or plain rope. These can be used to haul up a center insulator of the inverted-vee and fill out the ends of the antenna to nearby trees. The usual roll of rubber tape, a compass, a couple of hanks of hook-up wire, spare fuses and you probably won't go far wrong for support equipment. Oh, and don't forget the insect repellant!

Equipment

Spare tubes are mandatory. Don't forget some spare rectifiers, tubes, if your supply uses them, diodes if you are solid state. The tragedy of all tragedies is to have a complete breakdown caused

* Box 73, Hollywood, Fla.

by just one little problem in a power supply. You might encounter fluctuating line voltages and some power supplies hardly dote on that treatment. Spares for the rig should include fuses, tubes, etc. to the extent that your experience dictates: driver and final tubes and fuses for sure.

Don't forget a log. The type designed for mobile operation is handy. An inexpensive secretary's note pad is also ideal. Let the Radio Inspector know where you're going according to the FCC regulations.

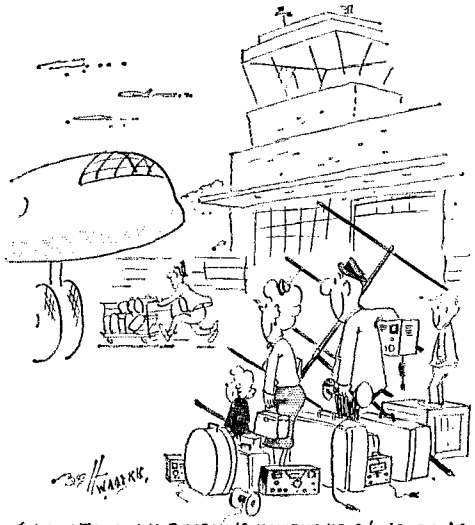
Planning the "Big Trip"

The problems of the serious DXpediter are somewhat greater in scope. Chances are that he is going to a spot quite remote and therefore his planning will necessarily be more extensive and meticulous. He should have everything, and I mean everything, that will meet any anticipated problems. He will return and find that much of the gear was not utilized. But he will also recap his trip and find that he did have something along, which if forgotten, would have either crippled his operation for a long period of time, or put him out of business altogether. Therefore, the following list is offered as representing the minimum required to support one independent station operation.

LIST OF EQUIPMENT

Ideal For DX-pedition or Field Day

Log Book
100 ft. light nylon rope
200 ft. RG58/U coax cable
6 — Egg insulators
4 — straight insulators
100 ft. No. 20 wire
Cube tap, male plugs, female plugs
25–50 ft. extension cord
collapsible carpenter rule
Soldering gun — solder
Crimper and solderless connectors
Coax connectors — male-to-male, female-female "tee" connector
Short lengths coax with connectors in place
Set screw drivers — Phillips, slot, small and large
Adjustable wrench
Long nose and regular pliers
Wire cutter
few phono connectors
A.c. cord — 25 feet
spare spark plugs, with plug wrench (if using generator)
Pocket knife
Transmitter
Receiver
Connecting harness, pre-assembled with connectors and tagged.
Keyer, with paddle.
Straight key
Microphones (2) spare connectors and short length cable.
Small box assorted hardware, nuts, bolts, washers, etc.
Beam
Flashlight — spare bulbs, extra batteries
Small multimeter with instruction book.
Camera, film.
s.w.r. bridge.
Light sockets, bulbs.



TRANSMITTING AND RECEIVING EQUIPMENT SHOULD BE AS SMALL, LIGHT, AND PORTABLE AS POSSIBLE

Admittedly, there are items listed above which probably could be left behind. Also, there may be other things that could be added to contribute "lustre" to the trip. The main point is that if you are prepared with all the listed gear, you will get along very well indeed, barring complete catastrophe. This list also makes an excellent check list for field day.

Other Planning Tips

The preplanning facet of the overseas EXpedition can be very educational, interesting and challenging. Go to the consulate of the country involved or write them. Get all the information they have about currency rates of exchange available. Do they know anybody who has traveled there in the past? Can they help with baggage entry arrangements, letters of introduction, etc? Go to the biggest and most complete library available to you. Enlist one of the librarians in your cause. Have all possible references brought out and read carefully about your target spot. Information and pictures can be had from the *National Geographic* and a complete library has extensive collections of this magazine. Get into the encyclopedias. Sometimes their information is sparse, sometimes quite complete. Go to a marine supply store and ask for hydrographic charts, if it is an island. If you are going to utilize native boat transportation, you may find that the sailors appreciate these charts. The cost is only a few cents. You can use the charts to get the lay of the land, the best place to set up the station, suitable spots for antennas. By careful study and plotting of the topography you can easily visualize slopes, mountains, etc. that will shorten the time required for station installation. A trip to the marine supply store might also enable you to scan *Sailing Direction for Mariners*. This manual is expensive so probably your best bet would be to request photocopies of the

pages applying to your island. You will get a horizon view of the island and word descriptions of the anchorages, plus the ambient conditions, and fresh water availability. By the time you have completed the encyclopedia, library references, *National Geographic*, marine supply store, and charts, you will have an excellent idea of what to expect.

Obtain your passport and necessary visas according to the instructions of the consulate involved. Don't trust what you may casually hear or read. Current information is available from the nation's consular representative. Allow 6 weeks or more for this.

Your next step is to ask an airline representative for the loan of the International Edition of the *Air Travel Guide*. Here you will find schedules of all airlines serving the nearest airport of entry. Sometimes fares, accommodations and privileges vary. Very few, if any, American carriers would allow an uncrated beam to repose in the aisle of a fully loaded passenger flight! But, I have been on a flight where one of the crew lectured the passengers about the necessity of having the beam there and admonished them to keep their big feet off the elements as well! Other trips have seen the beam loaded into the plane through a fuselage window. Again, that was not an American Flag line.

One little hint about that beam. It's hardly sensible to go to a far-off spot and then find it difficult to give out with a strong signal. Everyone has heard of the "15-db. gain" built into a rare call sign, but the frustration can come from those long periods of utter silence following a CQ. Though it appears to be somewhat of a luxury, a beam is absolutely necessary for 20 and 15. If you fear your package is too long, or if the airline refuses to accept the standard carton, you can cut elements in half and fit suitable sleeves for easy joining. It should be no trouble to arrange a beam in a 6-foot package, which would be no problem for any airline. Go to a rug store and get one of their rolling tubes, or seek out a form used by building contractors for pouring of cylindrical concrete structures. Pre-assemble your beam, test it, adjust it, and then leave it as completely assembled as you can and still package it for the expected rugged handling. Remember — the beam pre-assembled and tested is your best insurance for top-flight QSO results.

In packaging the other equipment it is best not to exceed about 35 pounds per carton. This makes for longer carton life and easy handling by the baggage smashers (some of whom are experts in the art of smash and crash). One available generator is capable of 1250 watts and weighs 75 lbs. crated and can be handled by one man, if necessary. Good practice here is to test it thoroughly at home before departure. Mark all the cartons with a distinctive set of identification. The call signs of the station are good for this purpose. Make a count of the parcels: get a separate baggage check for each carton. Enclose small items, such as the s.w.r. bridge and keyer inside a larger parcel for ease of handling.

With a travel guide or information furnished by the country's representatives, nail down in advance your residence while in the foreign country. This could be a guest home, a private home or a hotel. If you decide on a hotel, my advice is to keep to the smaller ones, as they are usually a bit out of the way, quieter, with more flexibility as to accommodations and permission for antennas. You can make friends more easily with the management. These are the people who can make your stay enjoyable and your efforts worthwhile, or can cause many levels of trouble. Best to have your accommodations confirmed if at all possible. Very few foreign immigration officials will permit you to roam around looking for accommodations.

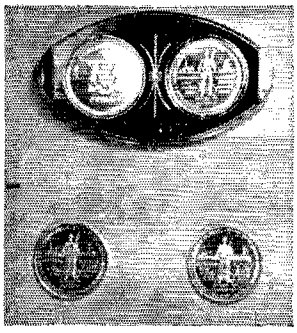
YOU MAY FIND YOURSELF IN AFGHANISTAN AND YOUR GEAR IN LEOPOLDVILLE

In some cases it might be to your advantage to ship the equipment air express rather than to assume the overweight charges if you kept the gear as personal baggage. A word of caution: It is best that you and your equipment arrive on the same aircraft. There is no frustration comparable to finding yourself in Afghanistan and your gear in Leopoldville! As to getting the gear through customs . . . here the regulations vary so greatly that no set rule or procedure can be given. This is a point that could possibly be cleared before the trip starts, and that certainly is the preferable method. Barring any arrangement beforehand, you will have to trust to receiving favorable treatment once you arrive. A customs broker can be employed if you wish.

If you do not know the language of the country to which you are travelling, bear in mind that usually there is someone nearby at all ports of entry and at hotels catering to tourists who can manage a few words of English. Don't let the language barrier stop you from going. Granted, you will have more problems than if you knew the language fluently, but failing that, you can still make it. Get a Berlitz and pocket dictionary. A big smile and a shrug of the shoulders sometimes help one over the tough spots.

I assume you have the license or you wouldn't be going to all the troubles outlined above. Only one more thing before you go . . . listen for W4QVJ about 5 kc. above the rest of the pile! QST

Results,
Seventh World-Wide Centennial
RTTY Sweepstakes



Here's an idea of what the centennial medallions look like. Additionally, the top ten high scorers will receive special centennial certificates as well as special certificates for the top Canadian station score and the most contacts with Canada. All submitted logs showing over 10 entries will receive the Centennial Citation.

Contest Chairman 3C3GK reports that the Canadian Amateur Radio Teletype Group's October SS brought forth activity from seven Canadian provinces (but no VE1), 29 states (including Alaska and Hawaii), and at least 46 countries overall. Sid adds, "We are grateful that, as a group, we could offer this medium of amateur radio as a status of good will and fellowship far and wide throughout the world during this Centennial Year."

SCORES

Top Ten

PY2CQ*	128,310	W2RUI	51,220
DL1VR*	97,101	WA8BOT	47,723
ON4BX*	82,576	DJ6ZB	41,836
WA4LWE	73,249	VK3KF	41,767
UA1KBW	63,320	W1GKJ	40,512

* Medallion winners

Other Scores

WA6WGL	37,007	W4CQI	11,712
K8MYF	36,223	VE5DR	11,606
W3KDF	34,468	WB6ADY	10,100
YV5AVW	33,988	W1BZT	9,882
K5OLU	33,136	W5DNR	9,784
3C3RTT*	31,275	I1LCL	9,768
W5QCH	30,350	K4VDM	9,532
W7ESN	29,260	WA2YVK	9,530
XE1YJ	28,240	W7ATV	9,199
W3ISE	28,026	W9YB	9,076
KZ5KR	27,406	W1MX	9,056
W9HHX	26,292	3C5LG	9,019
W8FWG	25,190	W4EGY	8,520
WA1DIU	25,081	W6AEE	7,856
W8CQ	24,264	KA9AK	7,707
HB9P	22,403	SM7AZI	7,391
I1KBT	20,408	WB2AHF	7,296
IS1KG	18,944	YV1IK/5	7,271
FG7XT	18,215	W6JOX	7,035
OZ6OX	17,732	K6EQV	7,032
K8MAM	15,766	W6BTV	6,435
KP4JM	14,552	VE2HL	6,096
G6JF	14,414	F3PI	6,084
W1KQY	14,190	VO1DZ	5,808
UQ2AB	13,398	WA8NGJ	5,788
W2FAN	13,222	W6LDA	5,770
K4OAH	13,120	K2YEQ	5,420
K8JTT	12,794	W8MSG	5,168
SVØWL	12,555	VE4FG	4,972
DJ9XBA	12,411	DL5PQ	4,142
		PJ2CR	4,102
		VK3DM	3,691

*Not eligible for award

WB2JBH	3,638	WB6QJW	1,024
K6FLO	3,483	KH6AVX	1,020
WA8IQZ	3,170	WA3CFK	966
K8YJQ	3,168	G3IYG	960
3C3EUU	3,156	VE6MM	714
K8KAG	3,148	WA6MLI	708
W6TX	3,099	WA2ZVL	686
VO1BL	2,816	VE3FHQ	640
W2AKU	2,713	W9CTX	612
WB6JSY	2,584	WA8BVY	520
W8CAT	2,190	LA4KF	456
W6IWO	2,110	KP4AQL	424
WA8IDP	2,072	VE2BMK	408
3C3FBP	1,976	W5FCP	324
OA4BR	1,920	3C3CCY	280
W6UUS	1,855	W8HPR	252
W6FFY	1,803	W7GYO	228
W2SZ	1,710	W7MAE	218
3C3EBR	1,443	VE6AOO	212
EI6D	1,416	OZ6OB	200
WB2MPZ	1,410	WAØEDN	182
W4ULY	1,372	KØKRX	159
PAØLBN	1,224	W2UJS	130
WB2ITZ	1,200	W9CAA	92
W2NCA	1,152	VE3FPJ	90
SM5BJU	1,133	VE7AMJ	72
KC4USB	1,095	W9IGW	72
WB6QFE	1,094	VE3CKW	52
LX2BQ	1,024		

Soapbox

"Thanks to you for a terrific job well done. Most enjoyable contest." — *3C3FBP*

"Worked lots of new states and eleven new countries." — *W1MX*

"A fine contest, but 48 hours is hard going for an OT." — *G6JF*

"Well-planned and successful contest. Bonus-point system was excellent and stimulated activity on higher bands." — *W5QCH*

"Took me three contacts to discover I was Zone 5. None of the local hams knew!" — *VE2BMK*

"My first RTTY contest and I liked it very much." — *DJ9XBA*

"Sounded as if 80% were on at one time or another. Murphy's Law pertained at several points — rapid repairs the order of the day, but it was well worth the effort." — *WA8IDF*

"I had much fun in this contest and will try and enter the next one too." — *DJ6ZB*

"Ten meters was great — no QRM, and better manners on the part of the operators." — *W6AEE*

"Make shorter messages, combine numbers, etc. Would permit short contacts and more QSOs." — *HB9P*

(*Continued on page 138*)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1NJM

Who's The Boss?

During the ARPSC meeting at the Pacific-Southwestern Division convention in Los Angeles last year the meeting almost got bogged down on the question of which organization takes precedence in an emergency, the AREC or RACES. Who would give the orders, the EC or the RO? Would AREC order RACES around, or would RACES take over and tell the AREC how things were to be run?

This question received some discussion in the November '67 issue of the *San Francisco Section Courier*, edited by SCM WA6AUD, which points out that at the 1966 ARRL Board Meeting the directors unanimously adopted a motion that the ARPSC consist of AREC, NTS *and RACES*. This concept is reflected in organization charts in the *ARRL Operating Manual* (p. 81) and the *Public Service Communications Manual* (p. 2).

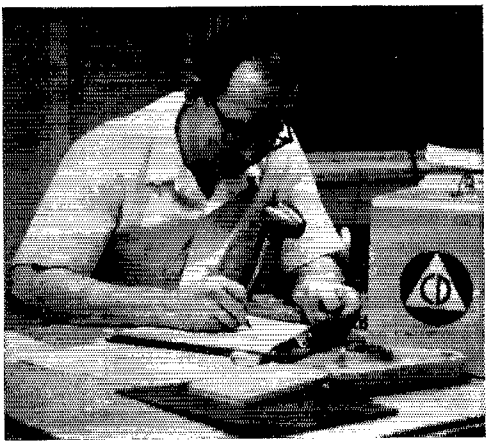
"The question, which went unanswered," says the *Courier*, "was evidently put in good faith by an amateur active in RACES. The *Operating Manual* on page 131 quotes regulations as saying RACES was set up for civil defense purposes only and the regulations restrict operations to 'civil defense communications purposes only.' Some states take this to mean that RACES cannot be used in natural disasters while others take a more liberal interpretation in the definition of 'civil defense communications' which makes specific mention of 'safety of life, preservation of property, maintenance of law and order, alleviation of human suffering and need' as well as communication in connection with enemy attack, at which time the only amateur operation would be RACES.

"The question that must be answered," the item goes on, "is whether an answer is actually needed. In an emergency, what would you do? Wait for an AREC net, a RACES net, or join in with any *ad hoc* communications set up to handle emergency traffic?"

Actually, the item concludes, "the question is academic. If there is a vital and operating AREC emergency group, well and good. If RACES has the organization, join it. If both operate, all the better. These were not intended to fight each other but to meet the emergency needs for communications and to cooperate in an emergency."

A thoughtful and rational analysis, thanks to WA6AUD and the *Courier*. The subject has been a troublesome one from the beginning; that is, the beginning of RACES in 1951. We sometimes suspect that officials of the government agency sponsoring RACES expected us to forthwith abandon our own little emergency organization and lend our full and undivided support to RACES, devoting our full attention to civil defense communication, by whatever interpretation. This was seriously considered, but decided against because it would have constituted abdication of our responsibilities for overall public service communication involving non-c.d. agencies. Nevertheless, a new viewpoint had to be formed. "The increasing tendency to recognize us for what we are and wish to be — a communications service operating in the public interest — makes us swell with pride," said "With the AREC" in 1951. "A little pride is good for any organization, and we have a right to be proud of what we have accomplished. But actually, we amateurs are being put on a spot. Recognition means responsibility, something we have never had before officially. We have come of age, to the point where we are recognized as a service, and it now looks as though our service, the Amateur Service, will be put to work in civil defense, this time in our own name. We will get the credit if we put it over, but don't forget also that we take the rap if we fail!"

Bearing this grave sense of responsibility in mind, we amateurs set about implementing RACES. How? Naturally, through our established emergency "plant," the AREC. ECs were



This is KØVQM, the NCS for WØWSV/Ø, in action during the Witch-Watch operation at Cedar Rapids, Iowa. The Cedar Valley Amateur Radio Club did an outstanding job and there was exceptional cooperation between the amateurs and police.

*Communications Manager

urged to offer AREC services to c.d. officials. In most cases they were accepted, gratefully, and initial rapport was established. But soon troubles began to develop. Some c.d. officials managed to restrain their enthusiasm about AREC (sometimes, alas, understandably!), started to set up their own amateur groups. Either the AREC group dissolved or, estranged, became hostile, and strife developed. There was good and bad on both sides. Some AREC officials withheld cooperation pending the meeting of certain conditions by c.d. Some c.d. officials adopted the attitude that RACES was a means of using amateur frequencies for c.d. communications and that cooperation of amateur groups as such was neither needed nor wanted.

There have been periodic flareups on this matter ever since; that is, the matter of whether AREC or RACES is paramount. It is a question that shouldn't come up, a thing that shouldn't happen. At the LA ARPSC meeting we were unable to give a pat answer for that reason. We guess, in retrospect, that there *is* no pat answer, that the question has to be decided in each specific instance, if it *must* be decided. The only reason it comes up at all is that there are amateur groups at loggerheads, and when this occurs it seldom resolves itself by anyone's making a decision or statement of policy.

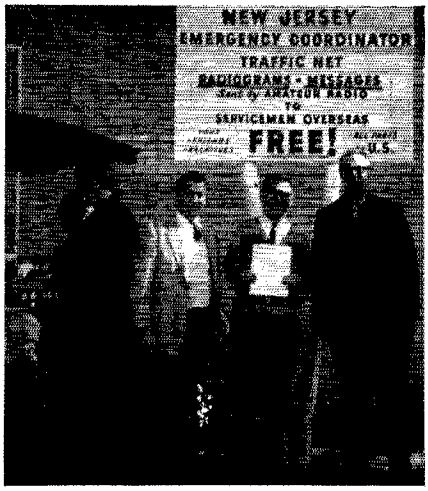
Who's the boss in an emergency, AREC or RACES? Neither. The boss is the concept of maximum public service by amateur radio. We fancy that if this concept is kept uppermost, any strife between any two or more organized amateur groups will quickly resolve itself. — *W1NJM.*

Tampa Fair

All traffic men are familiar with the large volume of traffic that originates from the annual state fair at Tampa, Fla. It has been going on each year since about 1934, message originations usually in the thousands. It is perhaps one of the biggest such operations conducted annually, if not the *only* one.

We note this activity this month because February is the month it is held. You will probably be hearing some W4DUG traffic being passed, maybe even handle some of it yourself. W4DUG is the station of the Tampa Amateur Radio Club. The station is manned by club members and volunteer operators from the Tampa-St. Pete area, of which there are many excellent ones. Traffic is handled by both phone and c.w., but usually strictly c.w. at night because phone operation gets a little difficult.

It is not a hit-or-miss operation. Schedules are maintained with traffic stalwarts throughout the country such as (you guessed it!) W3CUL, WØLGG and, in the past, the dean of all traffickers, W4PL. Much of the traffic inevitably finds its way into NTS circuits, but usually the initial hop is direct to the delivery area by special schedule. This way, NTS nets are kept from being bogged down.



The Emergency Coordinators Traffic Net sponsored a mobile operation on Oct. 21, at a large shopping center in Woodbridge, N.J. and handled over 100 messages which were originated on 2 meters at this location. Shown facing camera are WA2TBS, WB2QMP and WB2PXO, all Assistant ECs.

Some traffic operators pooh-pooh "fair traffic," but if properly handled and organized, it can be just as good for practice and training (and traffic totals) as any other kind of traffic. We don't encourage emphasis on "free messages to anywhere, anyhow, any time" in public places, but a certain amount of it, properly done, can be a worthwhile public service and is good publicity for amateur radio. If by any chance you ever contemplate such a venture, write to ARRL for its suggestions and precautions on the subject.

Diary of the AREC & RACES

On Oct. 7, safety communications for a 14-mile hike at Devils Lake State Park (Wis.) were provided by fourteen members of the Milwaukee — Waukesha — Ozaukee AREC. Normally this is an enjoyable outing, but this year rain started about 0700. Hundreds of hikers were out for the event, weather or not. At 0945, the park ranger ordered the trail closed. The AREC communications provided instant liaison with all major points on the trail as well as two roving stations on the bluffs. W9ZBM had the chore of closing down the entrances to the Bluff Trails on the West Bluff. Hikers were directed by WA9GZO to return on a trail at the foot of the bluff. WA9POV closed the trail on the East Bluff, but few hikers had progressed to that point. WA9LUK, a roving station, was asked to return and turn back hikers as he met them on the trail. WA9KRF asked hikers to return along the railroad tracks. Near the end of the operation, there were four groups not accounted for, but these were later found. Communications were provided between handi-talkies on the trail and a base station at headquarters. Liaison with Milwaukee was available via radio at all times. The operation was a definite success and a tribute to the operators, especially those who worked out in the cold and rain. — *K9KJT, EC Milwaukee County, Wisc.*

Standing, left to right: W2YPZ, W2HIA, W2SJI, WB2CQL, K2SLG, W2PEV, W2LQP, W2CVW, K2JJC, WB2FJE, WA2ILB, WA2CCF, WA2IGQ. Sitting: W2NHJ, K2MFX, WA2KVU, WA2TAF, W2ZI, K2VNL, WA2TEK. This picture of the N.J. Emergency Phone and Traffic Net includes 2 SCMs, 2 Asst. SCMs, and three PAMs.

On Oct. 22, there was a car rally utilizing blind navigators. The instructions in braille were given to the navigators and relayed to the drivers during the 100-mile trip from Expo 67 to Maranda Hotel at St. Basil Le Grand, Que. The eight amateurs used 2-meter equipment, including the VE2MT repeater for the rally, to relay information regarding the seven check points. — *VE2ANH, EC Pierre Lafortune, Quebec.*

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On Oct. 29, members of the Monroe County, Mich., AREC furnished communications for a Boy Scout road rally. A portable station was set up at the start and mobiles were used at check points. The organizers made good use of the radio facilities that were furnished by eleven amateurs. — *W8NDM, EC Monroe County, Mich.*

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From Oct. 29 to Nov. 24, twenty-six amateurs utilized the facilities of the West Coast Amateur Radio Service on 7255 kc. to report nine different traffic accidents and two traffic hazards to the highway patrol. On Nov. 1, to 4, West Coast amateurs aided Mexican amateurs with communications for an off-road race from Ensenada to La Paz, Baja Calif. Information concerning race standings and requests for parts were handled by the amateurs. — *WB6IZF.*

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Goblin Patrol *Canadian Style.* During Halloween 1966, in the North Vancouver area, thousands of dollars damage was done by vandalism. Amateur radio operators were praised for their efforts to help police.

For 1967, VE7PF and the c.d. officials coordinated all efforts at c.d. headquarters. The set-up consisted of a transceiver for amateurs, a transceiver to fire-department, a transceiver to Works Dept. and a remote system to the Royal Canadian Mounted Police on the floor above. The non-amateur circuits were operated by amateurs holding commercial tickets. There were 24 amateurs operating 20 mobile units that patrolled certain areas consisting mostly of schools and streets. Each amateur mobile unit was issued a *red* hard hat, heavy duty flashlight, map and assigned a c.d. fireman or worker and a navigator if necessary. Police units remained mostly in the shopping centers.

If a gang appeared, it was not long before a RCMP car appeared. When a group of motorcycle riders appeared, they soon found RCMP and moved away. Their progress was reported by amateurs when they went in single groups to gather in a back street; again RCMP were there. This sequence was repeated so many times that soon the streets were empty of gangs. Later overheard: "There were just too many police about to have any fun." Actually, there were only two extra police cars and it was the roaming amateurs that discouraged any gatherings or potential trouble.

In the Ladner district, nearly 20 miles from North Vancouver, amateur mobiles used the same frequency (147.33). A base station located on the high spot of Vancouver was designated to act as relay for mobile units that could not contact their control station. This relay station had a good idea of the mobile units who might have trouble and copied all such transmissions. If a mobile or control station did not answer, he transmitted the message *without* the usual request for a repeat. The other amateurs in the area kept off the frequency and did not interfere when a mobile station called for a relay, because they knew there was one available. In the North Vancouver control center, operators wore headsets. The amateur circuit used a multiple receiver set-up with all copies of a received message passed to the operator who would then check the message and take action. If police action was indicated, the remote link would be used and a typed copy sent by runner to the RCMP. Many thanks to the nearly 200 amateurs in the greater Vancouver area for their respect to this effort. — *VE7FB, SCM British Columbia.*

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On Nov. 7, seven amateurs of the Glens Falls (N.Y.) Area AREC furnished communications between Red Cross headquarters in Glens Falls and a Bloodmobile in Hudson Falls, N. Y. The 6-meter link was maintained for seven hours and enabled volunteer doctors and other personnel to maintain touch with their offices. K2PBE, W2OP and WB2BZJ operated at the bloodmobile set up. — *K2AYQ, EC Glens Falls, N. Y.*

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On Nov. 4, twenty mobile units received instructions at Fisheries Center, Quebec, and then went to assigned locations in different parts of the province. The mobiles maintained contact with the control center and exchanged signal reports in this effort to find out the effectiveness of 2-meter communica-

tions in the very hilly country. The exercise concluded in the afternoon and a message was relayed from Annunciation to Montreal. — *VE2BVY, EC St. Hyacinthe, Quebec.*

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On Nov. 24 at about 0100Z, K4BXJ heard K2RFZ/MM aboard the *Flying Gull* calling for assistance. WA4VHM answered the call on 14,301 kc. at 0135Z. The *Flying Gull* operator had an emergency message for the Coast Guard Rescue Station in New York, regarding the yacht *Sorento* which was sinking and needed assistance. The *Sorento* with six people aboard was heading toward Bermuda, had encountered high winds and was thought to be in danger when the distress call was made. WA4VHM made the call to the Coast Guard and the Coast Guard operator requested the position of the *Flying Gull*. Upon receipt, the Coast Guard operator stated that they were the nearest known vessel to the sinking yacht, requested them to proceed to the location of the yacht to render assistance and *advised* that a Coast Guard aircraft was also on the way and could be contacted on 2182 kc. Acknowledgement of receipt of the instructions was not received because of fading signals and interference. HI8XJB could hear the *Flying Gull* but was unable to get an acknowledgement of the Coast Guard's instructions. The Coast Guard aircraft located the *Sorento*, determined that it was not in a sinking condition and then radioed to the *Flying Gull* to return to its original course. The *Sorento* rode out the storm and did not sink. — *WA4VHM, NCS Intercontinental Traffic Net.*

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On Nov. 24, VE2BU was contacted by the family of a girl who was missed the day before. Upon evaluation of the information and discussion with the police of Dorion, Quebec, it was decided not to *send out a search party but to transmit bulletins* through the repeaters, three of which were wideband f.m. and one a.m. The bulletin was sent in both French and English for 3½ hours. VE2ALE checked with the Dorion Police and learned that the original information was incomplete and partially false; VE2ALE then secured the alert. The police later located the girl and took her home. — *VE2ALE, SEC Quebec.*

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On Nov. 25, an AREC contingent of the Penn Wireless Assn. provided marshalling communications for a Thanksgiving parade. This was the PWA's second year with this particular parade and this year they entered with a civil defense radio jeep. W3ICC and WA3HBT manned the jeep as net control stations using 6 and 10 meters. Mobiles and walky-talky units were used on 6 and 10 meters. Although only six operators were used, the communications were adequate and provided a good test of both the operators and equipment. — *W3ICC, EC Bucks County, Pa.*

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On Nov. 27, a fuel-oil tanker crashed on a snow-slick road near the home of VE2DB. VE2BU, with VE2JO second operator, VE2CK and VE2ALE mobiles went to the crash site while VE2DB operated from home. The police were notified and VE2ALE assumed traffic control until they arrived at the scene. There were no injuries, so the amateurs secured after the 15-minute alert. — *VE2ALE, SEC Quebec.*

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On Dec. 2, seventeen amateurs used 2-meter f.m. equipment to furnish communications for a Christmas parade in Covina, Calif. Amateurs from as far away as West Los Angeles and Sylmar in the San Fernando Valley participated. The net was activated about 5 p.m. and finished at 9:30 p.m. Transmissions pertained to line-up information, road flare requests and searching the line for parents of children injured in an accident. AREC vehicles were at the beginning and end of the parade line as well as at several strategic points along the route. This was the second time that the amateurs have furnished communications for the event and the AREC has been invited to perform again next time. — *WA6JXG.*

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Forty-six SEC reports were received for the month of Oct., representing 17,895 AREC members. This is one less report and 791 fewer members than a year ago. The following sections reported: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, EPa, Ga, Ill, Ind, Kans, Ky, La, Mar, Me, Mich, Mo, Mont, NC, Nebr, Nev, NH, NLI, NNJ, Ohio, Okla, Ont, Org, Que, Sask, SBar, SCV, SDak, SF, SNJ, STex, Tenn, Utah, Va, Wash, WNY, WPa, WVa.

National Traffic System

It is a basic NTS principle that representation is of a *section*, not of a section *net*. Same thing? Not quite, because many sections have more than one section net. When a section net sends a representative to a region net, that representative takes *all* traffic for the section, not just for the places his section net can cover. Liaison between and among section nets in the same section must be accomplished at the section, not the region level. In other words, it's an internal section matter. The region net NCS will expect any representative from, say, Virginia, to handle traffic for any point in Virginia, and he (the NCS) couldn't really care less what net he (the rep) comes from — nor has he the time to devote to consideration of such details. His job is to distribute the traffic among the section representatives of the region.

Organization at section level is usually looser than at region level, and sometimes section-level people fail to understand the reason for the procedures used at region. The fact is that the region net is no place for beginners in traffic handling. True, every traffic man has a first time in every net at every level, and few if any of us sound like veterans our first time out. In fact, some of us make an awful botch of it. But there is no excuse for a section rep at region level not knowing the procedure used, or the proper order of preamble in a message, or who calls first in QNY procedure. These things are learned by experience, and inexperienced operators should not be dispatched to region and area levels of NTS.

On the other hand, there are extenuating circumstances. The poor harrassed section net manager cannot always find a hotshot to go to region, and he cannot always do the job himself — so he sends whoever volunteers. The operator who volunteers may do so with some trepidation, not being too sure he can live up to the higher standards at region level, but because there is no one else available he decides to tackle it. If, upon stumbling his way through a few exchanges, he finds that his operating ability is the subject of debate between his net manager and the manager of the next-higher-echelon NTS net, it is going to do little if anything for his morale and esprit de corps, or perhaps that of other witnesses at the same ability level.

It is well enough for net managers to discuss such matters privately between themselves (this does *not* mean on the air), but managership matters, particu-

Shown are WA6ZTY, WB6BNQ and KH6FQS, who operated KH6SP during Typhoon Sarah's savage gale wind on Sept. 16–19. This emergency operation appeared in the December "Diary of the AREC."

larly when they concern other operators (as they invariably do) should be kept private to avoid offense. Newer operators who are trying hard to become better operators are apt to be easily offended at any disparaging remarks concerning their present ability or progress level. In any case, it is not progressive.

Nothing wrong with discussion on such matters; we're all in favor of it. But if two basic principles are understood and adhered to, no discussion or debate or controversy will be necessary or called for. One is that the section net manager send up the best man available. Note that the adjectives "best" and "available" qualify each other — that is, the best man is not always available and the available man is not always best. The other is that the region net manager assume the man sent up *is* the best available and "make do" with him without passing remarks.

There are two "flaps" going on in NTS at the present time, arising from the dissatisfaction of a higher-level manager with the quality of representation provided by the lower level. Other controversies arise from time to time regarding similar matters of observance of basic principles. All this could be avoided if we observed the principles until or unless they are changed as a result of consideration for the entire system, not just this or that piece of it. — *W1NJM.*

November reports:

Net	*Sessions*	*Traffic*	*Rate*	*Average*	*Representation %*
EAN	30	1773	1.307	59.1	95.5
CAN	30	1523	1.235	50.7	100
PAN	30	1533	1.198	51.1	97.3
1RN	60	537	.360	8.9	92.4
2RN	58	554	.601	9.2	91.3
3RN	60	632	.489	10.5	100
4RN	53	462	.384	8.9	83.8
RN5	60	672	.357	11.2	95.2
RN6	60	1801	.757	31.6	100
RN7	59	628	.374	10.5	47.5
8 RN	60	683	.442	11.4	99.5
9 RN	60	639	.570	10.6	95.4
TEN	60	832	.731	10.3	87.2
ECN	60	133	.169	2.2	71.2
TWN	30	266	.355	8.9	86.0[4]
Sections[2]	2441	15,161		6.2	
TCC Eastern	120[3]	803			
TCC Central	90[3]	884			
TCC Pacific	120[3]	1025			
Summary	3211	30,541	EAN	16.4	85.2
Record	2830	27,785	1.315	12.6	—

[4] Region net representation based on one session per day.

[2] Section and Local nets reporting (80): AENB, D, H, M, O, P, R (Ala.); OZK (Ark.); NCN, SCN (Cal.); HNN (Colo.); CPN (Conn.); FAST, FATT, FMTN, FPTN, GN, QFN, SATN TPTN, WFPN (Fla.); GSN (Ga.); QIN (Ind.); ILN (Ill.); Iowa 75; KPN, KSBN, OKN, OKS (Kans.); FCATN, KTN, KYN (Ky.); LAN (La.); PTN, SGN (Me.); MDD, MDDS, MEPN, Termite (Md.-Del.); EMN, EMNN, WMN (Mass.); QMN (Mich.); MJN, MSN, MSPN (Minn.); MNN, MTTN, PHD (Mo.); NJN, NJPN, PVTN (N.J.); Roadrunner (N.Mex.); NYS (N.Y.); NCN, NCSB, THEN (N.C.); OSSB, OSN (Ohio); OLZ, OPEN, SSZ, STN (Okla.); EPA, PTTN (Pa.); RISPN (R.I.); SCN (S.C.); TEX (Texas); BUN (Utah); VN, VSN, VSBN (Va.); WSN (Wash.); WVN, WVPN (W.Va.); BEN, WSBN (Wis.); APSN (Alta.); BCEN (B.C.); RPQ, QueAREC (Que.).

[3] TCC functions performed not counted as net sessions.

K5IBZ comments that traffic was sorta slow but he was very happy to see the representation up considerably. The new stations from Miss. should bring representation back to where it belongs; however, it is rather unusual for any of the RN5 section reps to miss a session. WB6BBO is proud to report the high total even though it indicates only the traffic cleared within the net's time limits. K7JHA sez traffic was up for the first time since spring and far above the Nov. '66 figure. The rate and average should pick up; but with Alaska, Alta., and Sask. missing entirely, the representation is about all RN7 can expect. W9QLW: "It's a pleasure to award net certificates to WA9FDQ, WA9QKP, W4NBZ, W9NUW and WA9NVY." WØLGG issued net certificates to WAØDOU and WAØHUD. VE3BZB sez that the late session looks good, considering it's the first month!

Transcontinental Corps: W3EML reports a relatively good month with percentage down a bit but traffic up. All functions assigned and all were reported. A TCC certificate was issued to W4NLC for his fine steady work in Eastern Area TCC. W9JUK resigned as TCC Director Central but hopes to remain on the TCC roster. Hearty congratulation to Dave for the fine work he has done as TCC Director Central and for the formation of the Central Area Staff.

November TCC reports:

Area	*Functions*	*% Successful*	*Traffic*	*Out-of-Ne Traffic*
Eastern	120	95.0	2172	803
Central	90	93.3	1807	884
Pacific	120	95.0	2052	1025
Summary	330	94.5	6031	2712

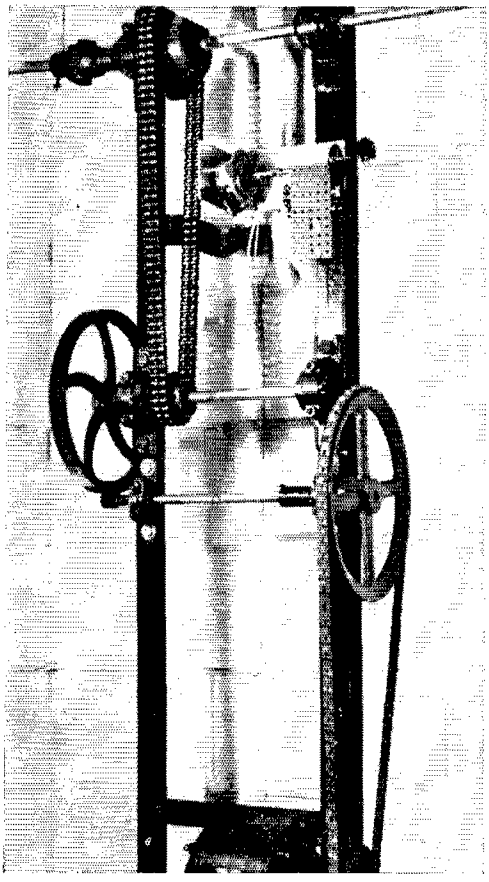
Nov. TCC roster: Eastern Area (W3EML, Dir.) *W1s* BJG EFW EMG NJM, *W2s* GKZ SEI, K2RYH, *WA2s* BLV UWA, *WB2s* UFV RKK, *W3s* AIZ EML NEM, K3MVO, *W4s* DVT NLC ZM, K4KNP, *W8s* CHT ICH/UM RYP, K8KMQ, *WA8s* CFJ OCG ZGC, *WØGXQ/8*, VE2UN/WA2UPC. Central Area (W9JUK, Dir.) W4OGG, *K4s* BSS/4 DZM, WA4WWT, WB4AIN/4, W5KRX, W8FAW/Ø, *W9s* CXY DYG JUK VAY YT, *WØs* LCX ZLN, *K0s* AEM YBD, *WA0s* DOU MLE.

Other Net Reports:

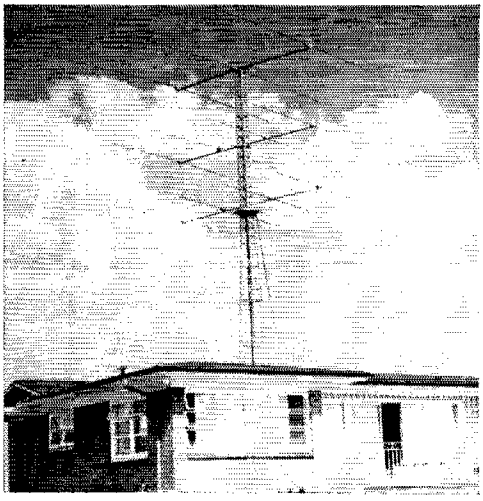
Net	*Sessions*	*Check-ins*	*Traffic*
North American	26	771	640
New England Teenage	28	269	122
7290	42	1586	1181
20 Interstate	20	381	3075
75 Interstate	30	1334	559
Clearing House	26	415	359
Eastern Area Traffic	30	356	521
South Atlantic Traffic	25	197	165
QTC	—	295	320
HBN	30	426	823
Mike Farad	56	563	418

QST

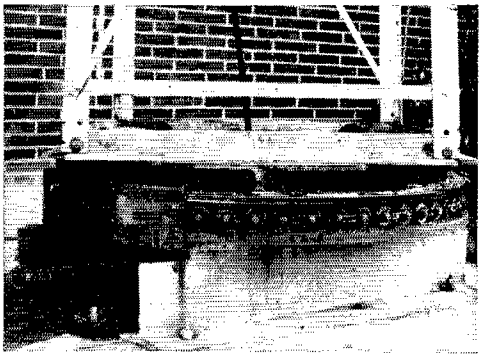
Strays



A ¼-horsepower motor drives the tower and antennas



The antennas, tower, and rotator shown here were all built by Roy C. Needham, ZL1KG. The tower is rotated on a converted gun mount by an electric motor and gear train. The tower is made from old windmill towers.



The converted gun mount at the base of the tower

Ham of the Year Award

The Federation of Eastern Mass. Amateur Radio Associations is now accepting nominations for the 1968 John Mansfield Memorial award "Ham of the Year." Only licensed amateurs in the 1st call district are eligible for this award and the candidate must be able to meet any one or more of the following qualifications.

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

The winner of this award will be presented a plaque and a cash award on June 1, 1968 at the New England ARRL convention at the New Ocean House, Swampscott, Mass. Send all nominations to Eli Nannis, W1HKG, Chairman Awards Committee, 37 Lowell St., Malden, Mass. 02148. The closing date is April 26, 1968.

WB2QMU won a diploma and silver cup for the North American Championship in the Fourth International Amateur Radio Contest. Because he could not be present at the award ceremonies, EA7HN and his XYL accepted the award on behalf of WB2QMU from Mr. Manuel Sala Rodriguez, mayor of Malaga. That's the mayor on the right.

Happenings of the Month

Dana E. Cartwright, W8UPB

With deep regret we report the death of Dana E. Cartwright, W8UPB, for the past eight years director from the Great Lakes Division, on December 10, 1967.

Carty, who was 70, was stricken at Civil Defense headquarters where he had served as communications officer since retiring from the Stearns and Foster Co. five years ago.

Previous to his election as director, W8UPB was vice director for two years. Earlier he had been section emergency coordinator of Ohio for twelve years, and had been active in Red Cross. He was a charter member and station trustee for the Queen City Emergency Net, a member of the Greater Cincinnati Amateur Radio Association, the Oh-Ky-In VHF Society and had first been on the air in 1912. Carty leaves his wife Helen, two sons and five grandchildren.

—•••—

Charles C. Miller, W8JSU, vice director of the Great Lakes Division since 1964, completed Carty's term as director. Alban A. Michel, W8WC, who won a six-way race for the office this past autumn, became director on January 1, 1968, and W8JSU resumed the office of vice director to which he had just been reelected.

ARRL COMMENTS ON SLOW-SCAN TV

In November, this column reported the issuing by FCC of a Notice of Proposed Rulemaking, Docket 17736, which would allow narrow-band slow scan television in portions of the h.f. phone bands.

In accordance with an action of the Executive Committee, ARRL has filed comments with the Commission supporting the idea in principle but asking that the initial adoption be for a trial period of two years. It also asks for suitable identification of amateur TV signals so that operators not equipped with slow scan will know the signals are amateur in origin. The text follows:

Governor Paul Laxalt of Nevada signs the first Amateur Radio Week proclamation for 1968, starting January 1. Boulder City's mayor, Robert Broadbent is at the Governor's side while (from left) SCM W7PBV, SEC WA7BEU and W7PRM, president of Southern Nevada ARC, look on.

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

In the Matter of Amendment of Part 97 of the Commission's Rules to provide for the transmission of pictures in the high frequency bands by stations in the Amateur Radio Service To: The Commission	Docket No. 17736

COMMENTS OF AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Incorporated, a non-profit organization with some 80,000 amateur radio operators licensed by the Federal Communications Commission as voting members, respectfully submits the following comments in

WWV staff members pose with special one-way WAC and WAS certificates awarded by the International Amateur Radio Union and the American Radio Relay League, in recognition of the contributions of WWV to amateur radio operators in the U. S. and around the world. Left to right: Peter P. Viezbicke, Jr. (WØNXB), electronics engineer who helped to design WWV, Fort Collins; Howard Michel (KØBPY) and Earl Snider (KØLON), electronic technicians at the station; Leo Honea (WØLAM), engineer in charge of WWV; Dr. Yardley Beers (WØEXS), chief of the NBS Radio Standards Physics Division; and William Dirks (K LAR/Ø), assistant engineer at WWV. One amateur associated with WWV but not present is Edward H. Rogers (KØGKB), electronic technician in the Broadcast Services section who is involved with checking the accuracy of WWV signals.

Behind The Diamond

Number 1 of a Series

It's logical for any series on the people behind the ARRL diamond to start with **Wayland M. Groves, W5NW** who began serving on the Board of Directors in 1935.

One of the most intriguing things about our blue-eyed, leather-skinned first vice president is his nickname "Soupy" itself short for "Soupbone." J. C. "Felix" Johnson, W5-LS, hung the moniker on Soupy in a yarn entitled "Hams are born — Not Made" which appeared in *QST* for January 1930. And considering Wayland's physique at the time, it was an appropriate handle!

Soupy represented the West Gulf Division from 1935 through 1938, and again from 1942 until he was elected vice-president in 1950. Though he primarily enjoys c.w. work himself, he made his mark on the Board as a tireless fighter for additional phone privileges — because that's what his division wanted. In recent years, he's been the Board's "clean-up hitter," coming in with motions — some important of themselves, some of them thoughtful gestures — not offered earlier by anyone else.

Soupy was first licensed in 1923 as 5NW and has been a League member ever since. He became a Charter Life Member last summer. Twice he's obtained the Amateur Extra Class license by examination, in 1924 and again in 1967 (just before incentive licensing was adopted).

During his career with Humble Oil Company as seismographer, clerk, telegraph operator, etc., Soupy ranged the world. We have a photo of him wearing a dark bushy beard, taken in Sumatra in 1931. In retirement, Soupy still finds it difficult to stay in one place — he recently took a turn as "Sparks" on a freighter, and with his wife has wandered around the States with a camper truck visiting old friends, and hamming en route.

The enthusiasm Soupy has for amateur radio has rubbed off on the rest of the Groves's: his XYL has been W5DUR since 1934, and sons Grantland W5QMZ and Bertron W5QNA received their tickets in 1950. QST

general support of the Notice of Proposed Rule Making released September 25, 1967 (FCC 67-1056).

The Commission has invited comments upon a proposal to amend Section 97.61 of its Rules in the Amateur Radio Service to permit "slow scan" television transmissions in those portions of the 3.5, 7, 14, 21, 28, 50, and 144 megacycle amateur bands which, upon full implementation of the amendments of Section 97 recently adopted in Docket No. 15928, will be available for radiotelephony transmissions only by holders of Advanced and Extra Grades of operator licenses. The Commission notes that the bandwidth of the picture transmission will not exceed that occupied by single sideband amplitude modulated telephony (s.s.b.) and the bandwidth required for simultaneous transmission of picture and voice will not exceed that required for double sideband amplitude modulated radiotelephony (d.s.b.).

The League's original petition for "slow scan" television, which was filed on June 8, 1961, proposed such operation only in the radiotelephony portions of the 21 and 28 megacycle bands. Conditions are sufficiently different today than at the time of the original petition that the League can support the expanded provisions for "slow scan" proposed by the Commission, particularly in view of the proposed limitation of such transmissions to the radio-telephony portions of the amateur bands which will be available eventually only to holders of the higher grade licenses.

Nevertheless, the League is concerned over the possibility of excessive interference from "slow scan" operations in the most heavily populated bands, i.e., those below 21 megacycles. The limitation of bandwidth to that of a voice sideband does not of itself assure that interference from "slow scan" operations will be no greater than from SSB operations. In voice operation, the emission is intermittent, varying to some extent with the conversational characteristics of the operator. In "slow scan" television, the emitted signal is continuous for the period of video transmission. Although a complete picture can be transmitted in approximately 8 seconds, the customary practice is to transmit a series of pictures of the same object to insure clarity of all portions of the picture. The effect is to produce a continuous signal for the entire period of picture transmission, compared with the intermittent transmissions for voice conversations. The net potential interference capabilities are therefore somewhat greater.

As the Commission notes in its Notice of Proposed Rule Making, there has been but limited experience with "slow scan" television transmissions in any of the HF amateur bands. The League perceives this mode of emission as a new and interesting one for amateur experimentation, wholly in consonance with the basis and purpose of the Amateur Radio Service. It is largely on this basis that League support has been forthcoming. However, because of the possible interference problem discussed above, the League requests that the proposed authorization for narrow-band types A5 and F5 emission be granted for a two year period only so as to provide an opportunity to gain experience with the new mode. Based upon such experience, a more useful and practical appraisal may be made at the end of the two year period.

The League also requests that any order adopting the proposed amendments clarify station identification requirements for the new mode. Station identifications should be such as to enable amateurs coming

(Continued on page 140)

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

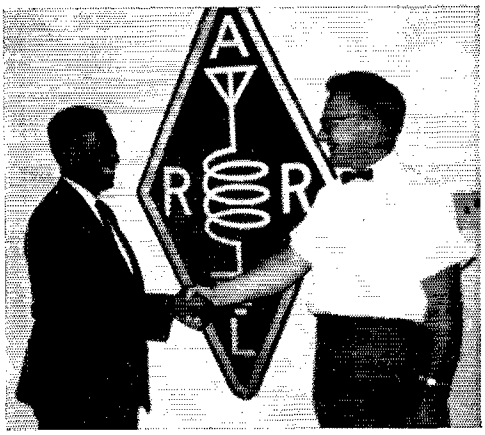
VENEZUELAN AMATEURS PROVIDE EMERGENCY COMMUNICATIONS

The following is an account received from YV5BPG: Saturday evening, July 29, 1967 will be remembered by the people of Caracas, Venezuela for many years to come. At 8:05 P.M. without any warning, a very strong earthquake shocked the city and for almost 40 seconds terror was experienced by all.

It was not known at once that heavy damage was centered around a residential area in Caracas itself and an area on the beach, on the other side of a mountain range, north of the city. Six large apartment buildings collapsed completely and many others were severely damaged.

Fortunately, electric service, as well as telephones, kept working so that most were able to communicate with their families, at least locally. During the first night, confusion and slow leakage of news about damage, via radio and television, led many to think that overall damage was not so huge. However, within a week's time the death toll had reached over 300.

Within minutes after the great shock, local amateurs had set up their stations to provide emergency communications. Welfare messages were sent out of Caracas advising many relatives far before the first news bulletins had been released. *The Venezuelan Radio Club* activated its "Red de Emergencia" handling traffic mostly on 40 and 80 meters along with other towns in Venezuela.



One of the visitors at ARRL/IARU Headquarters this past year was Mr. Suwijono Sastrosatomo, representing the Persatuan Amateur Radio Indonesia, who brought us up to date on amateur radio developments in his country. There is a chance that present restrictions will soon be lifted. Above, left, Mr. Suwijono is greeted in Newington by W1IKE.

As news bulletins were given outside Venezuela, there was a great demand for Caracas stations, mostly on 20 meters. Caracas being a city of over a million and a half people, and lying in a valley, is a place where concentration of amateur stations is unusually high. So it was not a problem to find a station on the air, but to accomplish traffic handling on a crowded band. However, generally speaking, excellent cooperation resulted between local hams, and many decided to operate on joint frequencies handling messages alternately in order to solve the severe QRM problem. Incoming messages were harder to handle, as many people left their homes in fear of new tremors and were staying in parks and other open areas in their cars.

Though all regular communication services were theoretically in operation, to all practical purposes ham radio was the only means to make contact to and from abroad. The number of people residing in Caracas, with families living in other countries on this Continent or in Europe is so large, that cables and overseas telephones suffered delays up to several days. It was not uncommon that those who could not get a message across via amateur radio, finally sent word out within a week or so, by mail. However, a surprising number of persons did think of the radio amateurs and called or visited their homes, anxious to send a welfare message out of Caracas.

It has been officially estimated that amateurs handled over 45,000 messages in the few days following the quake. This included not only welfare messages, but contact with the Red Cross in Curacao, calls to various Venezuelan Embassies abroad, and of course locally with hospitals, National Guard and other emergency calls.

The *Venezuelan Radio Club*, unable to list the calls of individual stations helpful in this national emergency, sent a circular letter of appreciation to many amateur radio societies abroad, whose members were helpful to us. A local CB Emergency Net which maintains contact with the *RCV*, was also very helpful providing local coverage from the sites that were hit worst and also between Red Cross supply stations. On the h.f. bands, excellent cooperation was observed, and an unusual number of stations were willing to take any outgoing Caracas traffic.

Stations in some European countries secured special permission to handle third-party traffic in the emergency. This might be a good opportunity to remark that it is a pity that emergency

traffic cannot be legally handled to and from many countries on amateur bands.

Later our *Radio Club Venezolano* received a sizeable donation of v.h.f. equipment and expects to put soon into operation the first two-meter f.m. emergency net with automatic repeater on a mountain overlooking the city. Efforts are being made to strengthen our emergency operations.

At the recent Technical International Red Cross conference in Caracas, the *RCV* presented its views on the subject of better coordination between the International Red Cross and amateur societies, especially when handling requests for emergency shipments of medicines and taking into account the insufficient communication facilities usually at the place such medicines are required. Consequently, *RCV* has proposed that the Red Cross consider to obtain amateur calls in every country, at least in Latin America and the U. S. A. This could help greatly to expedite emergency requests for medical help or medicines and at the same time avoid duplication of such requests. — *Pedro Seidemann, YV5BPG.*

1968 IARC PROPAGATION RESEARCH COMPETITION

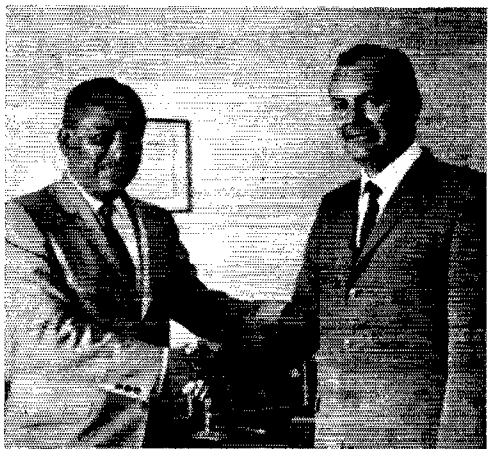
In connection with a program initiated by the International Amateur Radio Club aimed at publication of a manual giving prevailing propagation conditions between each of the 75 ITU zones as a function of amateur band used, month and solar activity, sponsorship of the 1968 Propagation research competition is announced. The object is for amateurs around the world to contact as many other amateurs in as many different CPR Zones as possible. The contest period is from 0001 GMT on April 1, to 2359 GMT on April 30. Any or all of the m.f. or h.f. amateur bands may be used. Certificates and awards will be available for high scorers. For further information and log forms write the International Amateur Radio Club, 1211 Geneva 20, Switzerland. All entries must be postmarked no later than June 1, 1968 and sent to L. M. Rundlett, W3ZA, Chairman, IARC Contest Committee, E.I.A., 2001 Eye Street N.W., Washington, D. C., U.S.A. 20006.

SIX METERS FROM POLAND

One of Poland's leading v.h.f. enthusiasts, SP2DX, has received special permission from the Polish Ministry of Telecommunication to operate in the band 50–54 Mc., a band not normally available to amateurs in Poland. The permission is valid until the end of 1968. (*Region I Bulletin.*)

FOREIGN-HELD FP8 LICENSES CANCELLED

The *Chef de Centre Radioelectrique* for Saint-Pierre and Miquelon islands has notified IARU/ARRL headquarters that all FP8 licenses except those belonging to French nationals have been cancelled. U. S. amateurs may no longer be issued licenses, because the French-U. S. reciprocity agreement does not cover French overseas entities.



