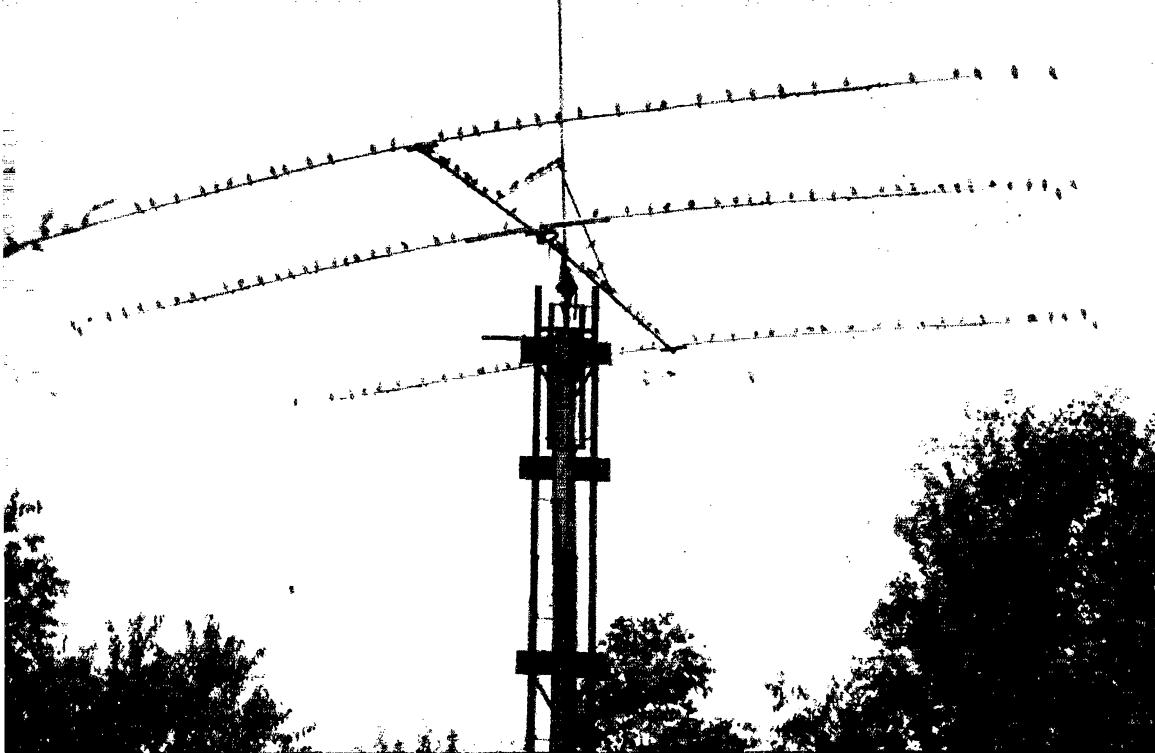


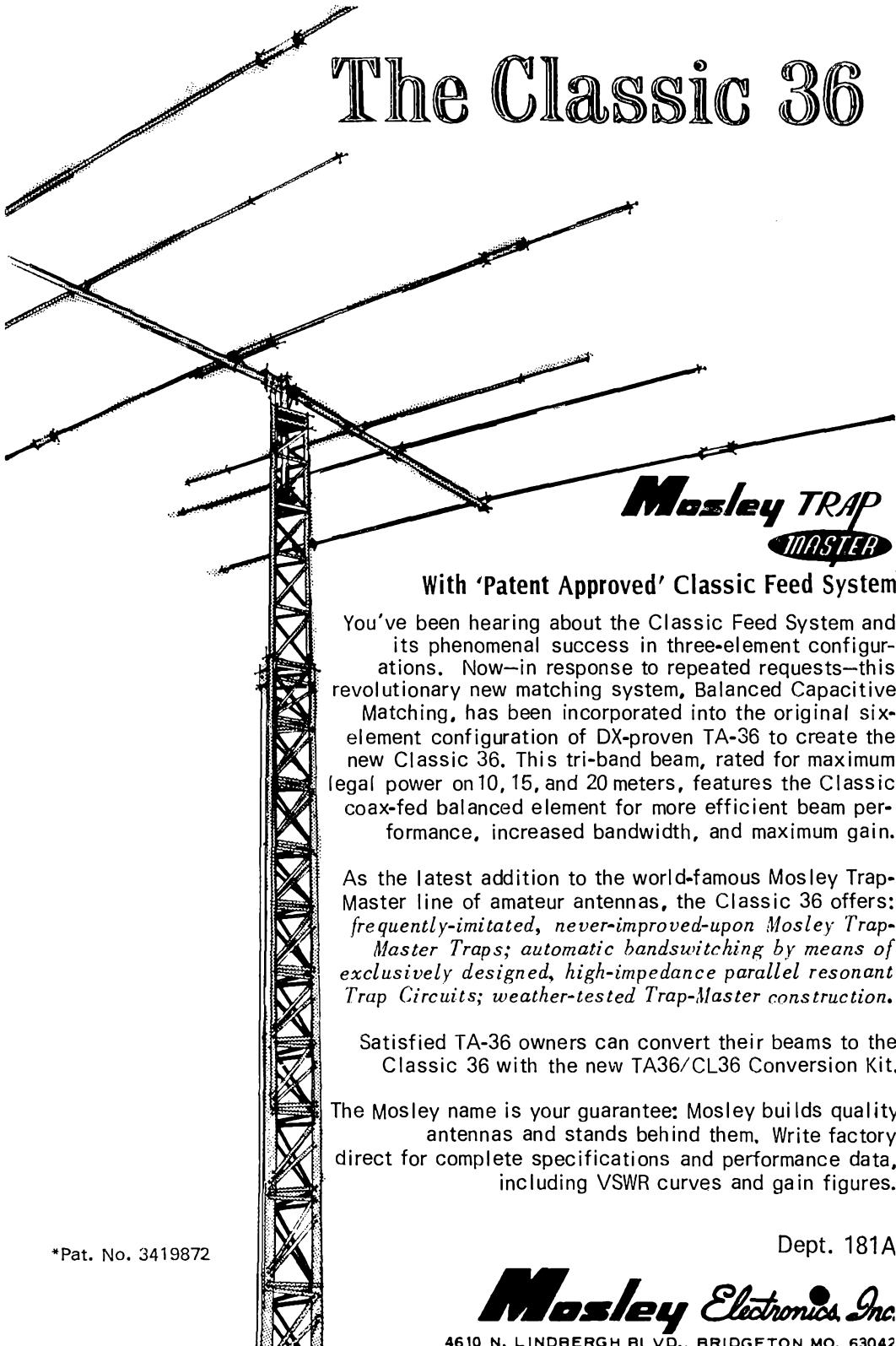
April 1969
75 Cents

QST

**Amateur
Radio**



OFFICIAL JOURNAL OF THE ARRL



The Classic 36

**Mosley TRAP
MASTER**

With 'Patent Approved' Classic Feed System

You've been hearing about the Classic Feed System and its phenomenal success in three-element configurations. Now—in response to repeated requests—this revolutionary new matching system, Balanced Capacitive Matching, has been incorporated into the original six-element configuration of DX-proven TA-36 to create the new Classic 36. This tri-band beam, rated for maximum legal power on 10, 15, and 20 meters, features the Classic coax-fed balanced element for more efficient beam performance, increased bandwidth, and maximum gain.

As the latest addition to the world-famous Mosley Trap-Master line of amateur antennas, the Classic 36 offers: *frequently-imitated, never-improved-upon Mosley Trap-Master Traps; automatic bandswitching by means of exclusively designed, high-impedance parallel resonant Trap Circuits; weather-tested Trap-Master construction.*

Satisfied TA-36 owners can convert their beams to the Classic 36 with the new TA36/CL36 Conversion Kit.

The Mosley name is your guarantee: Mosley builds quality antennas and stands behind them. Write factory direct for complete specifications and performance data, including VSWR curves and gain figures.

*Pat. No. 3419872

Dept. 181A

Mosley Electronics Inc.
4610 N. LINDBERGH BLVD., BRIDGETON MO. 63042

New All-Purpose Single-Sideband Transceiver



One Basic Radio

- Completely transistorized, transmitter and receiver
- 6 Channels 2-18 MHz
- Operates from 12 VDC without converter
- Lightweight, compact, modular construction
- Versatile—SSB, AM, CW
- Complete line of accessories

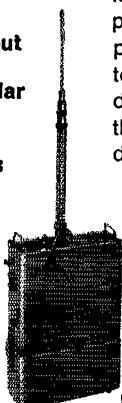
Accessories Include:

- AC Power Supply/Battery Charger combination
- Simple Go/No/Go test set
- Handcrank Generator
- Antennas for all Applications
- Canvas Carry Bag for Manpack operation
- Antenna Tuner
- Nickel Cadmium Battery Pack

All Solid-State... Communications System (SBT-22)

Pre-proved in service under adverse environments, SBT-22 is completely qualified as the one basic, all weather, all-purpose radio. Use in manpack, mobile, base-station, or portable. Simple design increases usefulness—permits non-technical personnel to be operators. Stand-by electrical drain common to vacuum tube units is completely eliminated through solid state circuitry. Write for complete technical details, in Form No. S-1002 ID free on request.