His excellency Oswaldo Lopez A., president of the Republic of Honduras and an ardent amateur (HR1OL), welcomes IARU/ARRL president Robert W. Denniston, WØNWX, to his ham installation. The occasion was the 1967 annual meeting of the *Federacion de Aficionados de Central America y Panama* in Tegucigalpa last September. *(Photo by HR1MD).*

CALLBOOK CORRECTION

The *Radio Club Venezolano* reports that the address shown in recent issues of the *Radio Amateur Callbook Magazine* for QSLing YV amateurs is erroneous. The correct address is *Radio Club Venezolano*, Apartado 2285, Caracas, Venezuela.

ZAMBIA ISSUES COURTESY LICENSES

Foreign nationals may secure courtesy licenses in Zambia, reports 9J2LN. Applications from British subjects should be submitted to the countries Telecommunications Office. All other applications go to the Ministry of Transport, Power and Communications for formal approval.

ITALIAN FREQUENCY ASSIGNMENTS

Associazione Radiotecnica Italiana is continuing efforts to have restored the v.h.f. and u.h.f. bands lost last year. Some success was achieved recently when amateurs received permission to use the segment 431.75–432.25 Mc. It is hoped that other v.h.f. and u.h.f. bands will be released shortly and an extension granted to the present restricted 3.5 Mc. band. (*Region I Bulletin.*)

RHODESIANS ON 70 MC.

The Rhodesian Telecommunications Controller has announced that radio amateurs in that country may now use frequencies in the band 69.75–70.15 Mc. Input power is limited to 25 watts for fixed stations and 10 watts for mobiles. The assignment is conditional on no interference being caused to other services using the band. (*Region I Bulletin.*)

FINLAND RECIPROCITY

Finland has signed a reciprocal agreement with the U. S. The effective date is the same as that of signing — December 27, 1967. QST

Correspondence From Members-

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

BETTER OPERATING PROCEDURES—CONTINUED

¶ Now that incentive licensing is in effect I hope the amateur population will continue to see articles like the December "It Seems to Us" column. Better operating procedures must not take a back seat to improving the technical level of the amateur radio operator.

The League's publication, *Operating An Amateur Radio Station*, states: "Amateur Radio exists because it qualifies as a service. Its continued existence depends to a great degree not on the service we have performed in the past, or on our simple potential for service, but on what we are performing now and will continue to perform for the public in the future." We can continue to perform a valuable service to the public only if we continue to improve our operating procedures along with technical knowledge. — *Tom Lappin, KØLHE/0, Hutchinson, Kansas.*

¶ The editorial states clearly our most needed requirement. I agree with this point of view and am glad to see *QST* say so. — *D. Fischer, KØAKK, Lincoln, Nebraska.*

¶ In reading about the upper class licensees calling "CQ Class A only", etc., I feel they perhaps were jumping the gun on what is coming when the new law becomes effective. These same guys will no doubt sit in the so-called "choice frequencies" and will give no attention to the other fellows on the other frequencies who are still in the process of working their way up.

I remember before 1953 when a Class B ham could get on a Class A phone band and get his friend by using c.w. as this practice was authorized. I might add that a lot of us after getting our Class A tickets kept our code up as we never knew when one of our Class B friends would call us to move up on the Class B bands. So far, I see no such provisions in the new law and I feel it is most unfortunate! A few of us were hoping to get the old set-up back and exactly as it was (and perhaps quiet down the Extra Class and 20 word per minute code speed like they did back in the early 1930s). However, it is not very often that we middle-of-the-roaders ever win a battle. — *Irving H. L. Herrigstad, W7KON, Lynnwood, Washington.*

¶ I, too, was assaulted by the "No kids, no lids" character and furiously angered at this kind of disposition. I can assure you that nothing like that will be heard from my station nor will I expect to hear it from anyone else.

I think most of the operators on the band make a solid effort to practice good operating procedures. A few, like myself, who are new on the phone band, need to learn these procedures which are quite different from those of c.w. Others could use a little brushing up. It all takes time and patience.

In a few months, I'll head on up to Chicago for my Advanced ticket. With this advancement, I'll need to concentrate more on good operating techniques. Like the editorial says: "Holders of Amateur Extra Class and Advanced Class are now especially on the spot—the experts on display!" How true! So, c'mon you future Advanced licensees. Let's make our stations worthy of their class! — *R. Perry Awe, WA9KNT, Hammond, Indiana.*

¶ Your December editorial took Myron Premus, W2OY, too seriously. He added spice and interest where there are all too many humdrum QSOs. I disagreed with much of his thought; his language at times was a little too colorful; but, he set me on the straight and narrow on several things. To mention three: 1) Phonetics — needed only during heavy QRM or weak reception, or preferably only when asked for. 2) Long transmissions — try conversation, not monologue. 3) Ham jargon — we all could fill pages with shop-worn phrases. Try ordinary conversation more often.

Being only 10 miles from his station and top man on his list, I've been snarled at S9/40 db several times. Nevertheless, most of those I talk to, and will miss the old grouch. Mike died suddenly and tragically on November 25, 1967. — *Richard Blum, W2AYM, Buffalo, New York.*

¶ The editorial on better operating procedures is excellent. However, I have one comment to make about the reference to tuning up on the band instead of into a dummy load. That is a pretty broad statement to make. Tuning up into a dummy load is excellent, but the final minute tuning must be on the regular antenna. This is permissible as long as no deliberate interference over the air is caused. There is no dummy load that is exactly like the regular antenna load. — *Paul F. Montgomery, WSZHB, Lewiston, Michigan.*

NO CITIZENSHIP REQUIREMENT?

¶ The Communications Act permits foreign nationals who are neither citizens nor permanent residents of U.S. and probably never will be, to own and operate an amateur radio station but does not give the same right to the legally admitted immigrants who are permanent residents of United States and future citizens.

I feel that this particular regulation of Federal Communications Commission against which I am complaining is unfair and discriminatory against of a group of new Americans and I am asking you to start an action to change it. I understand this can be done by an amendment passed by Congress. — *George Pataki, New York City, New York.*

COMMERCIAL INFO?

¶ Why doesn't *QST* run some articles on current commercial practice in communications, and how to get a commercial operators license? Most hams would find such information very useful. The ARRL could also inquire into renting a few satellite channels from Comsat Co., to fill in the gap between Oscar satellites. With a drive for contributions, I'm sure it wouldn't be too hard to rent a channel or two. — *Rudolph P. Zalesak, Jr., WA5REI.*

A HEADQUARTERS VISIT

¶ I am one of the few local amateurs who has had an opportunity to visit the League Headquarters. It is much different physically than I had imagined.

The organization and operation are also different. Happily, the Headquarters staff comes across as "just plain folks" — the kind you expect to meet when you call on the ham across town. Maybe a film or slide sequence of Headquarters, the staff and the administrative organization would help make it more understandable to those who cannot visit. Somehow, the view that ARRL is "Headquarters" must be dispelled. The Headquarters staff are actually the employees of the ARRL and as such strive to perform the many tasks which are essential to the maintenance of the League. The selection and specification of these tasks is no doubt under the control of the ARRL directors who in turn are elected by the ARRL members. With this allocation of authority and responsibility it is difficult to understand why people choose to condemn only the Headquarters staff rather than including the directors and perhaps the members as well. — *Tod Olson, WØIYP, Minneapolis, Minnesota.*

[EDITOR'S NOTE: A slide collection with narrative magnetic tape, "Your ARRL Headquarters," is available to any affiliated club from the Training Aids program. Ask for SC-6.]

ADVANCEMENT

¶ I am only a Technician but I have every intention of moving up to Advanced, and possibly Extra. I am personally glad to see incentive licensing go into effect, and I think it will cause some improvement on the bands. — *David Shepherd, WA4ZWE, Claremont, North Carolina.*

¶ Haines, Alaska could also be considered "in the sticks." We now have one Extra Class, one Advanced and at least one Conditional. Also the Extra Class was only a General less than a week ago; that's me. The other two mentioned are both ready to hit the books, the Advanced being an old-timer brass pounder and an excellent operator and technician from the word go. Also, the Conditional is practically a full time ham and builds a lot of his gear.

We have no organized club here but we are striving on our own to upgrade our license status and don't mind helping each other out one bit. We each have our own talents in this art and learn what we can from each other with due respect.

I hope that it won't be too lonely on the lower ends of the Extra Class bands because I'm sure all of us will want to upgrade ourselves for our own best interests. — *Gary L. Carlson, KL7FRZ, Haines, Alaska.*

¶ Although it is much easier to be complacent, I am grateful for the added motivation to get down to work again so as to improve myself and all that my call ought to represent. Sometimes we need that gentle or not so gentle push to get going and accomplish something worthwhile. — *Robert J. Lemanek, K8HVG, Plymouth, Michigan.*

¶ I'm going up and try for my Extra. Are you? — *Brad Smith, WA5PSA, Tulsa, Oklahoma.*

¶ I was all ready to take the Novice exam, but when incentive licensing was passed, I changed my mind. I decided to go for the General License directly.

I hope to start a radio club at my high school next year, to include classes in code and theory. I also hope to have drives to interest more people in ham radio, and to increase ARRL membership. Just about everyone I hear on my receiver (I managed to afford at least that) is planning to upgrade their license, which is a very good idea. 73! — *Matthew D. Meighan, Chicago, Illinois.*

¶ I am 70 years old now and I am going to take the Extra examination. It will not be any hardship but just a little time to devote to study and that will not hurt any ham. — *Charles Judd, W2LZW, Waretown, New Jersey.*

¶ I started at the bottom with a Novice, then a Technician, and now a General.

The reason that some of us fellows get interested in amateur radio is because we like challenges. The reviving of the Advanced Class will make amateur radio more challenging. I consider getting my Advanced as another step up . . . to getting my Extra.

Thank you very much. — *Charles J. Rabley, WA8RUO, Greenville, Ohio.*

¶ I have never heard so much interest in anything for some-time as the number of groups starting up classes. You can't buy a *License Manual* in the Boston area. Some specific results: WA1FSI, a mother of two, passed the Advanced Class examination; WA1DRS a 16-year-old high school boy, got his Extra. — *Frank Baker, W1ALP, Braintree, Massachusetts.*

¶ I have been a ham for more than 30 years. Most of that time was spent on phone and for the last ten years I have operated only single sideband. I thought it would be an interesting exercise to see how long it would take to meet the requirements of the Extra Class examination.

With a code speed of 10 words per minute to start, it took approximately 4 weeks to increase my code speed to 25 w.p.m. and 5½ weeks later I took the examination and passed it. — *R. V. Kinney, W3VYX, Lafayette Hill, Pennsylvania.*

¶ On November 22, I passed the exam for an Extra Class ticket (my 4th try). In my whole life I don't believe I have ever experienced the genuine satisfaction and pleasure of accomplishment that I felt when I left the examination room — knowing I'd finally made it. — *Alvey F. Pittman, W9JJC, Indianapolis, Indiana.*

GOURMET

¶ Today when we returned from an errand, my wife said to me "Come in here and see your new December *QST!*" Our 12-year-old dog, Teddy, either did not like the incentive program, or he was mad at us for leaving him. He really had shredded the good old mag! Only one thing to do, throw the scraps away! — *J. C. Erickson, W8DAE, Cleveland, Ohio.*

[EDITOR'S NOTE: You didn't say *how* it was shredded. We therefore assume Teddy chewed it, and that makes him a gourmet. The December number was the biggest of the year and Teddy undoubtedly knows a juicy issue when he sees one. A replacement is on the way. Tell Teddy the first one was on us and we hope he enjoyed it.]

LEAGUE ELECTIONS

¶ In the Great Lakes Division Directorship election the elected candidate mailed out a great number of propaganda circulars to division members. I

would like to know where he got the mailing list. Did the League provide it and if so, why wasn't it provided to the other candidates? If he paid for it either to the League or an organization to whom the League had sold the list, how much did it cost and through what authority did the League provide the list to the candidate and/or mailing service?

I think the candidate should announce his total campaign expense enabling future candidates to determine if they can afford the office. Additionally, I think the League should frown on such campaign tactics, for, as one constituent said, "Them as has — gets". I suggest that this practice might eliminate the less affluent, younger and possibly more vigorous candidate and if there ever was an organization which has demonstrated the need for a Board of Directors of less affluent, younger and more vigorous members, ARRL must be the one. — *James W. Voorhees, W8EGR, Hillsdale, Michigan.*

[EDITOR'S NOTE: By established rules of our Board of Directors, membership mailing lists up to a division in size are available to any affiliated club or a petitioning group of ten members. When a director nominating petition is received, it is considered to meet the latter requirement.

Several candidates in various divisions used the mailing lists this year, as has been done in the past. Each pays the League's out-of-pocket cost in preparing and furnishing the list. The cost varies with the form — i.e., whether directly on envelopes, or on mailing labels, etc. ARRL does not "sell" lists to any outside organization.

Issuance of a campaign letter of itself by no means assures election. For example, this year the incumbent in one division mailed one letter while his opponent mailed several; yet the incumbent was re-elected.]

ARE YOU READY?

¶ The winning article entitled, "Are You Ready?" of the December issue of *QST*, has what I believe to be a fallacious interpretation of amateur radio.

When an individual elects to become a ham operator he is taking on a "hobby." As such he has every right to participate in it as seriously or as light heartedly as he so chooses.

I do not feel that anyone has the right to "point the finger" at the standing of other amateurs. This is a hobby, and as a hobby we have no obligation for any state of preparedness.

By the way, those who do take on these areas of endeavor have my deepest admiration. — *Lawrence D. Odell, WA2ADC, Freeport, New York.*

¶ On the one hand Mr. Padgett encourages amateurs to participate in as many amateur service activities as possible (including MARS) and then follows up with the question "have you withdrawn to the QRM-free quick frequencies of MARS?" This is most remarkable. Presumably Mr. Padgett would like us to maintain participation in amateur frequencies which are already jammed.

For years, certain radio amateurs have bemoaned the overcrowding of amateur frequencies with poorly trained operators, and the incentive licensing program is presumably one method of helping to moderate the situation. It just so happens, however, that the ARRL does not have a monopoly on training programs, and MARS is one area in which both technical and procedural training is made available to amateurs as part of a public service activity. If Mr. Padgett begrudges amateurs working with MARS to the exclusion of certain amateur nets, I remind him that his "well rounded amateur" would be (if he participated in all or even a number of amateur service programs available) violating the Fifth Article of the "*The Amateur is balanced.* He never allows radio to interfere with any of his duties he owes to his home, his job, or his community." (And parenthetically, one might add: his country.)

In short, if one participated actively in all of Mr. Padgett's Utopia, he would have to forego many non-radio activities which are important to a "balanced amateur". After all, if a person is advancing in technical and procedural efficiency, does it really make any difference *how* it is done?

It is one thing to be a crusader for the good of amateur radio; it is something else entirely to be a zealot, who out of a desire to spread the "gospel" of amateur radio, covertly condemns as heretics all who do not follow the path of overzealousness.

You have eaten your cake in espousing the incentive licensing program, Mr. Padgett; please do not expect to keep it at the same time, for, as with your overall program, this is physically impossible. — *Kenneth U. Hackney, WA5KHE, Nacogdoches, Texas.*

CAN YOU SPEAK . . . ?

¶ One of the admirable aims of amateur radio is the promotion of international good-will through communications. English has become an international language just as Latin at one time was the language of the learned and French was the language of diplomacy. However it is believed that our DX friends would appreciate at times our use of an occasional phrase of greeting in their own language.

Most American amateurs have had at least a high school education and have had some exposure to Latin, French, Spanish or German. Because of this they should easily be able to learn a few of the more commonly used phrases in Italian, Portuguese, French, Spanish and even Russian if presented in phonetic form. Certainly amongst our group there must be a number of linguists who would be willing to compile such a group of phrases for publication either in *QST* or in pamphlet form. I believe that it would be preferable to distribute this to all members of ARRL rather than to make even a nominal charge in order to insure wide distribution and obviate the inevitable inertia associated with ordering a copy. The investment would pay off in good-will and might result in an extra QSO and a new friendship. — *Hugh Neely, M.D., WB2BPK, Douglaston, N. Y.*

[EDITOR'S NOTE: See page 57, August *QST* for information on a Spanish-English guide.]

Strays

Visit The Goldcoasters

Are you an old timer in ham radio? Do you manage to get to southeast Florida?

If so, visit the GOLDCOASTERS!

Formed in 1963, with a current membership of about 200 from 26 states, the GOLDCOASTERS consists of old hands, mostly retired, who meet about twice a month for a fun-luncheon at the "Captain's Table" at Deerfield Beach.

No speeches! No formalities! All guests are cordially welcome. Luncheon is served at 12:30 P.M. sharp. Come early. The interval before lunch is devoted to getting acquainted, lieing outrageously about your fantastic feats of prestidigitation, insulting your friends, preparing the intestinal tract for the onslaught of raw food, and kibitzing.

Upcoming meetings are February 5 and February 26. For data on subsequent meetings contact the Secretary, Raymond Guy, W4AZ, 2320 NE 34 Court, Lighthouse Point, Fla. (305) 942-5847.

HEADQUARTERS VISITS

Your ARRL Headquarters building is open to visitors Monday through Friday, 8:30 to 4:00, on a "drop-in" basis, and at other times by appointment. The headquarters and the W1AW station are on Main Street (Connecticut Route 176 and 176-A) about one mile north of the center of the town of Newington, and about 3 miles west of Connecticut Route 15 — U.S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule on page 96 this issue). Drop in and see us sometime!

February 1943

. . . Editorially, K. B. Warner has some sobering thoughts. He points out that there is a question in the minds of a great many as to whether or not we will be able to enjoy ham radio after the war. It all depends on who wins it and we now know it was a near thing at one time. He points out that those of us who stay at home can still perform great service and in a number of ways. But first of all, of course, is to affiliate with one of the services.

. . . Clinton B. DeSoto, W1CBD has another copiously illustrated piece on the armed services. This time, he visits the Coast Guard School at Atlantic City. There he runs into our John Huntoon, a Chief Radioman on leave from the League. Clint discusses the methods of instruction and points out that any error in copying code is not to be tolerated.

. . . The Office of Civilian Defense is out with a booklet giving all the dope on how to organize and operate a WERS net. Acting Communications Manager George Hart, W1NJM, tells about it and particularly about the "Tri-Part Plan," having to do with frequency selections.

. . . VK amateurs, according to the Wireless Institute of Australia, have been recognized by their Government and allocated a place in the defense of their country. They believe they are the first in the world to be so recognized and put to work.

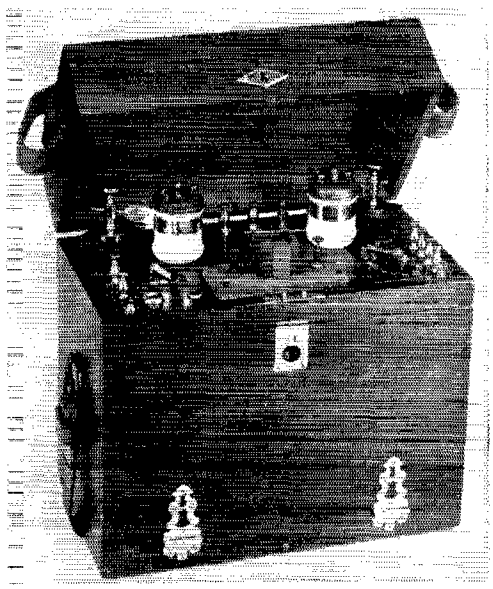
. . . T. W. Cadwa, W2KHM, a knowledgeable gentleman, discusses impedance-matching transformers for coupling antennas to transmission lines. He makes it look a little complication at first glance, but with a little reading things begin to unfold. A photo shows an impedance-matching transformer to be hung in the middle of the antenna. I can't quite imagine *that* box hanging up there, when I think of our present small baluns, etc.

. . . George Grammer, W1DF, has a fine article on elementary a.c. mathematics. This I'm going to read myself! We live with a.c. so much that we often lose sight of the basic theory.

. . . Ever hear of Triplett meters? Most hams have or have had them in the shack. W. R. Triplett, W8OWW, tells how to rejuvenate old meters. Here is a lot of good expert advice and instruction. All of you should dig up this issue and read it. Maybe you have a useless meter that can be put back in shape.

. . . Clinton B. DeSoto, W1CBD, starts a mystery serial entitled "Who Killed the Signal?" It is actually a course in radio theory, but skillfully presented as a detective story. He also has a piece on an all-purpose playback amplifier.

. . . A wiring diagram in connection with a code-practice rig shows an antenna, key and ground-period. Well, this reminds me of the simplest trans-atlantic receiver I ever used: antenna and phones — period! — *W1ANA* QST



From the Museum of Amateur Radio

ELECTROLYTIC RECEIVER. Originally made in 1902 as a transmitter by R. F. Gowen, later 2XX, this rig was brought to Harvard University and in 1904 converted to the receiver here shown. The detectors were made from cold cream jars. Perched on top is a Massie carbon-steel detector which was normally mounted inside. This was the first piece of wireless gear in what was to become the Harvard Radio Club.

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* WB4HIP

A Layman's Look at E.m.e.—Part II

K6MYC continues his discussion this month of propagation problems effecting e.m.e. communications and what the amateur can do to alleviate some of them.

Although there are electrons everywhere in our atmosphere and beyond, those in the ionosphere have the greatest effect on v.h.f. and u.h.f. signals leaving this planet. This cloud of electrons is in a constant state of flux, their number either increasing or decreasing, or moving about to form clouds or blobs, much the same as vapor clouds. For our discussion, however, think of the ionosphere as a homogeneous layer with no irregularities. A plane-polarized 2-meter signal entering this layer is gradually rotated and may go through several rotations before passing through the ionosphere and into space. If electron content is high, as it normally would be during daylight hours, the signal may rotate many more times than it would during early morning hours. This phenomenon is known as *Faraday rotation.*

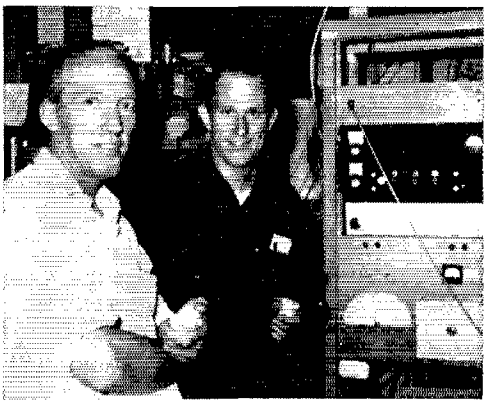
Regardless of the plane of polarization originally, the wave may come through the layer in any plane until it strikes the moon. As an example, consider the direction of rotation to be clockwise. When the signal strikes the moon and is reflected, it maintains its plane of polarization until beginning to re-enter the ionosphere, where again it begins to rotate, still in a clockwise direction, until returning to the antenna from which it was transmitted. An originally horizontal signal may have rotated six times plus 45 degrees leaving the ionosphere, and another six times plus 45 degrees upon re-entry, adding up to a net 90-degree rotation change, or vertical polarization. The signal received on a horizontal antenna may suffer a 20- to 30-db. loss from polarization shift alone.

The problem of Faraday rotation is further complicated when contact with another station is attempted. The transmitted signal must pass through two probably-different ionospheric sections before arriving at the other antenna. The polarization of the arriving signal may match the plane of one of the two antennas, but not necessarily both, or either. To put it simply, your own echoes may be coming back well, but the other station may not hear anything. But if transmissions are continued for an hour or so, chances are your own echoes will fade and the other station may start hearing you.

(A demonstration of this occurred on Dec. 20, when K6MYC and VK3ATN had another e.m.e. QSO. During the entire QSO, 1302 to 1310 GMT, neither was able to hear his own echoes. VK3ATN also heard W6YK for 8 minutes following. — EDITOR)

Another interesting fact about Faraday rotation is the relation to the hemispheres involved. A plane-polarized signal leaving the northern hemisphere twisting clockwise will return in the southern hemisphere counter-clockwise. It is possible that the effects of Faraday rotation can be nullified if the electron content of the ionosphere were the same for both paths. The shift related to hemispheres does not occur if both stations are in the same hemisphere. Schedule times should be chosen when both stations can use approximately the same antenna elevation angle (the moon the same distance above the horizon at both station) as there are usually two to three times as many electrons in the horizon path to the moon as in the path at a 45-degree elevation angle. The best time for ionospheric stability is between 2200 and 0600 local time at both stations.

Another factor entering into echo quality is *scintillation,* which cannot be corrected with circular polarization. An uneveness of electron density forms in the ionosphere and acts on a signal much like a lens on light. These "blobs" can have a focusing or defocusing affect on a signal producing unrealistically strong echoes, or no echoes at all. Scintillation, from my observations, is more apparent at frequencies below 144 Mc.

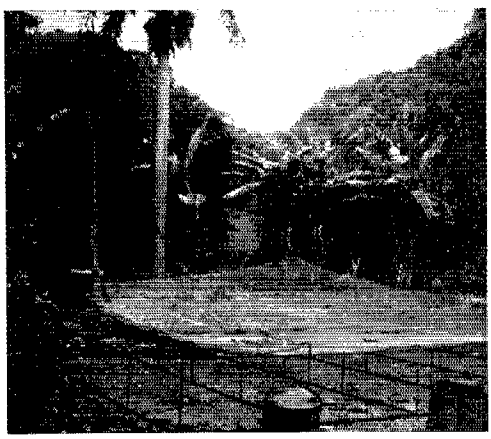


New Zealand, e.m.e. buff Ralph Carter, ZL1TFE, (left) recently visited K6MYC in Saratoga, California. Ralph is actively working towards e.m.e. contacts on 144 and 432 from his home in New Zealand.

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

Libration fading caused by the rocking motion of the moon also effects echoes. For short periods the path loss can be reduced by as much as 6 to 10 db. The moon is a rough surface and acts like many reflectors. Sometimes they add up in phase, while on the average they give a seven per cent πr^2 reflectivity. Libration spread is more troublesome at frequencies higher than 144 Mc.

Another factor having a large bearing on whether or not contacts can be made with marginal systems is *cosmic noise*. On 432 and above this should not cause much concern, but at 144 it is a different story. The minimum cosmic noise at 144 Mc. is about 1.9 db., which is quite easily heard with modern transistors. Cosmic noise is greatest is the direction of the Milky Way, or the galactic center. From my experience cosmic noise can make a 2-db. receiving system perform like a 6-db. system, or worse, when the moon is near the galactic center. There is usually a period of five to seven days each month when the moon is at its lowest declination angles. These days should be avoided if success depends upon



W1FZJ/KP4 is building this 50 foot square "dish" for 432-Mc. e.m.e. tests. The dish will later be expanded to 150 feet for use on 144. A movable feed will be mounted atop a 60-foot tower in the center of the dish

optimum receiving capabilities. Even the period as the moon is increasing its declination to its peak of approximately 27 degrees is not especially quiet. In my opinion the ten-day period after the moon has reached its declination peak is the best.

The following suggestions are offered as possible solutions to the problems just discussed:

1) Faraday rotation can be handled with circular polarization, or in part by carefully planned schedule times.

2) Larger than minimum antennas help overcome scintilation, libration fading and cosmic-noise effects.

3) An effective method of reporting and confirming signal reports helps in completing information exchanges. Avoid using code characters requiring dots, such as the letters I, E, S and H, and the numbers 2 through 7. The following system is currently being used by those scheduling VK3ATN:

T — signals detected
M — letters or portions of calls copied
O — Both calls and report copied
MT — nearly solid copy
5 — solid copy, no need for code

By this system an O plus both calls received at both ends and confirmed with RRR establishes a contact. Had this sytem been in use for my November 22nd test with VK3ATN we probably would have made another contact. However, by the old system VK3ATN was sending 3s represented by the letter E. Es are easily lost to fading and are sometimes not discernible from noise pips ringing in narrow-bandwidth audio filters. Especially after many hours of listening for weak signals, dashes are much easier to detect.

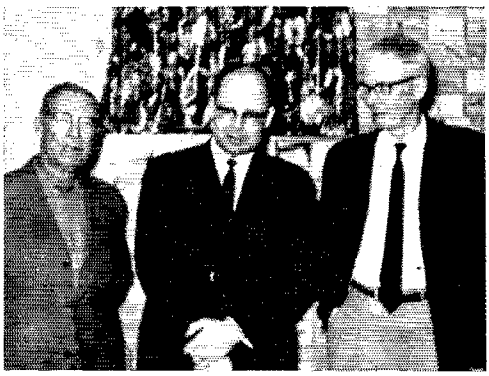
4) Receiving system modifications such as post detection, phase lock, noise blanking and cancellation all can help find signals in the noise. F.s.k. should offer a 3 db. signal-to-noise improvement and is an area for experimentation.

5) Keep transmitting and receiving periods short. I prefer 1 to 2-minute periods, particularly in daylight hours when Faraday rotation is rapid; 90 degrees every 15 to 30 minutes. Echoes can appear, peak and fade in 5 minutes or less. Five-minute periods are used by many, since some detection schemes require 3 to 5-w.p.m. c.w. speed for proper integration time.

6) Use relatively slow-speed c.w., under 10 w.p.m. When testing with VK3ATN my transmission periods are two minutes long. During the first minute each call is sent 2 or 3 times, and the report is sent the second.

7) Be sure of your frequencies, times and calling sequences. Frequencies must be within one kilocycle.

8) Keep your antenna as close as possible on the moon. If your antenna has a 5-degree beamwidth at the 3 db. points, you probably can't afford to be 5 degrees off. It is worthless to build a good antenna system and then waste it with poor



Willis Brown, W3HB, Bethesda, Maryland, recently hosted Andy Kalt, DL8PK, Wahn, West Germany (center), and Bill Smith, W3GKP, of early moonbounce fame. DL8PK is active on 2 meters in Germany. By the way, Massachusetts meteor jockey W1JSM is the son of W3HB.

aiming. This has been the principal cause of many e.m.e. failures.

9) Don't start listening for echoes in a narrow bandwidth (under 500 cycles) unless you are experienced or have a receiving system that requires it. I prefer an 800 to 1000-cycle bandwidth but most of my receiving is done in a 2.1-kc. bandwidth, with the ear providing the "selectivity."

10) When searching for weak echoes, continuously sweep the 500 to 1000-cycle portion of the band where the signal should be. I've found I can detect signals this way that might otherwise be lost in the noise. The ear can detect pitch changes easier than a steady note.

11) Doppler shift on two meters is not much of a problem. I've never heard an echo shift more than 500 cycles at 144 Mc. If the moon is rising, the signal will appear high in frequency. As the moon passes due south there will be little or no shift; then as the moon begins to set, the echo will appear lower in frequency. When listening for your echo from a rising moon, set the receiver so the transmitted signal produces a 200 to 300-cycle note. The echo will then produce a 500 to 700-cycle note. The opposite is true of a setting moon. Doppler on 432 and higher is of more concern and will produce a 1-kc. shift or more, except when the moon is due south of your antenna.

Next month's concluding discussion of this series will cover antenna mounts, drives and readout systems.

New 30-kMc. and Above Record

On October 27, Marvin Wahl, W6FUV, and Paul Davis, W6SJO, established a new distance record for frequencies above 30 kMc. when they worked over a distance of slightly more than 700 feet between portable locations in Mountain View, California. The operating frequency was just above 40 kMc., and the contact erased the previous record of 500 feet set in 1959 by W6NSV and K6YYF.

These are the holders of the new distance record for 30 kMc. and above; Paul Davis, W6SJO, and Marvin Wahl, W6FUV.

W6FUV and W6SJO both used an output power of about one milliwatt and a one-foot dish and horn antenna respectively. C.w. signal reports of 559 were exchanged.

Wahl and Davis hope to extend the distance to one mile, and then go after the 5650 Mc. record held by WA6KKK and WB6JZY.

APX-6 Cavity Conversion

WØPFP and KØCQA have found a method of coverting the APX-6 cathode cavity that eliminates the critical coax length of other conversions. WØPFP says two copper straps, ⅜-inch wide, are soldered into the cathode cavity and then the cavity assembly is moved away from the plunger assembly by remounting the cavity on ¼-inch spacers. With a 2C46 the modified cavity tunes to over 1300 Mc., and to at least 1250 Mc. with a 2C43.

This is the modified APX-6 cathode cavity showing the added inductance straps in place. Notice the feedback lobes.

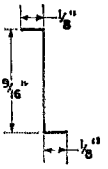


Fig. 1—The inductance straps are ⅜-inch wide and bent into the shape shown for easier mounting.

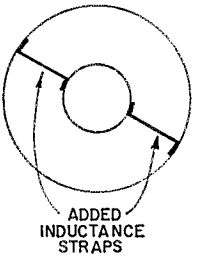


Fig. 2—This end view of the APX-6 cathode cavity illustrates how the inductance straps are mounted. Be careful not to damage the feedback lobes which are not shown in this drawing.

To facilitate the modification, remove the cathode cavity and, using at least a 200-watt soldering iron, solder the straps in place and replace the cavity. If the straps are bent into a "Z" shape they will stay in place for soldering. Install ¼-inch spacers on top of the gear box assembly and remount the cavity assembly. Do not cover the holes in the plate between the cathode and plate cavities, and be careful not to break off the feedback lobes.

If additional information is needed write to Jim McMechan, WØPFP; Route 4; Ames, Iowa 50010, and include a stamped, addressed envelope.

50 Mc. Starts the New Year Right

Old 1967 passed out in a blaze of glory, for v.h.f. men. An aurora starting in the last few hours of the old year signalled what was to come. K1HTV says that it was a good one, especially for December, a time when auroral openings are rare. He heard quite a bit of readable s.s.b. on 144 Mc.

There was a mixture of various kinds of propagation on 50 Mc. during Dec. 31, but the first day of

1968 was much more exciting. We will quote mainly from the report of K6EDX, as he covers the period in fine detail. During the 31st, Bob heard mainly backscatter of U. S. stations working VP2AT and a PJ2, around 1845 GMT. The most distant station heard was in Florida, but all were weak.

On Jan. 1, the band opened to Florida, Georgia and South Carolina around 1615 GMT, and soon after to the Northeast, as far down as North Carolina. One Montreal VE2 was heard until 1805.

One hour later Southern California stations were heard via backscatter from the west, and at 1910 KH6EEM was heard on s.s.b. KH6NS came in on a.m. (others say n.f.m.) at 1925. The KH6s worked many Mainland stations, including Florida W4s. KH6NS reported hearing a Long Island station, but the full extent of their coverage is not known at this writing.

WA6HXW, Inglewood, found conditions much the same as K6EDX, though all his times are a few minutes later than for the Fresno area 200 miles farther north. WA6HXW lost the KH6s at about 2055; K6EDX at 2042 GMT.

In the Northeast and Middle West there have been scattered reports of VP2AT, Antigua, TI2NA, Costa Rica, and other Caribbean and Central American DX. The openings to the West Coast have been mainly around noon, local time, and for an hour or so thereafter. News of the DX has travelled fast, and daytime activity levels are higher than since the last F2 DX of Cycle 19, around 1960.

K6EDX began hearing southern states on Jan. 3, around 1618 GMT. He worked VP7NA, Bahamas, and signals from this area were in until 1738. TI2NA was worked, his signal being heard from 1820 to 1905. KH6NS was worked again at 1938, and he reported having worked TI2NA. Via K6EDX, KH6NS passes the word to eastern stations that if they have trouble getting through the wall of signals from the West Coast to try c.w. calls, so that he can identify them and ask the Coast stations to hold off for a while.

This splurge of transcontinental and transpacific 50-Mc. DX in the first few days of the new year gives us a good clue for about the time that most readers will first see these lines. Watch the last few days of January, and approximately 4-week intervals, for the following several months!

OVS and Operating News

The first 50-Mc. F2 DX of Cycle 20 came Nov. 30. WA6HXW says the m.u.f. was 46.5 Mc. by 1800 GMT, and about 48 Mc. 15 minutes later, when he began a QSO with W6YDF. K1ZDY, Coventry, Conn., broke this up at 1820, for what may have been the first 50-Mc. F2 transcon of this cycle. Shortly after, WA6HXW worked W2EIF, K3HFV and W3KWH. The band closed at 1910 GMT. Earlier, Southern California stations had been working Arizona and Northern California stations by backscatter from out over the Pacific. W2EIF worked K6PXT, and had incomplete exchanges with W6ABN, WA6HXW and W6YFD.

Going back to October 18th, K6RNQ reports having worked CE3QG, Chile, on transequatorial scatter. We have not been able to confirm a report of a Massachusetts station having worked into South Africa during November. An inquiry to the station involved brought no response. From Hong Kong, VS6CJ, reports no 50-Mc. activity at the present time in that country although he does have a six-meter converter. Perhaps some of the VKs and JAs can persuade him to get on 50 Mc.

LU8BF/LU8HF reports band conditions have been good to Central America and the Caribbean. He reports *TE* contacts with eleven Puerto Rican stations, seven Brazilians, and stations in Venezuela, Mexico, Costa Rica and the Netherland Antilles. ZP9AY is making Paraguay available for a few lucky operators, and LU8BF lists active Argentine stations as LU3DHA, LU4DFN, LU5AAX, LU5CK, LU6ACH and LU9AEP. LU6ACH, using a 6AQ5 at 5 watts, and a folded dipole, recently worked TI2NA in Costa Rica!

L. M. Moreno-Quintana, LU8BF/LU8HF, is one of Argentina's most active 50-Mc. men. He runs 50 watts to a 4-element Yagi, and on 144 Mc. runs 40 watts into a curtain array.

Interest continues to build in 50-Mc. scatter. Don Roberts, W6PUZ/7, who recently moved to near Seattle, reports scatter contacts with several stations in California including an 1100-mile haul to WB6NMT in San Diego. Don was only running 60 watts and a 3-element Yagi, but probably has his kw. operational now. He would like scatter schedules and may be contacted at 6105 92nd Avenue, S.E., Mercer Island, Washington 98040. In Iowa, WØPFP reports several contacts into the East, including W3KWH, Pennsylvania. WØPFP says KØUYN is active at Waseca, Minnesota with a *50-foot* long Yagi! K7ICW, Las Vegas, Nevada, reports several scatter contacts over distances of up to 450 miles, and the reception of W6PUZ/7 at 1100 miles. WA7IER, also Las Vegas, works K7EBW in Tucson, Arizona, 400 miles, and WØJXK/7 at Boise, Idaho, 750 miles, regularly. VE1AFB near Halifax, Nova Scotia would like scatter schedules. After 17 years off six meters, W8PT/4, Pickens, South Carolina, is back on the band.

144 Mc. meteor ping jockeys were busy during the December Geminids shower. Early reports indicate a number of successes, but most of the clan agree that while pings were numerous, bursts of more than a few letters were scarce. K8AXU, Ohio, watched the shower peak between 2100 and 2200 EST on the 13th as he monitored television channel 5, no pun intended.

Here is a tabulation of the contacts, and the dates on which they were made.

W1JSM: W5GVE/4, Alabama, 12th
K1HTV: W4WQZ, Tennessee, 13th (s.s.b.)
K2GUG: WØLCN, WØLER, Minnesota, 13th
K4IXC: W9UNN, Illinois, 13th
W8PT/4: WØLCN, Minnesota, no date
W5ORH: WØEYE, Colorado, VE3BPR, no dates

WA9DOT: WB4HIP, Virginia, 12th; K4MHS, North Carolina; W5GVE/4 Alabama, 13th
KØMQS: W2AZL, New Jersey, 15th
WØLER: VE3BPR, 12th
VE3EZC: WØLER, Minnesota, 10th; W4WDH, Georgia, 12th; WØDQY, Missouri, 14th
VE3BPR: W4WDH, Georgia, 12th

Several stations reported near contacts except for the confirming "R" including K9UIF, Indiana, and WA5MFZ, New Mexico. K8AXU, Ohio, and KØRZJ, Colorado, came close over a 1250-mile path. K4IXC heard VE1AFB's 100 watts over an all water 1450 mile path.

Here's one for the books. On December 11th KØMQS was scheduling K8AXU. On one of the calling sequences KØMQS heard the Ohio station via meteors with K8AXU's key up, e.g. Dick copied the *200 milliwatt* exciter leak-through signal before Al pressed his key! When the key was closed the signal jumped to 20 db. over S9 on KØMQS's receiver. *That was some meteor!* But it didn't last long enough for a contact.

The almost nightly 3.815-Mc. gathering of m.s. buffs has boosted interest in random meteors, and it is surprising what can be accomplished during non-shower schedules. For example, one evening VE3EZC worked W5ORH and WB4HIP on random meteors, and on another K4IXC worked W4WQZ and K5WXZ. Similar contacts have been made by others. If you want to give it a try some evening, look on 3.815 Mc. after 2100 EST and you're likely to find someone to schedule.

All of this scheduling has brought forth some observations. Apparently some of us have difficulty setting our clocks to WWV or CHU, because differences of up to 5 seconds have been observed in calling sequences. Some of the automatic keying devices in use are less than satisfactory. One I hear regularly here in Virginia is so erratic that if you didn't know who it was, you wouldn't be able to identify the particular station. K2HLA's keying device is sequenced so that it sends exactly two complete sets of each 15 seconds thus getting maximum use of every transmitting period. And one final observation, we should use more of the band than the bottom 100 kc. It seems ridiculous for two or three stations within several hundred miles of each other to be using frequencies within several hundred cycles. Pity the poor chap 1000 miles away trying to determine whose pings he is listening to!

We hear that K4IXC is working towards his fifth country of 144 Mc. John is planning schedules with TI2NA in Costa Rica. Alabama is going to become more rare. Bill Nogues, W5GVE/4, lowered his antenna after the Geminids to return to Texas. Bill worked 22 states in seven call areas from Alabama in just seven months. Many 144-Mc. DXers thank you, Bill, for Alabama. K5WXZ is going to be tough competition.

Several good tropo openings occurred in November and early December from the upper midwest to the Gulf of Mexico. K5BDQ, Victoria, Texas caught an opening November 25 when he worked several 5-watt stations in the 200-mile range, and then finished with a 725-mile contact with WAØQDP/M in Mexico Beach, Florida! That same evening, WA5DUG, Port Arthur, Texas found the 146.94 f.m. slot alive with signals through repeaters, and direct from as far as WA4EVU, Destin, Florida.

For the f.m. enthusiasts, Michael Van Den Branden, WA8UTB, is now publishing the monthly *F.M. Bulletin* with operating and technical information of interest. His address is 2005 Hollywood, Grosse Point, Michigan 48236.

Auroral activity has been disappointingly low, but one way to keep track of sunspot activity is through visual observation. This may be done in several ways, one of which is to project the sun's image as seen through a telescope onto a white sheet of paper or cardboard. K8AXU physically views the sun through a 25-power hand-held telescope and a #12 welders glass with infra-red and ultra-violet filters. The glass should be available from welding supply shops for a few dollars. Areas of solar activity will show up quite well with either method and may be useful in predicting possible auroral condition.

DO NOT ATTEMPT TO VIEW THE SUN THROUGH ANY MAGNIFYING MEDIUM WITHOUT ADEQUATE FILTER PROTECTION AS PERMANENT BLINDNESS MAY BE THE RESULT.

220 Mc. would appear to have been all but forgotten since June 22, 1959 when W6NLZ and KH6UK worked 2540 miles across the Pacific. Except for K1YON, and occasionally one or two other chaps, my 220 portfolio is bare. Perhaps it is because of the odd harmonic relation from another v.h.f. band (but so is 144), a belief that 220 propagation is uninteresting, or channel 13, but I'm not so sure these aren't excuses rather than reasons. Look at the 220 standings, compare them with 432 for states and distances worked, and activity. There has never been a reported meteor scatter contact on 220, and only one or two e.m.e. attempts that apparently didn't go beyond the planning stage, although I believe one fellow built a large array only to find no one to schedule. Aurora has successfully been worked on 220.

Many of the 144-Mc. weak signal and m.s. stalwarts have worked everything they can, short of an e.m.e. system. It seems a shame for this talent to work over and over the same stations when another v.h.f. band goes wanting for occupancy. M.s. *can* be worked on 220; K4QIF has heard bursts from W4GJO on 432! The trail ionization will have to be higher than for 144, but the high velocity Lyrids, Perseids, Orionoids and Leonids showers should be capable of supporting m.s. Random work could prove as interesting on 220 as it is on 144. R.f. isn't hard to come by, neither are antennas or converters. Anyone besides K4IXC interested?

Jack Wilson, W1QXX, Arlington, Massachusetts says most of New England's 220-Mc. activity is on Tuesday nights. Jack lists nearly 20 stations active during one recent session, and W1HDQ and K1YON added a few more calls to the list. Jack sent me a list of frequencies if anyone needs it, but most everyone in his area is in the first 200 kc. K8AXU is ready in Ohio, and I think we could get W8PT/4 to put South Carolina on 220. How about other areas?

432 and 1296 Mc. showed periods of good tropospheric conditions in early winter. K8DEO Cedarville, Ohio, worked K4EJQ/4 near Bristol, Tennessee in late November, and then on December 3rd he worked W9BRN in Indiana; WA9HUV, Illinois, and KØDOK in Missouri. The next night he worked W3RUE in Pennsylvania. K8DEO's 5894 transmitter runs 20 watts output and the antenna is a 23-element, 16-foot Yagi of the W1HDQ design. Also on December 4th, W3RUE worked KØDOK over a nearly 600 mile path for the first third to tenth district 432 contact. W3RUE is running nightly 250-mile schedules with W4FJ in Richmond, Virginia with fair success. W4FJ has a 4CX300A

(Continued on page 142)

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Keeping in Touch

EVERY day in the year is a special event for somebody. There are the public holidays, as well as birthdays, anniversaries, reunions, and very special events that make one day of the year shine like a holiday for someone, on each of these special days the folks at home and their servicemen at our many far-flung bases around the world want to get in touch with each other to keep that day outstanding even though they are thousands of miles apart, and most of the time they do it "via MARS." Through the Air Force, Army, and Navy MARS stations the messages flow from Vietnam, Germany, Japan, Okinawa, Hawaii, the Philippines, and the women who man many of the affiliate military stations are there to relay, and much of the time, deliver those: miss you so much; hope your Thanksgiving was pleasant; and happy birthday son, messages. They contain the same texts and the same ideas as we find on any of the regular traffic nets, but this time they are linking people who can't sit down and pick up the telephone, or drive a few miles to help some loved one celebrate a special event. For gals like WØLGG, WA6LWE, W3CUL, W9JYO, WA4SKI, it is a great pleasure to say "I am an amateur radio operator, I have a message for you from ——." and add, quickly, "It's happy news." Sometimes it is that familiar "Arrived safely. Will write soon," that flows from the many stateside installations in a seeming bulk, but to each person who gets the message is as personal as the voice of the serviceman, and usually brings a relieved "Oh! Thank you so much. We haven't heard from him since he left for the camp."

To us in the YL clubs or nets they are Madge and Thelma and Mae and Mary and Ann and Jean, but in the hard working military circles that W, or K, is lost, and the A, or AF, or the Navy's Nø takes over.

The personal touch goes deeper with many of these ladies from MARS as they keep service people in personal contact with the folks at home. Here the magic of radio suddenly widens into the full meaning of the expression "Service to others," when these gals are able to make that "Hi Mom!" a real thing, and a homesick serviceman, and his equally lonely family have a very special reason to thank the gals with the strange prefixes who make the contact possible.

A great many women are active in this phase of the MARS programs of the three services, and each has her own memories of this type of operating. Their numbers are so many, and the experiences so varied that, like the Irish expression, they could "talk for four days together, and then they could start talking," if each of the women were to relate her own adventures in MARS. Air Force, Navy, or Army might remember a contact between a single ship and all fifty states, as well as Canadian provinces, and Puerto Rico; or the father who talked to his wife in the hospital 10,000 miles away just after their child was born, they would recall the proposals of marriage made and accepted through them, or the pilot who had just been rescued and wanted to assure his wife he was ok. To a very few it is the great privilege of a contact between a mother and a son who had been reported killed and the resulting reunion is something these gals will never be able to describe, or forget.

From the "ice" of Operation Deepfreeze, from Vietnam, Thailand, Germany, Hawaii, the ships at sea, and from many military installations here in the United States, these gals are relaying that

Jackie Butcher, WN9TQG, is waiting for her General Class license from the FCC. A sightless ham, Jackie is an honor student at her high school, writes plays, sings folk music and accompanies herself on an autoharp. *(Allis-Chalmers photo.)*

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

"Hello Mom!" to their homes, and keeping them in touch in what is coldly defined as a "public service," but to the women who actually do it, is the world's most satisfying occupation, and anyone who lends herself and her equipment for this activity is indeed personifying the real meaning of the Amateur Service.

MINOW Net Changes

On January 5, 1968, the MINOW Net changed frequencies on both 75 and 20 meters in anticipation of the loss of some frequencies to both General and Conditional Class licensees under the new regulations. The new frequencies are:

3.913 Mc at 1600 GMT
14.313 Mc at 1830 GMT

All YLs whether members of MINOW or not are invited to participate in either or both these nets.

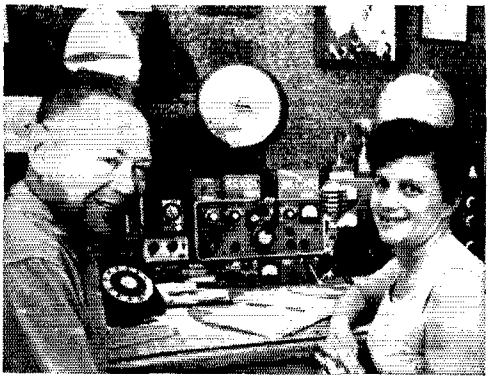
Lenore Jensen, W6NAZ

Lenore Jensen, W6NAZ

Lenore is a YL who has answered many calls. First licensed W9CHD, while she was an actress with NBC Radio in Chicago, in 1939. Later her call was W2NAZ, and when she came to the west coast only the area changed with the call W6NAZ. Since 1955, Lenore's favorite activity on the air has been maintaining liaison between servicemen and their families at home, and by now those contacts total five figures. To her this is better than reading novels, or looking at soap operas, for here are real life stories played by the people themselves. Says Lenore, "No thanks are ever needed, I enjoy it too much." But thanks have come in the tangible form of citations from military installations at Greenland, T-3, Ice-Island, Okinawa and other far away places.

A former Radio and TV producer, Lenore is now an actress in TV films, and in 1961 played the starring role of herself in Ralph Edwards' "This is Your Life," which was in tribute to her service to military personnel and their families. A charter member of YLRL, she is also affiliated with YLRC/-LA, ARRL and a member of Army MARS.

Lenore's first husband, Joe, W6MSC is a "Silent Key." She is now married to Bob, W6VGQ. Her spare-time hobby is as a reader for Recording for the Blind, Inc.



Lou, K6GHU, and Irma, K6KCI *(photo courtesy C. Lohman)*

Irma Weber, K6KCI

Irma claims she got into amateur radio in self defense. With the OM Lou, K6GHU, and their son, WA6IBR, she quit fightin' and jined 'em, and in 1955, K6KCI went on the air. Active in the YL Nets, rag chewing, and traffic handling, Irma is also busy in Air Force MARS where her greatest interest is keeping contacts between service personnel overseas, and their homes in this country. She has been active with hundreds of them in the Pacific Islands, Liberia, Antarctica, South and Central America, as well as several thousand from SEA on Air Force MARS.

A member of YLRC of Los Angeles, YLRL, ARRL, WCARS, and the Santa Barbara ARC, also NCS of the Ironing Board Net and the YL Open House Net, Irma is also custodian of the YLRC/LA, "Lads and Lassies" Certificate, as well as YLRL publicity chairman.

Connie, WAØMYF, with OM WAØNPF adjusting the antenna.

Visual evidence of her activity include several Public Service Awards, BPL, YLPA phone winner in 1965, DXCC-YL, WAS-YL, and WAC-YL and most of the other certificates we all cherish.

Irma's darkest moment came when a half hour power failure nearly ruined a schedule with six other stations until she was able to get the generator going and back into operation again.

Connie Bowen, WAØMYF

When most of us achieve full amateur privileges, we start out in a leisurely way, tasting the many facets of amateur radio and eventually settling down to some particular phase that interests us. Not so Connie. She received her General class in May 1966, and in June joined the Navy MARS program, and has stayed right there ever since. With the OM, WAØ NPF, she has averaged about 600 contacts a month between servicemen and their families, and her only regret is that there wasn't time to do more. On several occasions she has made 50 contacts in one day. There were times when she enjoyed the unique experience of relaying during daylight hours, when it was still night for both the sender and recipient.

The men of the First Marine Aircraft Wing in Vietnam, made a special plaque for the Bowens for their services. Another prized award is a hand-drawn certificate from another group. If there were a worked all states certificate for this type of service Connie could qualify easily. The awards are treasured, but Connie, like the other gals who perform this service, claims she does it because she is selfish, she gets a great personal pleasure from it. Or, as she puts it: "Every day is like a slice of the American way of life, with all the varied experiences shared with others."

YLRL International Convention Denver, Colorado, June 13–16

The Colorado YLs Club has announced the Tentative program with a special YL-OM Tour scheduled for Friday, June 14, 1968. It will include: "Leave the hotel at 8:30 A.M., stop for coffee at Palmer Lake, then on to the Air Force Academy, with a stop to look over the cadet area, and the Academy Planetarium. From there the tour will go by NORAD, on to Colorado Springs for lunch at the Holiday Inn, and back to Denver by way of the "Garden of the Gods."

Friday night is to be the YLRL "open" discussion.

Saturday, June 15, YLRL Forum in the morning, YL Luncheon, with a Wig and Fashion Show. Saturday night is the YL-OM Banquet with a special variety show.

This is one place where there will be more chances to meet the YLs you have worked than any other amateur gathering, even the National Conventions. There are sure to be a few DX gals there as well as that one that we have always wanted to meet, and never have.

Advance registration before June 1, 1968 is $3.00, after June 1, it will be $4.50. Make advance registrations with

Colorado YLs Club
P.O. Box 18008, Capitol Hill Station
Denver, Colo. 80218

DST

COMING A.R.R.L. CONVENTIONS

April 26-27 — Michigan State, Lansing, Mich.
June 1-2 — New England Division, Swampscott, Mass.
June 7-9 — NATIONAL, San Antonio, Tex.
June 29-July 1 — Saskatchewan Province, Saskatoon, Sask.
August 3-4 — Central Division, Springfield, Ill.
August 31-September 2 — Southwestern Division, Phoenix, Arizona
October 12-13 — Hudson Division, Tarrytown, N. J.

Hamfest Calendar

Florida — The Broward ARC will hold its Annual Auctionfest on February 17 at Chaminade High School, 500 North 51st. Ave., Hollywood, Fla. Doors open at 8:00 A.M., auction begins at 9:00 A.M. Free coffee. More information from W4IEH.

Illinois — The Wheaton Community Radio Amateurs (WCRA) will hold the Sixth Annual Mid-Winter Swap and Shop on Sunday, February 18 at the DuPage County Fairgrounds, Wheaton, Ill. Hours: 9:00 A.M. to 5:00 P.M. $1.00 donation at the door. Refreshments and unlimited parking. Free coffee and doughnuts 9:00 to 10:00 A.M. Hams, CBers, electronic hobbyists, friends and commercial exhibitors are cordially invited. Contact K9GHR, Ken Bourne, 305 Maple St., Glen Ellyn, Ill. 60137 for information.

Indiana — The Lake County ARC, Inc. announces its 15th Annual Banquet to be held at Teibel's Restaurant, U.S. 30 and 41, at 6:30 P.M. C.S.T., February 10. Chicken dinner, entertainment, speeches. Plan to attend with your wife or girl friend. Tickets $4.00 each from Herbert S. Brier, W9EGQ, 385 Johnson St., Gary, Indiana 46402. Positively no tickets sold at the door.

Ohio — There will be a ham auction Friday, February 2 at the Naval Training Center, 170 Ashland Rd., U.S. Route 42, Mansfield, Ohio. Look, swap or buy at 7:00 P.M., auction at 8:00 P.M. For more details write Dick Fisher, WA8MXQ, 1063 Woodhill Rd., Mansfield, Ohio 44907.

Ohio — On Sunday, February 18, the Toledo Mobile Radio Assn. will hold its 13th Annual Amateur Radio Auction at the Lucas County Recreation Center, Maumee, Ohio.

Oklahoma — On February 11, the Lawton-Fort Sill ARC will hold its annual "Ham-fest." For more information write David R. Tancig, WA9FRE/5, Fort Sill ARC, 1923 Kinyon, Lawton, Okla. 73501.