You're in the Global Communications Community
with a Hallicrafters



Power Input	Size	Weight	Recommended Antennas	Sideband Options
12.6 VDC, negative ground only	WITHOUT COVER 10½ x 11½ x 4¾ in. 26.35 x 28.57 x 11.1 cm.	WITHOUT COVER 8 pounds 3.6 Kilos	MANPACK— folding whip Wire dipole	CW and USB Standard
115/230 VAC, 50-60 cycles at 65 watts	WITH COVER 14½ x 11½ x 4¾ in. 37.47 x 28.57 x 11.1 cm.	WITH COVER 12 Pounds 5.4 Kilos	MOBILE Long Wire	Selectable sideband optional— AM optional

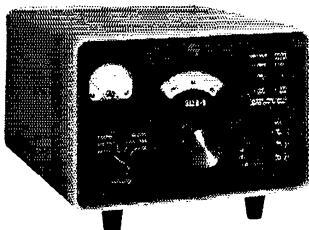
the hallicrafters co.

A Subsidiary of Northrop Corporation

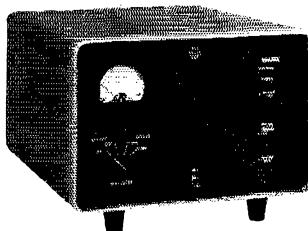


600 HICKS ROAD
ROLLING MEADOWS, ILLINOIS 60008

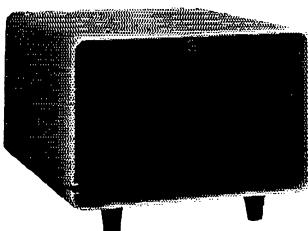
Ham Radio at its best



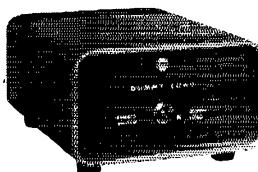
312B-5 VFO Console



312B-4 Speaker Console



516F-2 AC Power Supply



DL-1 Dummy Load

S-Line Components and Collins Systems

Adding Collins S-Line components to a Collins system gives you ham radio at its best.

The 312B-4 Speaker Console lets you control your S-Line with the flip of a switch. Another feature is directional watt meter.

Make your KWM-2 fixed station more versatile with the 312B-5 VFO Console. Get all 312B-4 features, plus the capability of limited separation of transmitter and receiver frequencies.

Switch on the DL-1 Dummy Load and tune up; switch it off and operate. No need to unplug. Control the dummy antenna load with a front panel switch or remote control.

All the voltages required for the 32S-3

Transmitter or KWM-2 Transceiver are supplied by the 516F-2 AC Power Supply.

Fixed station, portable or mobile, Collins has a complete line of system components to put more enjoyment into ham radio. And all components, including the power supply, are styled with S-Line eye appeal.



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OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

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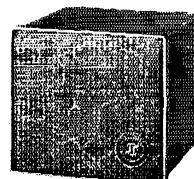
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Buy your new Hammarlund receiver this spring... and we'll throw in a free matching speaker.

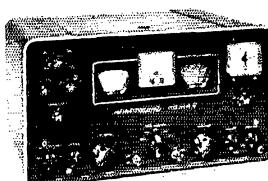


See your
Hammarlund dealer
for full details.

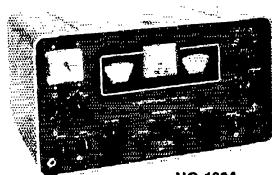
During March and April, Hammarlund will give you free an extended range speaker in matching cabinet, with the purchase of any new Hammarlund receiver.



HQ-110A-VHF



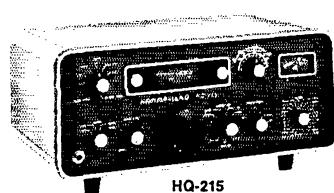
HQ-145A



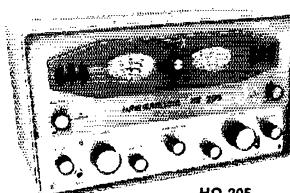
HQ-180A



HQ-200



HQ-215



HQ-205

MODEL HQ-110A-VHF
11 tube dual conversion, extra wide range receiver. Two to 160 meters in seven bands — all built in!

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Ten tube dual conversion general coverage receiver. 540 KHz to 30 MHz in five bands, featuring exclusive crystal and slot filter selectivity.

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Ten to 160 meters in a superlative 17-tube triple conversion general coverage receiver with linear product detector, selectable sideband, and vernier IF passband tuning for unequalled SSB reception.

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MODEL HQ-205
The transceiver which incorporates a general coverage receiver. Five-watts on CB or 10-meters in 6 crystal-controlled transmitter channels. Plus 540 KHz to 30 MHz and ham bandspread.

MODEL HQ-215
All solid-state communications receiver. Unequalled sensitivity, selectivity and stability on 10, 15, 20, 40 and 80 meters. Provision for 13 additional 200 KHz segments for general coverage adaptability with communications receiver quality.



Established 1910

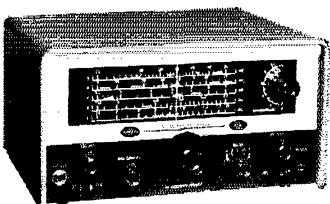
The **HAMMARLUND**
Manufacturing Company Incorporated

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

Just Getting Started In Ham Radio?

If your interest in ham radio has only recently developed you already know by now that there are hundreds of brands of equipment from which to choose, some costly . . . some not too costly. For years, Ameco equipment has appealed to the beginner because of its modest cost, yet with engineering and manufacturing quality you would expect to find in really expensive gear. Read about our All-Wave Receiver and Novice Transmitter below, then write for our new Ameco catalog to get complete specifications on these and other moderately priced items.

Model R-5A Allwave Receiver

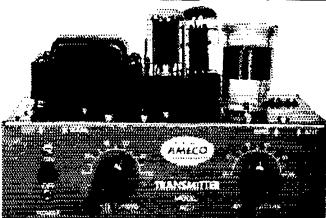


An exceptionally fine receiver for the short wave listener and beginning amateur operator. Fully transistorized-solid state. Covers .54 Mc through 54.0 Mc in five continuous bands. Includes standard broadcast band, all foreign broadcast bands, all amateur bands from 160 through 6 meters, all 27 Mc CB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

Wired and tested \$99.95

Battery adapter kit. (permits operation from 12 VDC or eight "D" cells) \$ 3.95

Model AC-1 Novice CW Transmitter Kit



The ideal kit for the beginner who requires a reliable TVI suppressed transmitter. Keying is clean and chirp-free. Crystal controlled, PI-network Output Circuit. Includes AC Power Supply. For 40 and 80 meters, CW. Fifteen watts input. Kit is simple to build and easy to operate.

Kit with coil for any 1 band, including tubes \$23.95
Extra coil kit for any 1 band, CK-1 1.00

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Radio Amateur Theory Course: Gives sufficient information to pass the FCC exams for the Novice, Technician, General and Conditional Classes of Amateur Licenses. The Ameco Theory Course is the shortest path to getting a ham ticket.
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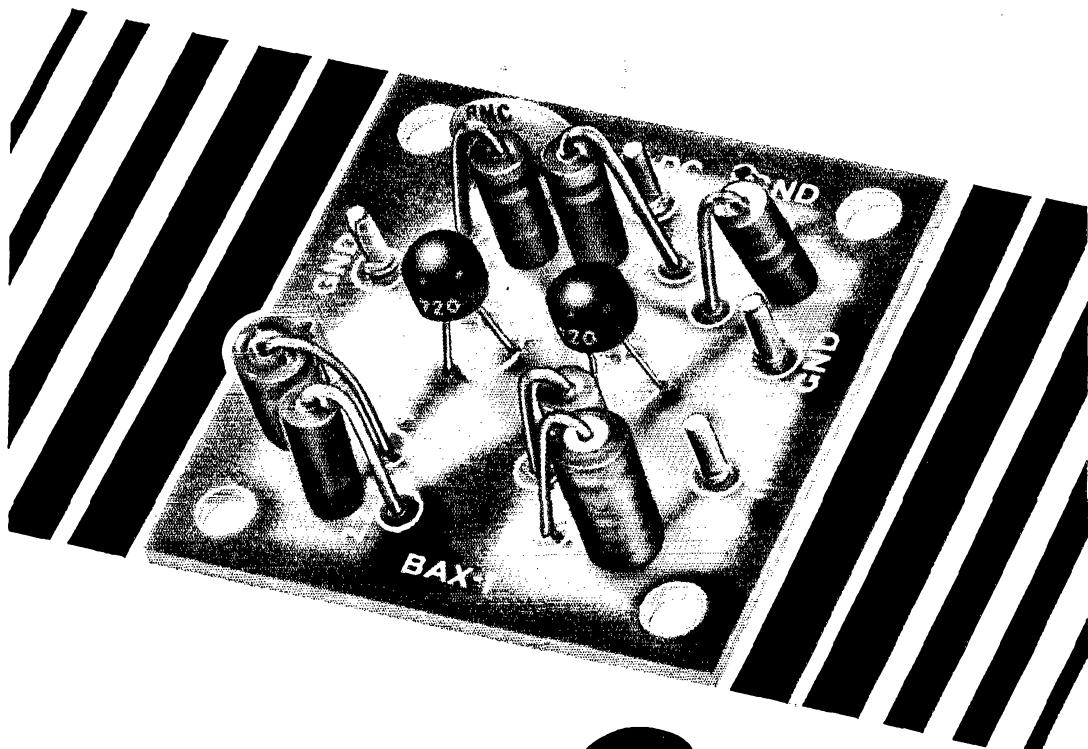
Division of Aerotron, Inc.
P. O. Box 6527 Raleigh, North Carolina 27608

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCMI, 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.

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Eastern Pennsylvania	W3HKA	George S. Van Dyke, Jr.	4607 Convent Lane	Philadelphia	19114
Maryland-D. C.	K3LFD	John Miniholland	306 Holland Rd.	Sterling Park, Md.	21146
Southern New Jersey	W2ZI	Edward G. Raser	19 Blackwood Drive	Wilburton Gardens	
Western New York	K2KTK	Richard M. Pitzeruse	303 Woodland Rd.	Trenton	12128
Western Pennsylvania	W3GJY	John F. Wojtkiewicz	1400 Chaplin St.	Syracuse	13219
Conway 15027					
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Idaho	W7ZNN	Donald A. Crisp	3404-B St. F.	Leviston	83501
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Hawaii	K7HBF	Les R. Vical	45-60 Lulu Ku Rd.	Kaneohe	96744
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Sacramento Valley	WA6JLD	John P. Minke, III	6240 Rio Bravo Drive	Armenia	95608
San Francisco	WA6AUD	Hugh Cassidy	77 Coleman Drive	San Rafael	94901
San Joaquin Valley	WA6JPU	Ralph Saroyan	4204 E. Townsend Ave.	Fresno	93702
Santa Clara Valley*	W6VZT	Albert P. Gaetano	115 Old Adobe Rd.	Los Gatos	95030
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West Virginia	W8JMI	Donald B. Morris	1130 Mountainstar Lane	Fairmont	26554
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Utah	W7QWH	Thomas H. Miller	3148 South 3360 East	Salt Lake City	84109
Wyoming	W7CQL	Wayne M. Moore	142 South Montana Ave.	Casper	82801
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Georgia	W4RZL	Howard L. Schoenher	P.O. Box 1902	Columbus	31902
West Indies	KP4DV	Albert R. Crumley, Jr.	P.O. Box 10073	Caparra Heights	
Western Florida	W4RKH	Frank M. Butler, Jr.	323 Elliott Rd., S.E.	San Juan, P.R.	00922
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San Diego	WB6GMM	James E. Emerson, Jr.	6561 Foyle Way	San Diego	02117
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Quebec	VE20J	Jim Ivey	1755 Brookdale Ave.	Dorval	P.Q.
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International BAX-1 Broadband Amplifier is a general purpose unit which may be used as a tuned or untuned amplifier in RF and audio application. For example: when used as untuned RF pre-amplifier connect between antenna and receiver antenna posts. Ideal for SWL, Experimenter or Amateur applications. Easy to build. Complete Kit.....\$3.75

SPECIFICATIONS:

1. Power 9 to 15 volts dc @ 10 ma
2. Frequency Range 20 Hz to 150 MHz
3. Gain at 1 MHz 30 db
Gain at 150 MHz 6 db
4. Response ref 1 mhz down 6 db at 50 hz.
±3 db 100 hz to 10 mhz
down 15 db at 100 mhz
down 24 db at 150 mhz
5. Operational Impedance 50 to 500 ohms
6. Noise less than 10 microvolts rf across 50 ohms; audio less than .0005 volts
7. Maximum Input Level 01 volts ac
8. Output at Maximum Input 50 ohms — .1 volt
(at 1 mhz) 500 ohms — .5 volt
- Size inches 1½" x 1½" x 1"
- Mounting 4 holes with spacers

Write for complete catalog.

6 to 30 DB GAIN!
WITH ICM LOW COST
BAX-1 BROADBAND AMPLIFIER (20 Hz to 150 MHz)



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

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

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

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

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

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



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"It Seems to Us..."

"OBSCENE HAM RADIO PROBLEM, SAYS FCC"

OUR plea for responsibility and personal discipline in the content of on-the-air conversations (February *QST* editorial) seems to have struck a number of readers as a dictatorial advocacy of censorship. Since it raised so many hackles (see "Correspondence" this month for a sampling), we'd like to think we may have been guilty of inappropriate language rather than undemocratic intent. On this premise, and in the interest of clarification, we'll risk some additional comment on the subject!

Almost as if to illustrate what we were trying to say, the same mail that brought some of the protesting letters also brought several clippings of a United Press International story datelined Washington. Headlines varied from the one at the top of this column to "How can we stop that dirty talk on the air?" and "Some hams turn air blue"—and more.

The text of the wire service story led off with "If you think some of the stuff you see on the newsstands or in the movies is indecent, you should hear what people are saying right on the air," followed by such statements as "a transcript taken by FCC of one ham radio operator's broadcast went into intimate details of sexual relations and homosexuality, apparently just for the sake of being obscene. The FCC has hundreds of similar transcripts on file."

As in society as a whole, certainly in amateur radio there is a small segment of such exhibitionists or those with other mental quirks — perhaps simply trying to prove their "right to freedom of speech." These people are not likely to be responsive to any appeal to reason. But they do hurt us all, as exemplified in the news story, by effectively smearing the image of amateur radio. They are acting illegally, yes. But FCC or other official redress can never be as effective as we might wish. Hence it is important — nay, vital — that each of us as conscientious amateurs accept personal responsibility to do what we can to cleanse the air of our own undesirables.

Equally — and this was the intended heart of our February plea — each of us should maintain high enough standards in choice of subjects in order to retard, at least within our own ranks, the trend to a new social order of permissiveness and lowered moral and ethical standards.

There is another aspect of the problem we attempted to discuss. It has to do with the occasional lapses in good judgement or good taste that even the most responsible of us may be guilty of through thoughtlessness or carelessness.

The point is not a question of free speech or even the value of controversy as such. We do not have to choose between being offensive or being innocuous on the air, between clinical discussions of sex or RST reports. There is a great deal of room in between such extremes for us to select subject matter for discussion that is stimulating, productive, provocative, illuminating, or what have you. What we should always keep in mind, however, is that amateur radio is a very public showcase for a very wide world made up of people of many different cultures, tastes and political persuasions. As amateurs we have a common bond and a wide area of mutual interest and curiosity to explore — without having to tread on dangerous ground. Cultural differences and political differences can indeed be discussed productively and interestingly within reasonable limits of good judgment and respect for other viewpoints and tastes, especially those which we may not personally share.

But where there is any question of doubt or uncertainty at all, it is our firm conviction that the interests of amateur radio as a whole, and of each of us individually, are best served by erring — if at all — on the side of caution

. . . by avoiding areas of possible offense rather than sounding off just to exercise our right to free speech.

We do have complete freedom of speech in amateur radio. It exists because over the years most amateurs have had — and voluntarily demonstrated — good taste in on-the-air communication. We're really only asking that it be kept that way. We think avoiding a couple of potentially offensive subjects will not really prejudice our rights and principles nor lead us into intellectual slavery. And by continuing to accept *all* of the responsibilities that go with *all* of our rights as amateurs, we not only maintain our fine image in the public eye and protect our hard-earned repute in national and international regulatory halls but, it seems to us, we strengthen the personal pride each of us has in our very special avocation.

League Lines . . .

"In Touch All Over the World" by VE2NK in the Canadian edition of "Reader's Digest," is a testimonial to the magazine and also effectively tells the amateur radio story as a means of personal intercommunication. Victor says we all have one thing in common: a wide range of interests and hobbies.

Because of claimed violations of security restrictions, the U.S. Navy has closed down its amateur operations in the far east, exclusive of hospital ships. More than likely, the trouble was caused by one or two characters being careless with the rules. Another aspect of "conversation discipline"?