Utah — The Council of Utah ARC, Inc., will hold a one-day Hamvention on February 17 at the Utah Technical College in Provo Utah. Pre-registration fee is $2.50; at the door $3.00. A guided tour of the institute's physical plant and a working display of equipment will be provided. Manufacturers displays, ARRL Forum, SCM/SEC meeting, special interest group meetings such as MARS, traffic, technical, DX, VHF and YL will be held in various rooms of the institute. There will be a prominent guest speaker. CB enthusiasts invited. For details and preregistration contact Dennis Utley, K7JLF, 2272 East 6630 South, Salt Lake City, Utah 84121, or any amateur radio club in Utah.

DST

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How (cont'd):

Oh-oh — here we go again. Some guy with a mill, a will and a stamp. . . .

Dear OT and YS:

Your homebrew QSO in November and December "How's" was interesting eavesdropping. Old-timer made his point, all right, but isn't *he* the Don Quixote? He tilts at a truism valid since the birth of the art: *A ham will use the best equipment he can get his hands on.* In the old days the best gear an amateur could get hold of was stuff he built himself. This is not generally true today, especially where elaborate modes are concerned. Single-sideband outfits can be homemade, and quite effectively, but those nostalgic "week-end rebuilds" are gone, fellows, even if you spread the stuff all over the shack.

Certainly the building art is to be encouraged. It's the spice of our ham pudding. He is to be pitied who has never experienced the supreme satisfaction of taming his first balky 6146, stabilizing his first skidding v.f.o., shaping his first clicky keying circuit, aligning his first ragged i.f. strip, quieting his first motorboating speech line-up, *ad infinitum.* (Ineligibility for most of this blood-tingling excitement makes the CBer more to be pitied than scorned.) The two- or three-stage c.w. rig, with a.m., n.b.f.m. or d.s.b. added at leisure, still is a bargain radio-tech course on the kitchen table. More power to it! And the two-stage blooper, later modified into a four-stage super, etc., is still a wealth of homespun receiver fun and education capable of DXCC and BPL in skilled hands. No argument here.

However, an implied underlying premise of the dialog seems open to challenge. Like so many of us lately, you both insist on putting the cart before the horse. In view of PICON and the amateur's need to be needed (psychiatry holds that *everyone* craves to be needed) it's easy to go overboard with soul-searching and hands-wringing. Must we continually beseech each other to make more DX friends, to handle more traffic, to build more equipment? Surely this activity is, for us amateurs, its own rich reward. It's the meat of the sport, the reason most of us hold tickets. And such pursuit exists because there's an amateur radio, hardly the other way around.

The radio spectrum, some of it very international to be sure, belongs to the people. So do our nation's roads, the sky and public parks. As radio's roadway, the spectrum is similarly divided and subdivided for optimum advantage to all. Ham bands are simply boulevards of this road system, reserved for noncommercial use. Any *qualified* individual can cruise the amateur bands, just as any qualified driver can navigate our boulevards. But, golly, are motorists expected to rush about carrying packages for people, making friends in Canada and Mexico, to "justify" their use of boulevards and highways? Build and personally maintain their own cars? Really!

Few analogies are flawless, but this one may well be worth study. Instead of concentrating only on glorifying amateur radio as a built-in rescue squad, DX ambassador of good will, and reservoir of electronics sharpies — which of course we are — it suggests that each and every one of us might fruitfully strive to make our nonlicensed peers more acutely aware that the amateur bands are *theirs* to preserve as well as ours; that the amateur bands are a priceless national heritage and traditionally conserved educational/recreational resource; and that, as such, the amateur bands are not to be periodically eroded by high-pressure commercial bidders.

Mere defensive proclamations of amateur radio's worthiness grow wearisome. We have much to be proud of, but let's promote from a position of maximum future strength. How far do you think some greedy group would get in an effort to buy, or rope off for nonpublic use, a small stretch of Route 66? Or Yellowstone Park?

— *A Not-so-newcomer*

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

Man, that one builds you up and then he knocks you sideways. Wonder if he's licked his TVI. Get your kicks on Route 88!

What:

As anyone with a short-wave receiver will soon find out, it's ARRL DX Contest time. We'll take a multiband tour aboard the "How's" Bandwagon this month to see what's boiling through the slots. Conditions? DXtraordinary! As usual, "4M5A (220) 12-13" means that 4M5A was observed 220 kc. above the lower band edge at 1200-1300 GMT. Always dependable, twenty draws a bye for space. And *away* we go. . . .

160 despite its power-input limitations and segment complexities, steadily demonstrates accepted status as just another good DX band. Ws 1BB ØVXO, WA1FHU and club periodicals report 1800-2000-kc. action by **CE9PC, CX3BH, DJs** 2TI 7YR, **DLs** 2HI 5YZ 9KRA, **EIs** 4AN 9J, dozens of Gs and GMs, **GCs** 3LFJ 4LI, **GD3TNS, GIs** 3JEX 3LEX 3NPP 3NZZ 6TK, **GW3s** NNF REQ UGI UMB VAR, **HB9s** NL QA TT, **JAs** 1BHG 3AA, **KA9AK, LA3BG, OEs** 2JG 5XXL, gobs of OK-OLs, **PAØAHO, PYs** 1NFC 2BJH 2PA, **PZ1AH, TGØAA, VE8ML, VKs** 3ACH 3GK 3GX 3WI 5KO, **VO1FB, VPs** 1PV 5AB 8JD, **VQs** 8CC 9JW, **ZB2s** AM AP AY, **ZC4s** GM RB, **ZF1ES, ZS6AM, 5A1TY, 6W8CW, 9H1AM** and **9V1LK.** C.w. is the rule in top-band DX work but single-sideband contacts grow more plentiful. W1BB has collected about a hundred countries on 160. Got *your* 50-state WAS and WAC on this band?

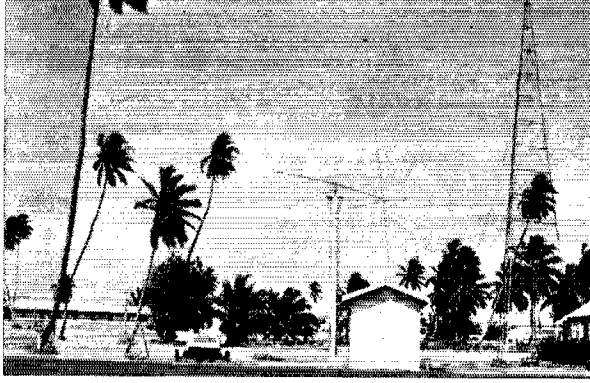
75 phone is ready for the fray, too. K2AOQ, **WB4HIP** and the DX press account for **CN8TV, CT1FK, DL1DI, DJ8SW, EPs** 2BQ 3AM 3RO, **EI4AL, F9VI, GB2SM, HB9DX, HL9KR** 23, **KP4s** AST CRH, **ON4UN, OHØNF, OX3WX, SM5DZN, SP8AJK, TA2PA** 2, **TFs** 3EA 5TP, **TI2NA** 2-3, **UA2CD, VOs** 1FX 2WM, **VP9FB** 23, **WØGTA/LA, YO5LC, YUs** 2RAZ 3LB, **ZD7KH, ZLs** 2BCG 3ABJ 4BQ 6, **4L7A, 4M5A, 4X4s** AK AS IX, **6Y5EM, 7Q7EP, 7XØAH** and **9Y4VT,** mostly just below the Yank phone subband with a secondary pocket near 3700 kc.

80 c.w. finds **Ws** 1SWX 6MUR, **WAs** 1FHU 1GXE 1IUL 8MCQ and **WN1ION** busy with **CN8RQ, CR6NK** (1) 23, many DJ/DLs, **DMs** 2CZL 6, 2XLO (3), 4PL 4VQL (10), **EI9J, EP2BQ** (12) 16, **ET3FMA** (5) 22, **Fs** 2CB/**FC** (5) 20, 2PO (2) 5ST 8TM, lots of Gs, **GC3BKT, GD3FBS, GI2SKH, GM3s** KDA KLA, **HAs** 1KSA 7PJ (27), 9PH, **HB9s** CM (5), OU (10), QA, **HL9KR, I1s** IZ LAO, **JAs** 1DMX 1RST 3CIB, **KH6IJ,** KP6AP/**KH6, LA6U** (10), **M1AB,** a dozen **OKs, ONs** 4HC (5), 4UN 4ZC 5NO 5RG, **OZs** 1LO 5DX, **PAØs** ELs (29), NNT LOU, **PI1PT, PJ3CC, PYs** 1BTX 2SO, **PZ1AH, SMs** 4DJE (3), 6MX, ample SPs, **TA2BK** (7) 23, **TGØAA, UAs** 1DZ 2CD (3) 0, 3KWI 3LL ØAG (6) 23, **UB5s** CV KAS, **UF6s** DF (3) 23, KAE (11) 18, **UL7GW** (11) 23, **UP2s** KBC KBI (33), KNP NV, **UQ2s** KBC KCR, a hatful of **VKs,** including **0CR, VP1PV, VS6DD** (3) 18, **YU3AT, ZD8J,** (4) 22, **ZLs** 1AXB 1BCR 2OY 3TV 4IE 4LM, 3A2CL, **4L3A** (2) 23-0, **4U1ITU, 4X4CA** (1) 21, **5H3KJ** and **9H1BA** (1) 23.

40 phone is good for **CE6CA, CM6SJ, CN8s** AW BV, **CR6IV, CT2AO, CX3BH** 6, EL2AJ, **EP2s** BQ GI, **GI3OQR, HC5MP, HKs** 3ARI 3BHN 4PJ ØBKX, I1YI, **JA3EGW,** KØLLI/**KG6** (207), **KGs** 4AN 6ALY, **KH6AJF, KL7s** DTH EBK FAY, **KP4BBN, KS6CL, KV4s** AA EY, **OHØNI, OY7s** ML S, **PAØSNG, PJ2s** CE MJ, **PX1PA, PY7ACQ, SL3ZV, TF3EA, TG9EP, TI2NA, UAs** 2KBD 9BE, **UB5KMIX, UD6BV, UF6FE, UL7FA, UQ2s** KAA KFG, VKs in quantity, **VPs** 1PV 2KM 5AA (95) 3, 6WR 9BDA, W9GTA/**LA, XE1s** CCW DDM KB7, YN1NI, **YO9CN, YS1IGM, YU3LB, YVs** 1BI 5BPG, **ZC4s** GB MO RB, **ZD7KH, 4L7A, 4M5A, 4W1I, 4X4UH, 6Y5CB** and **9Y4DS,** all but a few using single-sideband, according to **K4HQD, WAØPTC** and **1SWL** sources.

40 c.w. bolsters 20 on the midwatch, **Ws** 3HNK 3JZJ/9 4YOK 7VCB 8YGR, K4IEX, **WAs** 1CNU 1FHU 1GGN 8MCQ and 8PVN making off with **CE1DY** (2) 7, **CM5AP, COs** 2AV 2DR 2PY (8), 3CS, **CRs** 6AI (8) 3, 6DA (1) 7, 6CK (4) 2, 7CI (2), **CTs** 1CV (12), 2AN (5) 23, **CX8CZ** (3) 21, **DMs** 2ANG 2BJG 2BYO 2CCN 3BE 4XL 4YEL, **EA6s** BD (8) 6, BH (10) 0, **ET3FMA** (2) 21, **EP2BQ** 8, F9VN/**FC** (13) 23, **FM7WD** (10) 11-12, **GCs**

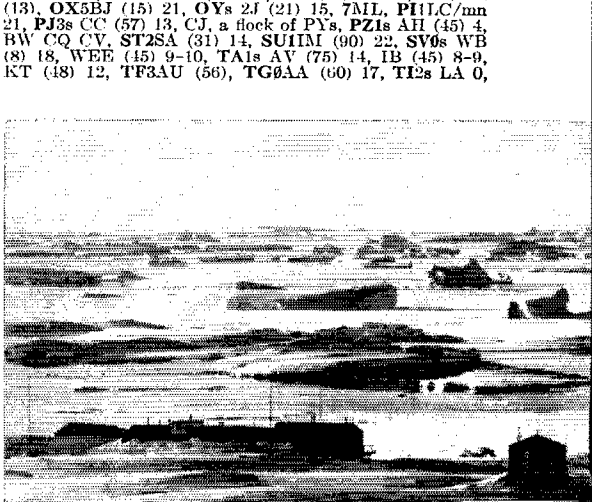
You could soak up plenty of sunshine and surf between pile-ups at VK2ADY/9. . . .



2FMV (7), 4LI (7) 23, **HAs** 1BV (29), 1KSA 1KVM 5GE (10), 4KYB (8), 7PB (7), 8KUC (9), 8UD 8UF (11), **HC8**FN (6) 1, **HIs** 7JMG (2) 0, 8IBC (4) 22, 8KVD, **IS1**CZQ (12) 19, **IT1**AGA (5), **JAs** 1JPJ 1MIN 5BJC 6AK, **KP4s** CQC (4) 20, TIN, **KV4**CI (4) 22, **KZ5s** DX (36) 7, FX GN TW (6) 23, **LZs** 1HN 1KRD 1, 1KSA 2KDS (2), 2KLC (7), 2RD 2RF (10), **OEs** 1DEW 5NT, **OH0s** AA NM (9) 0, **OY**4R (5) 20, **PJs** 2MI 3CC (18) 0-5, a dozen PYs, **SL5**ZL (2), **SMs** 1ACB 2AYE (3), 2DQS 6GM (41), **ø**RIL, twenty SPs, **ST2**AR (33) 0, **TAs** 1SK (11) 23, 2BK (15) 22, **TF3**TF (4) 23, **TGØ**AA, **TJ1**QQ (10) 6, **TU2**CD (7) 7, **UAs** 2CS (10), **0**CJ **0**EH **0**KCU **0**YD (4) 14, **UB5s** ES (8), FP KIJ PG RN (22), RS (8), **UC2s** AR (8), CY (7), KMZ (9), OP (6), WP (16), **UD6**CE, **UH8s** CV (39) 5, KAB, **UI8s** IM (2) 0, IO (4) 17, KAD (26) 0, KNA (5) 23, **UJ8**KAA, **UL7s** AA (3) O, BU (10) 0, GR (48) 23, GW (20) 23, HO (11) 15, YM (18) 23, **UM8**BA (17) 23, **UP2**DX (11), **UQ2s** AN (8), GA (26), KBC (6), **UT5s** HF (8), PK (7), RF (8), RQ SN (3), UV3AZ (16), UW6LB (6), **UY5s** AQ (6), MV (6), ZH (8), ZX (8), **U5**ARTEK (1) 5 in the Crimea, **VEØ**MD (1) 23, **VKs** 1FB 1JG 1LN (1), 7SM (5) 8, **VPs** 1MW 2AR (10) 11, 6AD (5), 6BW (18) 23, **VQ9**JW, **VR2**DK, **VS6**DO (4) 15, **XE2s** DDF IE, one dozen YOs, two dozen YUs, **YVs** 4JJ (10), 4OY (30), 5BPJ (20), 5CKJ, **ZD8s** 8HL 8J (2) 21, **ZF1**DX, **ZS2**MI of Marion and other ZSs, **4J7**B (11) 22, **4L3**A (34) 23, **4U1**ITU (18) 23, **4X4s** VG (15) 19, WN (5), YV, **5H3**KJ (16) 21, **5Z4**RD (28) 23, **7Xs** 3AT (2) 20, **8**AH, **9G1**HM (40) 23, **9H1s** AL (1) 21, BD (40) 23, BA (8) 0, **9L1**HX and **9Y4**DS 8. WNØRJY grabbed **HP1**AR (163) 2 and **KZ5**NG (163) 6–7 while the Generals snoozed.

15 phone, halfway between 'way-out 10 and crammed 20, is just right for **Ws** 2DY 3CKU 3HNK 4YOK 4ZSH 5QGZ 6MUR 8YGR 9LNQ, **Ks** 3MNJ 4TWJ 9CSM 0DEQ, **WAs** 1CYT 1DJG 2LOR 3HRV 5PIF 5PUQ 7GFT 8MCQ 9THB, **WBs** 2LDX 2RJJ 4EWU, **DL4**PV, **KP4**DBJ and listener Kilroy who put the snatch on evasive **BY5**PX (321) 13, **CEs** 1HU 2IB (270) 1, 2IS* 3PY 3UF (250) 1, 3UQ* 4GT 6CA 6GW (350) 2, **9**AE (357) 22, **CO**s 7GC* 7HQ 8CA*, **CP**6CX, **CRs** 4AJ (344) 20, **4**BB (302) 1, 4BC 4BH* (245) 15, 5SP (300) 2-15, 6BF 6BT 6HK* 6II 6IM* 6KC (372) 16, 6KR 6LA* 6YY 7CY* 7ED* 7DS 7GR* 7JA, **CTs** 1BB 1MW* (255) 0-1, 1RR* 2AN* 2AO, **CXs** 3BH 7AP 9PP (370) 0-1, **DM**4WPL (290) 17-18, **DUs** AP FH (373) 12, **EAs** 6BC (335) 23, 6BH* 15, 6BG* 6BJ* 8FG 8EZ, **EIs** 6AX (360) 21, 7BA, **ELs** 2AK (375) 11, 2F 2I (350) 3, 8E (367) 17, 8H 9A (350), 9C 207) 5, **EP3s** AM RD, **ET3s** FMA (305) 20, PNV (392) 17, **FG7s** TH 13, XY*, **FL8**FP (248) 21, **FM7s** WK WN, **FR7s** ZD 15, ZG, **FY7s** YL YN 20, **GC8**HT, **GD3s** GMH (334) 16, RFK, **HC1**TC (280) 1, **HIs** 3AGS* 8NTB, **HKs** 1ML* 1ZU 4BFL 23, 4KL (340) 0, 5CH 6FI* **0**AI 1, **0**QA, **HL9s** KB KQ TS, **HP1s** BN LB 23, **HR1s** HEH KAS (360) 1, KS (383) 0, WM (300) 19, taboo **HS1**AN, **IS1s** EP LIR RUA (313) 18, SCB (310), VAZ (307) 19, **JAs** 1BOD 1DJL (360) 3, 1JAN (266) 3, 1JXU 1SWL 1WAB 2BMO 2GWX 2GDT 3FDA 4JAZ 5CEU/1 6ATY 6BZI 7BWV 7EHU 7MA 7QD 8AWH 8DIN 8DO **0**BMW **0**PI, **JH1**EUO, **KAs** 7RF 9MF, **KCs** 4USB (330) 23, 4USJ 5, 4USV **6**AO (432) 21, **KGs** 4AA 4AM **4DH 6**AAY (400) 14-15, 6ALV 5, **6**ALY 6AQI (338) 6, **KJ6**BZ (404) 4, **KL7s** AIZ 2, FAY, **KM6s** BI (373) 21-0, CE (**379**) 22, **KP4s** CH (442) 22, CRD, **KR6s** LF (394) 3, MB 1, SJ UD, **KS6s** CK 5, CL (330) 1, **KV4s** AD CF/m, **KW6**EM (378) 3, **KZ5s** AA EZ 22, WO, **LX1s** AJ/m (255) 17, SO, **MP4s** BBA BFJ (340) 11, MAY 15, **OAs** 4JR 5AY 6AD 8V (305) 21, **OD5s** EN FB* FG, **OXs** 3CJ 4AB, **OYs** 2J 7ML, **PE2**EVO (287) 15 of Holland, **PJ5**BE, **SV0s** WB WFF (340), WL WQ WV (285), **TF3**AP, **TG7**EH (300) 2, **TIs** 5WAL* 6EC 23, **TJ1**QQ (338) 20-21, **TN8s** AA BK*, **TU2s** AE* AF BX, **UA9s** KDL OW, **UB5**KMX 17, **UC2**AA (330) 17-18, **UF6**FE, **UN1**KAM*, **UP2s** NV (330) 15, OO, **UQ2s** KFG LE*, **UR2**AR, UV3TP (380) 16, **UWs** 3BG* 9CC, **VKs** 1GD 1KM 12, 9BS 11, 9DJ 9WD 9WV 9XI (370) 16, **0**RJ, **VO1**BW, **VPs** 1VP (404) 17, 2GBC (363) 21, **2SG** 2SY 5AA 6AO 6GC 13, 7NO 8FL 8HZ 19, 8JC (335) 0, 8JD* 9FB 9FR, VQ9s DH JW (330) 11, TC (286) 21, **VRs** 1L (352) 2, 2DI 6, 2DK 6TC (348) 6, **VS6s** AG (360) 2, AJ 3-4, BE DO (298) 12, FW FZ, **VU2s** BK DKZ FN JM 13, WB (310) 13, W3DWG/**VR6** (350) 2, WA9MCR/-VO2 (325) 0, **XE3**AF, **XW8s** AS AX 15, BJ (313) 13, BQ (330), **YA1s** AN (160) 11, DAN (345) 14, **YN1s** BKC 20, WPF 15, **YS1s** BOB (360) 1, HKE (330) 21, **YU3**LB 0, **YV9**AE, **ZB2s** AP (278) 15, AZ BC (350) 17, **ZC4s** MO (293), RB (310) 21, **ZDs** 5R 7FF 7KH (328) 17, 8HAL (278) 20, 8JES 21, 8RB, **ZEs** 1CS (345) 19, 1CX 8JY, **ZLs** and **ZSs** in quantity including **3JJ 3T** (320) 8-9, **9L** (318) 20, **ZPs** 3AL 5EE 5JB 8JG 9AC* (260) 3, **3V8**BZ (328) 17, **4M5**A, **4S7**PD, **4X4s** CW (360), SO TP RW, **5H3**KJ (293) 22, **5N2s** AAF 13, AAW (315), AAX 11, ABB 12, ABG ABH (297) 21, **5U7s** AK* (395) 20, AL, **5V4**EG (344) 21-22, **5X5**JK 8, **5Z4s** FO JQ KK KN KO KK (300) 20, LG, **6O1**GB (325) 19, **6W8s** DX (344) 20, DY* EB* YL (330) 22, **7Q7s** BN (316) 19, EC LZ 19, **7X0s** AH (320) 9, VP (200) 22, WW* (250) 11, **8R1**G, **9E3**USA **9G1s** BF FF (320) 21, FL* FZ (360) 10-11, **9H1s** AG* R S*, **9J2s** AB 22, HZ IE, **9L1s** GQ (380) 19, JP* (250) 12, **9M2s** NF PO, **9Q5s** CZ DQ (345) 20, PI SS, **9U5s** DP (415) 20, ER (215) 20, **9V1** MX MY (385) 17, **9X5s** GG (321) 19, IA (241) 19, IH (345) 9-21, IX MW (244) 18, PB (300) 12, **9Y4s** DS (360) 16, LO (275) 17 and LR (340) 1, the asterisks representing rarifying s.s.b.-less varieties.

15 c.w. is DXploited by **Ws** 1AYK 3HNK 3JZJ/9 4YOK 7POU 7VCB 8YGR 9LCG 9LNQ **0**CVZ, **Ks** 3MNJ 4HQK 4HEX 9UCR, **WAs** 1CUN 1CYT 1DJG 1FHU 1GXE 2LOR 3HRV 4WWT 5AER 5PIF 5PUQ 7GFT 8JRL 8MCQ 8SLW 8UBY 9MQI 9QBM 9THB, **WBs** 2LDX 2RJJ 2ZNZ 4EFE 4EWU, **I1ER** and **DL4**PV to the tune of **AP5**HQ 1, **CEs** 3EL (55) 23, 4AT (69) 23, 8CF, **CM1**AR (8) 13, **COs** 2BB (40) 20, 2FC 17, 2MI (55) 15, 7MI (23) 0, **CN8**AE (44) 0, **CPs** 2BII 6FN (97) 2, **CRs** 3AD (52) 12, 4BA 5CA (61) 12, 6AL (49) 14, 6BX (60) 17, 6CK 6FA (88) 22, 7BN 7GF 7IZ (40) 17, **CTs** 1EE 1GE (31) 18, 1GK (86) 18, 1IT 1NW 2AS (20) 23, 3AS, **CXs** 1JM (80) 0, 2CA (22) 11, 7BY 23, 8CZ, **DMs** 2ADC 2BTO 2DQL 2GQL (25), 3SBM 4UJJ (37) 8SDF, **DUs** 1FH (80) 0, 7SV (89) 0, **EAs** 6BD (62) 11, 8FE (50) 9, 8FF (32) 10, 8FJ (66) 8, 8FO (60) 11, **EI9**J (13) 16, **EL2s** D (82) 17, NE NJ (8) 16, Y (25) 19, **ET3s** FMA (37) 8, USA 18, **FB8**YY (40) 13, **FG7s** XF (23) 20, XT (100) 18, **FM7**WU (92) 20, **FR7**ZD, **FY7**YI (56) 11, Gs 3RTU/4X (42) 11, 6ZY/**CN**, **GCs** 2FZC (60) 12, 2LU (40) 10, 3POI 3SHZ/p, **GD3**AIM (36) 0, **HAs** 1SB 1VI 1ZA 2MIM 1, 4DH 4KYB (36), 5DU 5KDQ 6NI 8UD, **HBØ**AG, **HC2**SB (73) 1, **HIs** 7JMP 8IXY 19, **HMs** 1DH (44) 22, 9DC/1 (7) 23, **HP1**AC (21) 2, **HZ1**AB (8) 15, **IS1s** SCB (51) 21, SEL (28), VAZ, **JAs** 1GTS 1HNO 1IIX 1ILN 1KSO 1OTX 1SEP 2BJA/1 2FMY 2HO 3BCC 3CZH 3EGE 3JPE 4AJI (10), 5AB 5AZO 5BFN 5HI 6BXA 6GWI 9BYS ØBXS, K1FNR/**KG6** 19, **KGs** 4CX (7), 6AAY (5) 16, Kure's **KH6**EDY (25) 2, **KJ6**CD (45) 20, **KL7**FRK (9) 1, **KR6s** BC US 22, USA (16) 3, **KS4**CF (23) 1, **KX6s** DB (32) 2, FN (8) 0, **KZ5s** AJ (10) 17, MW NG (100) 7–19, TH, **LU1**ZA, **LX1**CF (50) 20, **LZ1s** CD (41), FP 17, KAA 13–15, **MP4**BBA (40) 10. **OAs** 4FM (35) 12, 4NZP 4UO (2) 12, 7BI (72) 0, **OD5s** CN (45) 10, LX (11) 12–21, **OH0**AA (13), **OX5**BJ (15) 21, **OYs** 2J (21) 15, 7MIL, **PI1**LC/mn 21, **PJ3s** CC (57) 13, CJ, a flock of PYs, **PZ1s** AH (45) 4, BW CQ CV, **ST2**SA (31) 14, **SU1**IM (90) 22, **SV0s** WB (8) 18, WEE (45) 9–10, **TA1s** AV (75) 14, IB (45) 8–9, KT (48) 12, **TF3**AU (56), **TGØ**AA (60) 17, **TI2s** LA 0,



. . Or catch up on your reading and knitting at VP8IU when the bands are flat. (Photos via W9WNV and VE7AON)

February 1968

ES 19, **TJ1QQ** (30) 15-16, **TR8AH** (2) 10-21, **TU2BK** (18) 17-18, **UAs 2**AC (13) 22, 2WO ØEH (40) 23-0, ØKFG (15) 21, ØLH (43) 9, **UB5s** KAI (17), KFF KIX, **UC2s** IB 0, SE (89) 2, **UF6AS** (41) 13, **UH8AE** (16) 13, **UI8s** AI (40) 12-13, AX (48) 12, AM (16) 10, CC (19) 11, KAD (23) 10, **UJ8s** AB (34) 7, AH (36) 8, **UL7KAA** (45) 13, **UO5**KBA (70) 15, **UP2**KBC, **UQ2**KFG, **UR2**KAW (32), **UT5s** BL BX 13, CC FT (43), **UWs** 9EA (24) 2, **ØIN** (32) 2, **UY5XS**, **VKs** 7SM 9XI (26) 14, **VPs** 1AM 1MW (14) 18, **2MZ** 2, **6PJ** 6UN (29) 16, 7EF (7) 20, 7FC 8GQ 8JG (14) 18, **9BY** (5) 13, 9WB, **VQs** 8AW (74) 19, 8CC 19, 9B 1, **VS6s** EN (90) 11, FV (9) 11, FX (45) 3, LX, **VU2RQ** (37) 13, W1ISV/**VP9** (28) 12, WB2PXZ/**VP9** (6) 17, YA1KO, **YJ8**BW (61) 3, **YOs** 2BS 8AP, **YSs** 1O (60) 13, 2OB (17) 21, sundry YVs, **ZB2s** BC (31), BE (12) 22, **ZC4**GB (42) 16, **ZDs** 5X 20, 7GS 8HAL (51) 15, 8J (18) 15, **ZEs** 1AS (50) 15, 1CY (70) 19, 1S 3JJ, **ZP5**JB (102) 2, **ZS3**LU, 3A2CL (70) 15, **4S7**DA, 4U1ITU (27) 11-12, **4X4s** CJ OJ, **4Z4s** AG BG (76) 15, NAB 23, **5H3**KJ 20, **5N2**AAX (88) 19, **5R8**CQ (48) 16, **5U7**AK (105) 18, **5Z4s** DW (50) 21, KL (25) 21, KO (49) 11, **6W8s** CQ DD (75) 17, DV (75) 14, **6Y5**ET (85) 20, **7X**ØWW (20) 9, **9E3**USA, **9G1s** GC (35) 16, HM 16-1, **9H1s** AG (48) 20, AK AQ (25) 15, AV (35) 13, AW (70) 12, AZ (45) 9, BA 8, **9J2s** AB (35) 13, CL (41) 16, IE MX (13) 15, W (20) 15, **9L1**TL (50) 21, **9Q5**AE, **9U5**DS (45) 11-12, **9V1s** MY 16, NV (58) 16-17, ON (51) 3-4 and **9Y4**DS (52) 22.

15 Novice reports from **WNs** 1HHO 1HVL 1ION 1ISH 2APH 3GYM 3HRV 4GSS 8VZS 9TIL ØRJY ØRVK and ØRVR show some impressive quality among the quantity: **CEs** 4AT 23, ØAE 18-19, **COs** 2BM 2MI 15-17, 2RL 0, 5EG 22, 6AH, **CR6s** FA 20, IX, **CTs** 1LN 3AS 18, **DJs** 4DA 4UF 4ZR 5BT 6KK 6KX 7ND 7OX 8IK 8UJ, **DK1**IZ, **DLs** 1DQ 2MK 2RL 4ED 5PN 6CV 6GN 6WT 7IG 7MA 7MQ 7NP 9CJ, **DMs** 3UEA 4UJJ, **EA8**FO, **EL2**D 19, **Fs** 2SJ 3BV 5GV 5HJ 5RK 5SA 5UP 5XP 8UJ 8YI, **FG7XT** 19-20, **Gs** 2ADU 2HDT 2WQ 3CVS 3GHO 3HCO 3HMY 3IGU 3MAM 3MCP 3OHG 3OWA 3PJW 3PUM 3RME 3SR 3TYQ 3UYM 3VGR 3VKM 3VSQ 3VYZ 3WPB, **GM3s** BSQ CSM KSU, **HA4**KYB, **HB9s** ABU AFG AIJ, **I1s** AUM BOL DH EFV FOS LPL ZGA, **JA1s** DDZ GTF IUU OAF PCY YLP, K3IWW/**VO2**, **KA2**NY, **KH6s** EBQ EHR, **KL7s** AIZ CZ FAO FLR MF, **KP4s** AQL AXM 20, BBN CSZ CY DAP 22, **KZ5s** EZ 19, MWN NG OO 21, **LA7s** JH LG, **OEs** 1RG 2JG 6RAG 8HMK, **OHs** 2BAH 2BFJ 3LS 2NY 18-19, 4RF 5WH, **OKs** 1AHZ 1AKX 1ASJ 1FF 1NG 1WC 1XM 2BAV 2RZ 19, 3CAD 3CGP 3KYK, **ON5s** GI IG IK MW NK PA, **OX5**AW 17-18, **OZs** 1A 1LO 18, 9HO, **PAØ**HBO, **PJs** 3AH 4AC, **PYs** 1CGU 2BKT 2CAT 2NH 3AQR 5ASN 5BWF 8PUT 8UF, **PZ1**CV, **SMs** 2DPS 15-16, 3CFV 3CNN 3CSX 4COK 16-17, 5BFU 5BGK 5CYI 6BOT 6CAW 6CKF 6CVX 6UG 7CXF 7DSX 7IV, **SPs** 2BMM 3ABY 7AOD 7GH 8AG, **UA3**KBO 16, **UB5**OD, **UF6**AW, **UO5**KBA, **UT5**EW, **VO2**HA, **VPs** 2AD 9GA, WB4HSR/-**KG4**, **WH6**GHB, **WL7**GDA 7-8, **WP4s** CSZ DAJ 18, DBN 0, **XE2**JJO 21, **YOs** 2BV 3CR, **YUs** 1AHI 2EAB 2OB 3NAW, **YVs** 1OB 2-3, 18A 1WA 4UA 5BPJ 5CKJ, **ZB2**BE, **ZD8**JES, **ZLs** 1AMO 2GH, **ZSs** 5QU 6BMH 19, **4U1ITU** 15, **6Y5**ET 18, **9J2**W and **9Q5**LC. Those new two-year Novice tickets should bring W1WPO an upsurge in WN-style DXCCs!

10 phone has never been better, say **Ws** 2VOZ 3KVS 4YOK 5QGZ 6MUR 8YGR, **WAs** 1DJG 1GGN 2LOR 5AER 5MIN 5PUQ 8MCQ 9MQI 9THB, **WBs** 2RJJ 4EWU and **DL4**PV, gobbling up **CEs** 3TB* 3TS 6CA (560) 0, 6DP 3, 7DW (480) 16, **CN8s** BV* FV (650) 15, MZ (128) 15, **COs** 5PP* 7HQ* 18, **CRs** 6BF 6DX 17, **6IS** (619) 13-20, **7CZ*** 7FM (585) 19, **7IZ*** 7PC (595) 19, **CTs** 1AW 18, 1BH (581) 18, 1EE (595) 19, 1LN (650), 1MQ* 1MW* (255) 0-1, 1OF (572) 17, 2AN*, ten CXs, **DM2s** AFO* 13, ATO* 8, **DU1**FH 9, **EAs 6BJ*** 8AE (702) 15, 8CV 8DV* 8EX (595) 18, 8EZ (588) 15, 9AQ, **EIs** 3Y 4BB 17, 7AF (642) 19, **EL2s** AK 21, S U V 17, **EP2s** BQ GI KW (618) 8-9, **ET3s** JBP REL (585) 14, **FG7XT** (570) 19-4, **FH8**CD (680) 11, **GCs** 3FKW (610) 11, 8HT, **GD3**HQR 17, **GM3**SVK (625) 16-17 of the Shetlands, **HA2**KRB (620) 17, **HG2**KRD (631) 16, **HBØ**AG (624) 16, **HCs** 1PB (590) 1-2, 1TH (585) 19, 2OA 2SF 15, 5EJ 8FN, **HIs** 3AGS 3AGZ* 3JHV 8XDA, **HKs** 4DF 4KL 5OW*, **HL9s** KA 23, TS, **HP1**JC (540) 0, **HR1s** KAS WM (625) 15, banned **HS1**AF, **HZ1**AB 12, **IS1s** GF SCB (576) 15, **IT1s** BXX 15, YL* (350) 21, ZGY, **JAs** 1FRA 23, 1GTS (550) 22, 1JSO 1MIN 1NEZ* (200) 23, 1RWE 1SNX 1XNL 23, 2CLI 2JAA 3IVC 23-0, 4EOZ* 17-18, 6BCI 6EOR 7ERJ 7UU 8CXV 9AAY 9BJ 9IX, **JH1s** AJT DBU ECG, **KAs** 2DJ 7AB 10, 9MF (610) 0, **KC4**USN, **KG6s** AAY ALY FAE IC 1, SA (622) 22, SB (598) 10, SL, **KJ6**AP, **KL7**FDG, **KM6s** BI (610) 19, CI, **KP4s** AAK AEB BGD FS, **KR6s** CL IS (580) 23, KJ QW TAB UW (588) 0, **KSs** 4CF (592) 16-19, 6CL 0, 6CN (553), **KV4s** AD (585) 13, FA, **KW6s** EG (628) 9, EJ, **KX6s** BQ DB 1, DC 0, EN (650) 22, FJ (553) 22, FN, **KZ5s** AO (530) 19-20, CD* JB MB NG, **LJ2**X, oodles of LUs, **M1B** (570) 15, **MP4**BGE (565) 16, **OAs** 6BG/8 7BI 8V, **OD5s** AT BZ (620) 12, EN EP 13, FA (705) 11, FC (697) 14, **OEs** 1JHA 1JNW 17, 3NH*, **OKs** 2WEE* 8AIZ (360) 15-16, **OX3s** CJ DM DX, **PJ2s** CQ (600) 15, CR (598) 0, MI (508) 19,

KX6BU, multioperated by (left to right) WA1EJM, W1YLB and WA1IIP, amasses mountainous DX phone traffic totals from Kwajalein on 7 through 28 Mc.

a batch of PYs, **PZs** 1CK ØAA (520) 20, **SVØs** WEE WL (610) 12-16, WM, **TA1JB***, **TF2s** WJF WKM, **TGs** 8IA (640) 0, 9AD 9DF (610) 23, 9EP 9RV 9US* 14-15, **TIs** 2CAP 2CEF 2EGU* 2FAU (610) 13, 2JIC 4FCH*, **TJ1QQ** (580) 14, **TN8s** AA 18, AL 18, **UA9s** FAN* FBC* KAI* KWK*, **UB5s** DUS 10, EUA* FWJ* KMX, **UC2SC*** 18, **UF6s** ACR AHJ* HO* VAA*, **UJ8s** AAP AAZ* KAP, **UL7JA**, **UN1IB***, **UP2s** ADZ* 10, DN OV (575) 14-15, **UQ2AQP***, **UT5s** KDN* KHT* (860) 14, 5OH, **UVs** 3AAE 3ACI* 9PP, UW9KWP*, VE8BE, **VKs** 1GL 8AU (712) 10, 8UG 9DJ 9DR 9GN 22, 9WB (601) 22, 9XI, **VPs** 1PV 2ME 2MZ 2SY (600) 18, 2VM (600) 14, **6NB* 6**NV 6RG (580) 12-13, 6WR (595) 21, 6YC (527) 20, 7DL 9FC (600) 17, **VQs** 8CC 9JW (550) 14, 9TC (604) 8, **9V** (693) 17, **VR2**DK (607) 23, **VS6s** AH AJ (600) 10-11, AZ 13, DO (613) 9, FZ, **VU2s** FN JM KM WB (550) 9, **Ws** 3DWG/**VR6** (515) 1, ØGTA/LA, WA4QXB/**KW6** 23-0, eight XEs, **XW8s** AX BS BX, **YAs** DAN FV 11-16, **YN2JS**, **YOs** 6ALD* 9CN, **YS1**IM (550) 15, **YVs** 1LA14, 3NS (600) 12, 4AR* 4RZ 5AGM 6FV 22, 7AV, **ZB2**BC (560) 16, **ZC4s** CN MO* RB, **ZDs** 5R (605) 11, 7DI (700) 22, 8CX 8DX 8HAL 18, 8HL (600) 15, **ZEs** 1AA 1BP* 12, 1BR 1CX (615) 9-10, 2JA* 3JJ (558) 17, 7JK (380) 16, **ZF1s** DX (580) 21-22, ES*, **ZP5**OG, **ZSs** 3HT (680) 18, 3HX 3LU 17, 9H* (550) 17, 9L (537) 20, copious ZLs, **3V8**BZ (570) 17-18, **4M5A** (612) 20 of Venezuela, **4X4s** CJ 18, DH IF, **4U1ITU**, **5H3**KJ, **5N2s** AAF (600) 10, ABB* ABH (640) 11, ABI 15, A V, **5R8**AX, **5X5**JK, **5Z4s** KL KW NY (300) 16, **6Y5s** JB RD (560) 15, **7P8**AR (590) 12, **7Q7s** EC (601) 18, LZ (580) 11, **7X**ØAH (640) 10, **8R1S** (539) 19, **9G1s** HK YJ (145) 13, **9J2s** AB (685) 18, DT (590) 10, WR, **9K2**BY 19, **9L1s** GQ (618) 15, JJ, **9M2**NF, **9N1**MM, **9Q5s** EP 19, JW 17, **9U5s** BB (635) 19, DP, **9V1**NT and **9Y4DS***, the stars for straight-a.m. customers.

10 c.w. gets the week-end phone spillover, sample courtesy **Ws** 1AYK 2MFL 4YOK 5QGZ ØCVZ, K4IEX, **WAs** 1DJG 1FHU 5MIN 8MCQ, **WB2s** RJJ and ZNZ: **CNs** 2CC (18) 14, 8MZ (128) 15, **CR7s** BN (21) 14, IZ (43) 7, **CT3AS** (25) 18, **CX8**CZ 20, **EA8s** FF (43) 15, FO (46) 12, EL2D (16) 16, **ET3**FMA (28) 17, **GC2**FMV 15, **HGØ**IS 16 of Hungary, HM5DC (35) 2, **HP1s** IE XHG 14-15, **HZ1**AB (150) 10, JA2JZ (25) 12, **KG4**CX, **KH6**EBQ (70) 0, **KL7s** FDG ZF (50) 8, **KR6**UD (150) 11, KV4AO (10) 17, KX6DB 20, **KZ5**GN (40) 12, LX1CF (16) 16, **LZ1**YW, **OA4**PF (70) 20, PJ3CC (47) 13, **PY2**SO, **PZ1**CK (95) 12, **SL1**CP (45), **TA1**KT (46) 10, **TGØAA** (44) 17, **TJ1s** AJ (34) 16, QQ (30) 11, **UF6**CAR (20) 13-16, **UI8s** CD (95) 12, NC (14) 9, **UJ8**KAP (65) 12, **UL7s** FO (32) 10, GO (68) 11, **UM8s** AP (24) 11, IE (23) 10, **UO5**WED (100) 13, **VKs** galore including 8HA (49) 12, 8UG (38) 10, 9GN (10) 11-21, **VP6**PJ (56) 13, **VQ8**CC (22) 14, **ZC4**GB (32) 14, **ZDs** 5M 7WR (75) 19, 8DX (40) 17, 8J (40) 10, **ZE1**SR, some ZLs, **ZS3**LU (50) 14-15, **4J7**B (40) 10, 4L3A (40) 11, **4X4**YM (28) 15, **5H3**KJ (40) 8, **7P8**AR (95) 14, **7Q7**LZ (104) 14, **7X**ØAH 16, **9H1**AG 16, **9J2s** BC (43) 15, MX (57) 11, W (15) 10, WR (3) and **9K2**AM (78) 18.

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Subsequently we'll get back to 20 phone doings thanks to Ws 2DY 2VOZ 3HNK 5QGZ, Ks 4HQD 9UCR, WAs 1DJG 6JDT 8MCQ 8WSI 9THB, **WBs** 2RJJ 4EWU and **KP4**DBJ, 14-Mc. c.w.'s story via Ws 1AYK 3HNK 4YOK 7POU 9LCG, **WAs** 1FHU 1IUL 3HRV 8MCQ 9THB and correspondents to file. Plenty of contest multipliers in the preceding — pick your notch, crank up the gain, and fire away!

Where:

ASIA — "I believe many W/Ks are unaware of the disparity in U.S.A. living standards and those of some less fortunate countries," concludes VU2JN. "According to our statisticians I am in the uppermost five per cent of my countrymen. But the mere cost of a hundred QSLs, plain and one side printed, works out to about one per cent of my monthly income. If I send just one QSL per day *direct* to the U.S. this will drain six per cent. At this time I spend about twelve per cent of my income on our captivating hobby, and I am sure many will agree that this figure should not be raised further. Hams who desire my QSLs direct please enclose return postage or International Reply Coupons." VU2JN's letter eloquently illustrates the vital function of QSL bureaus . . . . . XW8BQ advises, "During seven months while I was off the air someone used my call and name, giving an incorrect QSL address. I cannot provide cards for such QSOs dating from January 29 to July 7, 1967." Beginning with QSOs of January 1, 1968, XW8BQ's contacts may be confirmed through WA4ZTW . . . . . JA4BEX helped W4NJF catch up with an overdue JA5AHF QSL . . . . . VS9ABL's Brian is back in the U.K. as G3TXH. W4NJF holds his logs except for some missing entries for September, 1967 . . . . . VU2CZ tells W1LVQ that VU2LM has no BY5 QSL connections . . . . . *DX News-Sheet* relays KR6TAB's offer to help deliver QSLs to DXers in his area.

OCEANIA — 8F1SH tells JA1HGY, according to *DX News-Sheet*, he's secretary of the Indonesian Amateur Radio Union, P.O. Box 2127, Djakarta. Another possible QSL route is given by one PK8YBC in the listings to follow. PK8s YAK YGJ YHR and YZZ also are reported heard or worked on 20 phone . . . . . Peripatetic W9WNV, recently popular as VK2ADY/9 and 5R8BA, clarifies his QSL routings to date: QSOs since August 15, 1967, via KØTCF; from January '67 to August 15, 1967, via WA6SBO; and all previous contacts via W4ECI. Exception: VQ8CCR QSLs go to VQ8CC. VE3GCO takes care of s.w.l. matters for the whole works . . . . . W4NJF passed the 500-card mark for YJ8BW since becoming Bill's QSL rep last July. Gay's logs for this one go back to May of '67 but he may be able to help confirm earlier YJ8BW contacts . . . . . WØPAN says he still has WØPAN/KH6 QSLs for claim . . . . . Gerry Johnson, 28056 216th Avenue SE, Kent, Washington, 98031, becomes VK9GN's QSL handler as of November 1, 1967.

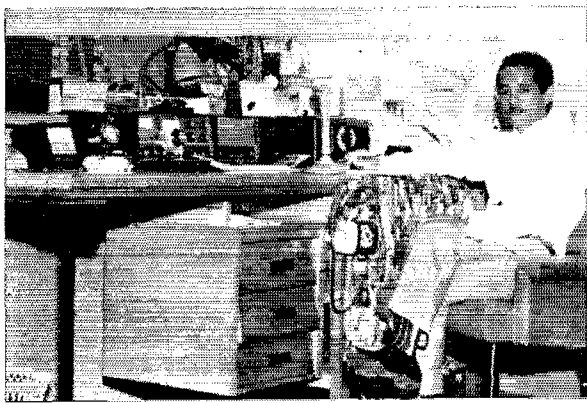
AFRICA — ZE1CX, formerly 9J2MM, has his Zambia QSOs confirmed only through W4NJF. The latter states, "Haven't heard from 7Q7LC in three months so I'm returning all cards received for Lin that do not fall within the logs I hold (January 21 to September 4, 1967)." Gay also notes that 5V4AP, a collector, prefers U.S. mint commemoratives to IRCs in some cases . . . . . From the jumpin' ARRL DXCC Desk of W1WPO: ZD7IP's liaison with QSL tender K2HVN has temporarily lapsed. You'll have to QRX till logs turn up. No problem with ZD7KH who transmits transcripts direct to K2HVN . . . . . W9JVF, not W9JFT, does ZD3D QSL honors . . . . . VE3IG's tour of QSL managerial duty for ET3USA begins with QSOs of November 19, 1967.

HEREABOUTS — "I'd like to be QSL manager for a DX station," chorus WØDAK, WAs 11UL 5PPZ 8LAN 8UBY and WB4FJO. We're glad to publicize these offers while pointing out that such arrangements usually come about during QSO and/or QSL exchange. There's considerable delay in dissemination of *QST* to DX points, you know . . . . . Your "QSLers of the Month" now, each applauded for fast shipment to "How's" correspondents Ws 1BWX 4JUK, WAs 11UL 3DMH 7GFT and 9MQI: CM5AP, DJs 21Y 5GG, Fs 3HK 5GV 8VK, FO8BQ, FP8CT, G3ESF, GD3FBS, GM3s PGO TRI, HA5DA, HB9s ADD DX, HP1AC, HR1KS, KG6AQI, KL7FSV, KP4DBJ, KS4CF, KV4AA, OX5BJ, OZs 4EOR 7Z, SM7BKX, SL5CX, SPs 4JF 6FZ, UB5KQV, UT5CC, YS1TIM, YU2s FVW NX and 9L1GQ, plus QSL managers W6RGG and K4MQG. Any candidates for commendation in *your* postbox lately? . . . . . *'ALP!* W4LXA can't seem to collect confirmations from CR7BN, EA8CG, FR7ZD, OD5LX, UA2KBD, UI8AG, UL7KBK, UO5AA, VK9BJ, VQs 8CC 9TC, VR2ER, VU2DIA, 9G1TY, 9J2MX; WA3DMH is stymied by OH0AA; and WA3HRV is frustrated by EL2D, ZE1S and 9G1HM. Any 'alp? . . . . . PJ3CC, as we've said before, is a "guest" call used by successive visitors to the Antilles. *Viz.*, PJ3CC logs are scattered far and wide. For contacts with this station on November 23 through December 1, 1967, W1JYH will gladly oblige on receipt of self-addressed stamped envelopes . . . . . "There is a great trading practice going on with IRCs," observes W4NJF. "DX stations should realize that W/K/VE/VO/-XE-issued Coupons should not be sent back to us for replying to their QSLs. The other day I received one dated 1957!" DXers accumulating piles of International Reply Coupons they expect to convert some day must consider other restrictive Post Office requirements and regulations, too, some previously mentioned here by W7WLL and others . . . . . Helpful hints from the hinterland, keeping mindful that each item is necessarily neither accurate, complete nor "official". . . .

CE3s ACV OE OF ZK (via WA9MQI)
CR4BJ, P.O. Box 83, Sao Vicente, Cape Verde Islands
CR6AS, Box 3, Sadabandeira, Angola
CR8AH, F. Leite, Box 225, Dili, Timor
DL3XH, W. Munich, Widukindish 2, 437 Marl./KRS, Recklinghausen, Germany
DM4WPL, R. Nitzschner, X8231 Dittersdorf No. 50B, Kreis Dippoldiswalde, E. Germany
ET3USA (via VE3IG; see preceding text)
KG6ALY, P.O. Box 901, APO, San Francisco, Calif., 96634
MP4MAH, C. Thomas, P.O. Box 81, Muscat (or via MP1BCC)
MP4TBC, E. Taylor, 244 Portland Rd., Hove, Sussex, England
OX4AC, AFCRL, APO, New York, N.Y., 09023
PA0AFN/W1/VO1/LX-EI9AY-DJ0CS-F0BH-ON8ND, H. Ingersen, Box 87, Topsfield, Mass., 01983
PK8YBC, 31 Salam St., Bandoeng, Indonesia
SV0WY, P.O. Box 66, Rhodes, Greece
VK9KS, K. Smith, P.O. Box 530, Rabaul, T.N.G.
VK9TB, E. Bastow, P.O. Box 56, Port Moresby, Papua Terr.
VP1PV, Box 634, Belize, Br. Honduras
VP1VP, G. Collins, P.O. Box 643, Belize, Br. Honduras
VP2GBC, P.O. Box 58, Grenada, B.W.I. (or via VP2GW)
VP8s DJ IA JB JC (via VP8HZ)
WØGTA/LA, R. Snyder, % AMOCO Norway Oil, NORSCO Oil Base, Tananger, Norway
XE0IR (non-W/K/VE/VOs via DJØIR)
XW8BJ (Europeans via F3DD)
XW8BQ (via WA4ZTW; see preceding text)
YN1MO/W4, Capt. M. Murciano, jr., P.O. Box 902, Coral Gables, Fla., 33134
ZD7DI, P.O. Box 8, St. Helena (or via RSGB)
4Ls 3A 7A, Central Radio Club, Box N-88, Moscow, U.S.S.R.

I1AV/M1 (to I1AV)
I4RUI (to I1RUI)
K8NHW/am (via W6FAY
MP4MBC (via RSGB)
PA9EQ (to W4CCQ)
PA9FE (to DJ9WA)
PJ3CC (see text)
PJ5MJ (to W2BBK)
PX1GH (to PA9GHB)
SM7CPI (via W9AEA)
VK9GN (see text)
VK0VK (to VK6VK)
VP8IU (via VE7AON)
VQ8BZR (to VQ8BZ)
VQ9V (to VQ9HB)
VR2FM (via WA6GLD)
W4YCZ/VP9 (to W4YCZ
YU7LAU (to OE6BRG)
ZD3D (via W9JVF)
8F1SH (see text)
ex-9J2MM (via W4NJF)

In your behalf, for the preceding we thank Ws 1AYK 1BB 1JYH 1WPO 2VOZ 3CKU 4JUK 4NJF 8SCU, Ks 2AOQ 7GHZ, WAs 1FHU 11UL 3HRV 7GFT 8UBY 9THB, Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Belmore Rd., Norwich, Nor. 72.T, England), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N.Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025; attn. K6CQF), Ontario DX Association *Long Skip* (VE3DLC), Southern California DX Club *Bulletin* (WA6GLD) and VERON's *DXpress* (PAØs FX LOU TO VDV WWP). *'Ray*, team!



FY7YM is a fresh and pleasant 20-meter voice from St. Laurent du Maroni. (Photo via W7DQM)

Whence:

SOUTH AMERICA — W8IBX espies, "In the *Saturday Review* for November 4, 1967, page 54, a travel agency offers thirteen days on Easter Island for $1280. Selling points include geological, archeological and piscatorial opportunities. Wonder if they are aware of the propagational potential as well?" Meanwhile, CE0s AB and AC back up CE0AE's Easter program on 20 s.s.b. . . . . "Worked W7ZFY/mm on 20 c.w.," relates W9LCG, "icebreaker *Southwind* heading for Valparaiso on Operation Deepfreeze assignment." . . . . "8R1S plans to become a 5H3 sometime this year," hears W9JVF . . . . . K2AOQ, who works him on 75 phone, says 9Y4VT hits all DX bands now with an R-4A and T-4X combo . . . . . Popular CE4GT closed down in December for a move to the Concepcion region. Therefore W3CKU expects a new CE5 to show up on Greg's favorite 21,385-kc. spot . . . . . VP8JD, frequenting 14,200 kc. or so, needs Del., Idaho, Ky., Nev., N.H., N. Dak. and Wyo. for ARRL's WAS credentials.

ASIA — XW8BQ keeps his SB-100, HA-14, FL-200B and two-element 50-ft.-high quad cookin' on 20 phone and looks forward to becoming a U.S. Four before long . . . . . "My new homebuilt 100-watt c.w. transmitter seems to put a good 14-Mc. signal into the States," comments VU2JN . . . . . W8SCU finds MP4TBC no longer associated with Kuwait Airways . . . . . MP4BGE, according to K6LAE, hunts Mont., Nev., S. Dak., Utah and Wyo. for guess-what, usually on 14,170-14,190 kc. at 1300-1500 GMT . . . . . Ex-VS9ABL tells W4NJF he hits 80 and 160 meters from G3TXH while contemplating h.f. antenna possibilities . . . . . Oriental lore via literature of aforementioned clubs and groups: JT1s AG and AJ may join JT1KAA in 14-Mc. sideband sport. . . . JA6YB intends a 150-ft.-high 80-meter dipole for 3500-3515-kc. c.w. and 3550-3575-kc. phone DX this season. . . . YA1FV heads for Vietnam, 9K2AM for Kilofornia. . . . CR9AH sometimes puts VS6AG on 15 phone. . . . Former VS9s OC and OSC are said to sign MP4s MPC and MBC these days. . . . New or renewed Far East Auxiliary Radio League memberships are claimed by KAs 2DO (K6GII-WØKGS), 2JK (WA6PZQ) 2JP (W4FRU), 2RC (WA3ION), 2UZ (WA5SZW), 7GD (W2KEQ) and 9AK (WØNMH-K6KGX).

AFRICA — Small world! "I was visiting Nouakchott on business last April and was surprised by the 5T5KG beam atop the hotel," writes VE2MS. "Living conditions in some of those places leave much to be desired. Lloyd and Iris deserve a medal for sticking it out over such a long period." . . . . . W4JUK, who also follows the travels of W6s DOD and KG, ran into the roamers recently while scheduling old friend 5N2AAX. The Colvins dropped in at the latter's Lagos shack before heading home for the Christmas season. 5N2AAX, who has a Drake transceiver and barefoot quad on 15 and 20 phone, also vacationed hereabouts over the holidays. Sid, with Western Electric, had to wait eighteen months in Nigeria before his 5N2 ticket came through . . . . . EL2AG keeps in touch with Stateside offspring via 20 sideband and schedules W4NJF Mondays, 14,240 kc. at 2300 . . . . . VE3IG informs, "After working me on 14,170 kc. at 2330, ET3USA quite often moves above 14,200 kc. to work W/Ks. Bill, ZD7KH, VR2CC and others channel rare DX onto 14,170 kc. at 2330-0030 and 0400-0730 GMT." . . . . . "ZD3D moved QTH," says W9JVF, "hoping to be back with a good signal after delays on antenna work." . . . . . Africa addenda courtesy the clubs press: FH8CD vacations in France until June. . . . ZD7s AY DI FF GS and KH spray each other with 20 sideband. . . . VQ8CDC showed from Chagos on 20 code, while VQ8BZR's December Rodriguez racket was produced by the Swan rig supplied by LIDXA, W9WNV and friends. . . . VQ9HB surprises his following with a one-letter label, VQ9V. . . . Kinshasa's 9Q5PI is an old XW8 hand. . . . 3Y0s EB and GB caused an outbreak of 14-Mc. Bouvet fever in December.

EUROPE — If you still have some steam left after the opening ARRL Test week ends, don't forget the voice division of REF's 1968 French Contest on February 24th-25th as detailed here last month . . . . . W1YYM hears that G3IEW may man GC3IEW in both c.w. week ends of the current League joust, 10 through 160. Neighbor GC2AAO has kept skeds with W4NJF for four years running, 14,245 kc. at 1215 GMT, sometimes joined by GC2FMV . . . . . K6UWW's friend LA8LG frolics on 15 sideband after earning WAS and other certifications via 20 c.w. . . . . WA1FHU's recent 7-Mc. c.w. contact with IIIR brought back poignant memories. Laci's first QSO with Roberto occurred on 40 in 1932 when WA1FHU was HAF3RL in his native Hungary, and IIIR was IIIP. "I was a college boy then. This contact was, for both of us, an emotional one!" . . . . . W8BQH and K4RZK rank high among *DX News-Sheet's* Islands on the Air performers.

OCEANIA — "YJ8BW should be even more active after he gets going with the antenna rotator I sent him," figures W4NJF. "Bill says the States have been thin on 14 Mc., and that JAs almost jam him on 21. As his QSL manager I can see what DX he works out there — 5W1s,

9V1OB finds plenty of DX fun on forty with 25 watts of c.w., especially during the annual ARRL DX classic. (Photo via W1YYM)

VR1s, etc. It's fascinating." . . . . . Club station KX6BU, manned by W1YLB, WA1s EJM and IIP, seeks New England QSOs almost daily on 14,330 kc. at 1145 GMT, Sundays on 21,380 at zero hours. W1YLB states further, "Operating permits in the Trust Territory take from four to six weeks to come through after applying. KX6s FE and FH are also active from Kwajalein with their HW-32. KX6DC is on from Roi Namur, usually 28,610 kc. at 2330-0030 GMT." . . . . . Pacific items from club periodicals: Papuan VK9TB plans a triband quad to go with his FL-200B and FR-100B for action on 7 through 28 Mc. . . . FO8s AA BJ BT BU and BV congregate on 20 c.w. . . . W6BHY-W7WJB tries the DX end as KX6DB. "Ten's a real ball out here on Kwajalein!" . . . VK0VK represents Mawson antarctic base this year. . . . VR1L, 14,190 kc. at 0630 GMT, expects a 24-month sojourn on Ocean isle.

HEREABOUTS — North Jersey DX Association holds its annual DX Round-up at the Holiday Inn, Wayne, N.J., on the 23rd of next month. "Our attendance is usually about 200 DX-minded hams," writes W2PXR, "and the afternoon program will include material of interest to the newcomer to DX circles." Consult Walt for further data . . . . . "I'll be operating PJ5MJ from Dutch St. Maartin on the 12th-26th of this month," warns W2BBK. "This will include one week end of the DX Contest, c.w. operation about 50 kc. above the low edges of 10, 15, 20 and 40 meters." You've doubtless heard or worked Doc previously as FP8AK and/or FS7AA . . . . . *QST* colleague WB4HIP invites DX v.h.f. buffs to check into the 3815-kc. V.H.F. Net, Mondays at 0200 GMT . . . . . "Thanks for that World Institute of Home Brewers plug in December's column," pens Cooper Union man W2LYH. "W2MEL's fine idea deserves publicity. Being one of those unfortunates who can be satisfied only with homebuilt ham equipment, I'm WIHB No. 92." . . . . . "Can't get over the c.w. magic of the letters 'VT'," muses W1AYK-K2UPD. "They cause actual pile-ups among Europeans." . . . . . PJ3CC will rarely be staffed with more DX and contest talent than during last November's visit by Ws 1BIH 1FJJ 1TX 3GRF 4GF and 4KFC . . . . . Check with VE3ACD for specs on Ontario DX Association's Trans-Canada, Seaway, and Provincial Capitals certifications . . . . . Tech hint of the month from *CARAscope's* W8ZCQ: Your new electronic keyer probably needs the same key-click filter the old brass job required . . . . . XE2YP mulls more XE4 radiations . . . . . OX4s AB and AC join OX4AA on 20 c.w. . . . . W2GKZ relieves WA2EPG in Long Island DX Association's *DX Bulletin* editorial sanctum . . . . . Accelerating use of artificial satellite spectrums may be easing commercial pressures on our own, speculates ARRL SCM WA6AUD in a Northern California DX Club *DXer* excerpt. FB! . . . . . Seems like only last month that W1s CEG and JMY dumped a bag of mail on our desk and said with Spartan simplicity, "Here." Thanks for those 20-year felicitations! As usual, *you* supply this DX juice — *we* merely pour.

Strays

Interested in more information about receiving pictures from the weather satellites? Then get yourself "A Guide to Construction of Inexpensive Automatic Picture-Transmission Ground Stations," authored by Charles Vermillion of the Goddard Space Flight Center. This "how-to-do-it" booklet will be in print at the Government Printing Office by the time you read this, but at press time the price (we guess 75c) and document number weren't available. But write to the Technical Utilization Officer, Goddard Space Flight Center, Greenbelt, Maryland 20771 (Code 206), and he'll give you the latest dope.

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Stolen Equipment

Stolen during January 1967: Central Electronics 200V (serial No. 378-575) with a filter capacitor mounted on rear, JETEC tube shields, and click suppression. Drake 2B (serial No. 5521). Clegg Venus (serial No. 1703-091) with power supply. Hallicrafters SR-42 (serial No. 442000, 507037) with v.f.o. Galaxy 300 with power supply, serial No. missing, standard screw-type mike connector on rear, and JETEC shields.

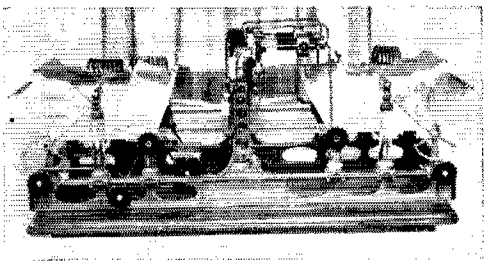
The thief may have sold these items over the past year to an unknowing purchaser. Contact the nation's largest, all-licensed teenage assn., the Germantown Radio Club, 38 E. Clapier, Phila., Pa. 19144.

—•••—

The following equipment was stolen from W1RY during Thanksgiving week: HQ-120 and large speaker (has numbers and dates along side each tube socket), HQ-140 and a defective Collins speaker (has white indicator marks on most knobs), KLH-8 f.m. receiver and matching speaker, Triplett No. 630 VOM, Radio Shack tube tester, Zenith "Long Distance 66" receiver, and a Bausch & Lomb 20-power target-spotting scope. Please notify Police Detective Bureau, Weymouth, Mass.

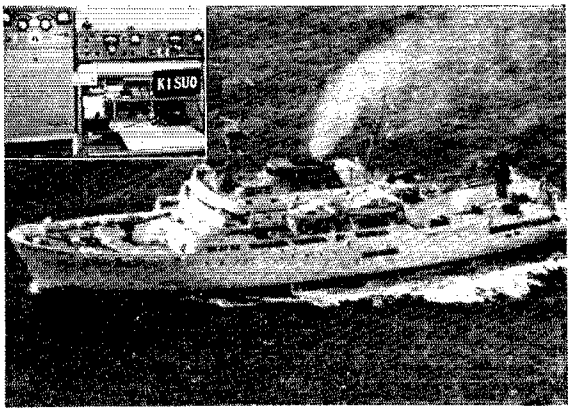
Recently WA5SEK helped avert a tragedy in Canada where a vacationing ham was marooned with his family on a burning island in northern Ontario, Canada. Mike received the c.w. distress message, then contacted authorities to locate the station which had left the air because of failing batteries. Within two hours rescue was accomplished. This is Mike at his rig.
(*Photo courtesy* of Tulsa Daily World)

This is W3SIR receiving the William Walker (W3NUG) Award at the Breeze Shooter Picnic. The award is given to outstanding western Pennsylvania amateurs, in memory of the late W3NUG, for contributions to amateur radio.



Now on display at W1AW is this much-appreciated gift to ARRL by T. Frank Smith, W5VA, well-known amateur, historian and DXer of Corpus Christi, Texas.

The Heintz & Kaufman tuned-plate, tuned-grid transmitter is a duplicate of one which served during 1928-1936 at W1MK, ARRL Hq. station and forerunner of the modern W1AW. Operated mostly on 3575 kc. (the 204As would "take off" at 14 Mc. and higher), the rig was used for bulletins and traffic as well as general QSOs. With need for greater stability, Communications Manager W1BDI built crystal and intermediate stages to drive the unit, all used until the disastrous flood of 1936 ruined the entire station.



The *USC&GSS Oceanographer*, a 3800-ton floating oceanographic research laboratory, is now on an eight-month around-the-world voyage. The ship's captain, K1-SUO, is frequently on 15-meter s.s.b. from the station shown at the upper left. Other hams aboard are W7NON and WA4TZM.

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE
DXCC: ROBERT L. WHITE, W1WPO
Contests: ROBERT HILL, W1ARR
Training Aids: GERALD PINARD
Public Service: WILLIAM A. OWEN, W1EEN

Gentlemen's Agreements. The FCC regulations divide our amateur bands into a number of segments based on type of emission and grade of license, but there still remain some basic incompatibilities which we have to resolve ourselves. Our ability to do so amicably is an indication of our maturity as a service — or lack of it, as the case may be.

In the past, there have been a number of "gentlemen's agreements" by means of which peace in the family was sought by agreeing to reserve certain segments within segments for certain types of operation. There was and is nothing mandatory about this, and nobody is going to receive an FCC citation or even an OO notice for not following it. It is simply a type of tacit understanding among mature communicators to observe certain proprieties.

The question has been asked what effect the new FCC regulations, which start going into effect, as far as band changes are concerned, in Nov. '68 — what effect this will have on the various agreements we have adapted in the past. For example, it has become the custom followed by most, that sideband generally occupies the high end of 75 meters, with a.m. on the low end. When the new restrictions go into effect in November, should Extra and Advanced Class licensees using s.s.b. be expected to stay off the low end of 75? 'Course not. We'll either have to work out another agreement or scrap it. Some think it is scrapped already.

It seems to us that the basic kind of Gentlemen's Agreement should be that we all agree to be gentlemen (or ladies), and go on from there. This is about half the battle, that we each recognize and respect the right of other amateurs to use whatever mode of emission they please, no matter how cockeyed we might think it is; that we accept the basic fact of amateur life that there *will* be QRM; that sideband is incompatible with a.m. as RTTY is with c.w. (perhaps not so much as you might think) but they must operate side by side in the same segments so let's try to get along, somehow; that no matter what kind of basic agreement we arrive at, there will be some who will not observe it, so let *us* observe it and refrain from complaining about those who don't.

Shall we set up some new Gentlemen's Agreements? Shall we attempt, among ourselves, to split up the bands into segments within segments so that the QRM will be c.w. against c.w., RTTY against RTTY, a.m. against a.m. and sideband against sideband, rather than mixing them up? Is it possible to do this, and if so is it

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-SCM-Affiliated Club-Operating Events

February	March	April
2 **Qualifying Run, W6OWP**	2 **LO Time** (League Officials, only).	1-30 IARC Propagation Research Competition
3 **LO Time** (League Officials only)	2-3 **DX Test** (phone)	5 **Qualifying Run, W6OWP**
3-4 **DX Test** (phone)	7 **Qualifying Run, W6OWP**	6 **LO Time** (League Officials, only).
3-18 **Novice Roundup** (p. 64, Jan. *QST*).	9-10 YL/OM Contest, c.w. (p. 92, Dec. *QST*).	16 **Qualifying Run, W1AW**
10 **FMT** (p. 97, Jan. *QST*).	16 **Qualifying Run, W1AW**	20-22 **CD Party** (c.w.)*
10-12 Vermont QSO Party (p. 110, this issue).	16-17 **DX Test**, c.w.	27-29 **CD Party** (phone)*
16 **Qualifying Run, W1AW**	18 W1EIA High Speed Code Test	* League Officials and Communications Dept. Appointees only.
17-18 **DX Test** (c.w.)	30-31 Florida QSO Party (p. 126, this issue).	June
23-25 QCWA QSO Party (p. 100, Jan. *QST*).		8-9 VHF QSO Party
24-25 YL/OM Contest, phone (p. 92 Dec. *QST*). French Contest, phone (p. 92, Jan. *QST*).		21-23 Field Day

FULL DX COMPETITION RULES APPEAR P. 60 DEC. *QST*.

practical and progressive? Or will these things work themselves out in time?

We have the better part of a year to consider it. Our present voluntary segmentation is as much by custom or practical necessity (e.g., no c.w. in the phone bands) as by specific agreement. Let's give it some thought, air it around, find out if the concept is practical and how it can be implemented. If we amateurs can pull it off by ourselves, it would be worthwhile.

The DX Contest. Every ARRL-sponsored contest has its special features, and we hope to keep them that way, despite pressure from some contesters to introduce common characteristics into all of them. The special features of the DX Contest are as follows: (1) It is worldwide, not domestic as are the others. (2) It "pulls out the stops" as far as legal power is concerned. Emphasis is placed on working foreign stations, using as much power as the law will allow, on any and all bands, with beams as elaborate as they come, the bigger and higher and more elements the better. Other things being equal, the amateur with the highest power, the highest and most beams, the best location, the sharpest operating ability and the most time will come out on top every year.

But the DX Contest isn't just for "winners." It is an ideal time to try out that new rig, that new beam antenna, to get your feet wet in some real hairy operating, to add to that country list toward getting your DXCC, and to make the acquaintance of some amateurs in countries other than the U.S. and Canada. Yes, you *can* make acquaintances during the DX Contest, provided you don't try to chew the rag with the "rare" ones.

And this latter aspect is important, gang. Even in the typical "hello-goodby" contact there is an element of international exchange, an impression made, a lasting flavor of "hamminess" created. Even in the fluster and bustle or reeling off one contact after another, the foreign amateur gets his impression of "Americans" through his hamming with them — the way you call, the quality of your signal, the skill of your fist or your voice operating technique. The impression can be good or bad, and varies from one contact to the next, but an overall feeling is created. How do we know this? We were a "foreign DX station" once.

Whatever your forte in amateur radio, have a crack at the DX Contest, just for kicks. You'll enjoy it. — *W1NJM.*

1967 ARRL SWEEPSTAKES

High Claimed Scores

To the vast astonishment of practically nobody, SS tallies continue to zoom higher each year. In '66 we had just 22 claimed c.w. scores of 100 K or more — this year you'll find 52 code entrants above that erstwhile magic figure. But the real eye-opener is the A3 listing: *60* microphone magicians topping 100,000 in '67, compared to a mere 20 just one year ago! Obviously the pendulum has swung to voice operation in the SS, with more and more contestants finding sideband a pleasant way to travel.

The following are high *claimed* scores received by our copy deadline, December 15; figures following the call indicate total score, number of contacts and number of section multipliers. Final results will appear as soon as the smoke has cleared. — *W1ARR*

PHONE

K4WJT.....197,136-888-74
W2RLM.....188,662-850-75
K1LPL.....181,008-838-72
K8DOC (WA8LEO, opr.) 178,707-841-71
WA4PXP.....176,073-806-73
K5RHZ.....168,276-758-74
K4PUZ.....167,610-758-74
W5WMU.....166,992-792-71
W3GRF (K1ANV, opr.) 166,500-756-74
W3AZD.....161,241-757-71
W3BES.....153,360-715-72
K8HZU.....151,650-674-75
K9GJD/6.....151,416-701-72
WA0CVS.....148,568-702-71
W8ILC.....146,742-661-74
WA0EMS.....146,620-673-73
W9YT (K9KGA, opr.) 146,520-665-74
WA8MCR.....145,913-651-75
WA5CBE.....144,825-644-75
K9LBQ.....141,750-676-70
K7RAJ.....137,196-622-74
K4BAI.....136,944-635-72
WA0LEW.....136,728-636-72
W8MEL.....135,420-610-74
W9RQM.....134,576-616-73
WA9HEU.....133,804-611-73
K2EIU/5.....130,980-591-74
W1KMV (K1JYN, opr.) 129,600-600-72
W8WPC.....127,677-583-73
WA0HSX.....124,542-611-68
W4PZV.....123,516-570-73
WB4DWD.....121,695-592-70
K3MNJ.....121,107-553-73
WA0SDC.....120,750-805-75
K6YNB/6.....118,104-534-74
WB2SSZ.....117,390-609-65
K9YNG.....115,403-563-69
K7PXI.....114,099-521-73
WA3CQW.....113,867-570-67
W4BVV.....112,887-512-74
W9ZRX.....112,110-505-74
W3GAU.....111,666-509-74
K4CG (K3WUW, opr.) 111,528-776-72
WA0CPX.....108,947-551-67
W4YDD.....108,523-517-71
K1HTV.....107,676-501-72
W3GHM.....106,680-508-70
W4KFC.....105,900-706-75
WA9LVJ.....105,525-526-67
W0QWS.....103,356-482-72
WA5LGO.....103,275-459-75
K5IIN.....102,075-681-75
W3DPJ.....101,115-485-70
K9DVZ.....100,463-448-75
W9JCK.....100,462-447-75
W1YNP.....100,366-755-67
WA0CHH (4 oprs.) 171,562-764-75
WA0CJU (8 oprs.) 130,143-619-71
W3ZKH (K3EST, W3s TMZ ZKH).....107,091-735-73

C. W.

K1LPL.....139,065-762-73
W9YT (K9ZMS, opr.) 138,563-743-75
W6RW (W6DQX, opr.) 135,563-724-75
W1BGD/2.....133,313-711-75
K4GSU/3.....130,122-720-73
K2EIU/5.....129,281-690-75
WA9ITB.....129,028-707-73
W3BES.....128,813-687-75
K4PUZ.....125,012-689-73
K8UDJ (K8MFO, opr.) 124,312-663-75
W4BVV (K1ANV, opr.) 123,950-671-74
K6AEH.....122,156-661-75
W9RQM.....121,915-660-74
WA0SDC.....121,875-652-75
K5OCX.....121,220-675-72
WA0CVS.....120,345-680-71
W8SH (K1ZND, opr.) 120,188-641-75
K4BAI.....117,188-625-75
W7EKE.....117,165-639-73
K7RAJ.....116,438-625-75
W1ECH.....116,180-632-74
K2KIR.....115,523-638-73
VE5US (VE5UF, opr.) 115,380-641-72
K7CT1.....114,875-614-75
W9JCK.....113,333-623-73
WA0HYI.....112,950-637-72
W5JAW.....112,850-613-74
K0JPJ.....112,055-628-73
W3EIS.....111,325-611-73
K6EBB.....110,960-608-73
W7QDM.....110,760-626-71
K5RHZ.....109,865-602-73
W8QXQ.....109,792-603-73
K4TIG/4.....108,719-615-71
W4KFC.....107,100-716-75
W5QJH.....106,500-601-71
WA9HEU.....106,215-582-73
W4PTR.....105,750-564-75
WA3BLE.....103,843-571-73
WA3IXN.....103,660-585-71
K3HKK (K3AHT, opr.) 103,483-583-71
W1KMV (K1JYN, opr.) 102,240-568-72
K4AEV.....102,000-550-75
W8QDH.....101,835-558-73
K4RIN.....101,561-558-73
W1EOB.....100,888-538-75
WA9AUM.....100,800-560-72
W5WMU.....100,731-574-71
W3GHM.....100,315-535-75
K4VDL (K4VDL, WB2ZFX). 128,438-686-75
K5LZO (K5LZO, WA5LES) 125,550-848-75
WA3EPT (8 oprs.) 116,250-619-75

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Feb. 16 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted Feb. 2 at 0500 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 16 becomes 2130 EST Feb. 15.

Any person can apply. Neither ARRL membership for an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230–0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230–0320 GMT practice on those dates:

Date Subject of Practice Text from December *QST*
Feb. 5: *It Seems to Us*, p. 9
Feb. 8: *Transceive with Transistors (Almost)*,* p. 11
Feb. 14: *Grounds*, p. 24
Feb. 20: *Rejecting Interference from Broadcast Stations*,* p. 35
Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Feb. 23: *Changing Audio to Radio Frequency*, p. 81
Feb. 26: *Amplitude Modulation*, p. 82

THE RST SYSTEM

Headquarters has become increasingly aware of late that our RST system of signal reporting, as correctly detailed on CD Operating Aid Number 3, is being shamefully misused. Considerable research on the part of our Midwest secret operative, W9BRD, enables us to present the following interpretation of the RST system as employed nowadays by the majority of hams, as true today as 20 years ago!

R5—Got everything, somehow.
R4—QRM chopping you up, got a little.
R3—Got practically nothing but squeaks.
R2—(This is an insult—never use it.)
R1—I am trying to be funny.
S9—Strong as heck (or "pse QSL").
S8—Above-average signal.
S7—*Average signal (also is the only correct* report for use during contests).
S6—Below-average signal.
S5—Weak as the devil—don't want your QSL anyhow.
S4—I think that's you in the mud.
S3—(Never use this report—no receiver can be this punk.)
S2—(Obsolete term—has not been used since 1938.)
S1—(Given to S9 locals as a joke.)
T9—Your signal sounds as though you have a d.c. plate supply.
T8—Your note is very rough.
T7—Your note is terrible. Better QRT before FCC catches you.
T6—(Insult, never use this report.)
T5— " " " " "
T4— " " " " "
T3— " " " " "
T2— " " " " "
T1—(Given to locals as a joke.)

*Speeds will be sent in reverse order, highest speed first.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class

W1AW SCHEDULE, FEBRUARY 1968

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn. about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate you must have your *original* operator's license with you. The station will be closed February 22, 1968, George Washington's birthday.

*GMT**	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	.....	.....	.....	RTTY OBS[3,7]	.....	.....
0030			**Code Practice Daily[1] 10-13 and 15 w.p.m.**				
0100	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. IBS[1]	C.W. OBS[1]	C.W. OBS[1]
0120-0200[4]	.....	.....	7.080	3.555	7.080[6]	3.555[6]	7.080
0200	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0205-0230[4]	.....	.....	3.945	50.7	145.6	1.82	3.945
0230			**Code Practice Daily[1] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**				
0330-0400[4]	.....	.....	3.555	7.080	1.805	7.080	3.555
0400	RTTY OBS[3]	.....	RTTS OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]	RTTY OBS[3]
0410-0430[4]	.....	.....	3.625	14.095	7.045	14.095	3.625
0430	Phone OBS[2]	.....	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]	Phone OBS[2]
0435-0500[4]	.....	.....	7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS[1]	.....	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]	C.W. OBS[1]
0530-0600[4]	.....	.....	3.555[6]	7.080[6]	3.555	7.255	3.555
0600-0700	.....	.....	7.080	3.945	14.100	3.555	7.080
0700-0800	.....	.....	14.280	7.255	3.945	14.100	14.280
2000-2100	.....	14,280	21/28[5]	14.095	21/28[5]	14.280	.....
2100-2200	.....	14.100	14.280	14.100	14.280	14.100	.....
2300-2345	.....	7.255	21/28[5]	21.1[6]	21/28[5]	7.255	.....

[1] C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3.625, 7.045, 14.095 and 21.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
[7] Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.
Maintenance Staff: W1s QIS WPR.* Times/days in GMT. General operating frequencies approximate.

DX CENTURY CLUB AWARDS

From November 1, through November 30, 1967, DXCC Certificates based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

K8YCM/5..209
K2JWM...198
WA6OJM...145
K5AGI....144
OH6VE....130
W8DEV....123
DL6CL/W2..118
JA2AMD...116
DL8TG....113
WA1FCP...111
WA4WFQ...110
DL8DC....109
WA2QFE...109
W2MNK....108
YU3UR....108
JA0SU....106
HA5DA....105
OE3BJW...105
WA3ATN...105
G8KL.....104
HB9AED...104
OK1KOK...104
K3ZAW....103
SM5CZK...103
WA1FJU...103
W2DGV....103
WA0JUM...103
I1KD.....102
DJ2IW....102
DL6TV....102
SM5FC....102
VE6SX....102
W2CKR....102
W2NRV....102
W4KEB....102
DK1HA....101
VO1HQ....101
W4RM.....101
W4VZD....101
K1YKN....100
WA4UZV...100
W7GXC....100
W9IIL....100
WA0LWE...100

Radiotelephone

EA4JL....262
YV4IQ....220
WA4TSF...175
K2QOU....162
W5KGJ....152
W2VBJ....150
K1SLZ....142
JA2DDN...133
W4SPX....128
K4WPL....126
OH6VE....126
I1SMN....119
HH2HH....116
WA2IDM...111
VE3ACU...109
W5OLG....109
DL8DC....108
JA1QCA...108
VP2KR....107
F5BI.....105
VE3QW....105
W5NOO....105
K1ZJW....104
K0GSV....104
W2OPF....104
GI3ILV....102
GD3TIU...101
WA4GZZ...101
K8THT....100
YV4QG....100

Endorsements

Endorsements issued for confirmations credited from November 1, 1967 through November 30, 1967 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

330
W6LN
W8KPL
W8ONA

320
W2AEB
W5HDS
W7UMJ

310
HB9KB
W4BRZ
W8YCP

300
VE4OX

W1DGJ
W3YZI
W5LEF
W9RQM
W0QKC

280
I1RB
JA1AG
K2GMO
K2KER
W2CES
W3LPF
W4HOS
W6BYB

260
K1DFC
SM7ANB
SM0AJU
ZL3AB

240
HB9NU
K6LAE
WA2BRI
W3PVZ
W5HTY
W5NGW
WA6GFY
W8RCM

220
HB9KC
K4WJT
W1EOA
W5KGJ
WA9IBT

200
DJ2WN
K2ZRO
K6CWS
W2KIT
WA2IDM
W3HNI
W4ZSH
W7YEX
W0CVZ

180
F9TE
K2QOU
K9DNR
W1PYM
W2BUY
W2UGM
WA2CYQ
WB2UKP
W5QIX
W6PTS
WA9GXL
W0GTU

160
CR7BN

F3CB
K1GUD
K6EBB
K6RSY
K9PQG
W4EI
W4HHN
WB2HZH
WB2YQH
WA5JSI
W6GTE
WB6IUH
WA8GPX
WA8OVC
W9ALP
W9TPA
WA9GXL

140
JA2XI
K1PVB
K3QVV
K6BAG
K6EEL
OK1JD
OZ3PO
VE3BJK
W1ETV
W2IYW
WB2OLN
WB2OQU
WA5AUZ
WB6SEV
W9RZZ
WØKAW
WA0IBJ

120
DL1EQ
GI6YM
K3FDQ
VE1ADH
W1CT
W1EZM
WA1CYT
WA2ARM
W3ZPO
W4DJT
WA6THG
WA6ZQU
W7CAL
W9MFW

Radiotelephone

310
W1HX

300
K2YLM
W1DGJ

280
I1RB
K2KER

W4RBZ

260
I1JT
W4AVY
W0QLX

240
HB9NU
I1LAG

I1RCD
IT1GAI
PY3AHJ
W1RO
W5HTY
ZL3MN

220
EA4CX

K4GXO
W3ICQ
W4TRG
W5LEF
ZL3AB

200
K1DFC
K3PDC
SM3AZI

VE3MR
W1BAB
W5RNG
W6DZZ

180
VE3EVU
W1FDL
W1FXD

ZS1DC
9G1DY

160
EA7IR
K8VCB
W2SSC
WB2BEE
W4HOS

140
DJ2WN
K1PVB

120
K4RQZ
K4WJT
K6RSY
W1MP
W2DY
W3MDJ
W3ZPO
W8TWA

WØYZQ
6Y5GG
K9PQG
KØEEL
WA0IHQ

license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least one year immediately prior to nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, *zip code* and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the.....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

—George Hart, W1NJM, Communications Manager

Section	*Closing Date*	*SCM*	*Present Term Ends*
Santa Barbara	Feb. 9, 1968	Cecil D. Hinson	Aug. 10, 1968
Eastern New York	Feb. 9, 1968	George W. Tracy	Feb. 10, 1968
East Bay	Feb. 9, 1968	Richard Wilson	Feb. 10, 1968
Connecticut	Feb. 9, 1968	John J. McNassor	Apr. 11, 1968
Saskatchewan	Feb. 9, 1968	Mel Mills	Apr. 11, 1968
West Indies	Mar. 11, 1968	A. R. Crumley, Jr.	Jan. 10, 1968

Alaska	Mar. 11, 1968	John P. Trent	Resigned
Santa Clara Valley	Mar. 11, 1968	Jean A. Gmelin	Resigned
Nebraska	Mar. 11, 1968	Frank Allen	Resigned
Maritime	Mar. 11, 1968	J. Harley Grimmer	Resigned
Wyoming	Apr. 10, 1968	Wayne M. Moore	June 9, 1968
Louisiana	Apr. 10, 1968	J. Allen Swanson, Jr.	June 10, 1968
Quebec	Apr. 10, 1968	Jim Ibey	June 11, 1968
Eastern Massachusetts	Apr. 10, 1968	Frank L. Baker, Jr.	June 15, 1968
South Carolina	Apr. 10, 1968	Clark M. Hubbard	June 26, 1968
Arizona	May 10, 1968	Floyd C. Colyar	July 14, 1968
Utah	May 10, 1968	Gerald F. Warner	July 15, 1968

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.

Canal Zone	Russell L. Oberholtzer, KZ5OB	Nov. 10, 1967
Oklahoma	Cecil C. Cash, W5PML	Dec. 11, 1967
New York City & Long Island	Blaine S. Johnson, K2IDB	Jan. 2, 1968

In the San Diego Section of the Southwestern Division, Mr. James E. Emerson, Jr., WB6GMM, and Mr. Douglas E. Decker, Jr., WA6TAD, were nominated. Mr. Emerson received 219 votes and Mr. Decker received 116 votes. Mr. Emerson's term of office began Nov. 1, 1967.

In the Ontario Section of the Canadian Division, Mr. Roy A. White, VE3BUX, Mr. David S. Hutchinson, VE3DU, Mr. Herbert Titmarsh, VE3FPJ, and Mr. Stanley R. Swinerd, VE3BSY, were nominated. Mr. White received 397 votes, Mr. Hutchinson received 176 votes, Mr. Titmarch received 157 votes and Mr. Swinerd received 88 votes. Mr. White's term of office began Dec. 12, 1967.

QST

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
K6BPI	5713	1727	1530	197	9167
W3CUL	435	1896	1751	123	4205
K5TEY	22	1324	842	14	2202
KØONK	201	782	769	26	1778
W6RSY	18	823	707	115	1663
W7BA	8	602	557	44	1211
WB6BBO	51	517	484	5	1057
WØIES	0	512	511	0	1023
WØLCX	41	435	424	11	911
K9IVG	22	450	397	9	878
WA7DXI	34	414	352	31	831
W3VR	48	391	369	19	827
W3EML	33	389	369	3	794
WB6PCQ	22	399	348	24	793
WA1EYY	51	349	289	51	740
W5OBD	14	344	343	0	701
W7DZX	12	374	299	5	690
K5BNH	50	339	201	84	674
WØLGG	10	345	290	14	659
WA2IGQ	28	289	228	61	606
WB6GGL	10	296	281	15	602
W6VNQ	23	288	278	0	589
W6MLF	161	211	207	2	581
W7HMA	54	264	256	4	578
WB2RKK	16	278	241	17	552
K3NSN	130	211	200	11	552
W6QAE	14	265	228	22	529
WA2EEJ	59	252	186	26	523
W6EOT	0	261	259	2	522
W1EFW	30	270	176	42	518
W7ZLW	31	246	220	7	504
WN6HVA	23	263	126	91	503
WAØDOU	12	249	249	0	500
Late Report:					
WB6PCQ (Aug.)	14	336	306	26	682
WB6PCQ (Sept.)	25	322	298	17	662
WB6INO (Oct.)	71	103	426	58	658
KH6GHZ (Oct.)	109	221	174	47	551
WB6PCQ (Oct.)	11	261	229	19	520
W6IPW (Aug.)	10	245	221	24	500

BPL for 100 or more *originations-plus deliveries*

W8IV 225	WB2DZZ 128	WA5KZA 109
WA1FVH 193	KØAKK 128	WAØELO 109
KØZSQ 179	WA9MHU 127	W6LNZ 105
K6IBI 176	WA4NEV 120	W1TXL 104
WA6BYZ 162	W8NAL 119	WA6OQM 104
WA8IAQ 155	WB4HKP 115	W4ILE 103
WN4GTG 143	W2OE 113	WA2GPT 102
VE7BHH 143	WB6TYZ 113	WA4VEK 100
K1PNB 135	W7YWW 113	Late Reports:
W3TN 133	WA6KZI 110	K1PNB (Oct.) 148
WA9CCP 132	VE7A8Y 110	K3NSS (Sept.) 111
		W1EEN (Oct.) 107

More-Than-One-Operator-Stations

WB2BDJ 315 K6QEH 156 W4DV 140 K4CG 114

BPL Medallions (see Aug., 1954, p. 64) have been awarded to the following amateurs since last month's listing: WA2IGQ, WB2SSZ, WB6GGL, K7NQX, WA8MAM.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Meet Your SCMs

Here's an introduction to Frank M. Butler, Jr., W4RKH, starting his *sixth* term as SCM! Frank's interest in amateur radio dates back to 1940 and his first license to April of 1950. In addition to W4RKH, he has held the call W8GBS. His educational background (leading to a B.S.E.E.) includes the University of Alabama, Ohio State University and Florida State University. The principal interest in ham radio for this active SCM has been public service. He is a regular NCS on the W. Fla. Section Phone Net, Secy.-Treas. of *the Eglin Amateur Radio Society, County* RACES Radio Officer and occasional NCS on the local v.h.f. MARS net.

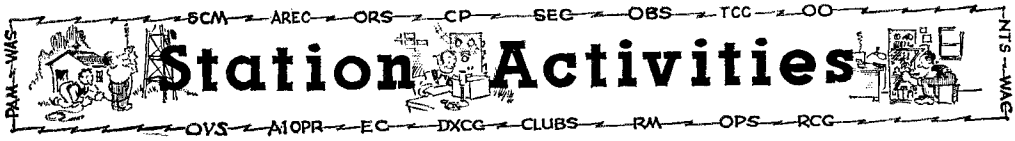
Station Activities

(*Continued from page 134*)

networks in Ontario into a cohesive working force. It is a big section and there is a lot of work to do. Many of you have offered sincere assistance and I'm sure he will be calling on you to help him. We have indications that the Chicken Junction Net people and the RSO itself are very anxious that the League nets *fulfill* their real task of traffic-handling in this section and we tilt our whole tower to them both. All of you want to help so much but, like the whole world, need the leadership that seems so hard to obtain in our affluent society. It has been a real pleasure to work with so many very grand people. 73 and stand by for action. Traffic: VE3BZB 121, VE3GCE 63, VE3EHL 57, VE3ATI 54, VE3DBG 50, VE3BBQ 49, VE3NO 47, VE3AWE 28, VE3BUR 25, VE3EZY 20, VE3EWD 12, VE3VD 7, VE3AUU 3.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAMs: VE2BWL, VE2AGQ. VE2BMQ has supplied an interesting article about crystal plating and etching. VE2BWL finds time to maintain his net activities. VE2PJ performs well on Reseau Telegraphic Quebec. VE2RM now has a very good a.m. repeater. *VE2DR still is about the most active station on OQN.* VE2EK, life honorary pres. of the St. Maurice Valley Radio Club, is a supporter of CTR. VE2EC still is the grand spokesman for the VE2MO gang. VE2CK *is hard at work finalizing W/VE Contest results.* VE2WM keeps lower St. Lawrence on the radio map on 75 to 2 meters. SS results were sent by VE2CP, VE2BMS, VE2BUW, VE2PJ, VE2BMS (phone). Plus de 45 élèves sont inscrits aux cours organisés par le Radio Club de Québec à l'intention des futurs amateurs. Dès le printemps prochain, ces candidats seront bien préparés pour réussir leur examen du Ministère des Transports. VE2BWL fait de l'excellent travail à titre de gérant du réseau du Québec, tous les soirs à 18.45 sur la fréq: 3780 kc. les stations contrôles du réseau sont VE2ASU, VE2BWL, VE2ADR, VE2ADL, VE2BMY, VE2AFJ, VE2AJD. Il *faut également* féliciter la RAQI pour l'excellence de son travail et sa grande préoccupation de parfaire l'efficacité d'opération de ce réseau. VE2BVY est certainement un des meilleurs opérateur de c.w., parmi les amateurs de télégraphie de langue française de la Province. Félicitations, Richard, et ton travail au sein des réseaux de c.w. est très apprécié. Traffic: VE2DR 104, VE2PJ 96, VE2-BRD 95, VE2OJ 77, VE2ALE 62, VE2BWL 41, VE2-DCW 39, VE2BVY 30, VE2EC 20, VE2WM 20, VE2-AJD 15, VE2BGJ 15, VE2CP 11, VE2AGQ 8, VE2-CK 6.

QST



• 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—RM: W3EEB. PAM: W3DKX. Officers of the newly-formed Brandywine High School ARC are WA3GKI, WA3BQT, WA3IID and WA3EGX. The Sussex County meeting was a huge success. All stations living in that county who are interested in RACES, please contact W3PM. WA3DDW received the Kent County ARC Amateur of the Year award at its Annual Christmas Dinner. K3NVV sports the new Drake line. A new preamplifier has brightened the 2-meter net for W3EEB. We wish to thank retiring NCS DSMN WA3DYG for a job well done and, gang, let's give the new DSMN NCS, WA3ELO, a big morale boost by checking into the DSMN Tue. at 2100 local time. DEPN reports 59 QNI, 4 QTC; DSMN, 48 QNI, QTC 1; DTMN, 29 QNI, 16 QTC. Traffic: W3EEB 163, W3DKX 14, K3NYG 12, WA3DYG 3, WA3DUM 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI—SEC: W3AES. RMs: W3EML, K3YVG, K3MVO, W3MPX. PAM: K3MYS. V.H.F. PAM: W3FGQ. EPA, QNI 397, QTC 369. PFN, QNI 519, QTC 609. PTTN, QTC 237. EPAEP&T QNI 674, QTC 385. EPA V.H.F., QNI 228, QTC 143. OO reports were received from W3BFF, W3NNC, K3HNP, K3RDT; OBS reports from K3WEU, W3CBH, WA3AFI; OVS reports from WA3EEC, W3ZRR, K3MSG; SS messages were received from WA3ADN, WA3ATX, WA3EQ, W3BES, K3BNS, W3BUR, WA3CQW, WA3DSZ, WA3EGD, WA3EMO, WA3ERS, WA3EXB, K3FSV, WA3GAT, W3GHM, WN3HMU, WN3HOM, K3HTZ, WA3IPR, K3LBG, W3MPX, W3NNL, W3NOH, WN3PIE, W3QMZ, K3RFB and K3TGM. W3CUL, W3VR, K3NSN and W3EML made the BPL. WA3FPM is doing a little DXing. WA3CQO is using 144 and 220 Mc. for a traffic outlet from the EPA V.H.F. Traffic Net. W3VR is using RTTY for a traffic load. WA3CKA has completed an all-solid-state transmitter and receiver, plus a v.f.o.! WA3GAT was in a wrestling competition. W3MVO's traffic totals hold up even though for only half a month. WA3FUE has a new Swan 500 and a TR33 beam. W3ID has receiver trouble. W3YPF is active on v.h.f. WA3EXW is recovering from a little cutting-up session at the hospital. WN3HMU is closing in on WAS while working on his big G ticket. WA3AIB has built a 1-watt rig. K3RUA broke his index finger. K3KTH has a new keyer. KØWEU/3 is now WA3JCA. WA3EMO reports the school club station is just about ready. K3WEU is touring and lecturing on ham radio. The EPA section now has a book review net going on 50.2 Mc. Tue. at 8 P.M. WA3EEC is looking for information on Harvey Wells rig TBS-50. W3EU needs tubes for his NC-44. Traffic: W3CUL 4205, W3VR 827, W3EML 794, K3NSN 552, W3AIZ 383, W3FGQ 268, K3PIE 260, WA3AOJ 235, WA3CTP 235, WA3ATQ 223, WA3GLI 189, K3MVO 189, K3YVG 184, K3VBA 179, W3MPX 146, WA3JCA 127, W3ELI 122, WA3GAT 108, K3TNL 102, K3WEU 99, W3FPC 90, WA3AFI 84, K3RTX 82, WA3EMO 75, W3CBH 63, WA3FPM 62, WA3EEC 61, WA3CKA 59, K3RUA 53, WA3CQO 47, WA3AIB 43, K3WAJ 43, WA3CND 40, K3BHU 39, K3KTH 34, W3NNL 32, W3AXA 28, W3RV 25, W3OY 21, K3KKO 20, K3UZO 18, W3KJJ 17, K3MDG 15, W3BUR 14, WA3BSV 13, WA3EIO 12, K3HKW 10, W3OML 8, W3WBS 6, W3HNK 5, W3KCM 5, WA3HGX 4, K3HNP 4, WA3BJQ 3, WA3HIT 2, WA3HVR 2, WA3IAZ 2, W3ID 2, W3BFF 1, W3CL 1, W3EU 1, WA3EXW 1, WA3FUE 1, K3MSG 1, W3NNC 1, K3RDT 1, W3YPF 1, W3ZRR 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, K3JYZ—SEC: W3LDD.

Net	*Freq.*	*Time*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	0000Z Daily	30	277	11.8	K3OAE, RM
MDDS	3643	0130Z Daily	30	45	5.5	W3ZNW, RM
MEPN	3920	2300Z M-W-F 1800Z S-S	23	91	26.3	K3NCM, PAM
MTMTN	145.206	0030Z Tu-F 0100Z W-T-S-S	23	27	7.9	K3NOQ
CVTN	145.615	0200Z Sn-F	8	12	3.6	WA3CFK
AREC	3820	2300Z Sn	4	5	12.0	W3LDD, SEC

New appointees: WA3IHR, EC Harford County; K3LFD, EC Anne Arundel County; K3WSQ, EC Washington, D.C.; W3DFW, EC Allegany County. Endorsed appointments: W3LBC, ORS; W3CVE, ORS, OBS, OO C1 IV; W3TMZ, ORS, OO C1 I; W3ZNW, RM of MDDS, ORS; W3EOV, OPS; W3TN, ORS; W3MSR, OVS. Appointments are reserved for active ARRL members who qualify and remain qualified by their activity. New officers of the Springbrook H.S. ARC are WA3HWW, pres.; WA3OYW, vice-pres.; WA3IAQ, secy.-treas. The Antietam RA, Inc. elected WA3CFK, pres.; WA3JCK, vice-pres.; WA3GLN, secy.-treas.; WN3JBS, act. mgr. The Capitol Institute of Technology ARC, WA3BYN, is active on 40, 15 and 6 with WA3EJI, pres.; WA3CEK, vice-pres.; WA3BTY, secy.-treas.; K3SGB, station mgr.; WA4YPQ, P.R.; WA3EOP, QSL Mgr. Your SCM received 45 Sweepstakes messages. K3CYA, W3MYB, W3TXQ and W3MSR sent out 41 OO notices. W3TN made the BPL. W3GKP worked K5WXV via 144-Mc. meteor scatter. W3CDQ had a nice visit with W4PPQ while on vacation in Florida. W3CBG has a new sky wire and his signal shows it. W3MCG is on in his new QTH with temporary wire antennas. WA3GLP reports working his 50th state at last. W3MSR is back on 2 meters and reports lots of c.w. activity. K3UMM has completed his DXCC since moving to Silver Spring. WA3CCN, while on TDY in Calif., reports working through a 2-meter repeater for the first time. W3TXQ reports 5 states on his new homebrew solid state transmitter with 2.2 watts and he is working on a companion receiver for hip-pocket mobile. WA5EHA, operator at K3NSS, is on his way to a new Navy assignment. Traffic: (Nov.) W3TN 284, W3CBG 171, K3JYZ 164, W3PQT 100, WA3CFK 62, K3GZK 48, W3PRC 45, W3ATQ 33, W3EOV 31, K3QDC 30, WA3GLP 23, WA3HTQ 23, WA3ERL 19, W3MCG 18, WA3CCN 14, WA3CBC 11, WA3EOP 10, WA3DWF 7, K3NCM 7, W3TMZ 7, K3CYA 2, W3DPJ 2, W3MSR 1. (Oct.) W3PRC 7. (Sept.) K3NSS 233.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV. PAM and NJPN Net Mgr.: W2ZI. New officers of the SCARA are K2HKG, pres.; WA2QAA, vice-pres.; W2BYW, secy.; WB2FTD, treas. Recently-elected DVRA officers are W2ZPJ, pres.; K2USQ, vice-pres.; W2VU, secy.; W2WOA, treas. Will all SNJ appointees *please send* in your certificates for annual endorsement: I have notified many by postal card, with little results. New Jersey Emergency Phone & Tfc. Net reports 30 sessions, QNI 537, traffic 181. NJN (C.W. Net) reports 30 sessions. QNI 413, traffic 353. Many SNJ members participated in the SS Contest. WA2HJF and W2HDW both received their Extra Class tickets recently. Princeton Univ. Radio Society's new station call is W2PU. WA2KIP has been on Naval Reserve training at Lakehurst. W2ZI was interviewed over station WJLK and WJLK f.m. Nov. 20 during its 20th anniversary "Open House" as a guest broadcast pioneer. W2ZVW now is NCS for NJN and EAN Tue. skeds. W2ZI attended the AWA's 5th Annual Historical Wireless Convention at the Ford Science Museum, Dearborn, Mich., Sept. 22/23/24 and lectured on rare and unusual antique receivers. WA2JNA is a new man reporting from the Trenton area. SJRA officers for 1968 are K2BG, pres.; W2FYS, vice-pres.; K2LEO, secy.; K2BPX, corr. secy.; W2EMB, treas. WB2APX was doing well organizing the AREC in his area but had to resign because of a heart attack. Traffic: W2ZI 115, WA2KIP 112, W2ZVW 35, W2YPZ 20, W2ORS 19, WB2VMQ 16, WA2ANL 14, W2KGM 13, K2SHE 13, WB2BGH 12, WA2DVU 10, WB2MOQ 10, K2RXB 10, K2BG 7, W2BZJ 6, WB2APX 4, W2HDW 4, K2JJC 4, K2MBW 3, WB2URO 3.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. The NYS C.W. Net meets on 3670 kc. at

1900, ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. at 1400 GMT and 2345 GMT on Mon. WA1FVH, Net Mgr., advises that the Eastern Area Traffic Net will meet on 3930 kc. at 0030 GMT daily. Check-ins from W.N.Y. are appreciated. Congratulations to W2OE on making the BPL again. The BARRA has moved WB2TLJ (the Buffalo Repeater) to the underground EOC of Erie County Civil Defense. When antenna problems are solved better service is expected. Full cooperation with RACES and its Canadian counterpart is provided for, both as to frequencies and personnel assignments. Our section has approximately 2300 members (ARRL). W2SEI and WA2KND made a fine effort in their director and asst. dir. campaigns. Congratulations to W3YA, who is familiar to all who attend hamfests on his reelection. I don't know the secret but W2MPM, of RARA, reports 27 more new members. That brings the total to 85 new ones since Sept. The club total is now over 400 members. The Rochester group surely deserves some commendation for a consistently fine job in all areas of club activity from hamfests to code and theory classes. I wish to note the passing of W2OY, who was found hanging from his safety belt on his tower apparently the victim of a heart attack. There is scarcely a ham on 75 meters in the east who hasn't heard of the call. What can I say but that it is the passing of an era. WB2VSL is the net mgr. of the East Coast Traffic Net, 7280 kc. at 2130 GMT daily. WA2GRT received the Fulton ARC Club award for outstanding service. Traffic: (Nov.) W2SEI 446, W2OE 414, WB2OYE 226, WA2NDC 214, WB2VSL 124, W2RUF 122, WB2GAL 121, K2RYH 117, WA2HSB 109, W2FEB 92, W2HYM 60, WB2SMD 51, WA2ILE 38, W2RQF 34, W2FCG 24, K2IMI 23, WA2ANE 21, K2OFV 17, K2DNN 14, K2EQB 11, WA2AWK 8, W2MTA 6, WA2GLA 5, W2BLO 4, W2CFP 4, K2HUK 2, WA2PZD 2, WB2VND 2.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO. PAM: K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7:00 P.M. local time; KSSN, 3585 kc. Mon. through Fri. at 6:30 P.M. local time. The *Radial* reports WA3HKI and WA3GZW are new Generals; WN3GKL passed the General Class exam; WA3GYN and K3IXB resulted in obtaining fast help at a recent major accident via their mobile communications; K3WOI is back on the air from a new QTH. *QST de K3HKK* reports the Nittany ARC has its 2-meter repeater station going. Also, the SS club score finally passed ½ meg. total points with K3AHT as the main spark plug at the controls of K3HKK. K3SMB has a new Drake 4B. K3CHD has a new Drake T4-X. WN3GSB is now WA3GSB with a new General ticket. WB2TNB/3, ex-WA3DHU is operating portable at Carnegie-Mellon University. K3YAK has finished an all-transistor a.f.s.k. oscillator and is using it. W3VXV has joined K3ASI and K3YAK on 2-meter RTTY. K3KMO is back on the air after almost a year of inactivity. WA3BGE and W2KAT/3 have received their Extra Class licenses. WA3BGE operated in the Sweepstakes from W8EDV. W2KAT/3 received his 35-w.p.m. endorsement sticker. W3MFB, WPA RM, reports 30 sessions, 38 stations plus 14 visitors, 372 QNI and 230 messages handled during the month of Nov. —a measurable increase over October's traffic. Traffic (Nov.): W3NEM 233, W3KUN 188, WA3BLE 157, WB2TNB/3 155, WA3AKH 118, W3MFB 78, W3LOS 61, K3PYS 57, W3BLZ 56, WA3EPQ 55, K3HKK (K3AHT and W2KAT ops) 52, K3SOH 34, W3KPJ 31, K3ASI 26, WA3HSQ 22, WA3GPK 16, K3SMB 15, W3YA 12, K3SJN 8, W3UHN 8, WA3BGE 6, K3KMO 6, K3RZE 6. (Oct.) K3SOH 100, W3BLZ 78, WA3AKH 62, W3KQD 13, K3RZE 12, W3IYI 10, K3CHD 3.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: W9EVJ. PAMs: W9VWJ, WA9CCP, W9KLB and WA9BLA (v.h.fs.). Cook County EC: W9HPG.

Net	*Freq.*	*Times*	*Days*	*Tfc*
IEN	3940 kc.	1400Z	Sun.	18
ILN	3760 kc.	0000Z	Daily	285
NCPN	3915 kc.	1300Z	Mon.-Sat.	179
NCPN	3915 kc.	1700Z	Mon.-Sat.	278
Ill PON	3925 kc.	2300Z	Mon.-Fri.	417
Ill PON	50.28 Mc.	0200Z	Mon. & Thurs.	2
Ill PON	145.5 Mc.	0200Z	MWF	30
TNT	145.36 Mc.	0200Z	Sun.-Fri.	No report

The Hamfesters held its inaugural banquet at the Log Cabin Restaurant Jan. 13. (Hallicrafters) Fifth Avenue Ham Club has moved to Rolling Meadows. WA9UHA was elected as president of the Evergreen Park High School ARC. The 2nd Annual Hamfest of the Rock River Radio Club will be at the Lee County 4H Fairgrounds near Dixon June 16, 1968. W9EET has a new Hy-Gain antenna. WN9TMR has dropped the "N" from his call. New calls in the Melrose Park area are WA9ULZ and WN9WFC. WN9PUK, WN9VYK, WN9VVL, WN9VVM, WN9VVN, WN9WFT and WN9WFU are new Novices of a Mattoon class conducted by W9EWX, W9VTT and WA9FBI. Radio amateurs in the Villa Park area helped the local city officials in keeping down vandalism on Halloween. The Freeport Amateur Radio Club and the Sterling Township High School Amateur Radio Club were approved for League affiliation by the Executive Committee at its recent meeting in Newington. The 9RN had a traffic count of 587, according to W9QLW. WA9RSP is now on RTTY. K9UIY has moved to Mineral Point, Wisconsin. K8HGT is now W9KOI. WN9UWY is a new Novice in Savanna. WA9QXT passed the Advanced Class exam. W9LDDL, W9FFQ and K9WTS are new Extra Class licensees in Rockford. WA9VJS is the call of the new 2-meter repeater in Joliet. W9KMD was elected as the only YL or XYL in the world to be a member of the "Wireless Spaghetti Network" Club of Italy. WA9TXA received his 25-w.p.m. code certificate. WA9MHU and WA9CCP are BPL certificate recipients. Traffic: (Nov.) WA9MHU 288, W9NXG 267, W9EVJ 221, WA9SEO 200, WA9CCP 187, K9KZB 164, WA9OTD 138, WA9BRQ 134, WA9PPA 123, K9AVQ 113, W9CGC 101, W9DOQ 81, W9PBK 78, K9KOI 77, W9JXV 74, WA9LDC 66, W9EET 64, W9YCH 61, W9HOT 60, W9PRN 60, K9BTE 52, WA9SFB 51, W9LDU 43, WA9SPA 38, WA9QXT 31, WA9POZ 30, K9HRC 22, W9KFQ 14, K9HSK 13, K9WMP 11, WA9VKX 10, K9IDQ 8, K9TXJ 5, WA9UHA 5, W9DBO 4, WA9FIH 4, K9HVS 2. (Oct.) W9EET 142, W9CGC 118, WA9NFS 79, WA9VKX 25, K9WMP 9.

INDIANA—SCM, William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: WA9LTI.