A group of amateurs in the area of the nation's capital, some professionally in the space communications business, have formed the Radio Amateur Satellite Corporation. The purpose, like that of Oscar, is to get some hamband sputniks back in business.

Washington was also the scene of extensive tax hearings by the Ways and Means Committee, at which the League (plus dozens of other similar non-profit associations) protested the IRS imposition of tax liability on advertising income. Results will not be known for some time. Actual effect of Treasury Department rules on ARRL's financial position would be small; it is the principle involved.

While we are still confident of a favorable outcome, complicated legal maneuverings have run up the defense cost of the million-dollar lawsuit by a neighbor against W4GJO claiming nuisance from TVI. The Sarasota (Fla.) Amateur Radio Club (Box 3323) is coordinating contributions to help out. ARRL General Counsel Booth continues liaison with Grid's attorneys to furnish appropriate assistance. Though it is not intended as a complete solution to every problem, the League's TVI kit of technical and regulatory background information has helped keep many a local situation from reaching court. A copy is available from Hq. on request by any TVI committee, club -- or even an individual in specific difficulty.

With the new subbands, we need to be especially observant of the rule requiring all transmitted energy to stay inside the proper segment. E.g., an Extra on 21,251 kHz. would have to have high confidence in his lower-sideband suppression!

We've seen a preview of some of the scenes for the League's new motion picture being produced by Dave Bell (W6BVN), and we're sure the complete job will give ham radio a real boost. Early distribution may be concentrated on television exposure, but later in the year extra reels hopefully will be available for showing at civic clubs, schools, and the like.

Next month officials of amateur societies in Europe/Africa will gather in Brussels for the triennial meeting of IARU's Region I Division. Such sessions not only help solidify amateur radio's worldwide position in representation at international regulatory conferences, but also coordination of operating activities -- contests, networks, etc. The results are particularly important to Region I with a multiplicity of countries within a comparatively small area.

Several affiliated clubs have undertaken sponsorship of Explorer Posts (the Boy Scouts of America program for high school boys and girls) specializing in amateur radio -- a fine idea for more clubs to copy! Your local Scout Council will be happy to help you get started; ARRL's "club kit" can assist, too.

An Examination of the Gamma Match

BY D. J. HEALEY, III,* W3PG, ex-W3HEC

A working analysis of the gamma-match problem that gives useful practical results. New light on the question of when it will and when it won't give a perfect match to the coaxial transmission line.

THE gamma match has been widely used for matching coaxial cable to all-metal parasitic beams for the past nineteen years.¹ Recently, a three-element 14-MHz. Yagi, having a boom length of 0.4 wavelength, was constructed at W3PG and mounted atop a 75-foot Union Metal unguyed antenna pole. A driven-element diameter of 1½ inches, a gamma-rod diameter of ½ inch, and 5-inch center-to-center spacing between the gamma rod and driven element were employed. A capacitance patterned after the W2VS design² was also provided. The maximum distance provided between the short and the antenna center was 44 inches.

When attempts were made to adjust the coaxial capacitor for a match to 50 ohms (using a resistance bridge connected to the transmission line approximately four feet from the matching section) a complete null could not be achieved. Variation of the capacitor resulted in best match at maximum capacitance, approximately 160 pf. Measurement of standing-wave ratio at the transmitter end of the coaxial cable showed a minimum s.w.r. of 1.5 to 1 at 14.0 MHz. and an increase to 3 to 1 at 14.35 MHz.

The author had used the gamma match on a number of beams in the past with much better results, but with somewhat different dimensions. In reviewing various articles on antennas that have appeared in *QST* and *CQ*, there appears to be quite a variation in the diameter ratios and spacing between gamma rod and driven element that have been employed. Nowhere in the literature, however, was I able to find a discussion of the gamma match that would indicate the limitations of the device. Since working at the top of the pole is rather difficult, I decided that it might be a good idea to have a better understanding of the matching section before making changes. What follows constitutes my interpretation of the operation of the gamma match.

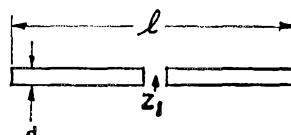
Input Impedance of the Antenna

The input impedance at the center of a half-wave antenna which has infinite length-to-diameter ratio and zero conductor resistance is $73 + j42$ ohms. This is the radiation impedance. A practical antenna has conductor resistance and a finite length-to-diameter ratio. Typically, the input impedance at the center of a half-wave dipole made of aluminum tubing is about $68 + j35$ ohms and the conductor resistance is negligible. To make the dipole resonant, it is necessary to shorten it. Fig. 1 shows the length that is required.³ It is not necessary that the dipole be resonant—in fact, when using the gamma match this is in many cases rather undesirable!

When the dipole is the driven element of a Yagi parasitic array, the impedance that appears at the center of the driven element will usually be quite different from that of the isolated dipole. The reason for this is that the Yagi antenna is equivalent to a number of resonant circuits tuned to different frequencies and coupled together. The self-impedance of the parasitic elements and mutual impedance between parasitic elements and driven element cause resistance and reactance to be coupled into the driven element. Mushikake⁴ has made a theoretical analysis for the three-element wide-spaced Yagi in which reflector and driven element are a half wavelength long and reflector-to-driven-element spacing is fixed at a quarter wavelength. His results show maximum power gain occurring when the director-to-driven-element spacing is 0.2 wavelength and the director length is 0.45 wavelength. Changing director spacing and length

³ Kraus, *Antennas*, p. 276, McGraw-Hill Book Co., Inc., New York, 1950.

⁴ Mushikake, "A Theoretical Analysis of the Multi-Element End-Fire Array with Particular Reference to the Yagi-Uda Antenna," *IRE Transactions on Antennas & Propagation*, July, 1956, pp. 441-444.



FOR RESONANCE,

$$l = \frac{0.48 \lambda \frac{l_d}{d}}{\frac{l_d}{d} + 1}$$

Fig. 1—Simple dipole with formula for resonant length.

* 2113 Southland Road, Baltimore, Maryland 21207.

¹ Washburn, "The 'Gamma' Match," *QST*, September, 1949.

² Reynolds, "Simple Gamma-Match Construction," *QST*, July, 1957.

List of Symbols

- b_p — Susceptance of X_p .
 d_1 — Diameter of gamma rod.
 d_2 — Diameter of driven element.
 e — Length of driven element.
 S — Center-to-center spacing of element and gamma rod.
 X_p — Parallel reactance of gamma considered as shorted line.
 X_F — Reactance needed for compensating gamma input reactance.
 Y'_2 — Admittance of Z'_2 .
 Y_F — Input admittance of gamma.
 Z_o — Characteristic impedance of gamma section.
 Z_1 — Impedance at center of driven element.
 Z_2 — Impedance of driven element at tap point.
 Z'_2 — Z_2 transformed to input of gamma.
 Z_F — Input impedance of gamma.
 θ — Angular distance from center to tap on driven element.

from 0.15λ and 0.46λ , respectively, to 0.25λ and 0.44λ reduces the power gain by only 0.3 db. from the maximum.

Mushiake gives computed curves of the input impedance which show that for the maximum-gain condition the impedance at the center of the driven element is $26 + j60$ ohms. Thus, as compared with a half-wave dipole, the radiation resistance is reduced and the reactance is increased due to the coupling between the driven element and parasitic elements. As the director length and spacing are varied over the limits, stated above, that affect gain by only 0.3 db., the impedance varies from about $20 + j40$ to $38 + j70$ ohms.

In typical amateur construction the impedance will probably tend to be on the lower side. The problem then is to couple the transmission line to the driven element (which will have an impedance of 20 to 25 ohms of resistance in series with a reactance which will depend on the driven-element length) in such a way that a low s.w.r. will exist on the transmission line over the operating bandwidth.

From Mushiake's curves it is obvious that the resistance and reactance will change more rapidly with a change in frequency than in the case of an isolated dipole.

The Gamma Match

Fig. 2 shows the basic gamma-matching section. The driven element is tapped at a point off center. By making the tapping conductor parallel to the driven element and closely spaced to it, several electrical characteristics result:

1) The antenna current flowing in the driven element is less than when the gamma rod is not present — i.e., when the element is excited as

split dipole. Part of the antenna current flows through the gamma rod. The result is an effective increase in the input impedance. Fig. 3 is a set of curves from the *ARRL Antenna Book* which gives the impedance step-up for folded-dipole antennas. This same set of curves can be used to determine the impedance step-up of the gamma-fed driven element.

2) Since the driven element is fed off center, the impedance at the tap point is higher than when it is fed as a split element. The increase in impedance is given approximately by the relationship⁵

$$Z_2 = \frac{Z_1}{\cos^2 \theta} \quad (1)$$

where Z_2 is the impedance at the tap point, Z_1 is the impedance at the center of the element, and θ is the number of electrical degrees (distance in wavelengths multiplied by 360) between the center of the element and the tap point.