Net	*Freq.*	*Time*	*Nov. Tfc.*	*Mgr.*
IFN	3910	1330Z Daily 2300 M-F	324	K9IVG
ISN	3910	0000Z Daily 2130 M-S	683	K9CRS
QIN	3910	0100Z Daily	279	W9HRY
IND PON	3910	1245Z Sun.		K9EFY
IND PON	50.7	0200Z Mon.-Thurs.	318	WA9NLE

K9YFT mgr. of the White River Valley Net reports Nov. traffic as 17. W9ILU, mgr. of Gr. Lake Emergency Net, reports Oct. traffic as 50. W9PMT, mgr. of the v.h.f. nets, report Nov. traffic as 65. WA9KAG, reports for RFN. The Randolph County ARC is now ARRL affiliated. This column's sympathy is extended to the family and friends of K9MUD, of Hudson Lake, who recently passed away. WN9WIU, ten-year-old son of W9FSU, is a new Novice at Brownsburg. WA9MTY is a new ORS, W9HCQ is OO, WA9LTI is OPS and WA9LTI is SEC. New ECs are W9QUH for Randolph County and K9ULW for Wabash County. Ex-K9KBW, of Kokomo, relicensed as W5QHD, is Extra Class and will soon be active in Asmara, Ethiopa, signing ET3WG. W9QLW has a new SB-301 receiver. New officers of the Evansville ARC are W9WNM, pres.; WA9RMO, vice-pres.; WA9BYZ, secy.; K9ALU, treas.; W9DGA, W9LXA and WA9CDP, directors. QIN honor roll: WA9MTY 28, WA9KOH 27, K9VHY 27, W9BDP 22, WA9KAG 20, WA9VZM 18, W9QLW 16, W9UQP 16, W9WIB 16 and K9WWJ 16. *Amateur radio exists because of the service it renders.* K9IVG made the BPL. Traffic: K9IVG 878, W9HRY 320, K9FZX 297, WA9FDQ 242, W9QLW 239, K9HVY 207, WA9LTI 186, WA9KOH 127, W9JUK 124, K9HZY 122, W9BUQ 118, K9CRS 62, WA9BGI 56, K9STN 56, W9CMT 53, W9DKR 44, W9SNQ 42, K9EFY 41, K9VHY 41, W9UQP 38, K9WGN 33, W9YYX 33, K9YFT 30, W9MTY 28, W9TKZ 27, K9ILK 23, W9FWH 22, WA9GJZ 22, K9RWQ 22, W9DZC 21, W9CUC 20, W9KAG 20. WA9VZM 18, W9JQY 17, W9LG 17, W9PMT 17, W9QLW 16, W9WIB 16, K9WWJ 16, WA9AXF 14, W9CHY 14, K9EOH 14, W9RTH 14, W9BGH 11, W9HWR 11, W9URQ 11, WA9CNW 9, K9UEO 9, K9BDP 8, K9DGA 7, W9DOK 7, WA9DBK 6, K9IIV 5, W9PU 5, K9UHQ 5, K9QVT 3, WA9UUE 1.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: W9NGT. RM: WA9MIO. PAMs: W9NRP, WA9QNI and WA9QKP.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Mgr.*
BWN	3985 kc.	1300Z	Mon.-Sat.	404	192	W9NRP
BEN	3985 kc.	1800Z	Daily	704	120	WA9QKP
WSBN	3985 kc.	2315Z	Daily	1273	237	WA9QNI
WIN	3662 kc.	0115Z	Daily			WA9MIO
SWRN	50.4 Mc.	0300Z	Daily	176	5	W9JZD

Net certificates went to W9KMM for WIN; WA9DXW, K9GEQ, WA9VNM for SWRN; W9CPB, K9LGU, WA9PXL and WA9SSN for WSBN; W9API and WA9SYD for BEN. New appointees: W9IQW as OO and ORS, W9SIZ as ORS, W9ROM as EC for Waukesha County. Renewed appointments: WA9QKP as PAM; K9UTQ and W9VHA as ECs; K9GDF and W9KCR as OOs; WA9-

NVY as ORS; W9YT, W9NUW and K9UTQ as OPSs; W9RQM, W9YT, K9FWF, WA9PBW, W9EWC and K9-DBR as OVSs. 9RN net certificates were earned by WA9NVY and WA9QKP. WA9NDV and WA9RAK are CAN NCSs. WA9AIA is going to Tanzania, East Africa. K9GDF led the OOs with 24 notices sent. K9REC is back from Viet Nam. K9REC has a new tower and beam. K9CPM has a new Galaxy III. W9GOC is conducting code classes for 8 prospective Novices. K9KSA is conducting technical sessions on the BEN. K9ZMI has a new SB-101. Traffic: (Nov.) W9CXY 252, W9DND 244, WA9QKP 237, WA9NVY 176, W9DYG 174, W9ESJ 164, W9IFS 148, WA9QNI 129, WA9RAK 98, WA9SSN 76, W9AOW 65, W9DXV 65, W9ABH 57, K9GSC 57, K9KSA 48, WA9IZK 46, W9CBE 43, W9YT 41, K9FHI 36, WA9-NDV 35, W9NRP 35, W9AYK 34. W9BCH 24, K9CPM 24, W9IQW 24, K9UTQ 21, WA9OAY 19, W9RTP 11, K9FYM 6, W9IRZ 6, WA9EZU 2. (Oct.) K9GDF 82, K9CPM 32, WA9NDV 24, WA9LRW 17, W9BSH 12, W9-RTP 6, K9ZMI 5. (Sept.) W9RTP 11.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr. WØ-TCK—SEC: WAØIEF. RMs: KØORK, WAØEPX. PAMs: WAØMMV, WAØJKT. MSN meets daily on 3685 kc. at 0300Z. MJN meets Tue.-Sun. on 3685 kc. at 0100Z. Noon MSPN meets Mon.-Sat. on 3945 kc. at 1805Z, Sun. and holidays at 1500Z. Evening MSPN meets daily on 3845 kc. at 2315Z. Minn. Wx Net meets daily on 3830 kc. at 2400Z and on 3690 kc. at 0100Z. Novices can check MJN by listening on the net frequency and checking in on their 80-meter Novice frequency. Inform RM WAØEPX of your frequency and the net will listen for you. Congrats to new appointees; WØPAN as OPS and OBS and WAØOVV as Winona Co. EC. Renewed were: WAØIEF as SEC, WAØFFU, WØLUP, WAØBJY and KØZZR as ECs, WØBUO and WAØJKT as OPSs, WAØIDB as OVS, WAØDOT has upgraded to Advanced Class and KØDEF to General. The St. Cloud ARC recently reelected its incumbent officers. A good time was had by 88 amateurs and their families at the annual Piconet Winter Hamfest, held at Rochester. New officers are WØAZR, pres.; KØAKM, 1st vice-pres.; WØMLJ 2nd vice-pres.; and WØFIT, secy.-treas. It is with deep regret that we report the passing of four active and well-known amateurs this month, KØKYK, WØDRK, KØJCJ and WØOJG. WAØ-PKD worked the *Queen Mary* (GB5QM) while it was en route to Long Beach on its final voyage. WAØJKT has worked all Iowa Counties after contacting KØKOP in Des Moines Co. Traffic: KOORK 127, KØZRD 127, WAØ-EPX 80, WAØMMV 54, WØTCK 45, WAØJKT 43, WAØ-PUH 28, WØBUC 27, WØUMX 26, KØUXQ/Ø 25, WØ-KNR 24, WAØHRM 23, KØSRK 22, WAØJPR 21, WAØ-PPY 19, WAØPXT 18, WØATO 17, KØFLT 14, WAØLVK 13, WØSZJ 13, WAØODB 12, WØKLG 11, WAØOEJ 11, WAØDOT 10, WAØEZQ 10, WØBUO 8, WAØDFT 8, KØLWK 5, WAØNQH 5.

NORTH DAKOTA—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. OBS: KØSPH. PAM: WØCAQ. RM: WAØELO. The N.D.Y.L. Weather Net has been going well. WAØGRX and WAØMND are the NCSs and hold the fort on 3996.5 every morning during the week at 7:30 A.M. WAØELO made the BPL. WAØGTU has been moving some out of Minot USO in this connection. WAØ-ELO and WAØNUD check into TEN. WØCAQ held down the RACES RO while KØSPH was in California. WAØ-TBR is a new Conditional at Cathay. WAØAYA and WØNVV had a wedding at their house with WØVBE and WAØGRX, from Moorehead, attending. WØPHH/6 and WØORV/6 have a sked with WØEFJ. WØDM spent Thanksgiving week with their son at Ellsworth AFB. There has been a little swapping going around with WØBHT getting an SBE-34 and KØOVE an NCX-3. WØDM swapped the Drake 2B for an SBE-34 for mobile and portable work. WAØOVW has put together a Heath SB-401. KØHXL has a TR-3. WØMQA fired up the Galaxy into a new antenna. KØOVE put up a two-element Mini-Beam and has a TA-33 Jr. ready to put up. WØE-UQ's many-element antenna is down. WAØIKS and WØEFJ have been doing nice work keeping W9BGX in touch with the condition of a relative in a Minot hospital. KØSPH received the necessary parts for the linear. Those who reported activity in the SS contest were WAØPPK, WØHSC, WAØHYI, WAØELO, WAØOVW, KØRSA and WAØDQX. WAØGRX has been very busy with jury duty. WØBHT had a little tower trouble so is temporarily out of 2-meter activity. WAØPPK is very near YL WAS. WØ-FUP is on 160 meters with modified Command equipment and homebrew moderators.

RACES Net	21 sessions 873 Check-ins	Tfc. 90 KØSPH
PON	8 sessions 149 QNI	Tfc. 15 WAØHUD
YL WX Net	24 sessions 334	Tfc. 13 WAØGRX WAØMND
C.W. Net	13 sessions 58 QNI	Tfc. 50 WAØELO

Traffic: WAØELO 275, WAØHUD 174, KØSPH 37, WØ-KZL 20, WØDM 15, WØEFJ 15, WAØTBR 8, W9QNI/Ø 4, WØDXC 4, WAØMND 4, WAØGZA 2, WAØJPT 1.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WØIPF. S.S.B. Net Manager: KØBSW. Congratulations go to Chas. Landon, Jr., on his appointment as RM. The S.D. C.W. Net meets Mon., Wed. and Fri. at 1900 CST on 3645. Watch for any changes. WAØMRY has moved to a permanent location outside Watertown. Net activity is increasing. The Brookings ARC held its auction Dec. 4. Net reports: NJQ Net, 302 QNI, 39 QTC, 77 informal; Sioux Falls 2-Meter Net, 18 QNI, 2 QTC, in 3 sessions; So. Dak. S.S.B. Net. 1245 QNI, 69 QTC, 144 informals. So. Dak. C.W. Net. 56 QNI, 17 QTC, 13 sessions in 240 minutes. Traffic: WØZWL 383, WAØLLG 87, WAØMYS 60, WØSCT 46, KØTNM 43, KØYGZ 21, WØDJO 16, WAØRIQ 16, WAØQMV 7, WØJGM 6, KØKOY 6, WAØPNB 5, WØRWM 4, WAØ-FUZ 1.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: WA5IIS. PAM: WA5PPD. RM: W5NND, W5HXS has a new TR-3. W5SMS is the new EC for Ouachita, Calhoun and Dallas Counties. Members of the Central Arkansas ARC treated their wives to steaks at the Annual Christmas Dinner. WA5OFT edits a fine bulletin for the North Little Rock ARC. Congratulations to the new Arkansas DX Association on becoming affiliated with ARRL. Net reports (Nov.):

Net	*Freq.*	*Time*	*Sess.*	*Traffic*	*QNIs*	*Mgr.*
OZK	3790	0100Z	30	55	213	W5NND
ARSN	3815	0030Z	30	93	897	WA5PPD
APN	3885	1200Z	26	9	661	K5ABE
APON	3825	2130Z	21	445	339	W5MJO

AREC membership is now over 100. Your help is needed to make it 200. Congratulations to W5OBD on making the BPL for the 10th time in 1967. Is your gear ready for any emergency? Are you ready? Keep those traffic reports coming in. Traffic: (Nov.) W5OBD 701, WA5KEF 341, W5DTR 124, W5NND 106, W5QFU 57, WA5PPD 40, WA5-NCJ 33, WA5HNN 29, K5VBF 28, WA5LYA 18, WA5TLS 18, WA5QPI 17, WA5BQI 14, K5TYW 9, WA5PKO 8, WA5KQU 5. (Oct.) WA5HNN 6. (Sept.) WA5HNN 15.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ. V.H.F. PAMs: WA5DXA, W5UQR.

Net	*Freq.*	*Days*	*Time GMT*	*Net Mgr.*
LAN	3615	Daily	0030/0300	W5MBC
Delta 75	3905	Sun.	1330	WA5EVU
LAPON	3870	Sun.	1300	W5KC

Under the leadership of W5NQR, the Lafayette Radio Club held its bang-up Annual Banquet. W5BUK was honored for winning the 1967 La. QSO Party and W5CEZ for his untiring efforts in promoting and maintaining such high ideals in LAN. The presence of W5LDH and W4-WHN, our Director and Vice-Director, added additional interest. WA5EVU, NCS Delta 75, reports an average of 20 check-ins each Sun. Under the guidance of W5RU and W5NO, the NOLA Chapter of the OOTC held its annual banquet. GNOARC station W5UK reports 2 meters opened from NOLA to Miss. and Texas recently for over seven hours. TV experiments on 432 also are in progress at this fine station. Some of the gang from Natchitoches and Winnsboro visited with the CLARC group recently. K5AGI is trustee of the OARC station in Slidell, which now sponsors a Novice class. New licensee WN5TRI is the son of W5QPS. K5ARH was La. winner of the Md.-D.C. Party. School takes up most of WA5NYY's operating time. WA5KLF reports the Twin City gang has set up a station in the local Nat. Guard Bldg. WA5DXA has a new Drake receiver. WA5RSA and WA5RSB are now Generals! WA5EID is studying for that Extra. WA5LGO had a real "blast" in the recent SS Contest. W5JYA has installed 80-meter s.s.b. gear in his car and is active in the GCSN. K5WOD/5 reports that the Springhill group has had good representation in local and Statewide RACES nets. W5QIX is now chasing DX. WA5OJG proudly shouts that there are now seven hams in Bastrop! K5RSH and his XYL announce a new addition to the family. Many of you have asked how to contact me. I'm on 3900 kc. daily except week ends at 1230 GMT. Traffic: (Nov.) W5CEZ 296, W5KRX 246, W5MXQ 131, K5ANS 93, W5KRX 77, W5MBC 58, WA5DXA 15, W5PM 14, W5EA 12, WA5QVN 12, WA5LGO 9, WA5NYY 9, WA5-EID 5, WA5OJG 4, WA5KLF 3, K5OKR 2, W5JYA 1. (Oct.) W5MBC 89.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. Congratulations to K4RIN/5 on leading the

section in the Md.-D.C. QSO Party. Seven tornadoes struck the Miss. Gulf Coast and K5TYP jumped into action from Keesler Field with operators WA0OJZ, KØZBO, KØGYK, WA9PTG, WA9KMS, WA8WLT, WA8RWM, K7RSD, WB6SHC, WA5CSJ, WA5RWM, W5IUP, WA4UPE, WA4SWC, WA4QBV, WA3BCM, WA3EQJ, K3SFC, K3RFC, K2DEM, K2IJL, WA2LLG, WN2ZMC and K1ETP. Also participating very actively were WA5KEY, WA5PTE, W5EBF and K5SYG. We welcome these new Novices: WN5TIV, WN5TIE and WN5TGE. Glad to have WA5TPM and WA5TPN back in Mississinpi from Kansas. WA5KEY has done a good job as net manager for the Miss. Sideband Net, as has WA5-OHQ as assistant manager and WA5OKI as secy.-treas. WA5PPS took a bunch of Boy Scouts to Camp Shelby and telephone relayed through K5SYG to their families on the Coast. WA5DGO assisted in the project. K5IIN made an excellent showing in the ARRL Sweepstakes with 681 contacts, 75 sections, with a score of 102,075. Traffic: K5TYP 289, WA5OKI 265, W5BW 30, WA2WBA/WA5SKI 19, WA5JWD 17, WA5RXV 10.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—Asst. SCM: Lloyd Shelton, WA4YDT. PAMs: W4PFP, WA4CGK, WA4EWW.

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*	*Mgr.*
TSSB	3980	Tue-Sun.	0030	26	1611	175	WA4CGK
TPN	3980	Mon.-Sat.	1245	31	1328	146	W4PFP
		Sun.	1400				
ETPN	3980	M-F	1140	22	454	54	WA4EWW
TN	3635	Daily	0100	31			K4UWH
TCN	3980	Thurs.	0200	(Wed. night CST)			W4OGG

Appointments: WA4URA as EC, K4MQI as OPS, WA4-YEM as ORS. WB4EKI has put shoes on his s.b. line with an SB-200. W4OGG was named "Amateur of the Year" for the Delta ARC of Whitehaven. We regret to report that WA4AIS, one of our faithful net members, has joined the Silent Keys. W4EHK reports 2-meter activity is increasing in Washington County. Why not take advantage of the NTS and the section nets by originating some traffic? The Tenn. Council of Clubs has gained the interest and participation of nine clubs across the state. Keep the ball rolling, fellows. Belated congratulations to W4FX on his 75th birthday. Traffic: W4OGG 227, W4FX 218, W4DIY 142, W4RUW 139, W4SQE 138, WA4YEM 125, W4WBK 73, WA4YDT 36, WA4GLS 35, WA4TWL 35, K4MQI 23, WA4CGK 22, W4PQP 20, WA4-URA 20, WB4FCE 19, W4PFP 18, WA4ZBC 16, K4UMW 14, WB4EKI 12, WA4EWW 12, WA4NEC 12, K4PUZ 10, W4TZJ 10, W4PRY 7, WA4AJB 5, K4BTY 2, WB4EHK 2, K4FKO 2, W4SGI 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO —SEC: W4OYI. Endorsements: W4ADH as OVS, W4BAZ as RM and K4TXJ as OO.

Net	*Freq.*	*Days*	*GMT*	*QNI*	*QTC*	*Mgr.*
KRN	3960	M-F	1130	411	40	K4KIS
MKPN	3960	Daily	1330	139	36	K4TRT
KTN	3960	Daily	0000	887	430	WA4AGH
KYN	3600	Daily	0000/0300	486	448	W4BAZ
FCATN	50.7	M-T-F	0200	86	79	K4KZH

W4CDA reports that the Wilderness Road Club holds classes to upgrade licenses. K4LOA wants 6-meter skeds with Central Kentucky stations. WB4AFH now is Air Force MARS. WN4FGE operated a Novice radio booth at the Boy Scout Show with a big traffic origination total. The AREC organization, under W4OYI, with the help of the nets, conducted a rescue drill with the Kentucky Cave Rescue Organization. W4YOK has a new 2-meter f.m. antenna. K4DWO is building an s.s.b. transceiver kit. New OARC officers are W4MMY, WA4JQE, WB4FAY and W4EPD. W4WNH now is Extra Class. WA4UGQ is building a CN50 for 6 meters. WA4SMS, ex-W2LEO and W3-WSE, is back in the traffic net on KYN. Traffic: WA4-WWT 343, WA4DYL 334, K4DZM 310, WA4AGH 191, W4BAZ 191, WA4KFO 144, W4OYI 117, W4NBZ 115, WB4-AFH 86, WN4FGE 83, WB4BKG 72, WB4AIN 71, WA4-GHQ 65, W4LUB 56, K4MAN 56, W4YOQ 55, WA4WSW 46, WA4UIH 41, WB4AGO 38, WA4UAZ 29, W4CDA 26, W4KKG 25, WB4EOR 22, W4MWX 22, WB4FOT 18, WA4GMA 18, WB4RTM 17, K4FPW 17, W4BTA 16, K4-TRT 16, WA4VEC 15, K4VDO 13, W4YOK 13, WA4BZS 12, K4LOA 10, WA4UHR 10, WA4UGQ 9, K4HOE 7, W4KJP 7, WA4WQZ 7, W4JUI 6, W4ADO 5, K4UMN 2.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8FWQ, W8RTN, WA8OGR, K8-KMQ. PAMs: W8IWF, K8JED. V.H.F. PAMs: W8CYQ, W8YAN. Appointments: WA8DNZ, W8FWQ, W8MGQ, K8QLL as ORSs; K8EFY, W8FSZ, W8OQH, as OPSs; W8FZ, K8PBA as OVSs; W8DCT as EC. Silent Keys: W8EJR, K8PKU, W8ZRZ. BPLers: W8IV, WA8IAQ.

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*Sess.*	*Mgr.*
QMN	3663	2300	Dy	974	590	60	W8FWQ
WSSB	3935	0000	Dy	1104	177	30	K8AYJ
PON-Day	3935	1600	M-Sat.	416	502	26	WA8OGR
PON-CW	3645	2400	M-Sat.	189	67	26	VE3DPO
B/R	3930	2230	M-F	860	109	22	K8JED
UPEN	3920	2230	Dy	333	29	30	K8ZSM
M6MTN	50.7	2400	M-Sat.	310	34	26	WA8LRC
Noon 50	50.4	1700	M-Sat.	165	2	23	WA8FXR
MEN	3930	1400	Sun.	246	7	4	K8JED
Lenawee 2	145.38	0200	Dy	215	48	25	WA8UWQ

If your net is not listed either it wasn't reported, had no traffic or was too late to make the 5th deadline. New officers: CMARC—K8BZV, K8HKM, K8ETU, K8NQP, W8BCI, K8UDJ, board of directors. Genesee County RC—WA8LNL, pres.; W8MYA, vice-pres.; WA8POB, vice-pres.; W8NJM, vice-pres.; K8WKE, vice-pres.; K8PBQ, secy.; K8KMQ, treas. U. of M. ARC—K8QKY, pres.; WB2FIT, secy.-treas. Hills ARS—W8EZX, pres.; K8-SGJ, vice-pres.; W8QGJ, secy.; WA8PWQ, treas. Grand Rapids ARA—WA8DNX, pres.; WA8IGY, vice-pres.; K8LOY, secy.; WA8KEP, treas. W8NOH is doing better in the Butterworth Hospital, Grand Rapids. Write him. WA8CTC still is in the Navy. W8DQL has a "new" HT-37 and inverted "V" for 80/40. WA8MCQ made his own v.f.o. W8FX blew the transformer in his 310B. W8HKT made up a loose coupler—shades of Marconi! W8AAM went deer hunting. W8SWN (ex-9M2JJ) and K8KJP passed the Advanced Class exam, and WA8MCQ passed the Extra. See you at the Lansing Convention, Apr. 26 and 27. Traffic: (Nov.) K8KMQ 343, WA8OGR 337, WØGXQ/8 296, W8JTQ 259, W8IV 238, WA8IAQ 221, WA8ORC 184, K8MIXC 160, W8UM 148, WA8KME 137, W8IUC 134, W8IWF 134, K8ZJU 122, WA8MCQ 114, WA8SQC 108, W8RTN 97, W8CBQ 89, K8GOU 80, W8-QQK 80, W8FX 78, WA8MAM 75, WA8PII 66, K8ETU 60, WN8WZF 50, W8TDA 47, K8JED 38, W8FWQ 33, W8MRM 31, W8YAN 28, K3KRX/8 27, W8HKT 24, W8UFS 24, WA8GTM 21, WN8WQS 21, WA8MGM 18, WA8TSB 17, W8IBB 14, WA8LXY 13, W8ZHB 12, W8AUD 11, W8MWG 10, WA8JDF 8, K8VDA 8, W8DSE 6, WA8PZT 6, W8TBP 6, W8UJY 4, W8EU 3, W8AAM 2, WN8WNG 2. (Oct.) WA8VOG 34, K8GOU 32, WN8-WQS 20, W8IUJ 18, WA8DSB 13, W8DQL 6.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OUU. RM: WA8CFJ. PAMs: W8VZ and K8UBK.

Net	*Freq.*	*Time*	*Mgr.*
BN	3580 kc.	0000/0300Z	WA8CFJ
OSN	3580 kc.	2325Z	W8PMN
OSSBN	3972.5	2345Z	K8UBK

Net	*QNI*	*QTC*	*Sess.*	*Pct.*
BN	648	474	60	
OSN	194	74	29	
OSSBN	1826	1101	56	19.5

We regretfully announce that Great Lakes Director, W8UPB joined the Silent Keys Dec. 10 as the result of a heart attack. K8VCW received a CP-25 certificate. W8AQ notified us that W8DXB has joined the Silent Keys. Mt. Vernon ARC's *K8EEN Newsletter* tells us the club held its election. W8CPU receives his Advanced Class license and WA8TPJ visited in Venezuela. WA8-AGV reports that WA8BBH is on 6 meters with an SR-46, WA8GLF is working 75-meter mobile with an HW-12A and a Hustler antenna. WA8UKJ has a new 66er and a 22er, W8DWE has a new tower and TX-62, W8CQL has left WBBW and joined the staff of WKBN, WA8FHP has a new Swan 250, W8AGX and WA8BBG have new QTHs and K8LDD is back on the air with new S/Line and a TH6-DX beam. W8CQU was on active duty for training as Radio Officer. Army MARS offers extension courses to members from the U.S. Army Signal School in communications-electronics. W8QXQ received his Extra Class license. The Massillon ARC held an auction. According to the Inter-City RC's *IRC News Buletin* W8JEY has a new three-element beam. K8HDO moved to Zanesville. The Seneca RC held its annual potluck dinner. W8BZX reports that the Miami County ARC's 1968 officers are W8BZX, pres.; WA8MVV, vice-pres.; WA8SYL, secy.-treas. WA8COA reports the QCEN furnished communications during the airliner accident and the pickup of Muscular Dystrophy donations. Toledo's *Ham Shack Gossip* says WA8SIO joined the Silent Keys. WA8WAL received his General Class license, WA8YVM received his General Class license, WN8YQA, WN8YSA, WN8YXE, WN8YXM, WN8YYC, WN8ZBZ and WN8ZCZ received their Novice licenses, W8QYY is working DX on s.s.b., W8PSK is now a licensed private

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Zero-Signal Plate Current	250	225	mA
Max Signal DC Plate Current	455	370	mA
PEP or CW Plate Output Power	400	500	W
Third Order Intermodulation Distortion	—36	38	dB
Fifth Order Intermodulation Distortion	—54	—46	dB
Filament Voltage	2.5	2.5	V
Filament Current	10.0	10.0	A
Warm-up Time (to half power)	250	—	ms

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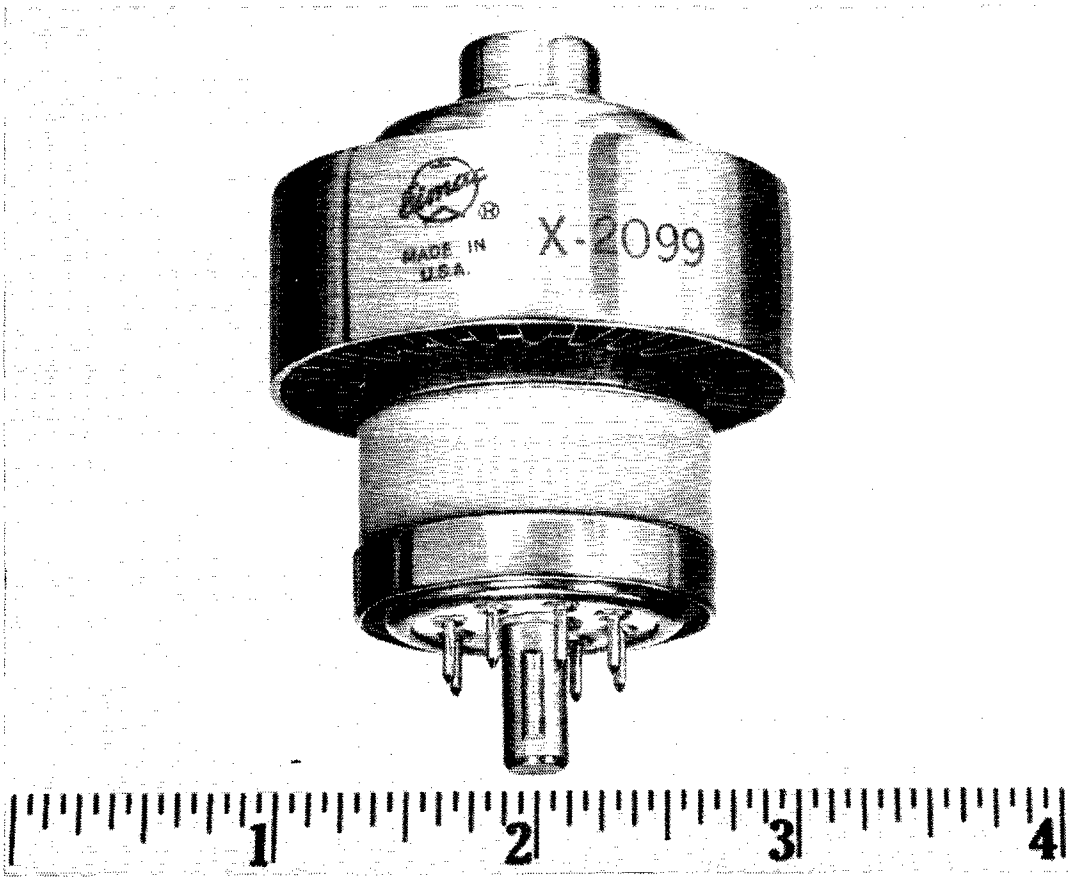

A good man is hard to find...

by Jack Quinn, W6MJG

The subject came up the other day. We started talking over coffee "for a few minutes" and ended up talking well over an hour. Bob Sutherland, W6UOV (he heads up our Power Grid Circuits Techniques group), said he had a problem. He had to write a recruiting ad, but didn't know exactly how. He said all those ads sound alike and we just aren't like other companies so why should our ads sound like other companies' ads?

I asked him what kind of guy he was looking for. He said he needed an engineer to help out on a special power grid tube project. "But not just any engineer," he said, "someone great. Someone who could take this project, and others coming up, and could really make them his. The kind of engineer who can build breadboard equipment to evaluate tubes. Someone who can get the job done working with engineering, quality control, vendors, and customers." Bob was getting warmed up as he described the man he's looking for. "I'm interested in the rare kind of guy who can work alone as well as with others. He's got to be outspoken...and he's got to be right most of the time."

But then he paused. "How do you say all that in an ad?" I looked at Bob's notes. He was looking for someone with RF circuit design and high power experience. Who could work with power levels up to a megawatt at frequencies to 220 megahertz in special vacuum tubes. And in a group that will be working on the interface between solid state and vacuum tubes.

Now, get this picture. This whole conversation lasts 20-25 minutes. And Ed Gilbert, who's sitting at the table with us, doesn't say boo. Not a word. He just sips his coffee. And then out of nowhere, he says he has the solution. We both turn to him. He says, "I've got the same kind of problem. I'm looking for a guy in my Applications Engineering group. I'm looking for someone sharp—really sharp—who has to work with customers all day. Who can dig into a customer's mind and pull information from him. Somebody who knows what questions to ask and how to ask them. It's a great job because he'll work with engineering, sales, promotion—the works. It's the perfect job to use as a springboard into marketing." Ed says he needs a man with experience in power grid tubes: High power pulse modulators, industrial tubes, VHF or UHF amplifiers, high power transmitters—you name it. "What really counts," he says, "is a desire to solve problems and see a customer's design work because of the advice our man gives him."

"Okay," I say, "now do you mind telling us what your solution is to the problem of writing the ad?"

Ed sits there smiling like a skinny Buddha and says, "We've just written it."

And you've just read it. If you're the kind of engineer we're talking about, get in touch with me.

Jack Quinn
Division Marketing Manager

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pilot, ex-K8JTA is now W7BET, W8DN visited in Florida, the Toledo RC held its annual area ham night and dinner. K8RXD is in the Navy stationed in Guam. Lancaster & Fairfield ARC's *The Rag Chewer* informs us the club's 1968 officers are WA8IBT, pres.; WA8WFL, vice-pres.; WA8VCV, secy.; WA8SSJ, treas.; W8DCX, act. mgr. Greater Cincinnati ARA's 1968 officers are K4KLB, pres.; WA8STX and W8PLB vice-pres.; K8-ZTS, rec. secy.; W8LNL, corr. secy.; W8NCV, treas. In South East ARC's *Ham Fax* we note that K8ZBL gave a talk on Muscular Distrophy. We learn from Springfield ARC's *Q-Five* that W8EQN/W4GU is spending the winter in Florida. Inter-City RC's *IRC News Bulletin* tells us that W8NBP gave a talk on transistors. West Park Radiops ARC's *The Radiops Log* informs us that WA8YWX received his General Class license. Warren ARA's *Q-Match* says W8HEF joined the Silent Keys. I wish all of you a Happy 1968. Traffic: (Nov.) W8NAL 267, WA8PQL 265, WA8FSX 242, WA8ZGC 232, WA8AUZ 228, WA8UPI 226, W8IMI 223, WA8CFJ 216, WA8TYF 192, W8QZK 186, K8ONA 141, W8GVX 138, WA8NTA 138, WA8VNU 138, W8GOE 120, WA8SED 119, W8SZU 118, W8CHT 110, W8DAE 102, WA8LVT 102, K8UBK 97, W8TV 90, W8UDG 90, WA8LAM 87, WA8PMN 85, WA8-SHP 84, WA8WEC 78, K8BYR 73, W8OUU 73, W8QXQ 72, WA8PKN 68, W8RYP 67, W8ERD 63, W8OE 62, WA8-OCG 56, K8RXD 38, W8QCU 37, W8TNF 37, W8LAG 35, W8WEG 35, K8VZI 34, WA8MHO 32, W8HII 30, W8WDU 27, WA8DWL 26, K8VCW 25, WA8QFK 20, WA8KPN 16, K8DDG 12, K8LXA 11, W8VVL 10, WA8GRR 8, K8DHJ 6, K8WVZ 6, W8VND 5, W8EEQ 3. (Oct.) K8DHJ 5.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointment: WB2VVS as ORS. Endorsements: W2UC and K2HNW as OPSs, W2UC and WB2UHZ as ORSs. Sweepstakes messages were received from W1BGD/K2UTV, W2TER, K2RDM, WA2WGS, WB2SUA, WB2UHZ, WB2UUD, WB2YBQ and WB2YBX. November was "homebrew night" at the Albany Club, with members describing their equipment. In New Rochelle, a Heath representative discussed their new line of gear with the club. New officers at New Rochelle include WB2NVJ, pres.; WA2TEQ, vice-pres.; WB2MOG, secy.; WB2VQB, treas.; WA2ZPD, sgt. at arms; W2YLE, WB2GMN, WB2FXB and K2SJN, directors. W1LVQ was chief speaker at the club's annual dinner, Nov. 25. Also representing ARRL was Hudson Division Director, W2TUK, speaker at the Schenectady Club. The Eastern Area Traffic Net, on 3930 kc. nightly at 0030 GMT, would welcome ENY stations who might drop in. WB2UEQ/1 passed the Advanced Class exam. Congrats. WA2VYS, mgr. of ESS, reports a traffic total of 270 for Nov. New Rochelle boasts of four ARRL life members for a possible club record. Congrats. A pair of 832As on 2 meters really put out a big signal, according to OVS WA2BRF. Middletown RACES reports four new members and a repeater for its county net. WB2YQU is a new General Class licensee. WB2UHZ reports a new SB-200, 300 and 400. Traffic: (Nov.) W2THE 210, WB2UHZ 156, WA2VYS 154, W2EAF 130, WA2VYT 80, WB2VVS 67, W2ANV 57, W2UC 49, K2SJN 47, WA2JWL 34, WA2WGS 27, W2URP 17, WA2HGB 10, K2HNW 7, WB2UEQ/1 6. (Oct.) WA2VYS 130, WA2VYT 102, W2UC 42, WB2UUD 10.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW. Traffic nets:

NLI*	3630 kc.	1915 Nightly	WA2UWA — RM
NLI VHF*	145.8 Mc.	1900 Nightly	WB2RQF — PAM
NLI Phone*	3932 kc.	1600 Daily	WB2SLH — PAM
NLS Slow*	3715 kc.	1845 Nightly	WB2UQP — RM
Clear Hse	3925 kc.	1100 MTWTF	WA2GPT — Mgr.
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG — Mgr.
All Svc	3925 kc.	1300 Sun.	K2AAS — Mgr.
NYSPTEN	3925 kc.	1800 Daily	WB2QAP — Mgr.

*Section Nets. All times shown above are local. WA2GPT, WB2BDJ and WB2DZZ all made the BPL. WN2BSQ, a recent grad of St. Johns, is a new Novice over Brooklyn way. WB2DZZ made WAS during the SS when he worked a KHG and a KL7. Ole WB2UQP goes to Columbia come next fall. W2GKZ still is busy pushing traffic through the TCC. WB2QIL's traffic total has gone up since he started handling messages for C.W. Post College. Now he's looking for folks interested in starting a radio club over there. Work picked up for WA2FTS so he had to relinquish some of his NCS skeds. Listen, all of our section nets continually need new stations in order to boost their traffic volume as well as increase their outlets. Section nets are designed to cover specific areas and our area is the New York City and Long Island land piece. So, c'mon, jump in and give us a hand. We are looking for you guys who can bridge the 80/2-meter gap in particular. WB2ZEL has designs on a new Cheyenne HX-20. Although WB2WFJ is busy operating Northeastern's W1KBN in the Beantown Net, he still yearns to trade the Apache and NC-303 for an SB-101 for the home station back here. Thanks to the Rockaway ARC, who loaned him a rig. WA2UWJ was introduced to 2 meters and he likes it! WB2DVK has been busy fiddling with a homebrew twelve-element Yagi for 432 TV as well as a 220-Mc. transverter. W2EW spent several weeks in November up at his sister's place in Armonk, N.Y., eating up some fresh air. WB2CHM takes over NCS of NLIVHF when his dad, WB2RQF, gets hung up in the NYC motor-type traffic. WB2YKL allows that WAS is now only 6 states away with the new TR-4 and its pal, the RV-4. W2PF has received his Life Membership in IEEE as a senior member after being a member for over 45 years starting with the old IRE. Hey, W2IAG needs more stations for his Queens County 10-Meter AREC A.M. and S.S.B. Nets! WB2BKS had delivery of his beam from England delayed because of a strike over there. W2UAL figures the high point of Nov. was the good old Sweepstakes. New officers of the Bronx Amateur Radio Telephone Organization are W2LWP, pres.; W2-EST, treas.; W2QPW, secy.; K2KFP, act. mgr. The new Novice class of BARTO already has produced WN2DMI, WN2DMN, WN2DMP and WN2DNT. The BNLARC participated in Visitor's Day at Brookhaven National Laboratory where over 10,000 toured and they passed over 300 messages. Happy St. Valentine's Day everybody. Traffic: WB2BDJ 315, WA2GPT 243, WB2DZZ 215.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2CVW. SEC: K2ZFI.

ARPSC Section Net Schedules

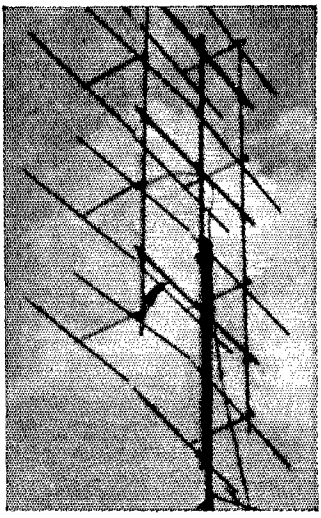
NJN	3695 kc.	Daily	7:00 P.M.	W2BVE-RM
NJ Phone	3930 kc.	Ex. Sun.	6:00 P.M.	W2PEV-PAM
NJ Phone	3930 kc.	Sun.	9:00 A.M.	W2ZI-PAM
NJ PON	3930 kc.	Sun.	6:00 P.M.	WA2TEK-PAM
NNJ AREC	50,300 kc.	M thru F	8:00 P.M.	WA2KZF-PAM
ECTN	146,700 kc.	Daily	9:00 P.M.	WB2IYO-PAM
PVETN	145,710 kc.	Daily	7:30 P.M.	K2KDQ-Mgr.

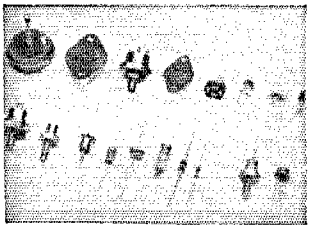
All times shown local in effect. New appointments: WB2YOI as EC for Hackettstown and vicinity, WB2ZSH as ORS, WB2KPD as OVS and WA2WGR as OVS. Endorsements: WA2ASM as EC for Plainfield and vicinity, WB2IYO as EC for Hazlet and vicinity. WN2YDU passed the General Class exam and his new call is WA2GRF. WN2YVN passed his and he is now WB2DON. WB2BXU installed a pre-amplifier for his HB f.m. mobile rig. WA2IGQ has a new antenna system, thanks to his son, WA2IGR. K2KDQ is on 6- and 2-meter RTTY. WA2-BNF has over 200 awards, all on the v.h.f. bands. WB2-OQM is studying electrical engineering at NCE. WB2-BXK has a new four-element 6-meter beam at 40 feet and an eight-element 2-meter job at 47 feet. WB2QXA has a new 6-over-6 J-Slot for 2 meters. W2GJH is chasing DX on 15. WA2ASM took first place for N.J. in the Md.-D.C. QSO Party. Former NJN editor WB2WWH is now WB4HKP. WB2TFH was transferred from USCGC *Campbell* to the C.G. radio station in Cape May. WA2CCF received his WBC and USA-CA Awards. K2-JSB is moving to N.H. W2QMT is now near Cooperstown, N.Y. W2NVA is building a 2-meter v.f.o. for his 22er. W2JDH is looking for Nevada and N. Dak. The Bonyagle group offers a certificate to all who work the 6 members. W2NVA has the details. W2KOG and WA2BMR report outstanding results with their polished 10-meter beam. W2COT retired his 30-year old copper tube three-element 10-meter beam for a three-element Tri-Bander. N.J. Army MARS has received a good number of Model 15s and welcome active interested amateurs into the system. Many thanks to all the SS Contest boys for the traffic. Good luck in the DX Test; see you in the pileups. Traffic: (Nov.) WA2IGQ 606, WB2RKK 552, K2KDQ 215, WB2UFV 187, WB2SEZ 161, WA2TBS 160, WB2VLC 140, WB2DDQ 117, W2LQP 89, WB2IYO 83, WB2NZU 74, WA2ACJ 70, W2PEV 60, WA2TEK 51, K2DEL 50, W2-BVE 47, W2BSC 44, WB2ZSH 31, WB2PXO 30, WA2ASM 29, WA2TNA 29, WA2KZF 27, WB2BXK 24, W2CVW 23, WA2CCF 21, WB2CGI 19, WA2NJB 19, W2EWZ 18, WA2TAF 16, WB2WUL 12, W2TFM 9, WA2CRF 8, K2-EQP 5, K2ZFI 5, WA2BNF 3, K2MFX 3, WB2IWB 1, K2KFP 1, W2LWP 1, WB2RJJ 1. (Oct.) WB2ZCI 14.

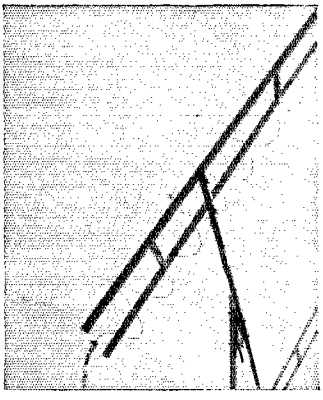
MIDWEST DIVISION

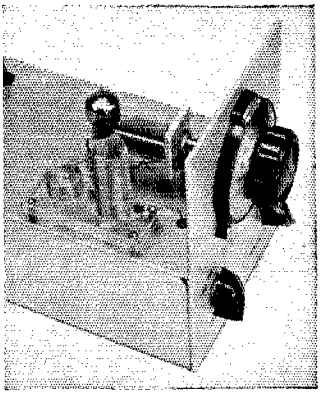
IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. PAM: WØNGS. RMs: WØTIU, WØSCA. Silent Keys: KØURE, Aug. 26; KØLEW, Dec. 1. Sweepstakes reports were received from WØEMA, WAØKXJ, SDC, PUJ, OTE, OYS,

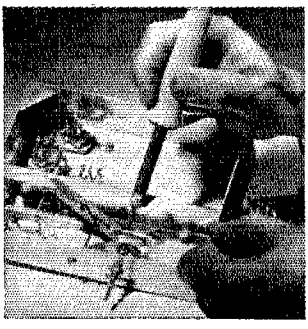
The Radio Amateur's Handbook

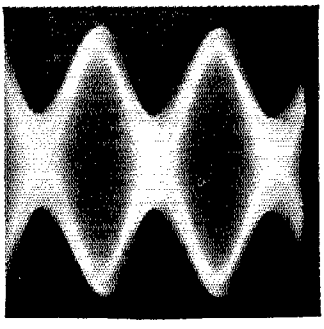












1968

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

LEW. KØYYU and AZJ. KØGAZ is in Quito visiting HC7RT (KØZMU), who is an engineer at HCJB. Roger is formerly from George, Ia. KØGEY has a new 2-meter beam on a 106-ft. tower and is looking for DX. WØDSP informs me they have a new ARC at the Washington H.S. (Cedar Rapids). The call is WAØSDT. Equipment includes a Swan 500, plus some Novice gear. WØEIT has a 2-meter linear under construction. The C.R. Club helped the Halloween patrol with 13 mobiles. First-place winner in the annual Md.-D.C. QSO Party for Iowa was WAØKST. WØPFP has completed a converter for 423 Mc., also converted two APX6s. He also has a new 7-lb. YL, as of Nov. 6. KØAGJ (Davenport) transmits code practice Tue., Thur. and Sat. at 0101 GMT on 21.1 Mc. at 13, 15 and 20 w.p.m.

Ia. 75-Meter Phone Net	26 sessions	1225	QNI	102	QTC
Ia. 160-Meter net	30 sessions	710	QNI	8	QTC
Tall Corn Net	24 sessions	167	QNI	34	QTC

Traffic: (Nov.) WØLCX 911, WØLGG 659, WOCZ 58, WAØMIT 40, WAØSDC 32, WAØDYV 29, WØVAU 24, WØNGS 13, KØTDO 13, WAØOTE 11, KØBRE 8, WAØDAG 4, KØKQD 4. (Oct.) KØEVE 21, WAØIYH 11.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RM: WAØMLE. V.H.F. PAMs: WAØCCW, WØHAJ, WAØLSH. The State Line Amateur Radio Club, Harper, is now an ARRL affiliated club. WAØSVO received his General Class license. WAØ-CCW is teaching electronics four night a week. The Zone 7 75-Meter, Zone 9 10-Meter, Zone 11 75-Meter, Zone 13 75-Meter, Zone 14 75-Meter and Zone 15 75-Meter Nets report total QNI 326 with 17 QTC in 27 sessions. Zone 11 tops with 109 QNI and 10 QTC in 4 sessions. WØDKU has a 100% ham family with Gay, WAØ-LAS, and Peggy WAØHYK; likewise WAØHAS with Anita, WAØHSK, and Mike. WAØIGY, WAØLSH would like to know if anyone else is interested in 1215 Mc. AREC v.h.f. nets and club nets on the v.h.f. frequencies total 40 sessions, 199 QNI and 35 QTC. Nets reporting are ACARA, Coffeyville ARC, Newton 2-Meter, North Central Kans. Zones 7, 9 and 11 2-Meter and Zone 15 6-Meter Nets. KØGIC has finally gotten up an antenna. New gear: WAØPZO, Swan 350; WØLNZ, S/Line; WØ-RCS, 40-ft. tower and Mosley beam; WØYZB, CL 33 beam; WØVDF, 6-meter beam or vertical; WAØOZP, NCX 3. KØBXF finally is on s.s.b. with a WRL Duo Bander 84. KNRC announces Aug. 3-4 as the date for its hamfest in Concordia and the CKRC at Salina has set June 8 for its hamfest. KØJDC is now stationed at Altus, Okla. The Boothill ARC elected WAØKHN, pres.; KØJDD, vice-pres.; WAØJFV, secy.; WAØOID, treas. The CKRC of Salina elected KØAWR, pres.; KØKWV, vice-pres.; WAØPSF, secy.-treas.; WØLXA, act. mgr.; WAØJFC, hamfest chairman. Traffic: (Nov.) WØINH 297, WAØMLE 190, KØLPE 172, WØLXA 147, KØHGI 104, WAØLLC 103, KØJMF 86, WAØKDQ 75, KØMRI 74, WØCGZ 62, KØEMB 60, WØPSN 60, WAØCCW 46, WAØJOG 43, KØBXF 42, KØUVH 41, KØVLZ 38, WA-ØJQV 30, KØGII 23, KØGZP 23, KØNL 18, WØAVX 12, KØFIG 11, WAØKDJ 9, WAØLLR 7, WAØNDZ 7, WA-ØLSH 5, WØVZG 5, WØEFZ 2, WAØOUI 2. (Oct.) WA-ØEMQ 8, WAØLSH 3.

MISSOURI—SCM, Alfred E. Schwancke, WØTPK—SEC: WØBUL. WØKIK renewed as ORS. WAØPUL and WNØSAO are teaching code classes at Ruskin High School, K.C. WAØOZO got a new Swan 350, and one week later lost all antennas in an ice storm. KØORB visited G-, GM-, and EI-Land, and enjoyed the hospitality of the RSGB. WAØFMD is rebuilding antennas to obtain a better match to his new T4X rig. WAØKUH reports receiving R.O. certificates for Clay Co. C.D. WAØ-ITU reports that attempts to call 2- and 6-meter nets through repeaters in the K.C. area were disrupted on Dec. 4 by skip signals from Chicago and St. Louis 2-meter repeaters. SS messages were received from WØ-BLJ/Ø, KØDEO, WAØELM, WAØEMS, KØFPC, WA-ØJBY, KØJPJ, WØPEM, WAØPUL, WØQEV, WØQWS, KØREV, WØSOZ, KØVVH and WØZLN. WNØRNS sprained his ankle while working on an antenna tower. KØERE is on c.w. with a new Viking transmitter. Missouri's sesquicentennial will occur in 1971. Anyone who can help in setting up an amateur radio committee similar to the one active during Nebraska's centennial observance, please contact WØSJE in Lees Summit. Net reports for Nov.:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2330Z	M-W-F	13	200	17	WØBUL
MON	3585	0100Z	Daily	26	208	151	WØTDR
MNN	7063	1900Z	M-Sat.	26	85	46	WØOUD
MoSSB	3963	2400Z	M-Sat.	26	681	162	WØRTO
MTTN	3940	2300Z	M-F	19	228	118	WAØELM
MoPON	3810	2100Z	M-F	22	182	124	WØHVJ
QMO	7075	2200Z	Sun.	4	13	7	WAØFKD
PHD	50.4	0130Z	Tue. (GMT)	4	100	9	WAØKUH

Traffic: KØONK 1778, KØYBD 457, KØAEM 305, WØ-ZLN 148, WØOUD 104, WØHVJ 96, KØRPH 78, WAØ-ABO 55, WAØFMD 55, WØRTO 48, WAØEMX 42, WA-ØJIH 42, KØREV 37, KØVVH 32, KØJPS 31, WAØPFU 30, WØBUL 29, WAØKUH 24, WAØDGG/Ø 21, KØGOB 18, WAØRMW 16, WAØELM 12, WAØPZI 12, WAØOZO 10, KØWYP 9, WAØFKD 8, WØGBJ 8, WØAMO 7, WA-ØPUL 7, WAØIHV 5, KØORB 4, WAØSSV 3, WØBVL 2, KØJPJ 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØOAL. Net reports for Nov.: Dead End Net, WAØ-MCX, QNI 280, QTC 7. Nebr. Storm Net, WAØKGD, 1st session QNI 879, QTC 103; 2nd session, QNI 1159, QTC 65. 160-Meter Net, WAØCBJ, QNI 425. Nebr. AREC Phone Net, WØIRZ, QNI 176, QTC 1. West Nebr. Phone Net, WØNIK, QNI 682, QTC 26. Nebr. Morning Phone Net, WAØJUF, QNI 1083, QTC 43. Nebr. C.W. Net, NEB, WAØGHZ, 1st session, QNI 60, QTC 92; 2nd session QNI 120, QTC 84. Nebr. AREC C.W. Net, WAØ-EEI, QNI 12. Nebr. Emer. Phone Net, WAØGHZ, QNI 1440, QTC 83. WAØGHZ has resigned as RM of the Nebr. C.W. Net. KØAKK succeeds Velma as RM. KØ-ODF boasts 100% AREC in Dawes County. Can anyone top this? New Novices are WNØTFP and WNØTFF. The U. of N. club station has the call WAØTAU. I wish to thank everyone in the state, SEC, RM, PAMs, OBS, ECs and all, for their outstanding cooperation and understanding during this past year. Traffic: WAØDOU 500, WAØGHZ 227, WØLOD 184, KØAKK 162, WAØ-OCW 83, KØJTW 72, WAØOHO 59, KØJFN 50, WAØ-QMZ 48, WAØIBL 35, WAØIBB 32, WAØGVJ 28, WØ-GGP 26, KØKJP 24, KØIXY 22, WAØKHE 21, WØAKG 20, WØCRK 17, WAØDXY 15, WØHTA 15, KØTUH 13, WØPHA 12, KØFRU 10, WØWKP 10, WAØBOK 8, WØ-HOP 8, WAØAES 7, KØECH 7, WAØIXF 6, KØHNT 5, WAØJUF 5, WØWKP 4, KØBYK 3, WØFBY 2, KØFJT 2, WØFTQ 2, WAØLRP 2, WAØPIF 2, WØVEA 2, WØ-YFR 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Nov.:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	18:45	30	448	357
CPN	3880	Daily	18:00	28	505	234
		Sun.	10:00			

High QNI: CN—W1ZFM, WA1HSN, W1EFW. CPN—WA1FVH 27, W1GVT 27, WA1EEJ 25, W1YU 24, W1YBH 23, K1BOP 21, W1LUH 21, K1MBA 20, WA1BDA 17, K1-LFW 16, K1LGB 15. A reminder from SEC W1PRT to all ECs: Please check the date on your EC certificate and submit it for endorsement when required. Feb. 9 is the deadline for SCM nominations. I will appreciate your vote if you have no other choice. All clubs should reply to our Director's Club Letter. He will appreciate your cooperation. WA1IOX, Talcott Mt. U.H.F. Society, is now an ARRL affiliated society. New officers of the Avon High School ARA are WA1GEK, pres.; WN1IBS, mgr.; WN1HSB, secy. W1IKE provided a very enjoyable program at the Southington ARA and Northwestern Director W7PGY attended this meeting. W1KAM reports for EASN, on 3740 at 6 P.M., 30 sessions, 210 QNI and 63 QTC for Nov. K1SXF is liaision between the 6- and 2-meter Nutmeg V.H.F. traffic nets at 9 P.M. nightly on 145.3 and 50.6. K1TFF/MM, on Navy Destroyer *Thomas*, is looking for Conn. contacts on 15 and 20. K1YPP/DL4ET wants Conn. contacts on 10, 15 and 20. Congratulations to: W1EFW and WA1FVH on Nov. BPL; WN1IVE a new Novice; WA1IEG on new General Class ticket; WA-1FGN on 30-w.p.m. sticker; WN1IQJ on the only Novice traffic report and W1YU on making WAC in 27 minutes. 10, 15 and 20 meters offer good possibilities for amateurs in the Armed Forces to work stateside. Traffic: (Nov.) W1EFW 518, WA1FVH 312, WA1HSN 254, W1AW 186, W1EEN 136, WA1FGN 128, W1WCG 115, WA1FNJ 104, W1GVT 100, W1YU 82, WA1CYV 74, W1KAM 74, WA1-HEW 63, W1BDI 53, WA1GGN 51, W1EJL 47, K1SXF 42, W1YBH 33, K1SRF 32, WA1GFW 27, W1QV 18, K1-BOP 16, W1CHR 12, WA1GIX 9, K1YGS 9, W1CSM 6, WA1FJU 6, WN1IQJ 6, W1BNB 4, WA1IEG 1. (Oct.) W1EEN 212, W1EJL 97, K1RQO 76, W1RFJ 21, W1CSM 7. (Sept.) W1EFW 355.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from W1RPF, K1DZG, K1PNB and WA1DXI. K1UEB is a Silent Key. W1HE and K1KED were in the hospital. W1MCX saved a tugboat and its tow from running aground and got credit from the Coast Guard. W1AIP is working in Quincy. W1s QV, ICP and ALP attended a meeting of the Massasoit ARA. The club has applied for the call W1RR. W1AQH/KL7 is on Fire Isle near Anchorage and on 28.7 Mc. and 21,375 kc. W1KVO has his old call back and is on the 80-, 15, and 10-meter bands. WN-5SOO/1 is working in Waltham and going to B.U. The

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HW-16 SPECIFICATIONS — TRANSMITTER: RF Power input: 50 to 90 watts (adjustable). **Frequency control:** 80-meter crystal or VFO on 80-meter band. 80 or 40-meter crystal, or VFO on 40-meter band. 40-meter crystal or VFO on 15-meter band. **Keying:** Grid-block. Break-in with automatic antenna switching and receiver muting. **Output impedance:** 50 ohm unbalanced. **Sidetone:** Neon lamp relaxation oscillator. **RECEIVER: Sensitivity:** Less than 1 microvolt for 10 db signal-plus-noise to noise ratio. **Selectivity:** 500 Hz at 6 db down. **Intermediate frequency:** 3396 kHz. **Antenna impedance:** 50 ohm unbalanced. **External speaker impedance:** 8 ohms. **GENERAL: Frequency coverage:** 3.5 to 3.75 MHz. 7.0 to 7.25 MHz. 21.0 to 21.25 MHz. **Power:** 120 VAC 50-60 Hz. **Transmitter tube complement:** 6CL6 Crystal Oscillator; 6CL6 Driver; 6GE5 Final. **Receiver tube complement:** 6EW6 RF amplifier; 6EA8 Heteroydne mixer-oscillator; 6EA8 VFO mixer-oscillator; 6EW6 IF amplifier; 12AX7 Product detector-oscillator; 6HF8 1st audio and audio output. **Transistor complement:** 2N1274 muting circuit. **Dimensions:** 13¾" W. x 11½" D. x 6½" H.