3) Since the gamma rod is parallel to the driven element, the tapped impedance point of the antenna is connected to the transmission-line feed position via a two-conductor parallel-conductor transmission line. As a result, if the impedance at the tapping point of the element is Z_2 , the radiation impedance at the exciting end of the gamma is modified to:

$$Z'_2 = \frac{Z_2 + jZ_o \tan \theta}{1 + \frac{jZ_2}{Z_o} \tan \theta} \quad (2)$$

where Z_o is the characteristic impedance of the short transmission line formed by the driven element and the gamma rod. The characteristic impedance is

$$Z_o = 276 \log_{10} \frac{2S}{\sqrt{d_1 d_2}} \text{ ohms} \quad (3)$$

where S is the spacing between centers of driven element and gamma rod, and d_1 and d_2 are the diameters of the driven element and rod.

4) Because the matching arrangement constitutes a short transmission-line section which is shorted at one end insofar as transmission-line currents are concerned (these currents flow in opposite directions in the rod and driven element, and are necessary to excite the antenna current which flows in the same direction in the rod and driven element) the transformed radiation im-

⁵ Wrigley, "Impedance Characteristics of Harmonic Antennas," *QST*, February, 1954.

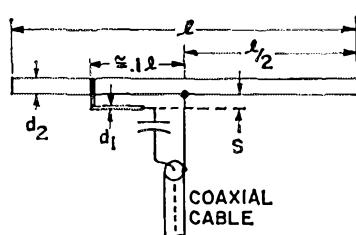


Fig. 2—Gamma match, with significant dimensions.

pedance appearing at the driven end of the gamma match is shunted by a reactance which is

$$X_p = jZ_0 \tan \theta \text{ ohms} \quad (4)$$

Since the gamma rod is only about 0.05 to 0.06 wavelength long, the shunting reactance is inductive. The lumped equivalent circuit for a gamma-matched antenna therefore appears as shown in Fig. 4.

Depending on the reactance associated with Z_2 and on the magnitude of Z_0 , the gamma section may or may not be capable of providing an input impedance such that, with a capacitor X_T of suitable reactance connected in series with the coaxial cable and gamma rod, the cable will be terminated in $53 + j0$ ohms, providing a perfect match for cable such as RG-8/U. (This situation probably led to the use of the omega match.)

A large number of combinations of gamma rod length, spacing S , and driven-element length will provide a match. However, if the length becomes too short, the efficiency and bandwidth of the matching section are poor because of the high current through the shorted transmission-line (gamma) section (small value of X_p). The transmission-line loss is $I_t^2 R_t$, where I_t is the circulating transmission-line current and R_t is the loss resistance associated with the gamma-rod and driven element. This power is delivered from the transmitter but is not radiated, so both I_t and the resistance of the matching section should be kept small.

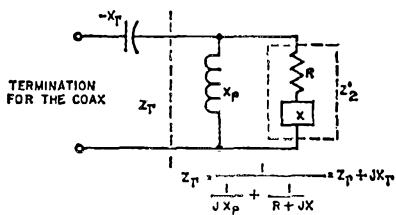


Fig. 4—Equivalent circuit of the gamma. The gamma input impedance is

$$\frac{1}{Z_T} = \frac{1}{jX_p} + \frac{1}{r + jX}$$

The gamma capacitor provides a reactance $-X_T$ that cancels the equivalent series reactance of the gamma input impedance, leaving the resistive component as the load for the coaxial transmission line.

The foregoing relationships, as well as the relationships shown in Fig. 4, can be used to determine the operation of the gamma section. However, a more convenient and rapid method of assessing the performance is to examine the effects of varying Z_0 , Z_1 and θ on a Smith chart.

This article will not attempt to explain the Smith chart. The reader may find an elementary discussion of the use of the chart in a previous issue of *QST*.⁶ Suffice to say, the Smith chart

⁶ Cholewski, "Some Amateur Applications of the Smith Chart," *QST*, January, 1960.

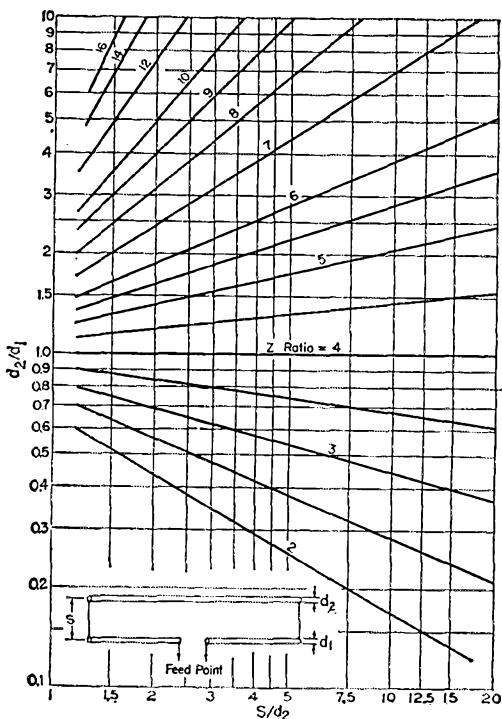


Fig. 3—Impedance step-up ratio as a function of conductor diameter and spacing.

permits equation (2) to be solved for any Z_1 , Z_0 , and θ very easily, and further makes it very simple to solve the circuit of Fig. 4. In Fig. 4 we know Z_2' , having solved equation (2) either by direct computation or by using the Smith chart, and we know X_p , having solved equation (4) or again simply using the Smith chart. The problem is to determine Z_T . Fig. 4 shows the equation that must be solved. On a Smith chart this is accomplished by inverting the point Z_2' to obtain $Y_2' = g_2' + jb_2'$. The total admittance, Y_T , is then $g_2' + j(b_2' + b_p)$. This point is plotted on the Smith chart, and then inverting this point on the chart yields Z_T .

Examples:

One of the points made in discussions of the gamma-matching problem is that the driven element must be resonant.⁷⁻⁸ Fig. 5A shows what will happen if the driven element is made resonant. A driven-element diameter of $1\frac{1}{2}$ inches, a gamma rod diameter of $\frac{3}{4}$ inch and a spacing (S) of 5 inches is considered. This results in $Z_0 = 258$ ohms, and from Fig. 3 an impedance step-up of 5.6 times. Since the driven element is made resonant, the radiation resistance will for the typical three-element Yagi be about 25 ohms. Letting the tap point be about 0.05λ from the center of the element, Z_2 is approximately

⁷ Nose, "Adjustment of Gamma-Matched Parasitic Beams," *QST*, March, 1958.

⁸ Orr, *Beam Antenna Handbook*, Radio Publications, Inc., Wilton, Conn., 1965.

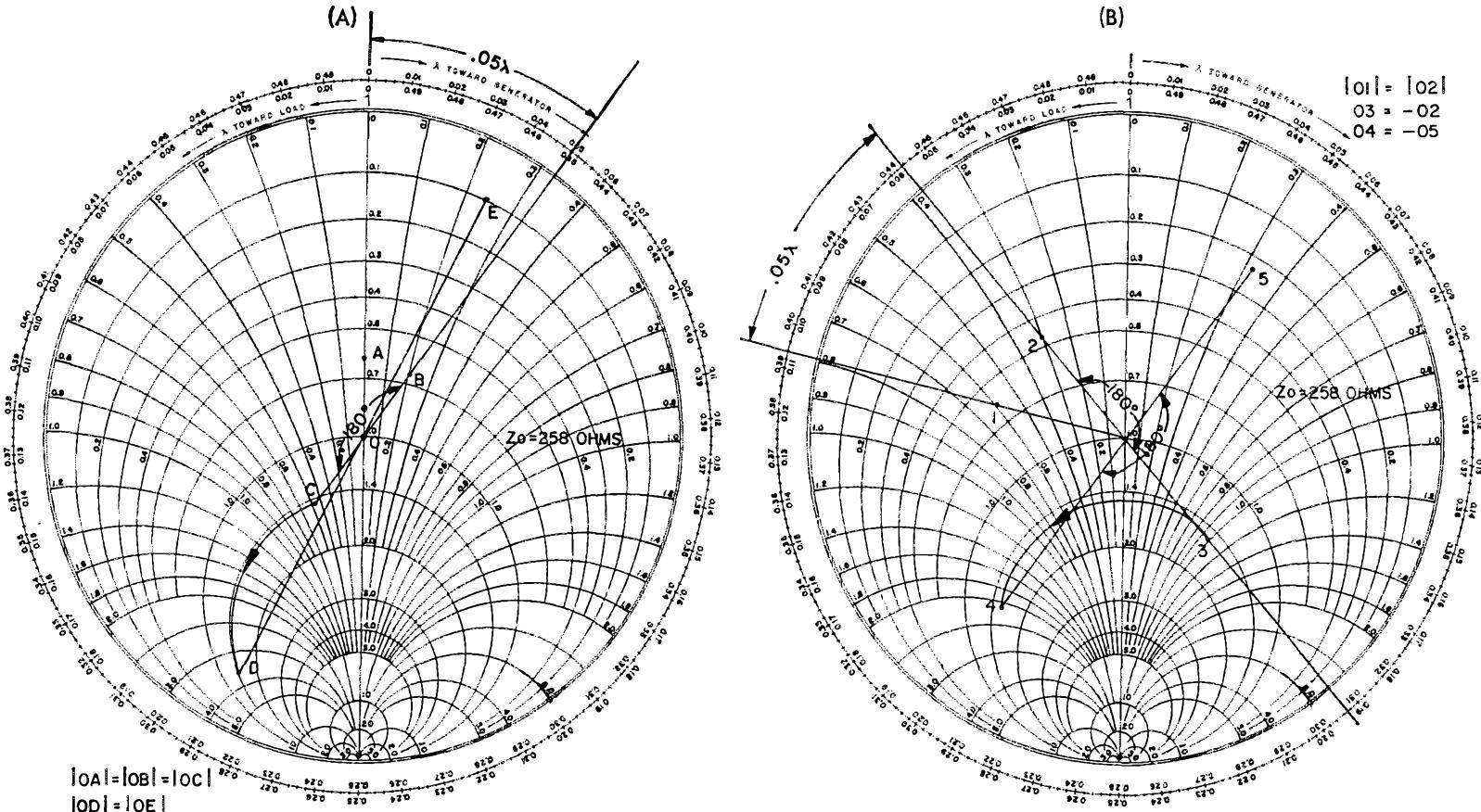


Fig. 5—Smith-chart plot for (A) the case where the driven element length is adjusted to resonance and gamma tap is 0.05λ from center, and (B) for a driven element shortened to provide capacitive reactance at the drive point; tap 0.05λ from center.

$$\frac{25}{\cos^2(18^\circ)} = 27.7 \text{ ohms.}$$

The stepped-up impedance is $5.6 \times 27.7 = 155$ ohms. On Fig. 5A, point A is this impedance normalized to the Z_o of the gamma section (i.e., $\frac{155}{258} = 0.6$). Since the length of the gamma section was taken as 0.05λ , the impedance Z_2' is obtained by rotation of point A about the center of the chart by an amount 0.05λ , resulting in point B. Point B is then inverted, yielding point C. $X_p = 258 \tan 18^\circ$ ohms, and the normalized value of X_p is X_p/Z_o or simply $\tan 18^\circ = +j0.325$. The inversion of X_p/Z_o is $Z_o/X_p = b_p/Y_o = -j3.08$. The coordinates of point C on the Smith chart are $1.41 - j0.42$. Adding the value of b_p/Y_o yields $1.41 - j3.50$ (point D). Inverting point D, a normalized impedance of $0.099 + j0.245$ (point E) results. Since this impedance is normalized to 258 ohms, the actual impedance at the driving point of the gamma is $(0.099 \times 258) + (j0.245 \times 258) = 25.5 + j63$ ohms. Minimum s.w.r. is obtained by connecting a capacitor of 63 ohms reactance between the coax cable and the gamma rod, but the minimum s.w.r. is 2.04 to 1 when using RG-8/U!

Now, if instead of making the driven element resonant it is shortened, the impedance Z_2 will consist of the normalized resistance of 0.6 ohm in series with a capacitive reactance. Shortening the typical 20-meter beam driven element by 12 inches will result in a reactance change of approximately 20 to 25 ohms. The normalized tap-point impedance thus will be about $0.6 - j0.6$ (point 1, Fig. 5B). The transferred radiation impedance to the input of the gamma (point 2) is $0.48 - j0.32$. Inverting this impedance gives the admittance (point 3) of $1.44 + j0.96$. Adding the value of b_p ($-j3.08$) the total normalized admittance becomes $1.44 - j2.12$ (point 4). Inversion of point 4 yields point 5, $0.219 + j0.322$. The impedance Z_1 provided by the gamma match is then $(0.219 \times 258) + (j0.322 \times 258) = 56.5 + j83$ ohms. At 14 MHz. with a capacitor of 136 pf. in series with the gamma rod an s.w.r. of $56.5/52 = 1.08$ is obtained. By changing the length of the gamma rod slightly a perfect match can be obtained.

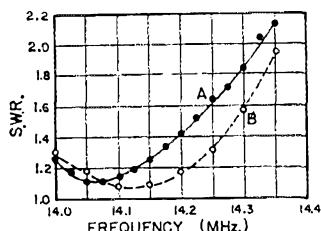
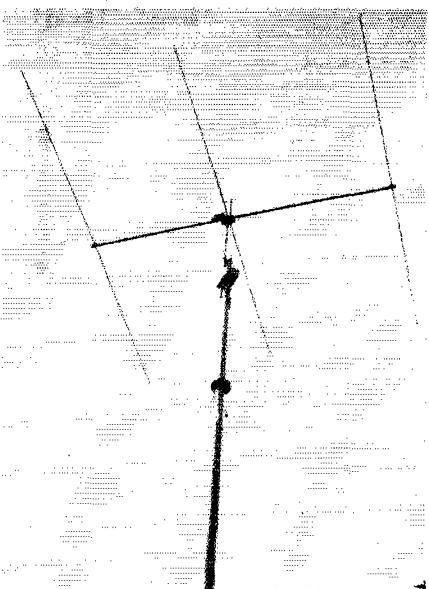


Fig. 6—Measured s.w.r. of W3PG three-element Yagi-Uda adjusted as described in the text, with gamma capacitance adjusted to minimize s.w.r. at 14.225 MHz. A—Based on impedance measurements with General Radio 916A r.f. bridge; B—Indicated by Jones Micromatch.



The three-element beam at W3PG. Driven-element length and gamma were adjusted according to the procedures developed in this article.

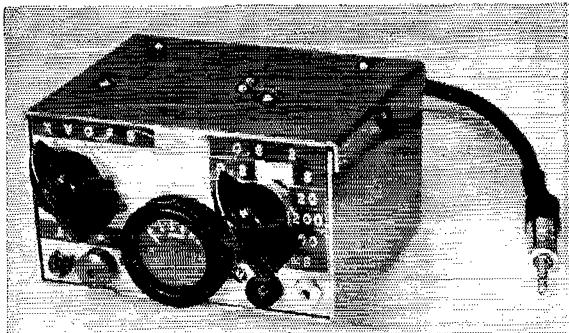
As noted in connection with Mushiaki's analysis, changing the spacing between driven element and director, as well as changing director length, radically affects the reactance so that the driven-element physical length needed to make the impedance Z_2 exhibit the necessary capacitive reactance may vary considerably with different beam constructors, as indicated by Nose.⁷

Results

Based on the foregoing analysis of the gamma match, the driven element of the W3PG 14-MHz. Yagi was shortened to 32 feet 11 inches. Dimensions of reflector and director are 35 feet $9\frac{1}{2}$ inches and 31 feet 7 inches, respectively, with approximately 0.204λ spacing to director and 0.185λ to reflector. Experiments were then made using a calibrated variable capacitor and antennoscope to obtain matching resistance and capacitance as a function of the position of the gamma short. Good agreement was obtained using these results and working backwards on a Smith chart to obtain the radiation impedance. A radiation resistance of 20.8 ohms was obtained as an average value from the measurements. Length of the gamma rod is 56 inches, with the short 39 inches from the center of the driven element.

It was observed that the proximity of metal scaffolding used to form a work platform at the top of the pole affected the input impedance. The primary effect was modification of the reactive component of Z_2 . For this reason a 150-pf. Johnson 2000-volt air variable was installed in a weatherproof box, coupled to a size 5 Selsyn follower so that the proper re-

(Continued on page 57)



The completed Multi-Tester.

This little device will fit neatly in the palm of one's hand, but its use rivals that of several separate and perhaps much larger instruments. The labels for the jacks and switch positions were made with a tape embossing machine.

A Compact Multi-Purpose Test Instrument

BY YARDLEY BEERS,* WØJF, ex-WØEXS

A compact test instrument which was built for use with various suitcase portable stations is shown in the photographs and in Fig. 1. The instrument is useful for stations ranging from transistor outfits with powers of less than a watt to those of the SB-33 transceiver class.¹ Contained in a box 3½ by 3 by 2½-inches is a device which can perform the functions of all the following equipment:

Reflectometer-type standing-wave detector,
Multi range voltmeter,
Radio-frequency probe,
Two-range ohmmeter,
Resistance-substitution box, and
Frequency calibrator using quartz crystals for reference.