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Eastern Area Traffic Net will meet on 3930 kc. at 0030 GMT daily, writes WA1FVH. The 6-Meter Cross Band Net had 19 sessions, 145 QNIs, 10 traffic, K1OKE says he needs more NCs. W1WFV passed the new Advanced Class exam. WN1IRX is new in Sharon. WN1s IRW, IRY, ISA, ISB are also new. Congrats to WA1DRS, 16 years old, on getting his Extra Class. W1HQC, Norwell, has his call back. W1PBN lives there also. W1EUJ has an SB-110A. W1CLS is working for Sanders Assocs., Inc. The gang at W1MX will have a kw. on 2 and RTTY. W1RPF, our Avon EC, reports 2 SR-42s for c.d. use and a net on 6. W1BB and his XYL took a short trip. Wellesley ARS is holding classes for various licenses. K9AQP/1 has a transistor s.s.b. on 50 Mc. WA5IOD/1 is on 220 Mc. with a 5894 and a seven-element antenna. The Middlesex ARC held an auction. WA1DPX worked some DX on 6. The Capeway RC met at W1ZST's. Sorry to hear that W1GAG was in the hospital. W1AAI moved to Marshfield and now is with WBZ-TV. W1AFP is on 20 c.w. EMNN had 11 sessions, 54 QNIs, 30 traffic. The T-9 Club met at W1MNK's. K1QFD was the winner in this section of the Annual Md.-D.C. QSO Party. W1OTZ is helping the blind get their tickets. WN1ISH worked HB9AGH on 15. WA1FUL has a new Swan 350. The Hingham gang is going after Extra Class. W1BW is on the air at a new QTH. W1DXK is working out well on 10. W1HIL worked some DX on 10. Appointments endorsed: K1OWN, W1JSM, K1FFE, K1ZCU, WA1EFN, W1EUJ as OVSs; W1s BB, AUQ, JNV as OOs; W1s BB, MME, JSM, RPF, YYZ, KWD as ECs; W1s MME, ALP as OBSs; W1MME as OPS; WA1DGH as ORS. WA1EYY made the BPL. W1-EAE hurt his right hand in a snow blower, so K1PNB is acting for him on EMN. K1VOK is working overtime. W1AOG gave a talk at the Medford Lions Club on our hobby. WA1AJN is handling traffic. K1HHN is mobile on 40 in his Volks bug. WA1DGL is on 2. W1JDP has the beam up for 10. WA2ZEW/1 has an SB-101. WN1IOB passed the General Class test. K1VGM is pres. of New Eng. CHC, Chapter 32. WA1FSI passed the Advanced Class exam. W1FJJ operated from PJ3CC in the CQ DX Test. K1PNB has a c.w. emergency net on the 1st Mon. of the month at 0100 GMT on 3733 kc. W1s AAU and AUQ are working each other on 80 c.w. K1FFE has an SB-401 receiver K1FJM stabilized his 6-meter rig. K1-OWM is building a tripler from 144 Mc. to 432 Mc. EMN had 30 sessions, 106 QNIs, 176 traffic. Traffic: (Nov.) WA1EYY 740, W1OJM 376, K1PNB 297, W1EMG 251, WA1FSI 131, W1DOM 123, W1DAL 88, WA1EUU 79, K1-VOK 78, WA1DRS 66, K1CLM 59, WA1HXF 58, W1CTR 45, W1KBN 43, W1FJI 41, WA1DEC 28, WA1DPX 28, W1AOG 27, WA1AJN 18, WA1GCH 16, K1LCQ 14, WA1-DED 12, K1HHN 11, K1OKE 10, W1CT 9, W1JDP 9, WA1DJC 8, K1ZGH 8, WA2ZEW/1 6, W6JCF/1 4, WN1-IOB 2. (Oct.) K1PNB 324, WA1GCH 21, WA1EOT 18, WA1DEC 6, WA1DED 2, K1EPL 2.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1DYG. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1700. Pine Tree Net, daily on 3596 kc. c.w. at 1900. WA1CSQ, of Presque Isle, has been transferred by the service. Hope we can work him from where he goes. Harve was active in the nets and a lot of help in traffic. K1DAP is taking on a radio supply store in the Waterville area. W1YXU is recovering at home from a heart ailment. W1UDD is the net manager for the Northeast Area Barnyard Net and reports that all is going well on the net. This net operates on 3960 kc. from 0800 Mon. through Sat. Traffic: W1GU 70, K1WQI 67, W1YA 66.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/K1DSA—SEC: K1QES. PAM: K1APQ. RM: Open. Endorsements: W1JB as OBS and K1PQV as ORS. New hams: WN1ISG, WN1ITG, WA1ITS and WN1ITH. The Merrimack Valley AREC Net leads again this year for the most traffic handled. W1BYS is fixing a new antenna for 75. W1PFU was heard on 80 working DX. K1-PQV received his VK7 QSL from Tasmania. W1YWC has a new home a quarter-wave long on 80 meters. K1QES reports rough going with QRM on the NHEPN. W1WMK reports his neighbor is N.H.-born W60A (ex-W1NZ). They have come full cycle (sun-spot cycle), ragchewing over a transcontinental backyard fence every week end since November 1956. K1PQV has a DX-35. K1YSD is back on the air from his new QTH. VE7ASY needs N.H. for WAS and would like a sked on 75, 40 or 20 meters. Any takers? K1MFQ. W1ALE and W1AZK were the top three for N.H. in the Sept. V.H.F. QSO Party. W1JB and W1SWX were active in the Frequency Measuring Test for Official Observers. Traffic: K1PQV 45, W1MHX 30, WA1EUJ 27, K1QES 7, W1BYS 4.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. RISPN report: 30 sessions, 347 QNI, 65 traffic. The Newport County RC, W1SYE, placed third in New England for four stations operating simultaneously during the 1967 Field Day. The club hopes to be able to purchase an s.s.b. rig soon. The nominating committee submitted the following names for election: W1TXL, pres.; WA1FFL, vice-pres.; WN1HXK, rec. secy.; WA1BLC, corr. secy.; Norman Anderson, treas. The W1AQ Club of Rumford held its dance for the building fund recently and was very successful. Pres. W1FNH announced that a successful fund drive had been completed and that it was hoped that the addition to the club could get started this spring. The addition is to include a new room for the transmitters and code practice. Sweepstakes reports were received from K1LPL, W1KMV, W1YNP, WA1FNK, K1YDA and K1TAV. Traffic: WA1EEJ 523, W1TXL 236, W1YKQ 116, W1BTV 46, K1VYC 42, K1TPK 24.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
Gr. Mt.	3855	2230Z	M-S	890	26	W1VMC
Vt. Fone	3855	1400Z	Sun.	196	—	W1UCL
VTNH	3685	2330Z	M-F	no report		K1UZG
VTCD	3990½	1500Z	Sun.	32	19	W1AD
VTSB	3909	2230Z	M-S	706	76	W1CBW
		1330Z	Sun.			

The Vt. QSO Party will be held Feb. 10-11, 1968. Please try to be on frequencies during this weekend even for only a few minutes. I can guarantee you a lot of fun; just like you were a rare DX station. The Burlington hams, especially W1DQO, W1VSA and K1PPW, have successfully arranged 2-way amateur radio visits between 6th grade classes in Burlington and Schenectady, Colo., and plan on one with Montreal—Operation Educational Amateur Radio. Traffic: K1BQD 363, K1MPN 36, W1-FRT 29, WA1GKS 4, W1KJG 2.

VERMONT QSO PARTY

February 10-12, 1968

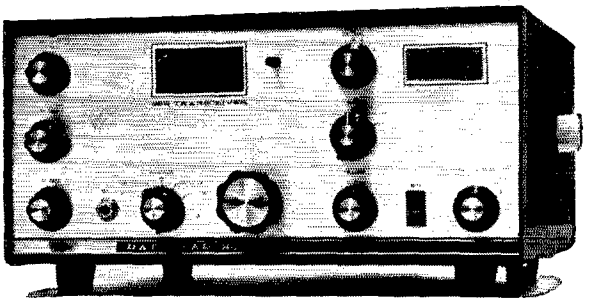
All Amateurs are invited to participate in the Vermont QSO Party, sponsored by the Central Vermont Amateur Radio Club.

Rules: 1) Time, the 28-hour period from 2300 GMT Feb. 10 to 0300 GMT Feb. 12. 2) No power restrictions, all bands can be used and contact credit with the same station on different bands and/or modes will be given. 3) Vermont stations score 1 point per contact and multiply by the number of ARRL sections and foreign countries worked. Outside stations score 3 points per Vermont station and multiply by the number of Vermont counties worked on each band. 4) Certificates will be awarded to the highest scoring station in each ARRL section, plus a trophy to the highest scoring station outside Vermont. A trophy will also be awarded to the top Vermont scorer, with 2nd, 3rd and 4th place stations receiving a gold-trimmed certificate. The W-VT (Worked Vermont) certificate will be awarded stations working 13 out of Vermont's 14 counties, provided the station has not previously been issued this award. A special certificate too, for multioperator stations. 5) Suggested frequencies: 3685 3855 3909 7030 7240 7290 14,040 14,225 14,290 21,050 21,300 28,100 28,600 50,250 50,360 144-144.5 145.8, and Novice frequencies. 6) Vermont stations send number of QSO, report and and county. Others send QSO number, report and section. 7) General call to be used "CQ VT" on c.w. and "Calling any Vermont station" on phone. 8) Logs should be postmarked no later than March 31 and sent to the CVARC, c/o E. Reg Murray K1MPN, 3 Hillcrest Drive, Montpelier, Vermont 05602. Stations sending as s.a.s.e. will receive a copy of the results.

WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—SEC: Open. RM: W1DWA. PAM: K1-DGQ. New appointments: K1DGQ as PAM and OPS for the new Western Mass. Phone Net, which meets at 6:15 P.M. (local time) Sun. through Sat. Mike extends his invitation to all wishing to call in with or without traffic. Endorsements: K1SSH as EC for the Greater Worcester Area. Ed welcomes any amateurs willing to help out with emergency preparations. W1DWA is in need of volunteers to work out AREC plans in the Berkshire County area. WA1CRL is the new EC for Lee, which should start the ball rolling for Berkshire County. Any others? Please contact W1DWA or your SCM. The Northern Worcester County area still is unheard from regarding AREC. Franklin County also is missing at the moment. The Pittsfield High School Radio Club is to be congratulated on becoming affiliated with ARRL. The Valley Amateur Radio Club had a successful Transmitter Tracking Con-

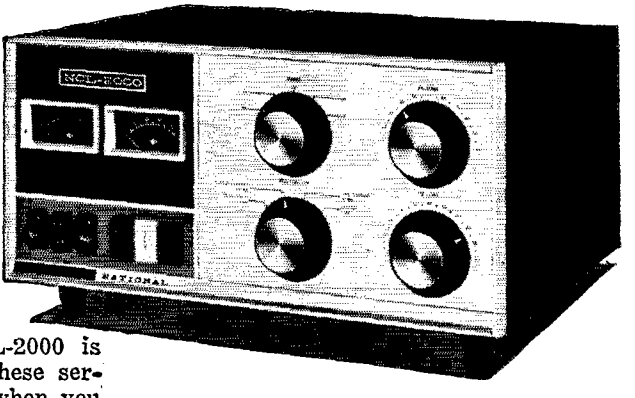
Start with America's most versatile 5-bander... only $359!

NCX200



For only $359, the new National 200 puts you on the air, with complete SSB, CW, and AM coverage of the 80 through 10 meter bands. You'll get years of enjoyment from this husky rig, thanks to National's field-tested design and workmanship, and these terrific performance features: *200 Watt PEP input on SSB, grid-block keying on CW, and compatible AM operation *Separate product and AM detection plus fast-attack slow-release AGC in all modes *Crystal-controlled pre-mixing with single VFO for high stability, plus identical calibration rate on all bands *Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent-channel QRM on receive... plus solid-state balanced modulator for "set-and-forget" carrier suppression *Universal mobile mount included.

Boost your power to a full 2000 watts... only 38¢ per watt!



Only 38¢ per Watt adds 1800 Watts PEP input to your National 200 . . . lets you push out the maximum power allowed by law. The NCL-2000 is a completely self-contained 2000-Watt SSB PEP linear amplifier for the 80 through 10 meter bands, with minimum peak output of 1300 Watts. *Amplifier Bias Control Circuit (Pat. #3,328,715) reduces distortion. Operate CW? AM? RTTY? The National NCL-2000 is rated for full kW operation in these services. You *know* you'll be heard when you add on this desk-top package of dynamite! The price? . . . $685, when you're ready for the big time.

Both the National 200 and the NCL-2000 are covered by National's exclusive One Year Guarantee against component failure.

National Radio Company

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test with four winners: WA1EYF, W1NPL, WA1FTG and K1YQQ. W1BVR is wintering in Westfield and will retire at the end of the school year to Lanesboro. The Mt. Hermon Radio Club, W1IPN, is back on the air. Advisor is W1ZPB, W1KWX indicates the VARC Net is shaping up. HCRA's Feb. meeting will have W1NJM, ARRL Communications Manager, and it promises to be a very fine meeting. Traffic: K1IJV 114, W1DVW 102, K1AEC 46, WN1HHA 46, WA1GWV 45, WA1CYF 30, WA1HEC 29, W1DWA 27, K1WZY 26, W1BVR 21, W1ZPB 4.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Albert F. Weber, KL7AEQ—Asst. SCM: John P. Trent, KL7DG. SEC: KL7GEF. OBS: KL7CAH. KL7BAJ is wintering in W5- and XE-Land and "just happened" to run into KL7DUW at VE2XPO. KL7EKZ reports that the Southeast Alaska Emergency Net moved to 3915 Jan. 1 but meets earlier than the Sourdough Net. KL7FSH has a new Swan 350 on the air. We are looking for someone to take an RM appointment. We also need some ECs down SE way. KL7EWH has been appointed EC for the Fairbanks area. KL7AZJ and W1ICB have been heard mobile on 2 while on the ski trails. KL7IS/DDB report that things are nice down in Oklahoma. At the recent biannual visit by the FCC, KL7GBG passed the General Class and KL7EVO came up with an Extra. The Northland Club reports that all sixteen members of its class are up to speed and should have tickets soon. The Arctic Club (Fairbanks) has started classes for the Novice Class and if the demand is great enough, also for upgrading. Traffic: KL7CAH 105, KL7FRZ 4.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7-THX.

FARM Net	Tue.-Sat.	0200 GMT	3935 kc.
ISN	Tue.-Sat.	0130 GMT	3593 kc.

WA7ETO has a new Galaxy 5. New Lewiston-Clarkston Club officers are WA7IUO, pres.; WN7HPY, vice-pres.; WN7HPX, secy.; W7AOO, W7VOU, W7ZNN, W7VIO, WA7ETO, directors. W7IY's SB33 power supply went out and is limited to a.m. and c.w. K7OAB is building a new sound-proof radio room. K7ONP has a new NCX-5. W7IY and WA7EWV turned in high Sweepstakes scores. W7QEL moved to a new QTH at Hayden Lake. W7OWA is in Vets Hospital at Boise for a back operation. FARM Net report: Check-ins 746, traffic 98, sessions 21. ISN Net report: Check-ins 90, traffic handled 23, sessions 21. Traffic: WA7BDD 134, K7HLR 110, WA7ETO 53, K7OAB 37, W7GGV 20, W7ZNN 12, K7QQZ 11, W7IY 9, WA7EWV 8.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. PAM: W7ROE. V.H.F. PAM: K7OIA. RM: WA7DMA.

Montana Traffic Net	3910 kc.	0100 GMT	M-F
Montana Section Net	3950 kc.	1700 GMT	Sun.
Montana PON	3885 kc.	1515 GMT	Sun.

Appointments: WA7DMA as RM, K7OEK as OVS, W7NPV as EC. New officers of the Yellowstone Radio Club, Inc., are W7EIH, pres.; WA7FCI, vice-pres.; W7BMI, secy.-treas.; WA7BJV, editor; WA7FCG, WA7-CFW, K7VCA, board. Meetings are on Mon. at the Oil-workers Hall. Montana stations who took part in the 1967 SS Contest were K7KOK, WAØATY/7, W7FO/7, W7FLB, W7TYN, WA7DMA, WA7BKW and K7CTI. WA7AIL is a new call in the Bozeman area. WA7CAB is going to school in Oregon. K7QWB recently was married in Bozeman. W7JIZ has a new granddaughter. Officers of the Hellgate Radio Club for 1968 are W7NEG, pres.; W7WWG, vice-pres.; W7IBH, secy.-treas. Check with the RM if you are interested in the Montana State C.W. Net. Traffic: WA7DMA 274, K7EGJ 56, K7DCH 51, W7ROE 16.

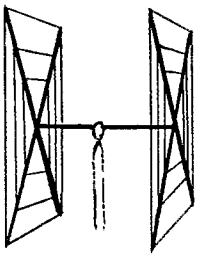
OREGON—SCM, Dale T. Justice, K7WWR—RM: W7ZFH. PAM: K7RQZ. New appointment: WA7GFP as OVS. Rick is active on 6 meters. Sweepstakes reports were received from K7RQZ, W7CPK, WA7ETL and K7BPR, and K7WWR sent his report to Headquarters. WA7FTN is handling traffic from the Southeast Asia area. K7RQZ reports the Central Oregon ARA Novice class is near completion and club meeting attendance has skyrocketed since the classes for license advancement began. WA7ADW has a 700-watt linear operating and WA7EEJ and W7TCT are now on s.s.b. with transceivers. K7GGQ is the new manager of NSN and K7OUF is a new director. WA7AHW reports for the AREC Net: Nov. sessions 30, check-ins 735, contacts 65, traffic 24, QSTs 1 and maximum number of counties 17. K7IFG reports for BSN: Oct. sessions 61, traffic 127, contacts 212 and check-ins 1054. W7ZFH reports for OSN: Nov. sessions

GOTHAM'S AMAZING ANTENNA BREAKTHRU!!

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 15 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3AZR



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: Steel 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.

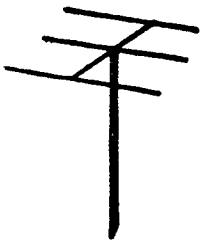
Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, 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, OZ4II, 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.

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21, check-ins 92 and traffic 30. Traffic: K7RQZ 346, W7ZFH 110, W7DEM 90, WA7BYP 81, K7IFG 79, K7OUF 70, K7WWR 42, WA7AHW 21, W7WQM 19, WA7GLP 17, WA7DPK 11, W7BNS 10, W7MLJ 10.

WASHINGTON—SCM, William R. Watson, K7JHA —SEC: W7UWT. RM: K7CTP. PAM: W7BUN.

WSN	3575 kc.	0200Z	Dy Traffic 371	QNI	347	Sess. 30
NTN	3970 kc.	1930Z	Dy Traffic 392	QNI	949	Sess. 30
WARTS	3970 kc.	0100Z	Dy Traffic 158	QNI	1489	Sess. 30
NSN	3700 kc.	0400Z	Dy Traffic 107	QNI	426	Sess. 30

A poll of clubs indicates a unanimous desire to have the Washington State Convention in 1968. *Flash*: Book stores and parts houses are short of new *License Manuals*. Can't keep them. W7ZIW was elected new WSN mgr. PAM W7BUN reports the highest SS phone score at this time. K7UKC reports the highest c.w. score. The Tacoma Club visited the Bremerton Club. With many clubs conducting license courses and the NW Tech. Net each Sun. the Washington section should set a good pace for higher class licenses—at least the spirit is there. SCM K7JHA visited the Boeing Club with N.W. Director W7PGY. An investigation is under way because of many complaints of ITV on the 80-meter band. Findings will be forwarded to ARRL for FCC scrutiny. The Spokane Amateur Radio Club is working on affiliation. OO W7HDL sends in a fine report with a stack of "thank yous" from amateurs all over the country. The "white" card is appreciated more than the "pink ticket." New appointments: W7VCB and K7JUT as ECs. You are reminded that all appointees must make regular monthly reports to the SCM except for ECs, who report to the SEC for a continuing endorsement. ORS appointments are channelled through RM K7CTP, and OPS through PAM W7BUN. There are openings in all appointment brackets so look in the *Operating Manual* to see if you are qualified and request the necessary application blanks. W7AXT reports good success with the new 1250-watt portable generator and transmits Bulletins on 3575 at 0145Z. W7IEU mobiled to Oregon and got FB weather reports as an assist. W7BTB reports that 5 Bremerton Club members attended the Tacoma Dinner and QCWA Party in Seattle. He also spoke at the Tacoma Club in Dec. on the boomless quad. The BEARS report QSO Party entries from 21 states and 2 Canadian provinces. The Skagit Club Hamfest has been set for Apr. 20 at Arlington. The club also is featured in *Woodells Trailer Life Magazine* for "Ham-Trailer-Camper" activities. W7VPW is active again in a new QTH. Dec. was the 20th anniversary of the WARTS Net. Congratulations to all members. Traffic: (Nov.) W7BA 1211, WA7DXI 831, W7DZX 690, W7HMA 578, W7ZIW 504, W7PI 349, W7KZ 299, K7CTP 212, K7JHA 147, W7BTB 108, W7JEY 104, WA7DZL 102, WA7EDQ 92, W7IEU 75, K7TCY 75, WA7BZY 66, W7AXT 58, W7APS 53, W7MCW 48, K7VNB 28, W7AIB 25, W7AMC 19, W7GYF 17, WA7HKR 17, K7OXL 13, W7BUN 11, WA7CXD 10, W7RXH 8, WA7-DBQ 7, W7UU 4, WA7HSJ 2. (Oct.) K7TCY 117.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—W6-TYM is W7WQM while in Oregon. W6UZX is helping K6KRL with QSK setup. W6NZ reports 154 telephone relays in Aug. and Sept. W6OJW had a broken gear in rotator but got it fixed and has the beam twirling again, enabling him to work more new countries. Congrats to W6ZRJ and W6YHM on elections as Director and Vice-Director, respectively. The HRC now meets at the Wesley Methodist church. W6WUK and WA6SUZ are new AREC members. W6UB reports that WA6EQP, WA6QPN and WA6KUK joined the Silent Keys. WA6-IHZ moved to San Diego. The Livermore Amateur Radio Klub took a tour of the MIT Radio Site near Camp Parks in place of a regular meeting. WA6RSG has left the section. W6OA has been keeping weekly 20-meter skeds with W1WMK for 11 years now. W1WMK and W6OA attended high school in New Hampshire but lost contact after graduation. Twenty-eight years later they stumbled on each other on the air not knowing of each other's interest in ham radio. Congrats to WB6-PCQ on making the BPL in Aug., Sept., Oct. and Nov. and to W6IPW on making it in Sept. W6IDY sold his TV business and is undertaking a new job. WA6TZN is stationed at Mare Island. K6LRN is looking for a larger sailboat. Traffic: (Nov.) WB6PCQ 793, W6UUZX 133, W6TYM 110, K6LRN 86. (Oct.) WB6PCQ 520, W6UZX 221, K6LRN 65, W6TYM 61. (Sept.) WB6PCQ 662, W6-IPW 306, W6UZX 170, W6IDY 124, K6LRN 74, W6TYM 64. (Aug.) WB6PCQ 682, W6IPW 500, W6UZX 168, W6-TYM 43, K6LRN 37, WB6FHH 25, W6OJW 4. (July) W6IPW 250, W6TYM 31. (June) W6IPW 200.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH6-GHZ. PAM: KH6EEM. RM: KH6GGR. RACES Nets (40, 10, 6 and 2) coordinate with KH6GG.

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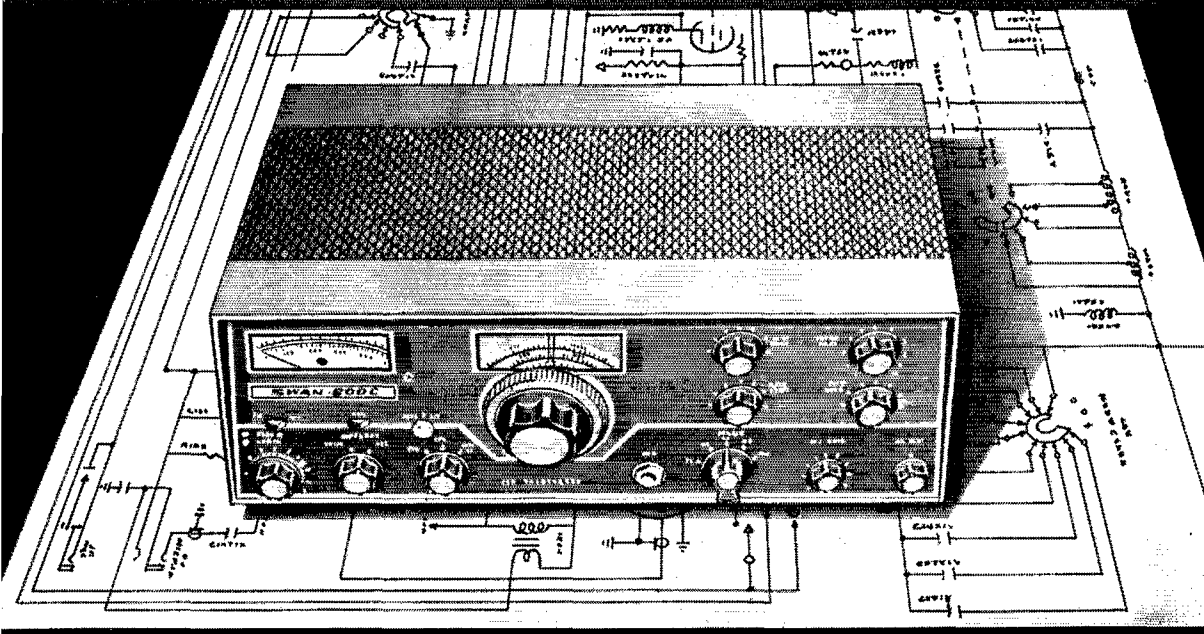

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For the CW operator the 500C includes a built-in sidetone monitor. Also, by installing the Swan Vox Accessory (model VX-2) you will have break-in CW operation. Thus, the model VX-2 now fulfills a dual function, both automatic voice control and break-in CW keying. Grid block keying of a pure CW carrier is employed with off set transmit frequency.

The 500C embodies the Swan's well known dedication to craftsmanship, performance and reliability, with a service policy second to none. When you visit your Swan dealer and look over the 500C, we are sure that you will be glad we couldn't 'let well enough alone.' **$520**

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Net	*Freq.*	*Time (GMT)*	*Days*
League Appointees	7.290 Mc.	0700Z	Wed
Friendly Net	7.290 Mc.	2030Z	M-F
Pacific Interisland	14.330	0830Z	All

I'm sad to report that KH6DLA and KH6AXY have joined Silent Keys. KH6EEM reports interest is building in the 2-meter opening to the West Coast this spring. WØPAN, ex-/KH6, writes from Bloomington, Minn., that he is on with a vertical until his damaged tower is repaired. KH6IW has joined USASTRATCOM-PAC. KH6-GDO landed VR2FM for a new one. W9GBH/KH6 will be reassigned to TA-Land in Apr. KH6COB is interested in an appointment. KH6BZF landed 5W1AS on 10 meters for a new one. W5YZL/KH6 will leave his chief C-E job with the U.S. Coast Guard here and return to Leesville, La. KH6EDY, Kure Is. returns to more activity with an additional ham assigned there. KH6BJ writes from Australia where he's on business. WA2PLP/KH6, ex-KV4BB, Cyprian, is enjoying the Hawaiian Isles almost as well as his Virgin Isles for DXing. Last month's report was missing; business trips were the cause. I stopped at KM6-Land recently and had the pleasure of seeing club stations KM6BI and KM6CE. KM6-Land actives are K9BYP, WB2MST, K6BJG, WA9-VPH, W6ANJ, WB6QKK, K6LUJ and others. KH6DQ is on 40-meter c.w. KH6GEW was elected pres. of the Honolulu ARC. Congratulations to SEC KH6GHZ on the fine article that appeared in Dec. *QST*. Traffic: (Nov.) KH6BZF 17, KH6DQ 1. (Oct.) KH6GHZ 551.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. The Southern Nevada F.M. Association has its repeater, W7DDB, operational with input 146.34 and 146.94 and output 146.94 and 145.5. The Reno clubs are working hard to see if they can get a Pacific Division convention for 1968. K7UDX is doing an FB job on reporting news over the local TV station. The Las Vegas Radio Amateur Club, under the direction of WA7ESM and K7RKH, is conducting a code and theory class at the North Las Vegas civil defense headquarters. K7UGT, Nevada Amateur Radio Society, has about 20 members on 2-meter f.m. 146.94, in the Reno area. The Southern Nevada Amateur Radio Club held a dinner to honor W7JU's retirement from the City of Los Angeles D.W. & P. Ray and his XYL are moving to Arizona. W6HC and 25 others attended the dinner. WA7BEU was host to Nevada's governor who spoke to the WCAR group on 7255 on Mike's rig. Traffic: W7PBV 2.

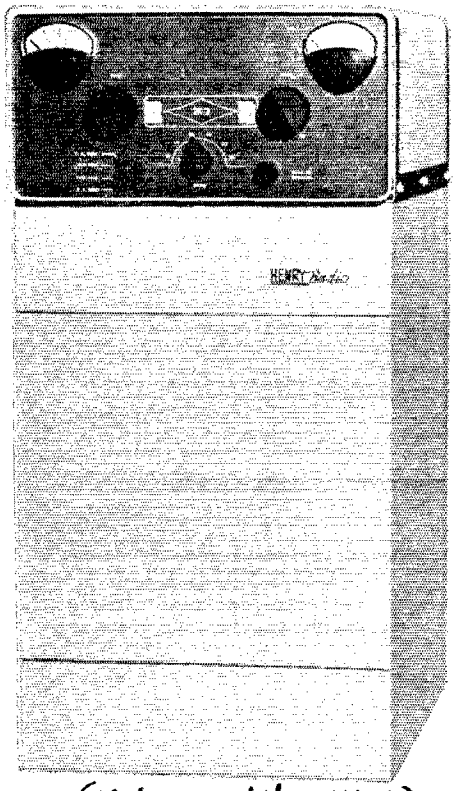
SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—RM: W6LNZ. ECs: WB6MXD, K6RHW, W6SMU, WB6RSY, WA6TQJ.

Net	*Freq.*	*Time*	*Days*	*Mgr/NCS*
NCN	3630	0300Z	Daily	WB6HVA
NCN/2	3630	0430Z	Daily	WB6HVA
Yolo Co CD	146.94	0300Z	Wed.	WA6TQJ
SCEN	146.25	0500Z	Wed.	K6IKV
Nevada Co.	145.80	0300Z	Wed.	W6ZUZ

W6DOR is a new OO in North Highlands. Sweepstake messages were received from WB6UNP, WB6MZX, and W6NKR. Sacramento clubs participated with the Red Cross recently in recording the annual "Letters From Home" program. Those who donated their time and efforts were WA6CXB, WA6YZD, K6IKV, W6GIA, WB6DZP, WA6IVI, WB6IAW, W6TEE, WA6UNL, WB2-CUW, W6RQO, WB6UNP and WB6IYO. To you Mars members an item of interest: Certain expenses from MARS participation *may* be tax deductible. Contact your SCM or W6WLI for details. Better yet, contact WB6RSY. WA6HGH, K6GUS, WB6KZN, W6QHP, WB6SHO and KØJHI, of the RAMS provided assistance for the Veteran's Day Parade in Sacramento. K6IF has retired from PT&T. I would appreciate a copy of all amateur radio club bulletins. Traffic: (Nov.) W6LNZ 217, K6IKV 19, WB6MXD 19, W6NKR 7, WB6QZZ 7, WB6MAE 4, WA6-JDT 3, W6VUZ 3. (Oct.) K6IKV 10, WB6MAE/6 8.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—The Tamalpais Radio Club held its annual auction in Nov. W6KHH was in Viet Nam on government business recently. New Officers of the San Francisco Radio Club are K6HZ, pres.; WA6PYN, vice-pres.; Bob Lyon, secy.; W6FAX, treas. W6WLV and K6NCG forwarded Sweepstakes reports for bonus credit. W6HSA and W6GQA were heard in the Telephone Pioneers QSO Party in Dec. WB6FZH is trying to decide between money for college or gear. WA6DNZ is back working on some deferred projects after being upgraded in some technical fields—Harry finished courses in data, wide-band data and transmission this year. WA6ALK is finding some good distance in 2-meter QSOs. WA6QXV finds an inverted "V" bringing in some good signals on 80 meters. WB6OGF reports 55 countries confirmed for DXCC. WA6BYZ made

WE EVEN SURPRISED OURSELVES



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BPL in Nov. for the third month in a row. W6CUB was in Europe for three months, getting into SM, OZ, LA and F-Land. Opinions solicited in the section *Courier* indicate an interest in this section's activities column. WB6IMO reported forty-four waiting to take the amateur Extra Class examinations at San Francisco FCC offices the last Fri. before the new regulations went into effect. W6UEV is an occasional check-in for the Northern California Net. The San Francisco Section Net, in its third year of operation, meets Mon. and Fri. at 1830 local time. WB6DGJ is displaying the complete line of Galaxy equipment in his shack. The Humboldt Radio Club meets in Jim's shack on Spring Street in Eureka the 1st Fri. of the month. W6BWV recalled some experiences in home-brew efforts at the Dec. meeting of the club. W6CYO is another DXCC in Marin County. W6HLD is new in Marin and has retired from the Air Force. Traffic: W6KVQ 264, WA6BYZ 248, W6BWV 22, WA6AUD 20, K6TWJ 8, W6CYO 7, WB6IMO 7, WB6OGF 7, K6TZN 6, WA6QXV 1.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The Tulare County Amateur Radio Club held its Annual Breakfast at the Pancake House in Nov., with 26 members in attendance. W6PIX is the activities chairman. W6ASU has a TR4 and TX rig. W6FJH is now in Visalia. In the SS W6TZN reports 77,550 points, W6QMIC reports 44, 744 points and WA6UQV/6 reports 13,104 points. The Lincoln Amateur Radio Club reports very good results in Field Day, with 3 Novices and 2 General Class licensees. The call is WB6WME, WN6YBX received his Ragchewers Club certificate. W6HKV has now been licensed to the Kingsburg High School. W6WSI has a TR-3. WA6FCR has a Swan 500 and is active on 75 s.s.b. W6ZFN is running a complete Heath line, and is active on 10-15-20 meters. WA6QCY is on 40 s.s.b. W6KTW was active in the SS Contest. K6KOL is building a transverter for 2 meters. WB6PUS has put up a 80-40 antenna. WB6SXU is checking in NCN-2. WB6MWY is operating KC4USD on 14.3 Mc. WA6SCR has a Swan 500. WB6JRL has a BTI linear driven with a 3283. Please keep sending in those reports. Traffic: (Nov.) WB6HVA 503, W6ADB 301, WA6SCE 246, K6KOL 145, WB6TFU 22 (Oct.) WB6INO 658.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Ed. Turner, W6NVO. SEC: W6VZE. RM: W6QMO. This is my last report as your SCM, as my resignation officially became effective Jan. 1, 1968. For the next two or three reports I will remain as your Acting SCM, but my election as Director of the Pacific Division will require more time than I can give to both jobs. May I at this time offer my sincere thanks to all of the members of the section who supported me so well during the past five years that I have been your SCM, and thanks to those who supported me in the director election. W6RSY made the BPL. W6YBV made a fine showing in the recent FMT. W6DEF reports that traffic is coming into his area rather slowly because of bottlenecks on the nets. Hal says that W6CTH is the new SCARS pres. WA6LFA works NCN. W6HC received a certificate of membership in the RSGB. W6PLS received a trophy for 1st place in the CHC/FHC QSO Party. Gene now has a certificate for 45 w.p.m. from the CWA. W6ASH is sending Oscar Bulletins at 0300Z Thurs. on 14.030 kc. and on 7015 kc. at 0600Z. W6ACW works both NCN1 and NCN2 and handled Sunnyvale traffic. W6AUC is net control of the QCWA A.M. Net Sun. mornings. Russ is active as OO. W6VZE is very busy with SEC matters and is working with the AREC Net Sun. at 10:30 on 3900 kc. W6OII works MTN. W6ZRJ now sports a new SB-101 and is active on s.s.b. and c.w. Look for W6ZRJ code practice Wed., Thurs. and Fri. at 0330Z on 3590 kc. W6ZRJ also can be found most evenings for a ragchew on the SARO Net on 3869 kc. at 5:30 P.M. WRFF has a tri-band beam and rotatable 40-meter dipole. WB6ITM is active on MARS and in amateur RTTY work and is secy.-treas. of the Monterey Bay Radio Club. W6PJW, San Mateo EC, reports that several locals manned the city c.d. station for an area hospital disaster. W6MMG reports that the San Carlos C.D. Radio Club holds code classes Mon. and Wed. evenings. K6YKG is NCS of the NCN on Sat. Traffic: (Nov.) W6RSY 1663, W6YBV 198, W6DEF 65, WA6LFA 60, W6HC 40, W6PLS 30, W6ASH 28, W6ACW 27, W6AUC 23, W6OII 16, W6ZRJ 15, W6RFF 8, WB6TIM 5. (Oct.) W6VZE 21.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, WA4FJM. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. The Buncombe County ARC had VK4ABG/W4 as a visitor at a recent club meeting. WA4NUO is now RTTY operator and repairman with his outfit in Gelnhausen, Germany. W4NQA celebrated receipt of his Extra Class license by making a "clean sweep" (74 sections) in the C.W. SS. W4IJP has three new additions, an Extra

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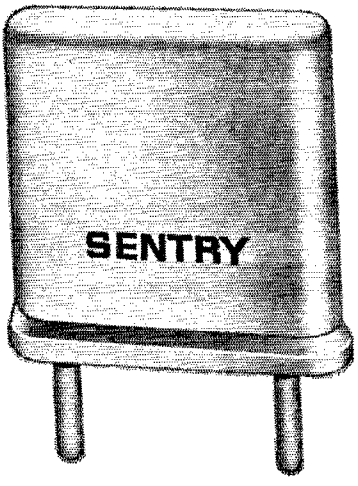

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Class license, CP stickers for 20- and 25-w.p.m. and an iambic electronic keyer. WA4KWC received his WAC with 2-way s.s.b. phone endorsement. K4NUZ reports the Duke University Medical Center ARC station, WB4BLK, is averaging 1.5 medical consultations daily with its world-wide, "Project MED-AID." New officers of the Buncombe County ARC are WA4KWC, pres.; K4TTN, vice-pres.; W4NQA, secy.; and W4DPF, treas.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
THEN	3865 kc.	0030Z	Daily	211	WA4GMC
NCN (E)	3573 kc.	2330Z	Daily	134	W4IRE
NCN (L)	3573 kc.	0300Z	Daily	74	WA4CFN
SSBN	3938 kc.	0030Z	Daily	71	WA4LWE
(Oct.)					
SSBN	3938 kc.	0030Z	Daily	93	WA4LWE

Traffic: WB4BGL 239, W4RWL 179, W4EVN 134, W4LWZ 102, WA4VNV 81, W4FDV 74, W4OTE 46, K4EO 44, W4ZZC 43, WA4ZLK 41, K4CWZ 27, W4BNU 25, WA4FJM 22, K4CDZ 20, K4TTN 14, W4AJT 10, W4NQA 10, K4PKE 10, WA4GMB 9, W4ACY 6, WA4KWC 4, WB4CVM 3.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: WA4EFP.

SCN	3795 kc.	Daily	0000Z/0300Z	Tfc. 117
SCSSBN	3915 kc.	Daily	0000Z	Tfc. 136

A section meeting was held Nov. 5 with 25 stations attending. The major topic of discussion was the NTS. The next meeting is scheduled for the first of March. WB4DXX has been appointed OBS and WB4CBJ has been appointed OVS. Traffic: (Nov.) WB4DXX 139, K4LND 108, WA4NWI 56, WB4BZA 43, K4LNJ 30, W4FFH 27, W4NTO 27, W4WQM 26, W4JA 25, WA4UDC 15, W4UMV 11. (Oct.) K4LND 133.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. RMs: K4MLC, WA4EUL. PAM: W4OKN. W4OP is the new OBS for the phone nets. WN4GTG made the BPL and is looking forward to joining the General Class soon. New club officers for 1968 are: LARC (Lynchburg) WA4VQH, WA4VQC and K4RRH; RVARC (Roanoke) K4UMK, K4YZN and WA4QVU; TARC (Norfolk) WA4BUE, W4KBS and WA4AOT. W4OKN is pleased at the recent increase of QNI and traffic on VSBN. WA4UMX operates from W2CXM at Cornell U. After many months of traffic-handling, K4CG has been appointed ORS. WA2UFI/4 continues to record and report non-amateur intruders in our bands. The Maritime Mobile Service Net meets on 14,317 kc. at 2130 GMT six days per week. This net has many Virginia members and specializes in providing communications for seagoing and overseas personnel. If you participated in the Va. QSO Party, you still have a few days to forward your logs to Box 2002, Roanoke, Va. 24009, for a listing in the final results. Part of the SCM monthly report includes a breakdown of traffic handled by category; members are requested to list traffic by category and not just by total. If you reside in the Virginia section your signal is welcome on 3680, 3835 or 3935. Monitor them. Traffic: (Nov.) W4DVT 206, W4NLC 192, WN4GTG 173, W4ZM 173, K4CG 169, W4RHA 160, K4TSJ 124, WA4EUL 114, WB4FDT 114, K4KNP 103, W4SZT 95, K4FSS 92, WA4OUS 74, WB4DRB 70, W4OKN 56, K4WMP 56, K4MLC 53, WB4DOY 51, WA2UFI/4 45, W4IA 38, W4BZE 37, W4MUJ 28, W4GEQ 27, WA4PBG 23, W4QDY 20, W4QDF 13, W4TE 13, W4YZC 13, W4ZAU 13, WA4DAI 12, W4KFC 11, W4SHJ 11, WA4FIJ 10, W4MK 8, W4ZMT 8, W4KX 5, WA4WFQ 5, W4LK 3, K4ITV 2, W4OP 2. (Oct.) W4SZT 131, W4IA 28.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8IRN. RMs: W8HZA, K8TPF. PAMs: K8CHW, W8IYD. New officers of the Kanawha Radio Club are K8WMQ, pres.; K8NVF, vice-pres.; WA8HCY, secy.; WA8UHC, treas.; W8VZO and K8YBU, act. mgrs. W8CUL has a Model 19 RTTY and 500 watts. WA3FKB/8, WA8IMY, K8LGS, WA8FMA, ZP5KB and WA8KQX overcame antenna problems 30 minutes before the start of the SS. WA8POS, WA8UUY, WA8TWR, W8HRQ reported Sweepstakes scores by radiogram. K8TPF is active again after constructing a new home. W8JM received a card from ZL3JC confirming a 75-meter mobile contact using an HW-12. W8CLX, Charleston, has contacted WA8FCZ, Wheeling, on 29.6 w.b.f.m. The WVN (Phone) Net has expanded to nightly operation on 3890 kc. K8MYU has installed a new beam. WA8LAL/8 operated at the State Capitol during the National CDX '67 emergency tests,

WVN Phone	22 sessions	617 stns.	84 msgs.	WA8RQB net mgr
WVN CW	28 "	(Oct.)	125 "	W8HZA "
WVN CW	30 "	(Nov.)	130 "	W8HZA "

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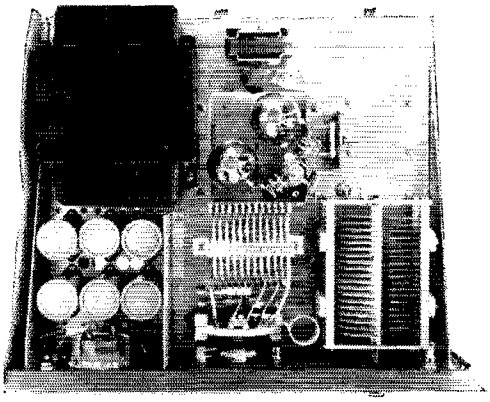

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W8CKX renewed ORS and obtained his Extra Class License. Traffic: WA8POS 130, K8MYU 78, W8HZA 68, WA8RQB 57, WA8YSB 39, K8BIT 38, W8CKX 26, K8CHW 13, K8MQB 11, W8WEJ 11, WA8UFX 8, W8JM 7, W8IYD 6, WA8UIH 5, WA8LAL 4, WA8NDY 4, W8QEC 4, WA8RZM 4, W8UUY 4, W8AEN 3, K8SOR 3, W8SQO 3, K8WWW 3, WA3FKB/8 2, WA8FIE 2, W8IRN 2, WA8LFW 2, K8PRC 2, WA8BUM 1, W8CUL 1, WA8EEL 1, WA8HPE 1, K8MSP 1, K8QYG 1, K8VAH 1, WA8VQT 1, K8WMX 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, KØFDH—Asst. SCM: A. E. Hankinson, WAØNQL. SEC: WØSIN. PAM: WØCXW. Congrats to WAØSKH/Ø, of the Hewlitt-Packard Club in Loveland, on winning the multi-operator V.H.F. Contest in the Colorado section. Also nice boing for KØEDG on his hard work and claimed score of 34,720 in the recent Sweepstakes Contest. Others showing excellent results include WØBWJ and WØUAT. Regretfully, we announce the recent passing of an old friend, WØCOC. Chub will be greatly missed by families of servicemen for whom he ran so many telephone relays. He had received numerous awards from railroad companies and communities for which he provided emergency communications in time of need. Chub was an active leader of our sectional c.w. nets in the 1930s. Note to the Columbine Net: Please try to send in your monthly totals prior to the 7th so that credit can be given for your services. Traffic: WØIES 1023, KØZSQ 367, WAØPGM 40, KØDCW 34, WØLRA 25, WAØALW 12, WØBWJ 10, WAØCVS 9, KØGVA 3.

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—Asst. SCM: Marty Petsonk, WA5MCX. SEC: K5KTQ. Plan now to attend the Hamvention in Provo, Utah. Congratulations to new licensees: WN5TGO, WN5TGG, WA5THW, WN5TGN, WN5TFG, WN5TFQ, WN5SZJ, WA5SXX, WN5SYF, WN5TJD, WN5TID, WN5TEU, WN5THX, WN5TJC, WN5TFT, WN5TGB, WN5SXB, WA5SVP, WN5SWV, WA5FJK has moved his shack upstairs and is telephone relaying to his neighbor's son, KØYDW. in K.C. K5MIJ is back on the air with a new Swan and is making plans to be Navajo Lake mobile in his houseboat there. W5HWJ is banging out a powerful signal with his new linear. W5NUI reports working W5CPB in Amarillo using a pair of 2N269s with a power output of 200 mw. on 3.770 with a signal RST of 239 and is claiming a new record for QRP. The Manzano Radio Club has filed for affiliation with the ARRL. W5MYM and W5QJH participated in the C.W. SS and each accrued quite a score. WA5FPS has been working the openings on 6 meters and nearly has WAS. Traffic: WA5RBU 37, W5DMG 18, WA5JNC 18, WA5MIY 9, W5MYM 9, W5NUI 8, W5BWV 7, W5NON 4, WA5BLI 2.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7OCX. Traffic nets:

BUN	Daily	7272 kc.	1930Z
UARN	Sat.-Sun.	3987.5 kc.	1500Z

The 1967 Sweepstakes Contest produced an unusually heavy turnout in Utah, both phone and c.w. Many fine scores were submitted to your SCM. W7KSB is now a lifetime member in the ARRL. New appointee: WA7IAW as OVS. The Utah Hamvention will be held Feb. 17, 1968, at the Utah Trade Tech. College at Provo, Utah. The Hamvention will feature guest speakers and activities for everyone. Contact K7JLF or K7SAI for details. W7FYR is enjoying a new 2C. K7CLS is back on 10 meters following repairs to an ailing quad. Congratulations to WA7IAW on winning first place for Utah in the V.H.F. QSO Party. WA7GQD reports that a club group has formed in the Layton area, called the Layton Amateur Radio Club, primarily for upgrading new licensees. Traffic: W7OCX 185, K7SOT 53, WA7BME 47, K7CLS 36, W7VSS 23, K7RAJ 12, K7ERR 9, WA7ENF 2, WAGQD 2.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: K7NQX. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM, K7NQX. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 3920; Wx Net, 0630 Mon. through Sat. on 3920. Tentative dates for the 1968 ARRL Rocky Mountain Convention are June 29-30 in Cheyenne. This is the first time Wyoming has hosted the convention so plan now to keep the dates open so you can attend. K7SAL is in the Air Force taking his basic near Lakeland AFB. K7UVJ/7 now has his WAC award and will be on RTTY soon. The YO Net needs better coverage in the state for traffic-handling. Why don't some of you fellows dust off the key and give it a try?

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The Casper Club gave 6 Novice exams in Dec. Traffic: WA7CLF 400, W7YWW 118, W7TZK 72, K7ITH 47, WA7EUX 43, WA7BPO 29, WA7DNZ 29, K7VWA 29, K7HHW 25, WA7EDC 20, K7SLM 19, WA7EGK 6, WA7FKF 6, K7OVD 5, K7RFL 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAM: WA4EEC. RM: WA4EXA. With the start of the new year we are inviting all operators to join in with their gear and participate in at least one of the section nets. New operators in Limestone County are WB4GZW and WN4GCW. W4ZNI has a new SB-200 linear. W4TCS now is on 146.940-Mc. f.m. Several 6-meter f.m. units now are in operation in Huntsville. Keep up the struggle, W4WGI. WB4CKM and K4ZAJ are active with amateur TV and looking for others who are interested. W5GVE/4 worked VE3EZC on 2 meters Nov. 18. We welcome K4AOZ, W4YER and W4GKO into the s.s.b. world. WA4EEC has been relected as manager of AENM and WA4CCV to the AENO for another year. AENM still is setting the pace in both attendance and traffic. WA4EXA is looking for more c.w. QNI on AENB. There is no better place to build up that speed than on 3575. A reminder for New Year's resolution. How about sending in the Form 1 report cards so that we can give credit where it is due? Your SCM, K4WHW, will be happy to receive them on the nets or through the mail. Traffic: (Nov.) WA4EEC 400, W4FVY 160, WA4FYO 147, K4AOZ 138, WB4DIN 119, WA4VEK 103, WA4EXA 95, WB4EKJ 46, WB4EKK 41, K4WHW 38, WA4VUG 24, K4BSK 23, WA4FAT 22, K4MKU 17, K4UUC 17, WA4ROP 15, W4YER 11, WA4AZC 9, W4FPI 9, K4KJD 8, WA4GGD 7, WA4JSM 7, W4DGH 5, WA4OCL 5, WA4WGF 3, W4ZNI 3, W4WGI 2, WA4WLD 1. (Oct.) WA4EXB 75, K4HJX 49.

CANAL ZONE—SCM, Russell E. Oberholtzer, KZ5OB—KZ5PA, in conjunction with the Canal Zone Welfare Groups, anxiously is awaiting the arrival of Drake equipment. The 40-Meter Canal Zone Emergency Net is going very well. All KZ5s are invited to join the net. Several KZ5s toured the Queen Mary. KZ5GN has his home-brew linear on the air. Get well wishes are extended to KZ5FX. Congratulations to KZ5QA on a brand-new harmonic. Our sympathy is extended to KZ5CT and KZ5SA on the loss of Tom's mother. Lil, former SCM, ex-KZ5TT, was injured in an automobile accident. Traffic: KZ5SF 257, KZ5OA 72, KZ5AD 44, KZ5OB 36, KZ5SS 36, KZ5FN 30, KZ5MV 24, KZ5IK 21.

FLORIDA QSO PARTY P. 126

EASTERN FLORIDA—SCM, Jesse H. Morris, W4MVB—SEC: W4IYT. Asst. SEC: W4FP. RM C.W.: W4ILE. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAM 40M: W4SDR. PAM 75M: W4TUB. V.H.F. PAM: WA4BMC.

ARPSC Net Schedules

Net	*Freq.*	*Time*	*Days*
QFN	3651	2330 & 0300Z	Daily
GN	3651	1300Z	Daily
FATT	3704	0000Z	Daily
FPTN	3945	1200Z	Mon. through Sat.
FMTN	7230	1700Z	Mon. through Sat.
TPTN	3945	2200Z	Mon. through Sat.
FAST	3940	2300Z	Sun. through Fri.
SATN	3945	0330Z	Mon. through Sat.
NHN	7165	1930	Sat.

K4KRG has been transferred to Washington, D.C. Wes has been EC for Orange County for several years and has an outstanding record. W4BKC takes over as EC of Orange County. It is with deep and lasting regret that I must announce that WA4AKS has joined the Silent Keys. Although he was not known too well by some of the ARPSC gang, since he only recently received his OVS appointment, he was known and loved much by me. He was my brother Wayne. I would like to thank all those who sent cards, letters and messages. I hope all those new Christmas rigs are performing as expected. Good luck in the new year. Traffic: WA4SCK 461, WB4AIW 377, WA4NEV 351, K4YSN 299, WA4FGH 255, W4FPC 242, W4ILE 214, WA4PWF 183, WB4HKP 133, W4SDR 118, K4COO 110, WA4TWD 102, WB4DSP/4 98, W4SMK 85, W4TRS 68, WA4HDH 59, WA4OHO 59, K4DAX 57, W4YPX 56, K4SJH 55, W4ZAK 52, W4AKB 48, K4IEX 45, W4IAD 44, W4KHY 43, W4OGX 40, WA4CIQ 36, WA4FJA 35, W4DVO 31, W4NGR 30, WA4NBE 28, WA4BGW 24, W4PBK 23, W4IE 22, K4LEC 20, K4LPS 15, W4TJM 14, WN4FSF 13, W4VPQ 11, W4BKC 10, K4BOM 8, W4CWI 8, WA4YRU 7, K4EBE 3, WN4FLW 2.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAMs: K4PKK, WA4WQU. WN4HLX is building a c.w. rig and putting up a 54-ft. tower

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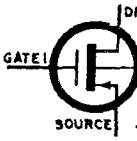

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200 ☐	9¢	1000 ☐	32¢
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200 ☐	9¢	1000 ☐	32¢
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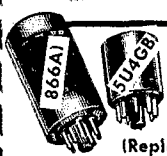

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400 mc NPN SILICON 5 for $1

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Watts	V_{cb}	H_{fe}	ma
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☐ 6.4	☐ 15.	☐ 50.	☐ 100.
☐ 8.2	☐ 22.	☐ 56.	☐ 120.
☐ 9.1	☐ 24.	☐ 68.	☐ 150.
☐ 10.	☐ 27.	☐ 75.	☐ 180.

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PIV	3A	6A	12A	55A
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100	☐ .07	☐ .22	☐ .25	☐ .75
200	☐ .09	☐ .30	☐ .39	☐ 1.25
400	☐ .16	☐ .40	☐ .50	☐ 1.50
600	☐ .20	☐ .55	☐ .75	☐ 1.80
800	☐ .30	☐ .75	☐ .90	☐ 2.30
1000	☐ .40	☐ .90	☐ 1.15	☐ 2.70

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PRV	6* AMPS	8 AMPS	16 AMPS	25 AMPS
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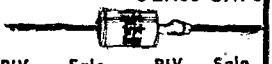

PIV	Sale	PIV	Sale
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85 WATT NPN SILICON

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1 AMP 4000 PIV MICROMINIATURE SILICON RECTIFIERS 1.45

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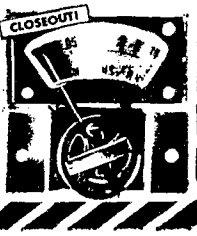
New! Originally designed to be used with radiation detector! Basic meter movement 100μa. 2 mounting holes for easy installation in panel. Size: 2x2½x3¼". Mounting centers: 1-1/16". Ideal for builders, hobbyists, labs, etc. Hurry, at this fantastic price they won't last long!



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FLORIDA QSO PARTY

March 30-31, 1968

Florida Skip, the all-Florida amateur radio publication announces the Florida QSO Party, March 30-31, 1968. Participation is open to all. Florida amateurs are urged to work as many out of state stations as possible, as well as those within the state. This year provisions have been made for multioperator Florida stations.

Times: 1500-2000, 0000-0500, 1400-2400, GMT.

Frequencies: 1815 3530 7030 14,030 21,030 28,030; 3930 7230 14,230 21,330 28,820. Phone and c.w. count as separate contests.

Exchange: Serial number, RST, county for Florida stations, all others state, province or country.

Scoring: Florida stations count 1 point per QSO times the number of states, provinces and countries. Other stations in Florida may be worked, but only for contact points. Outside stations count one point per QSO times the number of Florida counties worked. Bonus points will be given for working Florida counties as follows: first 15, 100 points; second 15, 200 points; third 15, 500 points; all 67 counties 1500 points.