This instrument was designed around a miniature microammeter, 1½-inches in outer diameter, with a full-scale reading of 200 microamperes and an internal resistance of 600 ohms. The author bought this meter on the surplus market some years ago. It is unlikely that many readers can obtain an exact duplicate, but several inexpensive miniature meters appear to be good substitutes. With some of these it may be necessary to use a slightly larger box, and it may be necessary to alter some of the resistance values given in the circuit diagram, in accordance with the procedure which is described later.

Originally, the intent was to build only a standing-wave detector, which is often needed to help match the impedances of the various haywire antennas inevitably used in portable operation. However, it seemed a shame to tie up a sensitive meter for this purpose alone. Why

not provide an extra switch position which allows the meter to be connected to a pair of pin jacks? This function would be especially useful because some of the small transmitters have no built-in meters, but only include test points for use with an external meter. Then, why not add another pin jack with a crystal diode so that it can be used to detect r.f. or a.c.? By a continuation of this reasoning, the present circuit gradually evolved.

In the early stages of the development of this circuit, the place for S_2 and the resistors R_3 through R_9 was occupied by a 50,000-ohm control. Its sole purpose was to set the needle exactly on full scale on the forward (F) position of the reflectometer or on the high resistance scale of the ohmmeter. However, it was realized that this control could also serve as a multiplier for a voltmeter, which would have a full scale reading of 10 volts. In addition, it was considered desirable to be able to measure the B+ voltage of the SB-33, about 500 volts. If the control value were made a high-enough resistance to serve as a multiplier for this range, its adjustment would be much too critical in other applications. Therefore it was decided to give up the luxury of being able to set the needle exactly on full scale, and the control was replaced by the present stepped resistance scheme which results in a much more versatile instrument. The precision is limited by error of reading the miniature meter, which has only twenty divisions. Therefore, the use of high-precision resistors for the multiplier is not fully justified, and common five- and ten-percent resistors were used in this network except in a couple of cases for which the junk box just happened to yield a precision resistor of the right value.

* 740 Willowbrook Road, Boulder, Colorado 80302.

¹ The SB-33 transceiver is rated at 70 watts p.e.p. output on the lower frequency bands. — *Editor.*

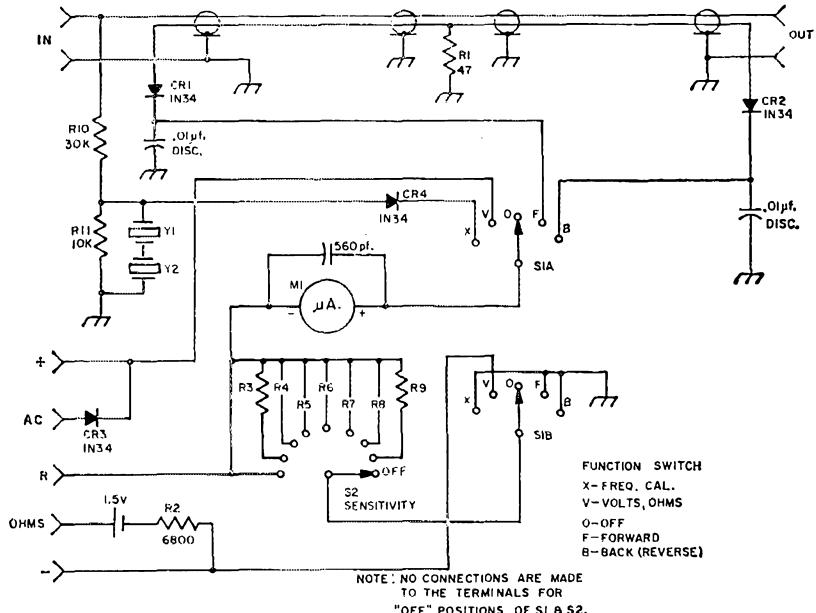


Fig. 1 Schematic of the Multi-Purpose Test Instrument. Resistances are $\frac{1}{2}$ -watt, values in ohms, K=1000. See text for resistance tolerances and modification of values shown. In the author's instrument, Y_1 and Y_2 are quartz crystals cut for 3995 and 7125 kHz, respectively, although the builder may substitute crystals for any calibration frequencies desired, as explained in text. The device is built into an LMB interlocking chassis, type 135.

CR₁ through CR₄—see text.

M₁—See text.

R₁, R₂, R₁₀, R₁₁—See text.

R₃—390 (0.2 volt).

R₄—3300 (0.8 volt).

R₅—10,900 (2 volts).

R₆—39,000 (8 volts).

R₇—0.1 meg. (20 volts).

R₈—1 meg. (200 volts).

R₉—2.5 meg. (500 volts).

S₁—Rotary, 1 section, 2 poles, 6 positions (1 position unused), non-shorting (Mallory 3226J).

S₂—Rotary, 1 section, 1 pole, 11 positions (2 positions unused), non-shorting (Mallory 1311L).

Construction

The photographs show the construction layout used by the author. One of the $3\frac{3}{4}$ by $2\frac{1}{8}$ -inch sides of the box serves as the front panel. On this panel are mounted the meter, two rotary switches, and four pin jacks. Of the two switches, S₁ selects the function, and S₂ controls the sensitivity. On the back are mounted the input and output r.f. connectors, the fifth pin jack (R), and, on the inside, a holder for a 1.5-volt penlight cell.

The heart of the standing-wave detector is a piece of RG-58/U coaxial line about two feet long. The outer plastic covering has been removed, and a piece of enameled magnet wire has been slipped under the shielding braid. The ends and mid-point are brought out through the shielding. This cable is coiled up and attached to the inside of one of the $3\frac{3}{4}$ by 3-inch surfaces by means of some wire, solder lugs, and machine screws. In the center of this coil is mounted a bracket for holding the two FT-243 quartz crystals used in the frequency calibrator. Also mounted on this surface is a terminal strip which is used mainly to support the other components of the standing wave detector.

The value for R₂ is selected with the penlight cell in place, with S₁ set at V, and with S₂ set

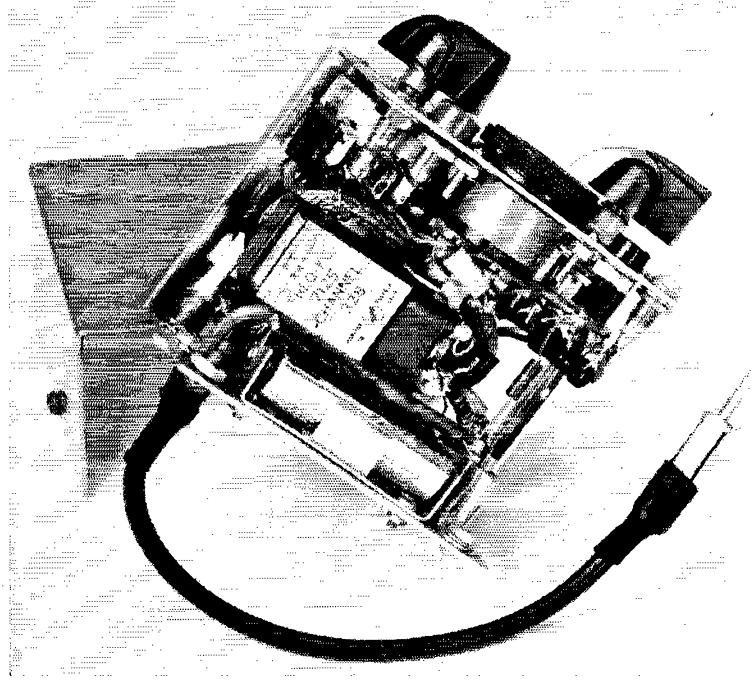
at zero. With a jumper connected between the OHMS and the + test jacks, select a value which will give a full-scale meter deflection.

Operation

For the sake of protecting the meter, the switches S₁ and S₂ are left in their off positions when the instrument is not in use. For use, S₂ is set to the least sensitive position (R₉, or 500 volts full-scale), and S₁ is set to select the desired function. The sensitivity is then increased by turning S₂ towards R₃ until the needle reads maximum without going off-scale. The selection of the function is not determined solely by S₁, but partially by the selection of pin jacks, as described in detail below.

Reflectometer

For the reflectometer, none of the pin jacks are used. The r.f. signal enters and departs on coaxial connectors. This portion of the circuit is standard in design and has been modeled on descriptions contained in *The Radio Amateur's Handbook*. S₁ is first turned to the forward (F) position and the needle is brought to a high scale reading by turning S₂, as given in the paragraph above. Call the value of this reading A. Then S₁ is turned to the back (B) position,



This photograph shows the parts layout used by the author. S_1 is shown on the left, the meter at the center, and S_2 on the right of the front panel. The sockets for the crystal are shown mounted near the center of the instrument, and the penlight cell with its holder are visible on the rear panel. Beneath the quartz crystals may be seen the shield of the coaxial line used in the reflectometer section of the device.

where the needle reads value C . The voltage reflection coefficient then equals $\frac{C}{A}$, and the voltage standing wave ratio is $\frac{A+C}{A-C}$.