Power: No restrictions.

Awards: Certificates will be awarded to the highest scoring station in each state, province and foreign country (with 5 or more contacts). Certificates will be awarded to the highest scoring single operator and to the highest scoring multioperator station (with 50 or more contacts) in each Florida county. Trophies will be awarded to the highest scoring station in the following categories: out-of-state, Florida single operator, and Florida multioperator.

Logs: All logs must be postmarked no later than April 30, 1968 and mailed to *Florida Skip*, Contest Chairman, P. O. Box 501, Miami Springs, Florida 33166. Please include your name, call, and address in block letters on your log. Your logs should indicate your scoring category and be signed by each operator. A four-cent stamp will bring the *Florida Skip* (June or July) issue with results.

and 10/15 quad. K4QWX is active in Army MARS and the State RACES Net. Georgia winner of the Md.-D.C. QSO Party was K4GSX. W4LRR built a 14-volt 20-amp. power supply and has a new p.p. 7984 final for 2. K4TXK soloed in a Cessna 150 in the AF flight program. W4HYW attended the Old Timers Wireless Assn. and Southeastern DX Club parties.

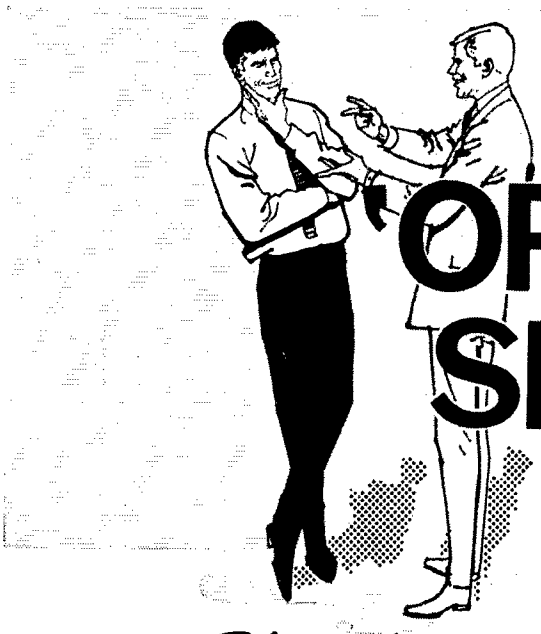
GSSN	3975	0100 Dy.	30 sessions QNI 816 QTC 167
GSN	3595	0000 & 0300 Dy.	59 sessions QNI 495 QTC 167

WB4HSG reports high noise level most of Nov. on 6 meters. W4DV (Amateur Radio Club of Augusta) operated from the Exchange Club Fair. Visitors at the station included HC1RS, W9YLK, KØFLH, W8GCT and WA6GEU. They handled 140 messages. WB4AJR operated in the SS. W4RZL has a new quad at 60 feet. New Augusta hams are WN4HGV and WN4GTV. New officers of the Augusta Radio Club are WA4WQU, pres.; WA4WXU, vice-pres.; WB4ETR, secy.-treas. WA4VVF expects to be more active on nets during the winter. W4ARH is operating at Warner Robbins. Traffic: (Nov.) W4DV 140, W4CZN 109, WB4AJR 96, WA4RAV 78, W4PIM 66, W4DDY 57, WA4WQU 48, WA4LLI 28, W4RZL 24, K4BAI 22, K4JFY 12, WB4HSG 5, W4ARH 3. (Oct.) WA4WQU 116, K4BAI 50, WA4VVF 13.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM: WA4ZGI. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2300Z	Daily	30	650	85
QFN	3651 kc.	2330/0300Z	Daily	60	—	—

Pensacola: The Five Flags Amateur Radio Assn. has been formed with membership open to all local hams. Temporary officers are WA8SQG/4, WA4EPH and K1ZKR/4. The Red Cross traded its a.m. gear for a Swan 350 and is applying for a station license with EC W4NOG as trustee. W8SQG has a Twoer and Big Wheel on the air. WA4EPH, WB4DHZ, WA4ECY and WB4GYX were active in the Nov. SS. We were sorry to learn of the passing of W4DAO/DEF, former SCM of West Fla. Fort Walton: W4SMS, now Tech. Class, and WA4EVU are engineering a 2-meter f.m. repeater station. WA4IYH



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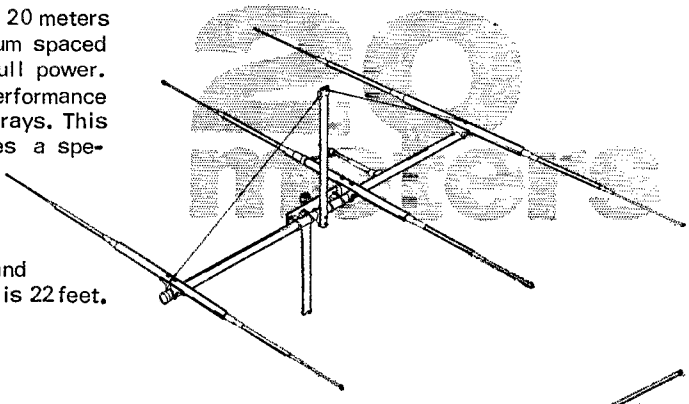
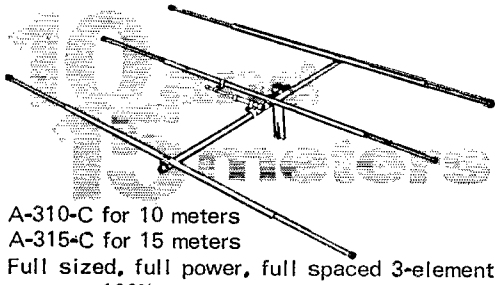
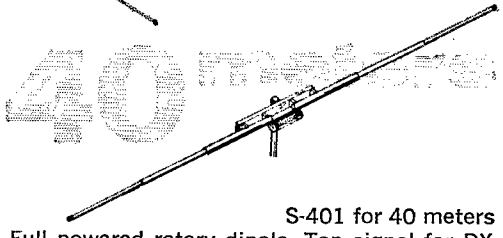
. . . . . The subject turns to Mosley

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





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



S-401 for 40 meters
Full powered rotary dipole. Top signal for DX performance, 100% rust-proof hardware. Low SWR. Heavy duty construction. Link coupling results in excellent match. Length 43' 5⅜". Assembled weight 25 lbs.

For detailed specifications and performance data, write Dept 157.

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has a Swan 500. W4MTD is back in town, for good, Panama City: WA5FTN/4 is active on v.h.f. with a Knight TR-108. Chipley: W4IKB picked up 3 new countries on 20-meter RTTY. Blountstown: K4YSQ is moving to Port St. Joe. Apalachicola: W4GWU was appointed EC for Franklin County. Tallahassee: WA4APB/4 is a regular on QFN while attending FSU; he also QNIs WFPN. Madison: WA4GHE switched from 6-meter a.m. to 2-meter f.m. and has made several out-of-town contacts, including W4CYG in Lake City. Traffic: K4BSS/4 134, W4BVE 126, WB4GYX 46, W4IKB 22, WA4EOQ 12, WA4EPH 8, WB4FLK 2, WA4GHE 2.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—PAM: W7CAF. RM: K7NHL. Congratulations to K7NHL on his Certificate of Achievement for 45 w.p.m. issued by the Connecticut Wireless Association. Arizona stations active on the TWN C.W. Net are K7NHL, K7UYW, W7DQS, WA7BVN and WA7FNN. WA7GOG again operated live ATV to the amateur radio display at the Arizona State Fair. Two-way voice was done on 6 meters. The operator and visitors at the fair could see the operator at WA7GOG on TV while working him from the fair station, WA7AOW, on 6 meters. Operators at the ATV transmitter were K7PTU, K7-JMR, K7YEX, K7AAB, K7IJS, WA7CBO, WA7HAD and K7MLE. Traffic: K7NHL 444, K7UYW 19, W7-FKK 16, W7DQS 2.

LOS ANGELES—SCM, Donald R. Etheredge, K6-UMV—SEC: K6QPH. Newly-appointed Asst. SEC is K6AVQ. W6MLF, W6QAE, WB6BBO and WB6GGL all earned the BPL certificate for their Nov. '67 traffic duties. ORS W6HUJ reports operation on 20 meters during the day with his inverted "V." K9ELT has changed QTH. WB6WDS is being initiated in traffic circles on the So. Cal. Net (SCN). W6AM operated as FP8DW recently. W6TXJ is now 40-meter mobile monitoring WESTCARS Emergency Net on 7255 kc. W6-YRA lost a transmitter at UCLA. However, he expects to be active again shortly. WB6SXY has a new tribander up. WA6OKZ gave a disaster communications demonstration to the L.A. Red Cross Director. W6-LVQ has a new job. WB6WWI reports the Pasadena Cadets CAP is holding a Novice/Technician license class. WB6OON has a new 2-meter transceiver. The Ramona RC (K6SIR) is working with the Alhambra School District on foreign country contacts with exchange students here. Los Angeles City RACES is active with the call K6ROC. W6VZA is sending code practice from the San Gabriel area at 2030 Mon. (local time) on 145.3 and 29.63 MC. W6FD recently returned from a trip to England/Scotland. New officers of the W6SD SFVRC include WB6JXY, pres.; WB6VOI, vice-pres.; WA6ZNQ, secy.; WA6KOE, treas. and W6LPJ, WA6-ILI and WB6OOX. The So. Cal. V.H.F. Club, K6-BPC, was active in providing communications for the annual kayak races at Hoover Dam. WA6KZI is publishing an excellent bulletin for traffic oriented amateurs, *Zero Beat*. The WVARC is attempting to regain the old call of K6DTA. WB6QZF is a new secy. for W6LS. OVS W6ORS has accepted a new job in W1-Land and will be moving shortly. A past job well done, Corky! The 1968 Southwest Division Convention in Phoenix is set for Labor Day week end. The So. Cal. Net (SCN) meets daily on 3600 kc. at 0300Z. A standing invitation to join the AREC and/or traffic-handling nets is extended. Club bulletins are solicited as well as news from individuals and should be sent to K6UMV, address page 6 of each QST. Traffic: (Nov.) WB6BBO 1057, WB6GGL 602, W6MLF 581, W6-QAE 529, W6FD 322, W6MLZ 306, WA6KZI 286, K6-CDW 191, W6OEO 188, W6BHG 102, W61VC 91, W6HUJ 54, WB6QMF 37, K6LJ 36, K9ELT/6 34, WB6TMC 33, WB6SLG 30, WB6AEL 27, K6UMV 25, WB6KGK 23, WB6WDS 23, K6ASK 19, W6AM 16, W6TXJ 12, K6KA 9, WB6SXY 8, W6PCP 4, WB6UHF 4, W6USY 4, W6-DGH 3, WB6OLD 3, W6TN 3, W6YRA 2, WB6OUD 1, W6RCV 1. (Oct.) W6FD 50.

ORANGE—SCM, Roy R. Maxson, W6DEY—WB6RVM is the new EC to assist SEC WA6ROF. PAM WA6IDN has moved to Orange and reactivated. K6QEH, Hughes Radio Club, has all 48 members belonging to ARRL and is doing an outstanding job of traffic-handling for the service personnel in Viet Nam, per K6IBI. ORS WA6OQM made the BPL once again. ORS WB6TYZ, K6QEH and K6IBI also made the BPL. SEC WA6ROF has been invited to serve on the Orange County Red Cross Disaster Committee. WA6VFI is a new AREC member. WA6PTU, K6MJU, WA6QZA, W6-FB and W6DEY are members of the West Coast Amateur Radio Service, WCARS, which holds forth daily on 7255 kc. This net is doing an outstanding service and exemplifies the spirit of amateur radio. W6FB's new DX is VP8IE, 5V1KG, TJ1QQ and ZD5X No.

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SPECIFICATIONS

FREQUENCY RANGE: 3.5-4Mc, 7-7.5Mc, 14-14.5Mc, 21-21.5Mc, 28-30Mc (3 more 500KC receiver bands can be added).
FREQUENCY STABILITY: Less than 100 c/s drift in any 30 minute period after warm up.
ANTENNA IMPEDANCE: 50 to 120 ohm unbalanced.
MAXIMUM INPUT: 500W P.E.P. SSB, 440W CW, 125W A.M.
CARRIER SUPPRESSION: —40db
SIDE BAND SUPPRESSION: —50db (at 1,000 c/s)
DISTORTION PRODUCT: Down at least 25db
AUDIO BANDWIDTH: 300-2,700 c/s
RECEIVING SENSITIVITY: 0.5uV,. S/N 20db (14Mc SSB)
SELECTIVITY: 2.3Kc (—6db), 3.7Kc (—55db)
IF AND IMAGE RATIO: More than 50db
AUDIO OUTPUT: 1 watt @ 5% distortion
OUTPUT IMPEDANCE: 8 ohm, 600 ohm
TUBES AND SEMICONDUCTORS: 18 tubes, 9 transistors and 33 diodes
POWER SOURCE: AC 117 volts, 50/60 c/s
DIMENSIONS: 15¾" wide x 6¼" high x 13¾" deep
WEIGHT: 50 Pounds

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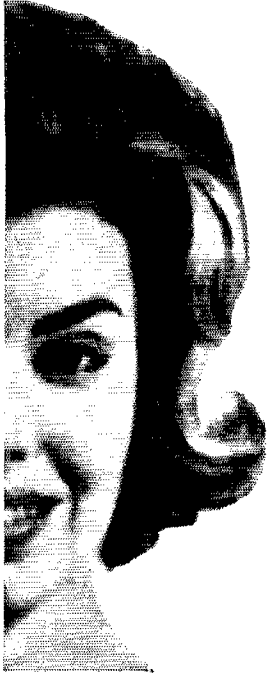
225. He also had W6WPH and W6OOA as visitors and worked GB5QM (went across the Atlantic on her in Sept. 1942). K6GMA has a 75-meter dipole up and is back in business. EC WB6JFO and OVS WB6MWL advise that the 6-Meter AREC Net is improving greatly. The ARPSC now includes RM K6IME, SEC WA6ROF and ECs WB6RVM, WB6QAK, W6BNX, WB6JFO, WB6CQR, WA6GQJ, K6CID, WA6TAG and K6GGS. *Join up now!* Traffic: *(Nov.)* K6IBI 488, K6QEH 423, WB6TYZ 255, WB6RJX 252, WB6JFO 229, K6MCA 226, WA6ROF 138, WA6RQK 125, WA6OQM 107, WA6QZA 96, WA6IDN 69, WA6PTU 55, WB6RVM 34, WB6MWL 9, WB6TIF 8. (Oct.) WB6RJX 179.

SAN DIEGO—SCM, James E. Emerson, Jr., WB6GMM—RM W6VNQ is the proud possessor of an Extra Class ticket which he obtained after 30 years. November saw several of our locals travel down to Baja, Calif., Mexico, to aid the hams down there. WA6COE is helping to establish a missionary radio station. SEC W6SK, RM W6BGF and W6KSI journeyed to Tecate to meet with the Baja Search and Rescue Club to set up long-haul communication supporting the rescue mission. K6KX and W6BGF attended a joint SET meeting in Riverside with the Orange section ARPSC. All San Diego section ECs met at the home of W6VNM, Asst. SEC, to firm up our local ARPSC. The 5th Annual Christmas Dinner Party held by the San Diego V.H.F. Club met with its usual great success. WA6COE has completed WAS from his new QTH. WB6GMM intends to go after the DX in '68; he moved to a new QTH, put up a 54-ft. tower and now runs the LK-2000 in back of the Drake Line. K6JLJ reports having a grand time in the Sweepstakes. OBS WA6QAY has moved to Poway and is very active on SCN. W6LRU, former SCM, received the BRATS Award from SCN. Keep up the good work, Don. All the best in the New Year. Traffic: K6BPI 9167, W6VNQ 589, W6EOT 522, W6BGF 443, W6LRU 409, W6QJW 72, WB6GMM 49, WA6QAY 2.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: K6GV. New officers of the Santa Barbara ARC are K6EAQ, pres.; WB6JQL, vice-pres.; WB6FZU, secy.; WB6SNH, treas. WB6DRY and W6OED are new Extra Class amateurs. The two-letter call is anxiously awaited after being stuck with WB6DRY. W6ORW has a new 60-ft. tower, Classic 33 and Ham M rotator to help his signal on its way. W6ORW reports that he will be on RTTY soon. W6GEB was active during the C.W. Sweepstakes and reports 407 contacts for a score of 74,004. WB6BWZ is a very active EC in the Santa Maria area and has developed an excellent emergency plan for Santa Maria-Vandenberg. All those interested in ARPSC activities and emergency communications should contact WB6BWZ at P. O. Box 1329, Santa Maria. WA6MGG is in the process of moving in Atascadero. Speaking of Atascadero, whatever happened to W6NY? WB6DRY has moved his mobile ham shack to a higher rent district but doesn't seem to have the antenna farm he once had. Traffic: W6OED 16, W6ORW 12, WA6MGG 1.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO, RM: W5LR. The Christmas Season seems to be the one time of the year when the various clubs try to get together and I received announcements of many parties, dinners and other type of meetings. I would like to have been able to attend all of them but that was a physical impossibility. I hope all were well attended and that the fellowship was worth while for those who sponsored the meetings. November was a sad month for many of us; several old-timers were added to the list of Silent Keys. W5ALK, one of the pioneers of the old 5-meter band, did much for the fraternity in the developing of antennas. Max also was active on the 10-meter band and contributed many ideas for the mobile operation on that band. W5PTL, another mobile enthusiast and organizer of emergency nets in this area, was active in getting recruits for the fraternity. The 7290 Traffic Net had 42 sessions with 1586 stations and 1181 messages handled. The NTTN had 30 sessions with 1416 checking in and 275 messages handled. K5LZA is the new manager of the NTTN. K5LZA says he will accept smoke signals or carrier pigeon; in other words, any way to get the traffic. WA5AGH is to be complimented on the fine job he has done as net manager. It was necessary for Bill to resign because of his job requirement. Don't forget to make plans to attend the West Gulf Convention in San Antonio June 7-9, 1968. This also is a national convention so you can expect an FB get-together. Traffic: (Nov.) K5BNH 674, K5LZA 57, W5PBN 42, WA5QQR 29, W5JSM 16, WA5QQQ 4. (Oct.) W5LGY 2. (Sept.) W5LGY 30.



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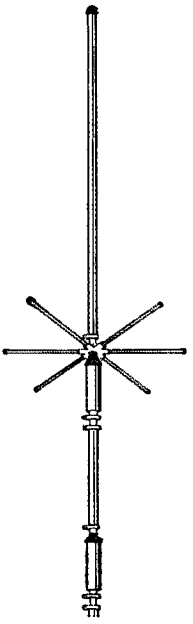

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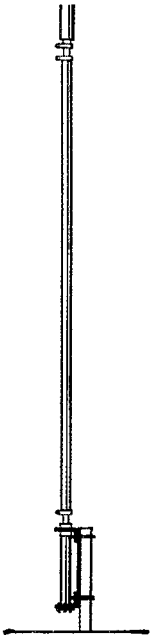

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OKLAHOMA—SCM, Daniel B. Prater, K5CAY—SEC: K5ZCJ. RM: W5QMJ. PAM-75: W5PML. We are glad to hear that WA5REL picked up his General Class license. WA5KNR is back as NCS on STFN on Mon., to the delight of everyone. WA5RBD is holding his own as NCS on Fri. WA5NYC is mobile now with a 140-D and is receiving good reports. K5YEE has a new TR-4. The '68 Aeronautical Center Amateur officers are W5UZX, pres.; W5VRV, vice-pres.; W5EHC, secy.-treas.; WA5KFT, asst. to pres. K5OCX reports he made 6075 contacts in 72 sections during this year's Sweepstakes Contest. He used 150 watts with A-1 emission. RM report: OLZ, 17 sessions, 91 stations, 34 messages. SSZ, 15 sessions, 32 stations, 31 messages. Oct. (late report): OLZ, 22 sessions, 47 messages. SSZ, 21 sessions, 39 messages. New net controls on OLZ: Mon., W5FEC; Tue., W8VDA/5; Wed., W5QMJ; Thurs., K4QIY/5; Fri., W2FIR/5. New NCS for SSZ are: Mon., WA5OHX; Tue., W5MFX; Wed., K5IBZ; Thurs., K5MBK/5; Fri. W5QMJ. Many thanks to all who helped me during the time I was SCM. Traffic: K5TEY 2202, WA5KZA 146, WA5IMO 96, W5QMJ 87, K5DLP 56, WA5KNR 50, W5FEC 28, W5MFX 27, W5OLB 24, W5DRZ 21, WA5OHX 15, W5PML 13, K5OCX 9, K5WPP 4. WA5DZP 3.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. W5ABQ reports his antenna mast was broken by a high wind but he gets better reports on signal with the antenna draped over a pecan tree. EC W5TFW reports the Beaumont ARC is holding Novice classes. W5OAU has a 15-watt c.w. rig going. WA5QKE added some new countries. PAM W5KLV advises the Bexar County Emerg. Net is passing out the word on the 1968 Hemisfair. K5WYN is back from a trip and telephone relaying for the hospital. WA5MBC is now Extra First with a new ground plane for 40-10 meters. EC W5DAA is getting back to normal after several visits to the hospital. W5KR's Southmost ARC news indicates K5QGY was on a motor trip to Panama. K5HMF does some operating from the KUHT-TV transmitter site. He has an antenna strung between guys up about 150 feet. W5KPB, W5ABQ, WA5MBC, W7WAH/5 and W5QJA have been doing a nice job as NCS for the TEX Traffic Net on 3770 kc. daily at 1900 and 2200 CST and will welcome check-ins with or without traffic. The West Gulf Emergency Net meets on 3945 kc. Sun. mornings at 0800 CST. South Texas Emergency Nets attendance is holding up also. Because of a change back to good old Central Standard W5ABQ found it necessary to revise his OBS schedule as follows: Mon. 3700 kc. Novice speed at 2130 CST, Tue. same speed and time with additional schedules on Tue. at 2100 and 2145 CST on 3770 kc. for TEX Tfc. Net information. Traffic: WA5QKE 183, K5HZR 145, W5QJA 138, WA5GZX 77, W5ABQ 52, WA5MBC 49, W5BGE 47, W5KLV 43, W5EZY 42, W5TFW 42, K2EIU/5 39, W5AIR 26, WA5IQL 25, W5OAU 20, W5AQN 14, K5HMF 4.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK. PAM APSN: VE6ADS. ECs: VE6SA, VE6SS, VE6XC, VE6PL, VE6AFQ. ORSs: VE6BR, VE6ATH, V6ATG. OPSs: VE6HM, VE6SS, VE6AFQ. OBSs: VE6HM, VE6AIF. OOs: VE6HM, VE6TY. Check 3700 kc. and 3650 kc. every night at 0200Z for code practice. Your new executives for the NARC are VE6UD, pres.; VE6KF, vice-pres.; VE6VF, secy.-treas.; VE6AOG, program; D. Court, activities; VE6AKY and VE6AQE, membership; VE6VU, publicity; VE6EA, v.h.f. Looking for Camrose? Call VE6AHN: he might be listening. We would like to see all control stations of the APSN use GMT time, which is 0130Z. It is much better for handling traffic. We are looking for a c.w. station that can take traffic from the B.C. C.W. Net on 3650 kc. at 0300Z. If any of you are willing, please drop me a line. The Vulcan Radio Club is conducting another class. Also Calgary has a class of about 35. Hoping to hear more from Edmonton in the near future. Traffic: VE6HM 54, VE6ATH 37, VE6TG 11, VE6AKV 6, VE6SS 5, VE6AOO 4, VE6TY 4, VE6AFQ 2, VE6AFW 2, VE6BL 2, VE6PZ 2, VE6WN 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—The month of November was a sad month; VE7LL and VE7AEY became Silent Keys. Missing in flight from Vancouver to Prince Rupert at this writing are VE7APH and VE7RT. VE7DF has retired from the DOT and will be active in Victoria. BCEN RM and Manager VE7ASY reports large gains in net activity, 3650 kc. at 0230 GMT. VE7BAV and the University of British Columbia, held question sessions for grade twelve students hoping to make varsity. SNC for VE7BRF, VE7AMI, VE7KZ, VE7AXH, VE7BPU, VE7FQ, VE7BVG, VE7BWA, BCEN members. Columbia ARC mem-

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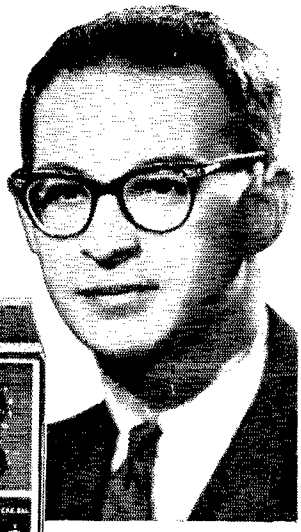
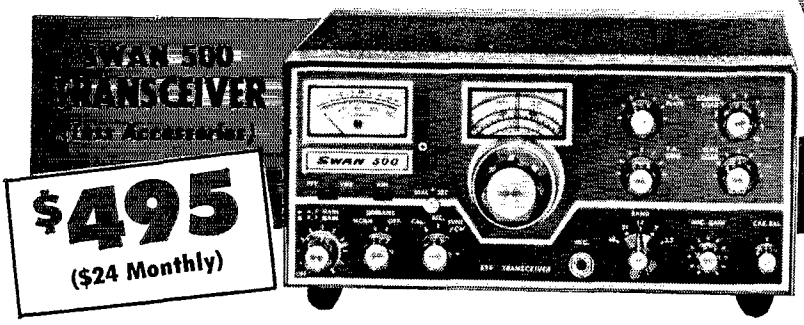


Larry Meyerson
WØWOX



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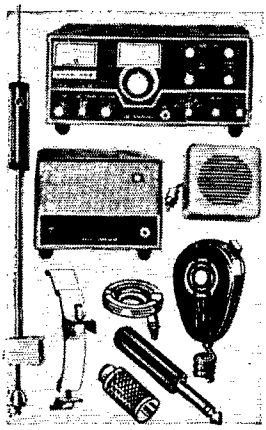

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bers showed off their pet homemade projects. Fort George ARC reports increased 2-meter activity and code and theory classes under VE7BWP. The BCARPS Net has been averaging 45 check-ins per night. Traffic: (Nov.) VE7ASY 225, VE7BHH 219, VE7BLS 23, VE7-FQ 19, VE7BUG 15, VE7BAV 12. (Oct.) VE7BLS 19.

MANITOBA—SCM, John Thomas Stacey, VE4JT—It is with regret that I report the passing of VE4HD, of Brandon. VE4UM continues its activity on the Canadian University Press Net and reports that this activity is growing at the various campuses across the country. VE6APR, ex-VE4AE, was a visitor to Winnipeg during November. VE4HI is back on 10 meters. VE4RO is active on 80 c.w. from Killarney and checking the c.w. net regularly. VE4EI, our RM, is pleased to see the new hams taking to the c.w. net but requests help from the Winnipeg gang to keep representation up. The Brandon ARC has produced a few more successful hams from its course and is well underway with the fall winter classes. Reports are rather skimpy and I would again impress upon you the fact that this column can survive only if the reports are forthcoming. We have a regular reporting form which is yours for the asking and takes but a few minutes to complete. We still need an OO, several OPS and OVS appointees. If interested, please let me know. Traffic net reports: Phone Net sessions 30, QNI 566, QTC 18. C.W. Net: sessions 30, WNI 142, QTC 89. Traffic: VE4JT 57, VE4EI 53, VE4NE 53, VE4YC 19, VE4UM 17, VE4EF 14, VE4XN 7, VE4RW 6, VE4QJ 5, VE4-FO 3, VE4GN 3, VE4JA 2, VE4RB 2, VE4DQ 1.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ. The 1967-68 executives of the HARC are VE1TG, pres.; VE1ASN, 1st vice-pres.; VE1ATC, 2nd vice-pres.; VE1-AQS, treas.; VE1AFN, secy. VE1ALS is a new amateur in the Halifax area and is using a Ranger II and Knight R-100 to a long wire and vertical. VE1IT and VE1AMS received their Advanced Class tickets. Congratulations, gals. The winner of the CBCARC 1967-68 Technical Achievement Award was VE1AMC. VE1-PB has moved to Mount Royal, Que. Congratulations to VO1BS on winning the Fred Eckiel Award and to VO1DA/VO2 and his XYL on the arrival of their first jr. operator. Best wishes to VO2AC and his new XYL. VO1AW now has his 160 country sticker for DXCC. The flow of traffic was very encouraging over the holiday season. Let's hope this is an indication of 1968 results. Traffic: VE1ARB 26, VE1AAX 14, VE1AMR 9, VE1ABS 6, VE1MX 4.

ONTARIO—Acting SCM, Rees Powell, VE3DJK—By the time you read this we will have a new year and a new SCM. We will be passing on to him all the information we have gathered from all of you over the past six months which, we expect, will help him improve the c.w., phone and RTTY communications

(Continued on page 98)

Modern Power-Supply Design

(Continued from page 23)

better diode, the one with 3-megohm back resistance, gets 150 volts. The other diode gets 50 volts. The better diode will break down.

If we put a swamping resistor across each diode, as shown in Fig. 8C, the resultant resistance across each diode will be almost the same, and the back voltage will divide almost equally. A good rule of thumb for resistor size is this: Multiply the p.i.v. rating of the diode by 500 ohms. For example, a 50-p.i.v. diode should be shunted by 50 × 500, or 25,000 ohms.

The shift from forward conduction to high back resistance does not take place instantly in a silicon diode. Some diodes take longer than others to develop high back resistance. To protect the "fast" diodes in a series string until all the diodes are properly cut off, a capacitor should be placed across each diode.

Fig. 8D shows the complete series diode circuit. The capacitors should be noninductive, ceramic disk, for example, and should be well

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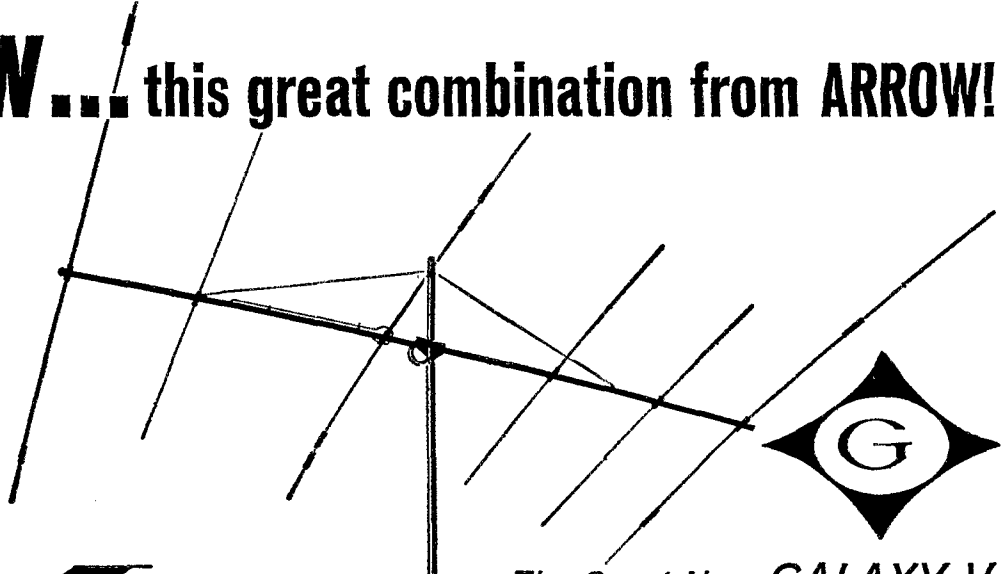

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matched. Use 10-percent-tolerance capacitors if you can.

Diodes in Parallel

Diodes can be placed in parallel to increase current-handling capability. Equalizing resistors should be added as shown in Fig. 9. Without the resistors, one diode may take most of the current. The resistors should be selected to have about a 1-volt drop at the expected peak repetitive current. QST

Edsel Murphy's Laws

(*Continued from page 59*)

power source, voltmeters in series with it.

3) The probability of an error in the schematic is directly proportional to the trouble it can cause.

D. — *Test*

1) Identical units tested under identical conditions will not be identical on final test after being buried under other components and wiring.

2) A self-starting oscillator won't.

3) A crystal oscillator will oscillate at the wrong frequency — if it oscillates.

4) A p-n-p transistor will be found to be an n-p-n.

5) A fail-safe circuit will destroy others.

E. — *Operation*

1) If a circuit cannot fail, it will.

2) A transistor protected by a fast-acting fuse will protect the fuse by blowing first.

3) Probability of failure of a component is inversely proportional to the ease of repair or replacement.

F. — *Trouble Shooting*

1) After the 24th cabinet-to-chassis screw has been removed to replace the under-chassis fuse, it will be observed that the line cord plug has become disengaged from the a.c. receptacle.

2) After the last of 24 cabinet-to-chassis screws has been assembled, the driver tube will be found under the schematic on the bench.

3) The bleeder resistor will quit discharging the filter capacitors as the operator reaches into the power supply enclosure.

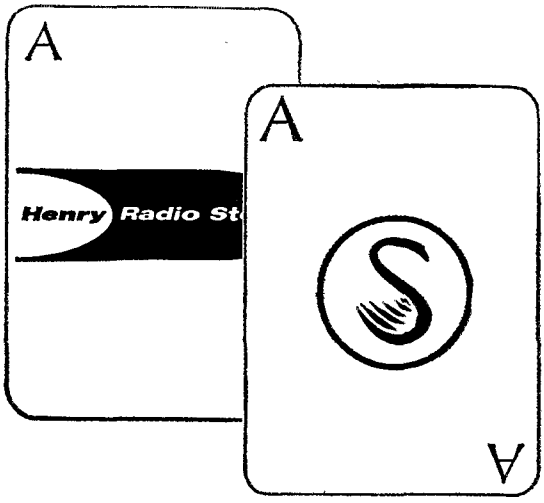
G. — *General*

1) In an instrument or device characterized by a number of plus-or-minus errors, the total error will be the sum of all errors adding in the same direction.

2) In any given miscalculation, the fault will never be placed if more than one person is involved.

3) All warranty and guarantee clauses become void upon payment of final invoice.

The man who developed one of the most profound concepts of the twentieth century is practically unknown to most of us. He is the victim of his own law. Destined for a secure place in the engineering hall of fame, something went wrong. QST



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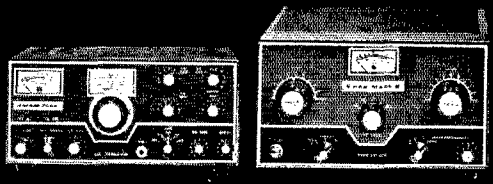

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RTTY SS Results

(Continued from page 65)

"Congratulations to CARTG for the success of the big effort." — *VO1BL*

"Am sure CARTG will be well-known now. Good contest." — VE4FG

"Did pretty well with less than 100 watts and 2-element beam only 8 feet off the roof." — *WA2YVK*

"Great contest, but I was sure glad to see it end!" — *WA8BOT*

"Hope to do better next year." — *PA0LBN*

"The hundred-point bonus very effective in encouraging multiband operation. Where were the ZL and KL7 stations? Contest lots of fun, and worked three new countries." — *K5OLU*

"Exchange points table is a handicap for Zone 14. Forty-eight hours is really long and hard." — *ON4BX*

"Only been on RTTY three days prior to the contest, and TU packed up just as I got started." — *VE3FPJ*

"One thing I am sure everybody agrees on: it was by far the best yet." — *W8CQ*

"No gripes here — just thanks and best luck and some headache tablets." — *W2RUI*

"I realized the time factor probably was not on my side if I didn't keep them short." — *KP4JM*

"Thanks for the fun I had with the Test." — *DL1VR*

"Enjoyed the contest but not the paperwork, hi." — *K4VDM*

"Had to QRT to let neighbours sleep, then had to QRT to move to new QTH. Lost log in the move." — *VE2HL*

"Please don't schedule the Sweepstakes the same weekend as the Phone CD Party next year." — *WA8CFK*

"Sorry I could not take advantage of full hours (busy with work). Hope to participate again in the future." — *PJ2CR*

"Enjoyed the contest more than I thought I would." — *VO1DZ*

"Hope you drop the bonus scoring next year. You did succeed in getting all bands used. Enjoyed myself immensely." — *WA6WGL*

"Nice to work 3C3RTT on two bands. Next year hope to have better TU to fight for weaker signals from DX." — *WA4TTG*

"My first try. Congrats to the gang there for a fine contest." — *3C3DR*

"First contest for me." — *WB2ITZ*

"Didn't even print a VE. Guess on at wrong time, or band conditions. Watch out next year!" — *W6QFE*

"Had many more contacts but they lost me in QRM. Will have to get more power." — *G3IYG*

"Enjoyed it very much. Regret we could not work other bands due to equipment failure." — *KZ5KR*

"How about giving bonus points for 170 shift?" — *K2YEQ*

"A pat on the back to you for your efforts in getting it arranged." — *VE3FHQ*

"Not much time to operate, but lots of fun." — *W6TX*

"Thank you, gentlemen, for making this contest possible." — *W2UJS*

—•••—

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Happenings of the Month

(*Continued from page 73*)

across the signals for the first time to identify the transmissions as properly amateur.

There is pending before the Commission a petition of the League, RM-886, requesting that the band from 144.0 to 144.1 megacycles be made available only for A-1 emission. If that proposal is adopted, it will be necessary to exclude "slow scan" television from that portion of the 144-megacycle band.

Respectfully submitted,
The American Radio Relay League, Incorporated

225 Main Street
Newington, Connecticut 06111

By Robert M. Booth, Jr.
Its General Counsel

1100 Vermont Avenue, N.W.
Washington, D. C. 2005
December 1, 1967

The SSS 80-40

(*Continued from page 16*)

If additional selectivity is desired ahead of the mixer, the circuit of Fig. 4 can be inserted between the antenna feeders and J_1. It should be peaked for the receiving frequency in the same fashion as when adjusting C_1. The tuner is also handy for receiving with short hanks of antenna wire. A few feet of wire can be attached to the hi-Z end of L_7 (rotor terminal of C_5) and the tuner will peak the incoming signal. It is unlikely that the tuner will be necessary if a toroidal inductor is used at L_2. It should be useful, however, if a Miniductor oil is employed in that part of the circuit.

A larger battery pack, perhacps with 6 size-D cells in series, will give longer life and will provide a "stiffer" power supply. With the penlight cells, there is a slight tendency for the supply voltage to shift downward at high settings of the audio gain control. The voltage change causes the slight shift in operating voltage at Q_2, varying the oscillator frequency. This causes the strong c.w. signals to sound a bit chirpy, and makes the s.s.b. signals seem slightly distorted. At low audio levels the condition doesn't show up. Another solution to the problem might be the addition of a 6-volt Zener regulator in the collector supply lead of Q_2, to hold the oscillator voltage at a fixed level during variations in battery voltage.

The no-signal current drain of the entire receiver is 10 ma. At normal listening volume (using the speaker) the drain varies between 25 and 50 ma. The set will draw as much as 180 ma. when the volume is turned up high on a strong signal. It can be seen from this that it is advantageous to use headphones if battery life is a consideration. Not nearly as much output is required from the audio portion of the set — the section which draws the bulk of the current — during headphone operation.

The sensitivity of the receiver is good. On both bands a 0.1 μv. c.w. signal was plainly audible at room level. A 1-μv. signal should be perfectly Q_5 when QRM and QRN are not present. QST

Silent Keys

IT is with deep regret that we record the passing of these amateurs:

W1BEN, Sidney V. Gage, West Boylston, Mass.
W1HWH, Irving C. DeHart, Windsor, Conn.
W1MFT, Robert W. Williams, Bridgeport, Conn.
K1MXT, John H. Gough, North Quincy, Mass.
K1TEE, Robert Cameron, Chelmsford, Mass.
K1UEB, William A. Somerby, Jr., Franklin, Mass.
W2JEX, Jesse N. Sternberg, Elmont, N. Y.
W2OY, Myron H. Premus, Lancaster, N. Y.
W2SFT, William Wilbur, Rome, N. Y.
W3CHU, Theodore Jones, West Chester, Penn.
W3CZD, Harry D. Vierling, Arnold, Md.
K3KIV, Raymond G. Dender, Philadelphia, Penn.
W3MAC, Lew J. Papp, Easton, Penn.
W3NO, L. Robert Evans, Baltimore, Md.
W3QXG, Robert Ramsey, Greensburg, Penn.
W3SGT, Nicholas R. Szware, Pittsburgh, Penn.
W4DA, Cicero Lucas, Washington, Ga.
WA4DCV, Joseph N. McIntire, Goldsboro, N. C.
W4DLF, Edward T. McLoughlin, Clearwater, Fla.
W4NTM, David Leaptrot, Hardwick, Ga.
W4UFJ, John Guin, Aiken, S. C.
W5FCP, Robert Jackson, Dallas, Texas
WA5MKB, Robert V. Parkison, Fayetteville, Ark.
K5MKE, Emory W. Thomas, Shreveport, La.
W6BQY, F. L. Talley, Sr., Santa Cruz, Calif.
WA6CAM, George Schroder, Aptos, Calif.
W6TKK, Robert H. Becker, Balboa Island, Calif.
W6UFT, Charles H. Schwab, Oakland, Calif.
W6YUR, Everett Parker, Santa Cruz, Calif.
K6ZRX, Lathrop C. Brown, Napa, Calif.
W7ASF, Stanley Rand, Portland, Ore.
W7CIS, Melvin E. Syms, Palouse, Wash.
W7OJY, James B. Glackin, Gig Harbor, Wash.
W8DXB, Homer Kohli, Spencer, Ohio
W8EJR, Otto W. Barted, Bay City, Mich.
K8HBK, Robert L. Hirbe, Lorain, Ohio
W8UEV, Elbert J. Volle, Cincinnati, Ohio
W8UPB, Dana E. Cartwright, Cincinnati, Ohio
W9CHQ, Charles Pounds, Sr., Centralia, Ill.
K9CLL, Jerome F. Firner, South Bend, Ind.
W9NNB, James Trout, Indianapolis, Ind.
K7OTJ, F. A. Doyon, Seattle, Wash.
K9RHC, David F. Graf, Morton Grove, Ill.
W9VP, M. E. Clark, Cambridge City, Ind.
W9WXZ, Howard G. Newbouer, Oconomowoc, Wis.
W9ZAW, Douglas Wheelock, Martinette, Wis.
WØAJU, Melvin G. Bullock, Richmond Heights, Mo.
WØDRK, Al Ulstad, Appleton, Minn.
WØDWK, Alvin R. Ueleke, Jackson, Mo.
WAØHJX, Charles W. Shaw, Denver, Colo.
KØJCJ, Martin J. Libor, Delano, Minn.
KØKYK, Orlen O. Hunstad, Jasper, Minn.
KØLEW, Joseph E. Salisbury, Charles City, Iowa
WØOJG, William H. Knutzen, Aitkin, Minn.
ex-VE1WW, Welsford A. West, Halifax, N. S., Canada
VE7AEY, O. J. Wheatley, Surrey, B.C., Canada
VE7LL, Willis R. Durbin, Westerman Bay, B. C., Canada

World Above 50 Mc.

(Continued from page 84)

and a pair of W1HDQ 11-element Yagis. December 4th was good for W9BRN, Indiana, when Dick worked W3RUE and K4EJQ, after having worked WØDRL, Kansas, 565 miles, and KØDOK, Missouri, the previous evening. Dick says there were some 40 signals in the first one hundred kilocycles of the band the evening of the 4th! In Kansas, WØDRL reports the same openings and that he has his 88-

element Yagi array in operation. Al says WØMJU and WAØENM, both in Kansas, are also active.

Also on December 3rd, W9OKB at Niles, Illinois copied three transmissions from W8MNT, Michigan, (ex WØIDY) over a 240-mile path — on *1296 Mc.* W8MNT was running some 40 watts output to a 7-foot dish, and W9OKB was listening with a 3-foot conical dish and *Handbook* converter. *Thanks, Ken, for the very interesting report.*

VE3DKW wants 432 schedules saying he has 150 watts into a 48-element collinear. TI2NA, Costa Rica, expects to be ready for 432 e.m.e. this month with 100 watts and a 208-element Yagi array.

An Unusual R.F. Amplifier Circuit

(Continued from page 46)

ohmmeter polarity, the resistance should be around 1000 ohms; with reverse polarity, the resistance should be about 9000 ohms. If these readings are not met, check the wiring, especially the transistor connections.

"If the readings are OK, connect a 50- to 60-ohm 2-watt carbon resistor to the r.f. output terminals. Plug in an 80-meter crystal (or 80-meter v.f.o.) at the appropriate points. Connect the probe (Fig. 1) to the output terminals. Connect 9 to 12 volts to the supply terminals and close the key. Adjust C_1 for maximum reading on the probe meter. The r.f. probe reading should be 7 to 10 volts with a supply current of about 150 ma.

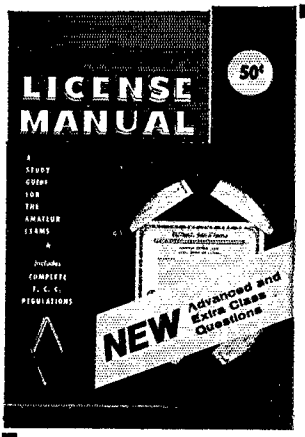
"Finally, connect an antenna through a matched 50-ohm line, using an antenna tuner if necessary, and start operating.

"A word about L_4: This functions as an autotransformer to match the load to the transistor. Maximum r.f. voltage across the dummy load is the objective. It would probably be better to use a separate switch so the turns ratio could be varied independently of the band switch."

Some experimenting with the size of L_4 and the positions of the taps is in order, although the coil specified in Fig. 1 works satisfactorily.

At 12 volts, the total supply current was 140 ma. on the model we tested. Of this, 115 ma. went to the collector of Q_2, the remainder being the driver current. Both currents increase with increasing supply voltage; at 18 volts the Q_2 collector current was 200 ma. and the total current 240 ma. Power output (on 80 meters, using an 80-meter crystal) was close to 1 watt at 12 volts and approaching 2 watts at 18 volts, measured with an r.f. ammeter into a 52-ohm load. (The usual r.f. voltmeter measurements are not too reliable with transistor amplifiers as the harmonic output is high, distorting the waveform so that "turnover" effects in a peak-reading voltmeter give misleading readings.)

Higher voltages can be used without damaging the 2N3053s, but if the key is held down any length of time the collector current rises and the output drops off. With c.w. keying the collector current is stable at 18 volts, and at 12 volts the key can be closed for long periods with no change in collector current. — *W1DF* QST



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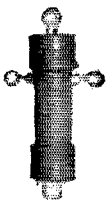

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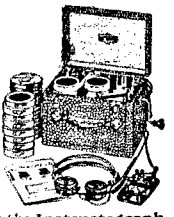

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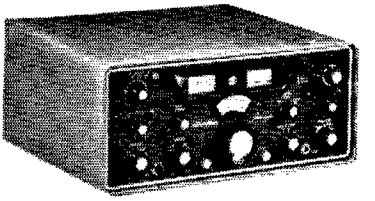

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A Zero Beating Method

(Continued from page 19)

tive reactance of the choke at the a.f. operating frequency. When there is only a very small difference between two frequencies to be measured (and therefore a small change in capacitance), the percentage change in frequency is almost directly proportional to the *negative* of the percentage change in capacitance.

Appendix C—Slicer for Chopped Beats

It is possible, and in many cases practical, to make an automatic system to lock an oscillator at your station to an incoming signal. This is done in many "coherent" detection systems and is the basis of the so-called phase-lock systems. (Readers who find difficulty with the following explanation will find additional material in articles on s.s.b. "slicers" or selectable-sideband receiving adapters using the phasing system.)

Two effects make it possible to lock an oscillator to an incoming signal. The first of these is that a product detector (or balanced modulator, as used in this discussion) requires a certain range of inserted-carrier phases to detect a pair of sidebands, and the second effect is that small differences of frequencies are almost the same as small differences of phase.

These effects were the basis of the audible chopped-beat discussion in the text—the "whah-whah" sound was the sound of the inserted v.f.o. modulation moving apparently into phase and 180 degrees out-of-phase with the incoming signal. Looking at Fig. 4, we see that the listener has been replaced by a feedback loop that compares the a.f. output with the modulating signal. Since we have shifted the 60-c.p.s. modulating signal 90 degrees, the loop output, as the incoming signal frequency is closely approached by the local signal, is a slowly-varying dc. This d.c. can be fed into a reactance modulator to change the frequency of the local oscillator. If the v.f.o. (local oscillator) has been adjusted very close to the incoming frequency, the reactance modulator will lock the v.f.o. to the incoming frequency and hold it close to a particular phase relationship with the incoming signal. This is where the name "phase-lock" comes from. The locked v.f.o. can be used as the local source of the same frequency and, if tied to some such standard as WWVB, can be a frequency standard. If you wish, two phases of the v.f.o. can be taken from the v.f.o., one in phase with the incoming signal and one at 90 degrees phase difference. The in-phase v.f.o. output can be used in a product detector to give coherent (I-channel) detection of a.m., while the 90-degree v.f.o. output can be used to give coherent (Q-channel) detection of p.m. or n.b.f.m.

There are of course other ways of getting coherent detection that depend on the information in the incoming signal sidebands, and for most effective coherent detection these means should be used. These techniques pass I and Q channel output through an a.f. 90-degree phase shifter, compare the a.f. outputs in a balanced modulator, and feed the result to the reactance modulator. The scheme described here is simpler, though, for locking to an essentially-unmodulated signal.

Appendix D—WWV, et cetera

There are National Bureau of Standards standard frequency transmissions, the most commonly known being WWV, and secondly WWVH. Most amateurs

do not know that these have slight offsets from the "standard" frequencies, but the offset is not enough to make any ordinary frequency measurement particularly inaccurate. Ionospheric propagation, however, can cause short-term errors of several cycles.

The only zero-offset transmission of NBS is WWVB, on 60 kc., which identifies with a step phase shift twice an hour. This station is usable practically everywhere in the United States with a big loop antenna and a t.r.f. receiver, 24 hours a day.

It is not suggested that the 20-kc. WWVL be used as a standard. Often the frequency is exact, but the station is also used for experimental transmissions, and it is easy to confuse one of these experiments with the standard-frequency transmissions. QST

A.R.R.L. QSL Bureau

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

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

W1, K1, WA1, WN1[1] — **Hampden County Radio Association, Box 216 Forest Park Station, Springfield, Massachusetts 01108**

W2, K2, WA2, WB2, WN2 — North Jersey DX Assn., P.O. Box 505 Ridgewood, New Jersey 07451.

W3, K3, WA3, WN3 — Jesse Bieberman, W3KT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4[1] — **H. L. Parish, K4HXF RFD 5, Box 804 Hickory, North Carolina.**

WA4, WB4, WN4[1] — Richard Tesar, WA4WIP, 2666 Browning St., Sarasota, Florida 33577.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QHV, P.O. Box 9915, El Paso, Texas 79989.

W6, K6, WA6, WB6, WN6 — San Diego DX Club, Box 6029, San Diego, California 92106.

W7, K7, WA7, WN7 — Willamette Valley DX Club, Inc., P.O. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.

WØ, KØ, WAØ, WNØ — Alva A. Smith, WØDMA, 238 East Main St., Caledonia, Minnesota 55921.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.

VE2 — John Ravenscroft, VE2NV, 135 Thorncrest Ave., Dorval, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Saskatchewan.

VE6 — Karel Tettelaar, VE6AAV, Sub. P.O. 55, N. Edmonton, Alberta.

VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.

VE8 — George T. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.

VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

KH6, WH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

SWL — Leroy Waite, 39 Hanum St., Ballston Spa, New York 12020.

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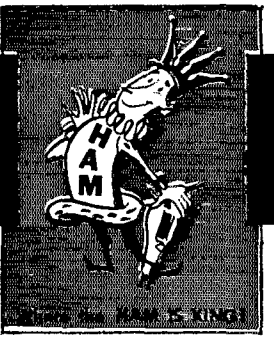

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LIKE-NEW BARGAIN SPECIALS FOR FEBRUARY

DRAKE R4A	$339	HT32A	$279	DX60A	$ 77
DRAKE L4	550	HT40	77	SB400	259
SWAN 250	239	S107	64	HW12 75METERS	89
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SBE33 INVERTER	57	HO145C	179	SB610 SCOPE	69
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RANGER II	149	HO180AC	379	KNIGHT SWR MTR.	12
GONSET 6 2MTR	149	NC60	39	K600B TUBE TEST	27
EICO 730	27	NC183D	179	HEW GDO W/COILS	37
HA350	98	HR060	199	GAS.GEN. 350WT.	57
HG305	38	HEATH SENECA	167	CN50W CONV 14MC	29
GPR90	249	HR10	79	100KC XTAL CAL.	18

LIMITED QUANTITY	NEW	EICO	KITS
755 SSB TRANSCEIVER	$139		
751AC OR 752DC	$59		
720 90 WATT CW	$67		
725 60 WATT CW	$59		
722 VFO W/AC SUPPLY	$54		

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.
(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.
(4) **Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.**
(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.
(6) **A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature.** Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is **no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.
(7) **Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.**
(8) **No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.**
(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

DAYTON Hamvention April 27, 1968, Wampler Arena Center, Dayton, Ohio, sponsored by Dayton Amateur Radio Association. QSO in person at the nation's foremost radio event of the year. Technical sessions, exhibits, hidden transmitter hunt. Bring the XYL for an outstanding Ladies Program. Join the satisfied participants who return year after year. Watch the Ham-Ads for information, or write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

AUCTIONFEST. Broward ARC, February 17th. Turn your used equipment into cash. Bargains unlimited. Location: Chaminade High School, 500 North 51st Avenue, Hollywood, Florida. Doors open at 8:00 AM. Auction begins 9:00 AM.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLs to its regular monthly meetings. Second Monday of each month at George Washington Hotel, 23rd St. and Lexington Ave., at 8 P.M. All are welcome. W2ATT, New York Radio Club.

AUCTION: The largest and most outstanding ham auction in the New York area will be held by the New York Radio Club on Friday, March 8th at 8 P.M. at Hotel George Washington Lexington Ave. and 23rd Street. All are welcome. Our regular monthly meeting the second Monday of each month will not be held in March due to this auction. W2ATT, New York Radio Club.

ROCHESTER, N.Y. Headquarters again for the big Western New York State Hamfest and VHF Conference Sunday, May 11.

MOTOROLA used FM communicagion equipment bought and sold. W5BCO. Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

PRE-WORLD WAR I operators will find many of their old buddies are members of the Old Old Timers Club. Pictures and thumbnail sketches will also appear in the coming Bluebook. We welcome all applicants whose first wireless contact was more than 40 years ago but give special consideration to those pre-World War I Pioneers including Charter Membership. Write to W5VA, Secretary of the Old Old Timers Club, P.O. Box 840, Corpus Christi, Texas 78403.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

TUBES, Diodes and Transistors wanted. Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St, N.Y. 11, N.Y. Tel: 242-7359.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts. BC-610, GRC-2, Autodyne, Bethpage, L.I., N.Y. 11714.

HAM'S Spanish-English manual $3.00 Ppd. Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

QSLS?? America's finest! Personalized made-to-order! Samples 25¢. DeLuxe 35¢. Religious 25¢. (Refunded). Rus Sakkers, W8DED, Box 218, Holland, Michigan 49423.

QSLS. New catalog, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSLS "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

QSLS stamp and call brings samples. Eddie Scott, W3CSX. Fairplay, Md.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Illinois).

QSLS-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. 25¢ for catalog, samples, 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-1, Atascadero, California 93422.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSLS, finest YLRL's. OMs samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching comic, sedate, fabulous, DX-attractive, protopal snazy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul, Minn. 55106.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057.

QSLs, SWLs, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz. 85017.

QSLS 300 for $4.35, samples 10¢. W9SKR, George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

ORIGINAL EZ-IN double holders display 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to Dealers or Clubs. Tepabco, John K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLS's: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-$3.00 up. Samples 15¢. Agent for Call-D-Cals. K2VOB Press. 240 West Kinney St., Newark, New Jersey 07103.

QSLS. Fast service. Free samples, Bolles, W5OWC. Box 9363, Austin, Texas.

QSLS Glossy coated, 100, $2.00. 3 and 4 colors. Samples, dime. Bob Garra, Leighton, Penna. 18235.

PICTURE QSL Cards for your shack, etc. Made from your photograph. 1000 $14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 9140.

QSLS by K1FF, $2.00 for 100. Others at reasonable prices. Samples 25¢ deductible. Box 33, Melrose Highlands, Mass. 02177.

QSLS, samples 20¢. Fred Leyden, 454 Proctor Ave., Revere, Mass. 02151.

QSLS, Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, WA4FJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

COLORFUL QSLS. Free samples. WA8NYB Print, Reynard, Cincinnati, Ohio 45231.

QSLS. Second to none. Your personal combination from largest selection. Glossy reds, blacks, Calypso, Pinecraft, Vellum and Crystallon. All ink colors. Many card styles. Fast service. Samples 25¢. Includes your call in beautiful 4½ in. letters. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

EXCLUSIVE QSLS, Picture, custom, standard. Over 250 styles available. Samples dime. K1NCZ Press, 535 Walpole St., Dept. C, Norwood, Massachusetts 02062.

RAISED Lettering QSLs. Ace Printing, 6801 Clark Ave., Cleveland, Ohio 44102.

QSLS, 100, $1.25 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minnesota 55803.

BEST Offer paid for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

FOR Sale: SB 101 and SB-200. Wanted, kits to wire, Heath preferred, 12% of cost, some in stock. Professionally wired. Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

1916 QSTS needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

CONTEST: Feb. 10-11, 1700 GMT to 1700 GMT, sponsored by S W Perma. VHF/SSB Club. Trophy award. Rule: Section Multip, times contacts. S-M good only for one band. W3UEJ, B. J. Wishner, RFD #2, Washington, Penna. Tel.: 412-225-5803.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) WAlker 5-7003.

WE buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

GOODIES. Cash for Teletypewriters, parts. List. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33312.

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, New Jersey 07032.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

INTERESTING Sample copy free. Write: "The Ham Trader," Sycamore, Illinois 60178.

WANTED: For personal collection: Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateur's License Manual, Edition 2, 11, 12. WICUT, 18 Mohawk Dr., Unionville, Conn. 06085.

RTTY gear for sale. List issued monthly, 88 or 44 Mhy toroids, five for $1.50 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code (201)-773-3320.

WE'RE Trying to complete our collection of Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

SELL: CQ, QST, Handbooks, old radio magazines, any quantity. Buy old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif. 94062.

NOVICE Crystals: 40-15M, $1.33, 80M, $1.83. Free list. Nat Stinnette, Umatilla, Fla. 32784.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

POWER Supply, adjustable 6-12 volt at 100 Ma., short-proof; regulation 0.1%, ripple 10 mv, 3x3 in. p.c. card; 6.3 VAC inp. Assembled, $12.00; kit, $7.95 p.c. board and schematic, $3.00. Listening, Incorporated, 6 Garden Street, Arlington, Mass. 02174.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts, 617-598-2530 for the gear u want at the prices u want to pay.

ESTATE Liquidation. SSAE brings list of quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

PRINTED Circuits. Build the modern way. 10¢ stamp for catalog. Harris Co., P.O. Box 985, Torrington, Conn. 06790.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan 48104, Tel. NOrmandy 8-8262.

RTTY Channel filters, octal mounted, 2125/2975, $5.95 pair. Special filters for TT/L-2. SASE for information, 88 mh toroids, uncased, 5 for $2.50. Herman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

SQUEEZE Keyer (WØEPV) ckt) Kit, $69.50; complete keyer, $89.50. Brown paddle, $16.95. Satisfaction guaranteed. Jimmy Moss, W5GRJ, Box 442, Natchitoches, La. 71457.

MINT Condx: Hallicrafters SR-500 w/a.c. supply. First $325.00 gets all, including Shure 440-SL PTT. W6FBS, 8411 Yolanda Ave., Northridge, Calif. 91324.

SELL: R-390, R-390A, 51J4, 51S1 receivers. W2ADD.

DAH-DITTER. New integrated circuit automatic keyer. Fully self-completing. Built-in AC supply and keying monitor. Isolated relay output. Completely assembled, ready for operation. Price $34.95. See your distributor or order direct. Free brochure. M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30328.

TOOOOBES. Tranzeesters, New, guaranteed, 6CW4, $1.40; 811A, $4.25; 6146B, $4.00; 6146A, $2.55. Also transistors. Write needs. Free catalog. Note new address. Vanbar Distributors, POB 91-Z, Paramus, N.J. 07652.

QUAD Parts, Kits, Accessories. Fiberglass spreaders, $6.00. DeLuxe bamboo, 12½ foot spreader, $2.25. 25-foot spreader, $5.00. Varnished. Quad Kits: $39.95 up. Complete quads, $59.95 up. Skylane Products, 406 Bon Air, Temple Terrace, Florida 33617.

WANTED: IRE-IEEE publications. TPI, Box 67, Palo Alto, Calif. 94302.

WANTED: Electronics Instructor. General ticket indispensable. Theory and workshops. Science. Camp Lake Placid, N.Y. Write Lothar Eppstein, 440 West End Avenue (4B), New York, N.Y. 10024.

WANT: Gianinni Microtorque potentiometers. Must be linear taper. Thompson, 5 Palmer, Gorham, N.H. 03102.

ESTATE OF KL7GO. Complete bound volumes of QST, 1946 through 1962, no 1952. Complete bound volumes CQ, 1950 through 1964; unbound copies of QST 1963 to date; CQ, 1965 to date. Write: Lola Harvey, Box 1125, Kodiak, Alaska 99615.

FOR Sale: Collins KWM-2 and 516F-2. New condition. $750.00. Kenneth Noller, Box 202, Arcadia, Ohio 44804.

SELL: Brand new Star-Line xmtr, rcvr. 50 Mc. converter. Never used. Cost over $1000. First $800 takes. Yager, Box 176. Prospect Heights, Illinois 60070.

HAM With General Class license, high school graduate minimum. To teach radio to campers at outstanding co-ed camp in Pocono Mountains. Must have own equipment. Excellent salary and benefits. For information, write New Jersey YMHA-YWHA Camps, 589 Central Ave., East Orange, N.J. 07018. Tel: 201-OR4-1311.

HT-44 and power supply, $250.00; SX-117, $225.00; HT-45 and power supply, $275.00; SX-115, $325.00; SR-42, and VFO, $150.00; Gonset Sidewinder, $150.00. All like new condx. W4MVC, 10 Carlen Ave., Asheville, N.C. 28804.

JOYSTICK Variable frequency antenna systems solve space problems. Available immediately. SWL Guide, 218-S Gifford, Syracuse, N.Y. 13202.

COLLINS KW1, ideal for CW or diehard AM, reworked, sturdier components, etc. Best offer and truck will take it away. Write Ercolino, W2BDS, 63 Wickapecko Drive, Asbury Park, N.J. 07712.

DRAKE T4-X, AC-4 combination, new, $350.00. No trades, sry. Larry Wilson, WØKVE, 215-3 De Long Drive, Marion, Iowa 52302.

HEATH HX-30, 6 meter SSB transmitter, in mint condition: $125.00 firm. M. M. Kovar, K3RWY, 1642 Martha Terrace, Rockville, Maryland 20852.

HALLICRAFTERS SX-101A, speaker, headphones, spare tubes, manual. Perfect condition, professionally maintained. Wollensak T-1500 electronic control recorder. Bob Yarmus, K2RGZ, 5900 Arlington Ave., Riverdale, N.Y. 10471. Tel: (212)-884-6336.

WRL's Used Gear has trial-guarantee-terms. NC-270, $139.95; HQ-170AC, $239.95; HQ-110AC, $169.95; 75S-1, $299.95; 75A-1, $169.95; SX-100, $134.95; HA-10, $189.95; HT-32, $249.95; GSB-100, $179.95; Ranger II, $169.95; G-766, $99.95; 650 and VFO, $89.95; Thor VI and AC/PS, $169.95. Hundreds more. Free "Blue-Book" List. WRL, Box 919, Council Bluffs, Iowa 51501.

SELL Hammarlund HQ-170 receiver with new type coil and Heath Apache transmitter 250 watts, both, and many extras: $350.00. Dismantling. Bruce MacKinnon, 76 Standish Road, Milton, Mass. 02187.

VALIANT with SSB Viking Valiant, beautiful condition, and Heath SB-10 SSB adaptor with separate power supply. Valiant modified to work with SB-10. Package deal includes Turner "Chief" microphone. All for $175.00. Pick up only, sry. Also Shure 440SL microphone, $15.00. B. Campbell, WA6ZBV, 709 Tamarack Drive, San Rafael, Calif. 94903. Phone 415-479-7491.

SELL: Heathkit SB-401 transmitter with SBA-401-1 crystal pack, wired, perfect, at cost: $314.95. Johnson power attenuator, Model 250-42-3, 52 ohm, with in-out switch, SO-239 male connections, perfect, $10.00. Eico Electronic keyer, Model 717, wired, new, $60.00. Turner crystal microphone, Model 80X, $5.00. Lee Richmond, WB2OSF, 166 Floral Ave., Plainview, N.Y. 11803. Tel: (516)-GE3-8663.

CLEARWATER, Florida 33516. Save on new Galaxy MK-2 with AC-400. Richard Leis, W4UHO, 1300 Milton St.

CLEANING House! No more time to build gear. New parts for KW amplifier at half-price. New Dow-Key T-R switch, $10.00; BC-458, BC-453 (Q5er) and other good but used parts. Very cheap. Send for list. QST and CQ, 1950-1967, cheap. Will consider trade or any above. What do you have? K2BU, 10 Cunningham, Glens Falls, N.Y. 12801.

GENERAL Electric regulated power supply: 1800 volts at .5 amp. G-E model 516E739G1. Varian VA-1302 power supply, 4000 volts, 200 Ma. Best offer. K3ZPN, Box 6001, Philadelphia, Penna. 19114.

WANTED: Collins KWM-1 with A.C. and/or D.C. supplies. Will pay top dollar for unit in mint shape. Advise condition and desired price in your first letter. Bill Theeringer, W8-PEY/4, 200 Verbena Drive, Orlando, Florida 32807.

SIX Meters: WRL-TC-6A. Transceiver with superhet receiver, PTT, noise-limiter. Transceiver, power supply, microphone. Shipped prepaid. $35.00. Steve, WB2UFN, 178-01 69th Ave., Flushing, L.I., N.Y. 11365. Tel: 212-RE9-3407.

NATIONAL NC-303, 6 meter converter, XCU-27 calibrator, mint condition, $275.00. Utica 650 six-meter transceiver, VFO, mike, $130.00. Richard Ravich, 10 Coolidge Road, Marblehead, Mass. 01945.

COLLINS 75S3, $395; 32S1, 516F2, 312B4, $525; 30L1, $395; complete package $1200. 30S1, $850. L. Macomber, 4 Yorktown Road, Setauket, N.Y. 11785.

FOR Sale: Antique Paragon receiver. Type RA-10, detector amplifier type, DA-2, with speaker. O. L. Sanders. Idalou, Texas 79329.

NATIONAL NCX-3 plus heavy duty homebrew power supply, $200.00. SX-71 rcvr, $65.00. Pick up only, sry. W. Raisch, WB2REL, 1110-Sixth St., North Bergen, N.J., 07047. Tel (201)-866-7061.

COLLINS 32V-2 xmtr, $150.00. Voyager xmtr, $60.00; Globe Scout 2, $40.00; Heath 6 mtr. sta. (new), $45.00; SB-610 monitorscope (new), $70.00; 6-80 VFO, $40.00, Preselector/crystal converter, $40.00. About 1000 tubes, all kinds, xmtr power tubes, $300.00. Surplus gear the lot $35.00. All in excellent condition. WA9WHC, 701 S. Second St., Delavan, Wis. 53115.

CLEANING Out shack: Tektronix model 561A oscilloscope with 2A63 and 2B67 plug-ins, used less than 10 hours, $600.00. Sell or trade the following: Four new RCA 7580 RF output finals with sockets, four use up to 500 Mc, several 250THs and 100THs, some new; model 15 RTTY printer with power supply and spare keyboard; standard 19 in. rack, 67 inches high with drawer; and Heath 10-20 ignition analyzer with timing light. Michael M. Benzen, WAØPAO, 10221 Unicorn Drive, St. Louis, Missouri 63137.

SELL: SX-101A, original owner, A-1 condition $200. WA3-HOQ, 314 Waveland Road, Baltimore, Md. 21228.

FOR Sale: Drake R-4A, T-4X, MS-4, and AC-4. Perfect condition. $750.00. Bill Bulchis, WB2WBL. Tel: 201-427-6266. 64 Summer Street, Hawthorne, N.J. 07506.

HQ-170 in mint condition. Original owner. Sacrifice: $150.00 Bill Snyder, W4WG, P.O. Box 775, Clarksville, Va. 23927.

ESTATE Sale: W5NZ. KWM-2 and power supply, $800. Henry 2-K, $495.00. Contact W5IVF, New Orleans, Louisiana 70112.

FOR Sale: New Heath HW-16, CW transceiver. Wired and tested by licensed broadcast engineer. $125.00. Dave Wommack, W5AVH, Box 289, Atlanta, Texas 75551.

WANTED: HQ-180A, C, AX. Looking for a transistor organ. State price and condition in your first letter. John Waskowitz, W2KPF, 541 Marcy Avenue, Brooklyn, N.Y. 11206.

FOR Sale: Heath "Twoer", mike, xtal; $30.00. Seymour Balsenbaum, WN2CHE, 9424 Ave. A, Brooklyn, N.Y. 11236.

COLLINS 32V-3. Good condition. $150.00. Extra final 4D32, $10.00. WB2GJW, R. A. Donson, 5 Division St., Binghamton, N.Y. 13905.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-B, $360.00; T4-XB, $360.00; MS-4, $17.50; RV4, $83.00; L-4B, $580.00; W-4, $43.00; factory-sealed boxes, fully guaranteed. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404. Tel: 919-299-8767.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories. Specially Collins. We pay cash and freight. Ritco Electronics, Box 156-Q345, Annandale, Virginia 2203. Phone 703-569-5480 collect.

SELL: Drake TR-3 w/accessories. Want 75A3, 75A4, 75S3, R-4 or similar receiver; 2 KVDC power supply or transformer. Clark, W4JBL, 204-24 Utica, Huntsville, Ala. 35806.

SELL: AN/SRT-14 0-275 RFO units. AN/FGC-29 NBESK filters. SASE for list. Need manuals for SRT-14 0-275 RFO, CHZ 60170 RF monitor. WØHLT, 512 McDonald Road, Leavenworth, Kansas 66048.

EICO 753 solid state AC supply, $200.00. Eico 717 keyer, $50.00. All in mint condition. Herb Howe K7CWO, 115 N. 52nd Ave., Yakima, Wash'ngton 98902.

WRITE, Phone or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Mosley, Waters, SBE, Henry linear, towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

RELAY Rack cabinet. Tel: 213-923-8917. Walt Whipple, 12450 Lakewood Blvd., Downey, Calif. 90242.

HEATHKIT VF-1 VFO with P.S., $15.00. Globe Chief 90 with modulator, $20.00. W3HMR, Paul Moffitt, 222 Sherbrook Blvd., Upper Darby, Penna. 19082. Tel: CL-94692.

HEATH Warrior linear. Mint condition. No reasonable offer refused. K8SGF, 7009 Brecksville Road, Independence, Ohio 44131. Tel: 216-524-2834.

GAVIN "Maverick" 6-meter low-pass filter; $9.00. Hallicrafters R-48 speaker and cabinet, $8.00. Cush Craft 6 meter halo and mast, $8.00, postpaid in continental 48 states. Paul Wing, K1WVX, 148 Morgan St., Holyoke, Mass. 01040.

SELL: Ancient "Rider Perpetual Trouble-Shooters Manual" Volumes 1 through 17 from 1919! Very good shape. Best offer takes by May 1967. K9DJG, P.O. Box 207, Winnebago, Illinois 61088.

SELL: Johnson Valiant I, recently reconditioned, $160.00. SX-100, $125.00; Vibroplex Original $15.00; Eico FM-TV sweep generator model 368, $25.00. Will ship. Want HQ-170. WA9UES, Route 3, Fairfield, Illinois 62837.

TELETYPE Line relay—RY33—by Automatic Electric, like new, $9.95. Robert Patterson, Box 255, Rawlins, Wyoming 82301.

NOVICE Station, Lafayette HA-230, 9 tubes. Beautiful condition. DX-20 50 watts, key, headphones, speaker, manuals, crystal, $80.00 or best offer. James Burns, 717 Railroad Ave., Manchester, Ky. 40962.

COLLINS KWM-2 with 516F2 supply, $700.00. Collins 30L1 linear, $350.00; Collins 312B4 console, $160.00. All are in perfect condition. Rex Bassett, W4QS, Box 4163, Fort Lauderdale, Florida 33304. Phone 305-564-8729.

SELL: HT-32A, $250.00; SX-28, $100. TA-33 beam and rotator, $60.00; Globe Chief 90A, $35.00. First $350.00 takes it all. All in excellent condition. No shipping, sry. Dave, ex KØIVI, 107-2nd St. N., Cold Spring, Minn. 56320. Phone 612-685-3147.

DRAFTED. Sacrifice complete ham station: Swan 500 with matching A.C. power supply, less than 20 hours use. Still in factory cartons. Astatic 10-D mike. Drake low-pass. TR44 rotor, Mosley MP33 Tri-bander with 60 ft. of rotor and coax cable plus 30 ft. telescoping mast. Close to $900 invested, first certified check for $595.00 takes. S. Kurtzman, 5363 Geyser Ave., Tarzana, Calif. 91356.

FOR Sale: Hallicrafters HT-37, Drake 2A rcvr, 2AQ Q-multp, in excellent condx. L. Olson, 609 E. Vanderbilt, Stamford, Texas 79553.

WANTED: 70 ft. crank-up tower; 100 mile radius of Boston. Write to W1SEB.

999th Signal Service Company (U.S. Army Europe WW II) ham veterans. Contact W4DZL, 923 Ware Street, Vienna, Virginia 22180. Reunion information.

DRAKE 2-B w/xtal. Calibrator, $165.00. Good homebrew. Keyer, $20.00. Excint condx. Cash only. J. E. Cloud, 573 Claymont Dr., Lexington, Ky. 40503.

GOING SSB! DX-60A, $70.00; HR-10 (with 100 kc. cal.), $50.00; HG-10 VFO, $25.00; Johnson Viking Matchbox, $40.00. WA1HEK, Terry Guerlain, RFD #2, Redding, Connecticut 06896.

NATIONAL NC-400 General coverage SSB receiver w/calibrator and manual, in A-1 condx. $400.00. William Sakal, W2KJF, 62 Bacon Hill Road, Pleasantville, N.Y. 10570.

HD-40 Tower, Motor, winch, SCR control; TA-33 SR; rotor head, AR-22. Excellent. $250.00. W2ETB.

FOR Sale: Late model Swan 350, AC power supply plus DC mobile supply, plus Hustler mobile ants for 80m thru 10m, in mint condx. Package deal: $475.00. Also Collins 75S-3 rcvr in excellent condx, priced for quick sale at $350.00. John Williams, 103 Midland St., Greenville, South Carolina 29607. Tel: (803)-239-6257.

TELEPRINTER and radio equipment must be removed by purchaser. Also old radio books and magazines. Prices reasonable. Write for list or telephone. Alexander McKenzie, 245 Poniar, Hackensack, N.J. 07601.

HQ-100 with clock, manual, original carton, Johnson Navigator with manual, Eico 730 modulator with manual. $150.00 takes all or $70, $70, $25. Shipped anywhere. Shipping charges collect. R. Napoli, 280 Main Street, Center Moriches, N.Y. 11934.

SELL: DX-60, $55.00; Heath 10-12 'scope, $50.00. Eico 221 VTVM w/probes $10.00. Vibroplex Original bug, $10.00. Three 829Bs, $7.00 each. Martin Huyett, S&T, Rt. 3, #30, Yankton, South Dakota 57078.

HQ-100 Hammarlund receiver. In excint condx. $75.00. R. Will, 1900 Chicago, Minneapolis, Minn. 55407.

TWOER: With mike, xtal and 8-element beam: $45.00. WAØOGS, 609 Lower Johnson, St. Peter, Minn. 56082.

BUG Vibroplex, clean chrome. $11.00. WØBHA, Bird Island, Minn. 55310.

FOR Sale: One Johnson SSB Pacemaker. Just like new. Used very little, in perf. condx. $150.00 F.o.b. One power supply, pair 833s. One 833 and parts for 5 Kw linear. All for $125.00. Will not ship this deal, sry. Clyde Williams, 509 W. Harrison St., Reidsville, North Carolina 27320.

SELL-Trade: NCX-3 with NCXD and AC supplies. Keying monitor installed, with crystal calibrator, excellent condx, only $275 for the whole works. Like new Hammarlund HX-500 SSB-AM-CW-RTTY 100W exciter, $250. Heavy duty Johnson rotator, $100, good Viking Ranger, $79.95. New Hallicrafters PS150-12, $50. New KWM-2 mobile mount, $55.00. Wanted: good 75A4, 5 band transceiver with mobile supply. Gene Hubbell, W7EKE, 6633 East Palo Verde Lane, Scottsdale, Arizona 85251. Tel: (602)-946-6350.

TWO 572B/T-160L tubes. New, in factory-sealed carton. $20.00. L. M. Divinia, 115 South Battin St., Wichita, Kansas 67218.

DRAKE TR-4, AC4 power supply, like new, guarantee card not sent in. $495.00. W9JCE, 370 Aspen Lane, Highland Park, Illinois 60035.

DRAKE R-4 receiver in mint condition. $280.00. Kay Turner, 655 No. 500 West, Provo, Utah 84601.

SWAN Mark-I, 2000 watt linear, used very little, and in good condition. Will sacrifice for first $300 or better. Fred Matthews, K4YET, 4327 Esterbrook Drive, Chattanooga, Tenn. 37412.

FOR Sale: HT-37 SSB xmtr, $250.00. HQ-170 AC rec, $270.00; Eico 720 xmtr, $70.00. Globe Hi-Bander 6 and 2 meter xmtr, $75.00; GSB-201 linear amp., $250. CDR AR-22 rotor, $22. All equipment in excint condx. Call or write, Mr. T. Adler, 2 Garden Rd., Scarsdale, N.Y. 10583. Tel: 914-723-3041.

COLLINS KWM-2, 516F-2, 30L-1, 75S-3, for sale: $1495.00. Jack West, 6747 N. Octavia, Chicago, Ill. 60631.

TRADE Or sell: HT-32, SX-101, Warrior final. Other side equipment. Will trade for photographic equipment. C. J. Clouter, Warroad, Minn. 56763.

SELL: Heath Mohawk RX-1 receiver, very good condition; Heath speaker, manuals, trimmers. $125.00. Pro-wired. No modifications. Bill Robinson, 1640 Wandering, Monterey Park, Calif. 91754.

RTTY Equipment. Model 15 printer. Model 14 reperf, Model 14 tape printer, polar relays, gears, parts, local line power supplies. Prefer pick-up on machines. W2UAE, Denow Road, Trenton, N.J. 08638.

FOR Sale: SB-110 (6M SSB), $200; SB-610, $55; 1 KW mobile and fixed linear (HA-14, HP-14, HP-24 complete), $150.00. Q-1 (Q meters) $35.00; HW-22, $75; HW-29A (6'er), $32.00; HP-14, $45.00, plus shipping. K8RFC, Phone: (616)-469-3431. A. Gouker, Box 544-A. R #1, Sawyer, Michigan 49125.

HEATH HX-20, like new, $125.00; Gonset GSB-101, excellent condition, $150.00; HP-13 mobile supply, wired, new, $50.00. W2IM G, 95 Haddenfield Road, Clifton, N.J. 07013.

NEW Simpson 383A capacitor checker, cost $100. For or trade for a Lafayette HA-410 10M transceiver, Comsat 25A CB. New RCA Mark 9 12V power supply CB, $15.00. K8NYT, Stan Strangle, Bruce Crossing, Michigan 49912.

CHANGING Equipment: For sale: TR-4, MS-4, AC-3, $525.00; R-4, $250 00; HA-1 keyer, $50.00; SB-200, $200.00. All are in mint condx. Prefer local deal but will ship. H. J. Nadley, W3INH, 307 Woods Road, Glenside, Penna. 19038.

FOR Sale: Lampkin 105B. Brand new. Never used. $200. Firm. John H. Robbins, W3ODP, Westfield, Penna. 16950.

SELL: Collins MP-1 DC supply, $125.00; PM-2 AC supply, $85.00. 351D-2 mobile mount, $55.00. All in excint condx. Will ship in original cartons with all hardware. WØECK, 3339 Blue Ridge Dr., N.E., Cedar Rapids, Iowa 52402.

DXERS QTH in Florida for sale. Has 66 ft. Rohn tower with TA-33 and Ham-M rotor, 40 ft. crank-up and tilt-over tower with TR-44 rotor. 3 bedroom house with deluxe hamshack. Two blocks from marina on famous chain-of lakes fresh water fishing paradise. Available in April, $20,500. K4IIF, P.O. Box 205, Winter Haven, Florida 33880.

MOVING: Sell Gonset Comm. IV, 6m with Ameco 621 VFO, Telrex beam, Drake filter, cables. $255.00. Perfect homebrew 6M SSB Superhet rcvr, Dow relay, $30.00. Many extras. All less than 3 months new. 80m ARC-5, heavy AC p/s, $25.00. Hank, WA2OVG, 53 Downing St., NYC 10014. Tel: (212)-OX1-4711.

R392/URR, in excint condx, and pwr. supply and cables, book: $625.00. H. Brock, 2226 E. 28th St., Brooklyn, N.Y. 11229. Mail inquiries only!

FOR Sale: DX-60 phone and c.w with xtals, $65.00. HG-10 VFO $25.00; Bug $8; Cisco SWR meter $12; B&W low-pass $8. All in perfect condx. Call or write M. Theodorou, WB2NDS, 16 Fane Court, Brooklyn, N.Y. 11229. Tel: TW1-3714.

RETIRED: *Must clean out to move:* ARC trans. and receivers, panel meters, HiV oil and mica condns., xtals, PA system amplifier, 200-400 kc receivers, DU 1 direction-finder, DC to AC inverter, dynamotors, chokes, transformers, tubes Lots, lots more. SASE for lists. Some antique parts. Like new 75A1. K. A. Trites, W1JJ. 165 Parkway, Melrose, Mass. 02176.

FOR Sale: Drake 2C revr. 2 CQ spkr. Q-multiplier. 2 NT xmtr, lefthand Vibroplex, Trimm phones, Johnson SWR meter, 14AVQ, ant. All are less than a year old and are in mint condx. Sacrifice due to illness. Ask ng $300.00. Milton Goldhagen, WA2ALS, 2960 *Oceancrest Blvd., Far Rockaway*, N.Y. 11691. Tel: (212)-471-4148.

HW-32A, HP-13, 20M mobile package. Perfect condition. Both $175. Also Drake AC-3, $75. "Ric," WB6TCM. Tel: (415)-347-6140.

SELL: Heath AT-1, Revere tape-recorder, Lafayette Explorer. WA2ACF, 722 Carlisle Road, Jericho, N.Y. 11753.

SELL: Halkman radio compass dial and synchro receiver. Out of Collins SC-101. Never used. Make offer. Al Bowers, K3GXX, 1306 Garden Lane, Reading, Penna. 19602.

100V unscratched and in excellent condition. Recently factory modified with solid state rectifiers and many 200V components. $400. Especially suitable for MARS, as covers to 4.5, 7.5, and 14.5 Mc. Can ship collect original crate, your risk. W1PO. S. Poor, Mill St., Hanover, Mass. 02339.

HW-12, HP-13, Hustler, microphone and speaker in excellent condition, $130.00 or best offer. Must sell. Trade my 10-12 scope for DX-60A? Finished R/C plane (6 meters) with everything, dirt cheap, send for details. R. Wanat, WA8LIX, 4404 Judith Lane, #2A, Huntsville, Alabama 35805.

SELL: F-455B-31 (3.1 Kc) filter, shop the ads and make offer. Wanted: F-455C-31 (3.1 Kc) filter and 148C-1 (NBFM) adaptor. Must be reasonable. W2CMD.

FOR Sale: Complete set text-books of RCA Institute of Electronics, Correspondence course, $20.00, Postpaid. Charles Hyde, WB2FKZ, RD #2, Ballston Lake, N.Y. 12019.

TRADE Perfect 75A4 Serial 5603 for Swan 350 with power supply. HP1BA, Boris Allara, P.O. Box 4837, Panama 4, Panama.

COLLINS 32S3, 516F-2, 312B-4 console, like new, $750.00. 75S2 hardly used, $250.00. 4-1000 GG final, 4KV-1A power supply, $200.00. Carl Frazier, 1129 LaMesa. Tel: (214)-235-5676. Richardson, Texas 75080.

FOR Sale: Heath SB-300, SB-400 and speaker, $489.00: SB-200 new, factory-wired, $220.00; HO-13 spectrum monitor, $50.00. HW-30 Twoer, $30.00. All equipment in excellent condition. Robert White, K9LWA, 2540 Birch Drive, Richmond, Indiana 47374.

COLLINS. Sell 32V-3 in excellent condition with manual, $160.00. Repairs done by me 2nd class commercial license holder. *Sell ART-13 with manual, conversion info, all tubes,* meters except 811As. $35.00. Raymond Reynaud, Box 65, Lutcher, Louisiana 70071. (K5CPR).

FOR Sale: Amateur equipment, parts and tubes. Power supplies, 1700VDC 350 Ma. power supply. Free list. Brand new resistors 1/2 W 10% 6¢, 5% 12¢, 1W 10% 9¢; 5% 18¢. For more information, write: Alan Robinson, 6651 Forward, Pittsburgh, Penna. 15217. Tel: 421-0652.

UPGRADE Your License! All new Posi-Check. FCC type questions and explained answers; General, Advanced, and Extra Class. New FCC type questions and diagrams, multiple choice, with IBM sheets and explanations. Study and test yourself and prepare for the new Amateur exams. New General Class, $3.25. New Advanced class, $3.50. New Extra Class, $3.75. Around 300 questions and answers per set. Postpaid third class. Send check or money-order to Posi-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

COLLINS Model #231-C, 1 KW output, commercial type; 2-833-A in final; 2-833-A in modulator; 3-phase power supply. Total weight 1800 lbs. Will not ship, sry. Bring truck. 2 prop-pitch motors in original boxes $30.00 each. Components for 1-KW power supply. Plate transformer rated 2 Kw. Weight 150 lbs. 1 Johnson Ranger, $125.00. Reason for selling above: moving QTH. J. A. Lugo, W4RNA, Box 1742, Raleigh, N.C. 27602.

NEEDED Immediately for September, licensed amateur, electronics instructor for industrial arts department. Setauket High School, Setauket, L.I., N.Y. Contact B. Berg, W2NOL. Tel: (516)-941-4184.

HT-32B, $325.00; SX-115, $325.00; GSB-201, $225.00; SR-160 w/DC p/s, $225.00. Packaged deals: HT-32B and SX-115, $600.00; HT-32B, SX-115 and GSB, $800.00 All above base plus mobile. HT-32B, SX-115, GSB-201 and SR-160 w/DC, special price: $950.00 U pay shipping. It's either the gear or the XYL. My choice came pretty hard! Jene H. Melton, WAØDEM, 1422 W. Division, Grand Island, Nebraska 68801.

CRYSTALS Airmailed: SSB, Nets, MARS, Marine, etc., Novice .05% crystals $1.50. Custom finished etch stabilized FT-243 .01% any kilocycle or fraction 3500 to 8600 $1.90 (five or more this range 1.75 each), (nets, ten or more same frequency $1.40). 1700 to 3499 and 8601 to 20,000 $2.75 with overtones *supplied above 10.000. 10.001 to 13.500 fundamentals* $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures above 2000. Seven "SSB Package" filter crystals $11.95; Five mixer $11.95. Tube "IMP" $9.95. Other ARRL publication builders crystals. Be specific. Write for order-bulletin and listings. Crystals since 1933. Airmail 10¢/crystal, surface 6¢. C-W Crystals, Marshfield, Missouri 65706.

CLEGG Venus, AC supply, antenna, rotator, $300.00 or swap SBE 34. John Mrozinski, WB2EXI, 155 Eckford St., Brooklyn, N.Y. 11222.

HEATHKIT GD232 organ with reverb, percussion and bench. Excellent condition, complete with manual. Worth $250.00. Trade ham gear, anyone? Sry, no shipping. J. H. Viele, W1BRG, 101 Henry St., Burlington, Vt. 05401.

SELL: Drake T4X, R4A, AC-4 and MS-4 *in original packing* with warranty cards, $740.00, Marvin Fein, W2KIT, 151 Rock Creek Lane, Scarsdale, N.Y. 10583. Tel: (914)-723-5493.

SELL Or trade: Drake RV-3, $60.00; Hustler 4-BTV, $20.00; RM-75, new, $17.00. TEAC 505R stereo recorder, $275.00. Jennings VAC 10-250 mmfd with puller, $20.00. Wanted: Drake R4-A, MS-3, D. Divinia, W5LNL, 5104 Meadowbrook, Greenville, Texas 75401. Tel: (214) GL5-0368.

NCX-5 MK II, practically new. Less than 6 months old and 10-hour use. F.B. H.B. supply. Both new condx: $400.00. WB2OQK, 1129 Astor Avenue, Bronx, N.Y. 10469.

GOTTA Move! Sell TH3-MK2 Tri-Bander, $85.00; Ham-M rotor, $90.00. DC supply for TR-4, $120.00; Atko Mini-Keyer, $30.00. All thig equipment in like-new condx. Mod. 15 page printer, $50.00. (sry, no shipping). Need: 3-1000Z, plus socket and chimney. Ray, K7HLR, P.O. Box 1176, Twin Falls, Idaho 83301.

KWS-1, S.N. 1491 and SC-101, each mint, $990 for both Prefer not to ship. W6WZD, 98 Fairview Ave., Atherton, Calif. 94025.

SELL: Poly-Comm PC-6 six meter transceiver. In excellent condition. Send money order. $115.00. I'll ship. Sidney Purvis, WA4VBC, 1934 Roxie Ave., Fayetteville, N.C. 28304.

WANTED: SSB transmitter or HX-20. Paul Walter, RR #2, DeKalb, Ill. 60115.

HEATH HA-14 linear, HP-24 power supply. Operation and appearance perfect. Will mail for $150. Tom Hargrave, Box 41, APO Seattle, Washington 98736.

30L1, clean, $350.00; C-E 10-B, $60.00; Master Mobile 500 watt GG amplifier w/p.s. For mobile, $85.00; 4-1000, $50.00; KWM-1 w/n.b., $295.00; A.C. pwr. supp., $70.00. K6KYB, 2903 Yearling St., Lakewood, Calif. 90712.

HALLICRAFTERS SR-500, P-500. $325.00. WA9TKN, 520 Bridge St., Rockton, Illinois 61072.

TOROIDS: 88 mhy. Unused, center-tapped, 5/$1.50 ppd. Three head TD with sync motor, $50.00; Johnson 250-39 TR switch, $18.00. Globe Chief Novice rig, $30.00. Harmon-Kardon Melody II (A-120 amp., $10; Hallicrafters HA-8 splatter guard modulation monitor, $7.50; Super Pro SP-200 receiver with power supply, $55.00; Heath Sixer, $25.00; RTTY page-printer paper, $5.50/case. Viking Valiant, $125.00; AR-22 rotator, $20.00. Eico 495 voltage calibrator, $7.00. Wanted: Gonset Communicator for 2. NC-300. Ham-M. Stamp for list. Van, W2DLT, 302Z Passaic, Stirling, N.J.

E-Z Way tower, 41 ft. crank-up, layover, galv. with ground post. Ham-M rotor. $215.00. WA2REQ, Giordano, phone: (212)-763-8726.

STEAL! Complete station: HQ-170C and speaker; Johnson 500 xmtr, 500 watts AM, 600 CW; Hallicrafters HA-1 T-O keyer and Vibroplex Auto-paddle; HE-34 SWR and power meter, Turner 250 dynamic mike, 4 inch scope, Drake TV 1000 low-pass filter; coax lightning arrester, headphones, Hy-Gain TH-3 beam, Lattin LRL-70 40-80 meter dipole, relays, spare 4-400A, coax cable. Sry, will not sell items separately, and no deliveries. Will give buyer other miscellaneous gear around the shack. $350.00. Art Santella, 43 Seaview Ave., Norwalk, Conn. 06850.

COLLINS KWS-1, Serial #1406, last production run, complete with relay, cables, $445.00. Will be willing to deliver up to 200 miles radius. 75A-4 filters, 500 cycle and 10 Kc., *both for $60.00 prepaid. WØUDZ, 1030-20th Street,* West Des Moines, Iowa 50265.

GOOD AXT-3B television camera, converted with power supply. Delivered within 100 miles, $100.00. S-20 Hallicrafters receiver, working condx, $25.00. Frank Maley, W1GZH, 24 North Main St., Waterbury, Vermont 05676.

HQ-180C, $245.00; Gonset Sidewinder AC/DC, $225.00. H. P. Ingwersen, PAØAFN/W1, Box 87, Topsfield, Mass. 01983.

WANTED: 2 volt '57 and '58 receiving tubes. W1BB.

LIKE-New Collins S/Line for sale. 75S3B, 32S3, and matching Collins power supply; $925.00. Skip Agard, Box 434, Aliceville, Alabama 35442.

COLLINS: KWM/2, AC supply, 30L-1 linear plus Johnson SWR Bridge. Mint condx. $1,000. Les Tanner, W9ING, 6433 No. Troy, Chicago, Ill. 60645.

HEATH SB401 w/crystals, two months old: $280.00. Mint condx SB-300 w/all filters, $200.00. Built by MITEE student. Will deliver within reasonable distance my QTH. Joseph Schippert, 66 Baystate Road, Boston, Mass. 02215. Tel: (617)-CI7-8602.

COLLINS 75S3B. Mint condx, one year old: $440.00. Hallicrafters SR160 with VOX, less power supply: $195.00. Two Eimas 4X150As/7034 brand new, $15.00 pair. W8UAR, Jim Morgan, 9339 Arnold Lane, Loveland, Ohio 45140.

SELL Or trade: Knight TR-106 6-meter transceiver, base or mobile. Professionally wired and aligned with matching VFO; 6 M mobile Halo and bumper mount; all brand new. Jones 262 and 261 VSWR indicator, too. Want Johnson Valiant II in comparable condx, or sell. WA4WIA, Vines, 345 Park Road, Pleasant Grove, Alabama 35127. Tel: 744-0927 PMs.

MUST Sell: Swan-350, perfect, late model, with 117XC power supply, microphone, manual. $305.00. HD-10 keyer, $18.00. SX-111 receiver, like new. $95.00. 18AVQ antenna, $15.00. Gary Schwartz, Box 523, Azusa, California 91702.

COLLINS 75S3B, spkr, $450.00; KWM-2, spkr and 516F2 power supply, $750; Filters 455FA15, $35.00; 455FA05, $35.00. Heath Deluxe SW rcvr GR-54, Heath checked, aligned, calibrated, with 100 kc. calibrator HD-20, $70.00; Electronic keyer HD-10, $40.00; service manuals VTVM-IMW13, R.F. and H.V. probes, all Heath wired and tested, $60.00; Q multiplier kit GD-125, $12.00; Hickok 450 VOM, needs minor repair, $30.00. Edward O'Brien, 86-10 34 Ave., Jackson Heights, L.I., N.Y. 11372. W2GFY.

PROP Pitch motors; replace your old rotors with the popular WW II surplus (PPM): supply limited. Small—10.000:1, large, 7,000:1. $30.00 each. F.o.b. California. John Link, 1081 Aron St., Cocoa, Fla. 32922.

SUMMER Camp ham radio instructor wanted, at top N.H. boys' camp. Counsellor and instructor age 19+. Must have General license or higher. We have complete equipment for training and operation. Write to Camp Cody, 99 Park Avenue, New York City 10016. Tel: (203)-226-4389.

SB-300 Heath SSB receiver, with AM filter, $225.00 or best offer. Includes shipping. M. Pollack, East Larchmont Drive, Colts Neck, N.H. 07722.

COUNSELLOR: Penna. brother-sister camp seeks ham radio man with general license. Daniel Blumstein, 1410 E. 24th St., Brooklyn, N.Y. 11210.

FOR Sale: Heath HW-22, 40 meter transceiver with HP-23 A.C. supply. Built by engr. at Heath. Both $110.00. H. Kline, W8DOS, 6478 Noranda Dr., Dayton, Ohio 4515

ED Moory promotes February Clearance Sale on new equipment with factory warranty: New Drake TR-4, Serial 26679; $469.00: T4-X, $349.00: R4-A, $345.00: L-4 Drake Linear, $539.00: New Eico Model 753 Kit 3 band Transceiver, Regular Price, $189.00, Cash Price $119.00: New Eico 751 Kit supply and speaker, Regular Price, $79.00, Cash Price $45.00: Package Deal: New Mosley Classic 33 and Demo Ham-M Rotor, $199.00: New Displayed BTI 2000 Watt Linear, $629.00: New Demo Swan 500, $399.95: "Special Rohn 50 ft. Foldover tower, prepaid, $189.50: Demo Ham-M Rotor, $94.50: Displayed Swan Mark II Linear, $449.00: "Fantastic Special, New National VX-501 VFO, $249.95, Cash Price $129.95: New Demo SB-34, Swan 350, $339.95: Ed Moory Wholesale Radio Co., Phone $329.00: New Displayed NCX-5 Mark II, $449.00: New 946-2820, Box 506, DeWitt, Arkansas.

TR-3 and DC-3 in good condition. Both $350.00. Forrest Hothem, W8OVJ, Box 671, Coshocton, Ohio 43812.

G-50, excellent condition, manual, unmodified except for solid-state plug-in instead of rectifier tube. $175.00 or best offer. Will ship. W9JDX, RR #1, Box 510, Cary, Illinois 60013. Tel: (312)-639-7565.

MINT Condition: Apache $90.00, SB-10 (factory wired), $65.00, HA-10 linear with new finals, $150.00. M. Salomon, 7909 Spruce New Orleans, La. 70118. Tel: PH: 866-8126.

SELL: Knight T-50, R-100, V-44. Bill McDougald, Prescott, Arkansas 71857.

FOR Sale: 4-1000A grounded grid linear amplifier, rack-mounted; coils for 20, 40, 15 meters. Power supply, 3000V-300 Ma. M. G. Long, Jr., RT 1, Box 179, Bonanza, Oregon 97623.

EICO 222 VTVM wired by tech. Ex $17.00: 1175B GR freq. monitor unused condx, with manual and connectors, $100.00. RBC rcvr and PS 4-27 Mc vy gd condx. $25.00. RBC pick-up deal. WA3BNB/3, RD#2, Box 408, Lewistown, Penna. 17044.

SALE: Collins 75S-3, perfect, $350.00: Collins Autotune transmitter, 200 watts AM and CW, 40 and 80 meters, with power supply, $50.00. Eico 723 60-watt c.w. transmitter, $25.00. K9IEL, Box 576, Winona Lake, Indiana 46590.

EXCELLENT Invader 2000, 2 KW SSB, $399.00. Very clean Drake 2B, $149.00. Immaculate Galaxy 300, $139.00. No trades! W4ETO, 1315-108th Ave., North, Seminole, Fla. 33540. Phone CLearwater (813)-595-3447.

SELL: Drake TR-3/RV-3/AC-3 in good condition, $425.00. K8TAS, 2454 Ivanhoe, Pontiac, Michigan 48053.

SELLING: Utica 650A transceiver with VFO. $100.00. Free delivery 100 miles. K2ARY. Telephone 609-299-2604.

DRAKE R-4A, like new condx. $320.00 firm! Will ship to first check received. WB2QOX, 15 Myrtledale Rd., Scarsdale, N.Y. 10583. Tel: (914)-SC3-6050.

COINS Needed! College student selling Drake R-4 for $275.00. Recently overhauled by factory. WA9PIM, Tom Sloan, 204 W. Third, Assumption, Ill. 62510.

COMPLETE Station: Hallicrafters SX-71 receiver, Johnson Valiant transmitter, 30 foot tower, rotor, TA-33 beam, D-104 mike, filters, accessories. All like new: $360.00. Tel: (516)-CA-1-7766, Les, WB2NHX, 2911 Anthony St., Wantagh, N.Y. 11793.

SELL: Hallicrafters SX-110 with spkr, Eico 720 xmttr, 730 modulator, Heath VF-1, package: $175.00. Also separate, in exc. condx, with manuals. Inquire: Hal, WB2VIQ, 1145 East 105th St., Brooklyn, N.Y. 11236. Tel: (212)-241-0280.

MUST Sell, going overseas: Hallicrafters SR-500 with PS-500 AC supply, $350.00: Heath Shawnee (6 meters), $150.00. Or you make offer. Both in very good condition. Will ship. T. H. Clark, K4SHY, 4043 Skyland, Kingsport, Tenn. 37664.

WANTED: B&W 381 or 381B T-R switch. VE3AOE, 79 Briarwood Crescent, Hamilton, Ont., Canada.

NCX-3 transceiver with XCU-27 calibrator and NCX-A power supply, all in good condition, $290.00. Philip Hunrath, 47 Parker Pl., Shrewsbury, N.J. 07701.

SELL My National HRO-60 Communications receiver, complete with coils A, B, C, D and AC, in good operating condition, never modified in any way, and ready to go. Includes 100 kc cal. osc., speaker, and for SSB reception Central Electronics Model B Sideband Slicer, all for $200 cash. Also my Hallicrafters HT-32 144-watt p.e.p. SSB, CW and AM transmitter, in excellent operating condition and never modified, ready to go at $200 cash. Very clean signal. W6KW, 11422 Zelzah Ave., Granada Hills, Calif. 91344.

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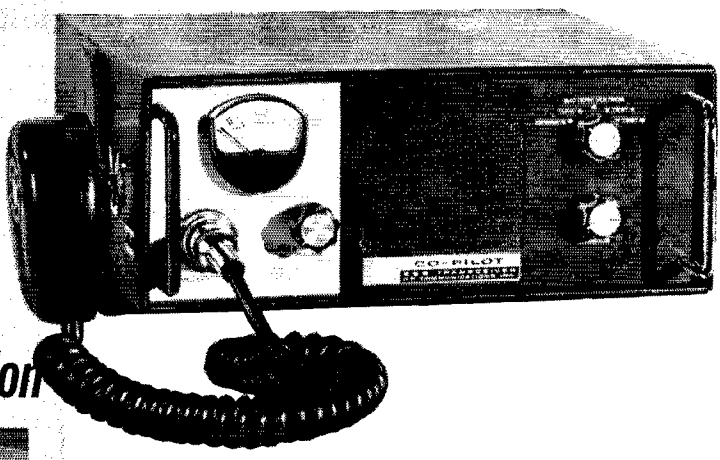

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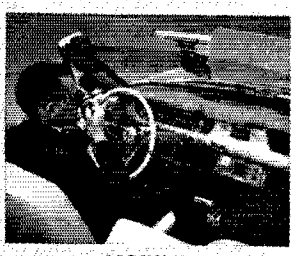

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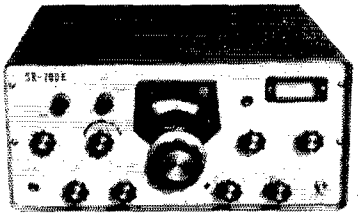

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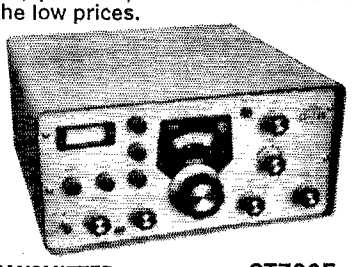

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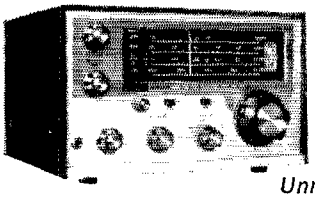

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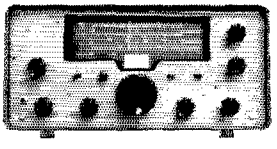

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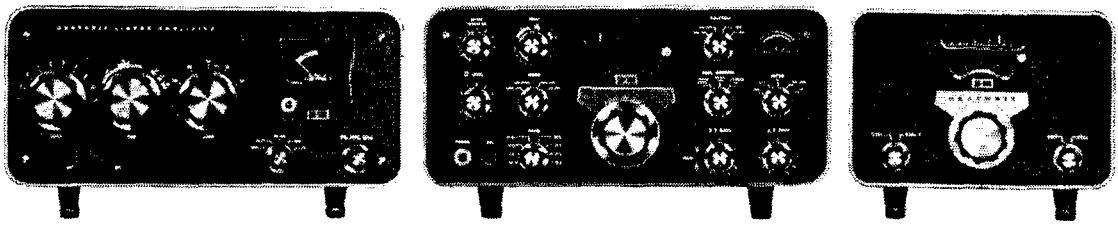
ver·sa·til·i·ty (vur'se-til'e-ti), n., the quality or state of being versatile; specifically, a) competence in many things. b) ability to move freely in any direction.



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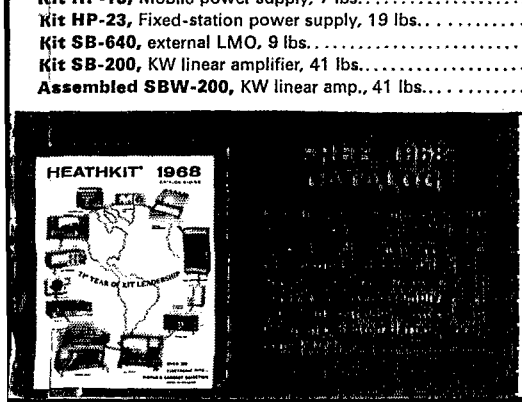
Compare the Specifications

PARTIAL SB-101 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Less than 1 microvolt for 15 db signal-plus-noise to noise ratio for SSB operation. **SSB Selectivity:** 2.1 kHz minimum of 6 db down, 5 kHz maximum of 60 db down — 2:1 nominal shape factor — 6:60 db. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 db down, 2.0 kHz maximum at 60 db down. **Spurious response:** Image and IF rejection better than 50 db. **TRANSMITTER SECTION: DC power input: SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **Oscillator feedthrough or mixer products:** 55 db below rated output. **Harmonic radiation:** 45 db below rated output. **Transmit-receive operation: SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Carrier suppression:** 50 db down from single-tone output. **Unwanted sideband suppression:** 55 db down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 db down from two-tone output. **Noise level:** At least 40 db below single-tone carrier. **RF compression (TALC):** 10 db or greater at .1 ma final grid current. **GENERAL: Frequency stability:** Less than 100 Hz per hour after 20 minutes warm-up. **Dial accuracy — "resettability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Cabinet dimensions:** 14⅞" W x 6⅝" H x 13⅝" D.

SB-640 SPECIFICATIONS — Frequency output, LMO: 5 to 5.5 MHz. **Frequency output, crystal:** 4.975 to 5.525 MHz. **Frequency stability:** Less than 100 Hz per hour after 20 minutes warmup from normal ambient conditions. Less than 100 Hz for ±10% line voltage variations. **Visual dial accuracy:** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Front panel controls:** Main (LMO) Tuning dial; LMO/XTAL switch; Crystal Selector switch — XTAL 1/XTAL 2. **Panel light:** ON when transmitting or transceiving frequency is controlled by External LMO. **Rear apron facilities:** Connector to SB-101. Frequency Adjust trimmers XTAL 1 and XTAL 2. **Power requirements (from SB-101 Transceiver):** 150 VDC at 5 ma. 12.6 VAC at 450 ma. **Dimensions:** 6⅝" H. (plus feet) x 10" W. x 11⅜" D. (including knobs).

SB-200 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 & 10 meters. **Maximum power input:** 1200 watts P.E.P. SSB, 1000 watts CW. **Driving power required:** 100 watts. **Duty cycle:** SSB, continuous voice modulation; CW, 50% (key down time not to exceed 5 min.). **Third order distortion:** 30 db or better at 1000 watts P.E.P. **Output impedance:** 50 to 75 ohm unbalanced; variable pi-output circuit. SWR not to exceed 2:1. **Input impedance:** 52 ohm unbalanced; broad-band pretuned input circuit requires no tuning. **Meter functions:** 0-100 ma grid current, 0-1000 ma plate current, 0-1000 relative power, 1:1 to 3:1 SWR, 1500 to 3000 volts high voltage. **Front panel controls:** Load; Tune; Band; Relative Power Sensitivity; Meter Switch, Grid-Plate-Rel. Power-SWR-HV; and Power Switch, on/off. **Tube complement:** Two 572B/T-160-L (in parallel). **Power requirements:** 120 volts AC @ 16 amperes (max.), 240 volts AC @ 8 amperes (max.). **Cabinet size:** 14⅞" W x 6⅝" H x 13⅝" D. **Net weight:** 35 lbs.



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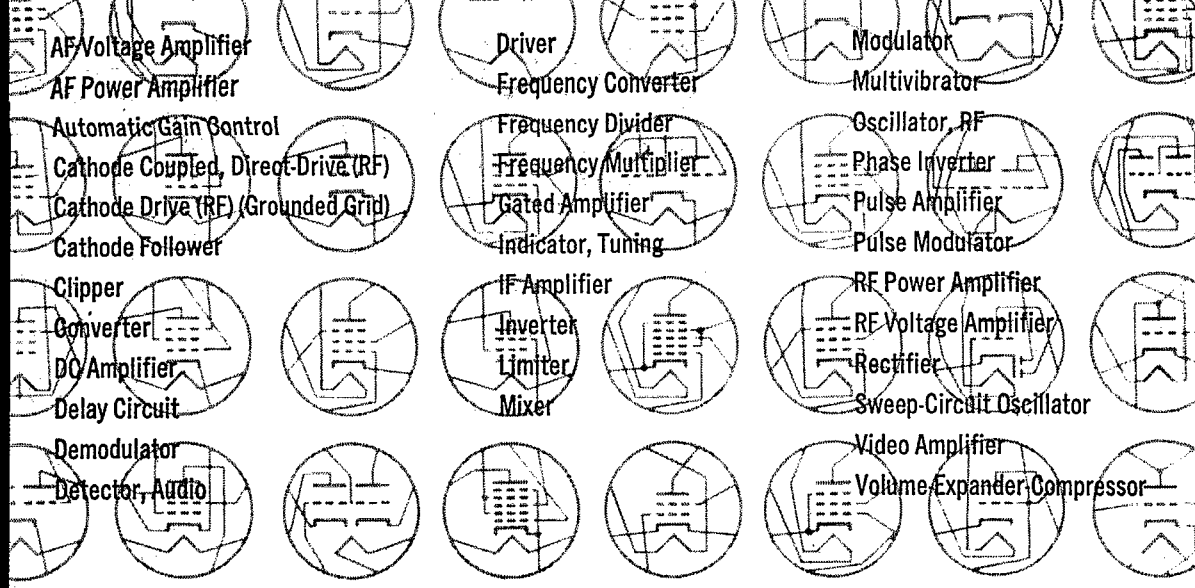

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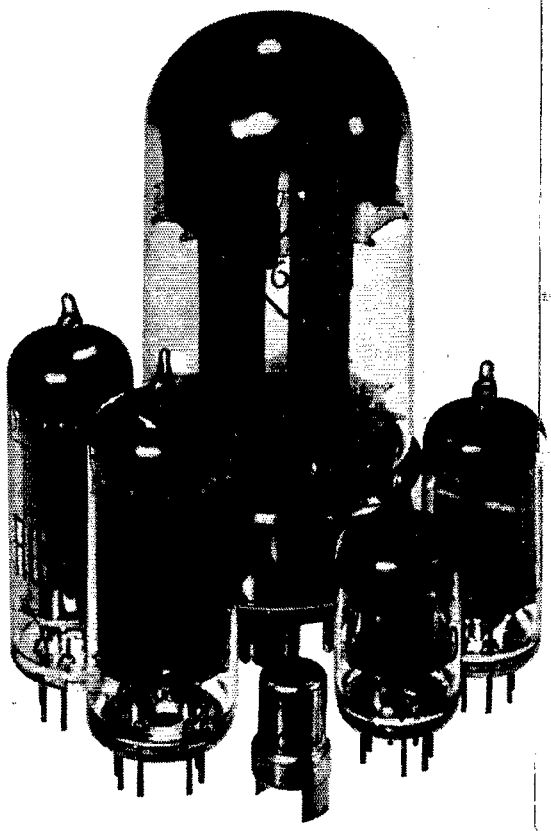

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