Measurement of D.C. Voltages

For the measurement of d.c. voltages, S_1 is turned to V, and the unknown voltage is applied between the pin jacks + and -. The voltage calibration at full scale is obtained by multiplying the full-scale current reading by the sum of the resistances in the circuit (the value selected by S_2 plus the internal meter resistance). These full-scale voltage values are given after the respective resistors in the table included with Fig. 1.

Measurement of A.C. and R.F. Voltages

For observation of a.c. and r.f. voltages, the unknown voltage is applied between the pin jacks AC and -, allowing the diode CR_1 to be connected in series with the voltmeter circuit. Then the procedure is the same as for d.c. voltages. (The meter should be calibrated previously against known a.c. voltages.) The higher voltage ranges cannot be used for a.c. or r.f. measurements because the diode will be damaged if the peak inverse voltage exceeds a safe value. With 1N34 diodes, the voltage should be kept under 20 volts r.m.s.

R.F. Probe

The instrument may be used as an r.f. probe by connecting a pick-up loop between the AC

and - pin jacks. Alternatively, an antenna may be connected to these jacks. A resistor or an r.f. choke must also be connected between the two jacks, if the antenna does not provide a d.c. return.

Ohmmeter

For use of either ohmmeter range, S_2 is set to zero and S_1 is set to V. For the higher resistance range, the unknown resistance, X , is connected between the OHMS and + pin jacks. R_2 has been previously selected to give a full-scale deflection D when a jumper is connected between these two jacks. With X in place, the deflection is E . It may be shown that, if R_M is the meter resistance,

$$X = \frac{(D-E)(R_2 + R_M)}{E}$$

This expression may be used to provide a calibration. Alternatively, the scale may be calibrated by connecting a number of known resistors, noting the deflections, and plotting a graph.

For the lower resistance range, the unknown value is connected in parallel with the meter. A jumper is connected between the OHMS and + jacks, and the unknown resistance is connected between the + and the R jacks. The lowest unknown resistance values will give the smallest meter deflections. The calibration can be determined by circuit theory if the meter resistance is known. However, if it is not known, the calibration can be determined by plugging in known resistors and noting the readings. (The internal meter resistance R_M is the same as the

value of an "unknown" resistor connected in this manner which gives a one-half scale meter reading, if R_2 is very much larger than $R_{M.}$)

Resistance Substitution Box

S_2 and its associated resistors R_3 to R_9 may be used as a resistance substitution box. Set S_1 on V, and connect to the R and - jacks.

Frequency Calibrator

The crystal frequency calibrator uses two quartz crystals connected in series, the resistors R_{10} and R_{11} , and the diode CR_4 . S_1 is switched to the X position, and the meter reads the rectified voltage developed across the quartz crystals. R_{11} parallels the crystals to provide a d.c. return. R_{10} drops the r.f. voltage from the antenna line down to a couple of volts and also prevents a significant amount of the total transmitter power power from being lost in this circuit. CR_4 rectifies the r.f. which is read as d.c. on the meter. As the frequency of the transmitter is varied, the meter reading changes very little except near the resonant frequencies of the crystals. If you tune in the direction of increasing frequency through crystal resonance, the meter suddenly deflects downward, then deflects upward, and then finally returns to a steady value. Either the minimum, the cross-over, or the maximum readings can be used for frequency reference. If the highest accuracy is desired, a calibration in terms of another frequency standard should be made for whichever reference is chosen. Generally the frequency differences between the points are of the order of one kHz., and the precision for resetting the frequency with

this device is of this order of magnitude. If the two crystals have resonant frequencies reasonably well separated, the presence of one of the crystals has little effect upon the resonances of the other, but if one is shorted out, the deflections of the meter at resonance for the other are slightly larger. If more space had been available, it would have been practical to connect additional crystals in series to obtain more calibration points. Incidentally, 7-MHz. crystals give usable calibration points on their third harmonics in the 21-MHz. band. If the power level of the transmitter is greater than 100 watts, the value of R_{10} probably should be increased.

One undesirable feature of this type of calibrator is that if the transmitter is connected to an antenna, the calibration process is a source of QRM on the air. Therefore, during the use of the calibrator the transmitter should be connected to a dummy load — an incandescent lamp of suitable size will do very well. Alternatively, the antenna can be disconnected, and, to protect the final amplifier, the drive can be reduced by detuning the driver stage or by whatever other means are available.

If the reader is unable to obtain a meter which duplicates the one used by the author, the values of R_2 through R_9 should be inversely proportional to the full-scale current rating of the meter. Thus if a 1-milliamperemeter is used in place of the 200-microampere meter, all of these resistors should be only one fifth as large as the values shown in Fig. 1. If a 50-microampere meter is used, the resistors should each be made four times larger in value.

QST



"I JUST FOUND MY MULTI-PURPOSE TEST INSTRUMENT! IT WAS HIDDEN BETWEEN A COUPLE OF PAGES IN THE INSTRUCTION BOOK!"

Strayss

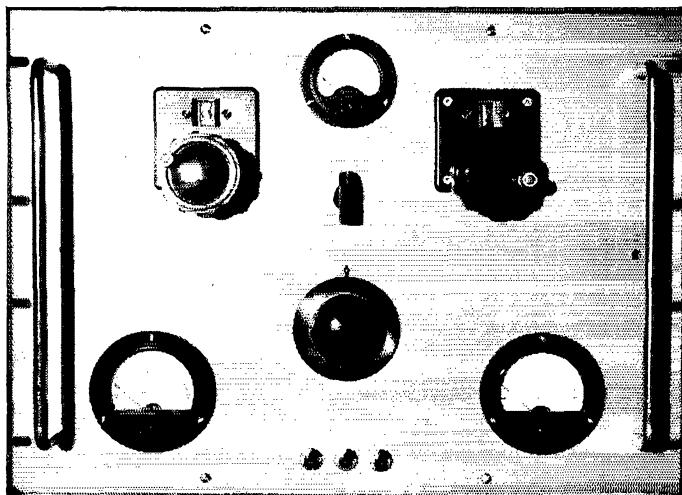
Feedback

In the 50-Mc. transistor transceiver described by WA7FJC in January, 1969, *QST*, Fig. 1 should show a high-value resistor, approximately 1 megohm, from gate to ground in the audio amplifier, Q9. Thanks to Richard Stealey, WA8KQX, for calling this to our attention.

The secondary impedance of T_1 , T_2 and T_3 in W2OWF's c.w. clipper-filter in "Gimmicks & Gadgets," February *QST*, should have been 10 ohms instead of 10,000 ohms.

Footnote 1 in W6HHT's article on the T-notch filter for the HBR, February 1969 *QST*, should have read *October* 1965 instead of August 1965. The author also recommends that builders refer to page 74 of the June 1967 issue for W6TC's discussion on parasitics, and to pages 42-43 of the July 1967 issue for W0SX's description of the Selectoroid.

The bending instructions in Fig. 2 of the article "A 2-Meter Transmatch With S.W.R. Indicator," March 1969 *QST*, were inadvertently reversed. Change each bend down to bend up and vice versa.



W2OL's high-power amplifier. The digital dials, on either side of the relative output-power meter and band switch, control the pi-network input (left) and loading (right) capacitors. Below are the input tuning control, grid-current meter (right) and plate-current meter (left), and indicator lamps.

The Evolution of an Amplifier

BY ROBERT B. ANDERSON,* W2OL

ABOUT two years ago, a close friend, who is also a ham, asked me if I could use a big tube, a WL-5736, if he were to give me one. He informed me that the tube is a medium- μ triode with a 6-volt 60-amp. filament, rated at 2½ kilowatts plate dissipation. At first, I was dubious about the possibilities of its usage. I had planned for some time to build a linear using a conventional tube, such as a 4-1000A or 3-1000Z, but had not contemplated designing my own amplifier around a tube of such size as the WL-5736. When I saw the tube, I was encouraged to give it a try. Physically, it is about the size of a 4-400A, even though electrically it is about six times as large. It is rated at full power to 60 MHz., which indicated to me that there should be no problems in operating it in the conventional 80- to 10-meter configuration. And, not of least importance, it is rugged enough so that even a life-insurance man like myself would have real difficulty in damaging it by making an occasional but inevitable boo-boo in operating or tuning. The tube is available on the surplus market, also to MARS members on a limited scale. In addition, many 5-kw. broadcast transmitters use these tubes for r.f. and audio amplifiers, discarding them after 10,000 hours of operating time. They would still be quite satisfactory for ham use at that time. However, this article is written with the idea in mind that the home brewer can utilize many of the innovations incorporated in the amplifier, regardless of the particular tube used. The complete amplifier circuit is shown in Fig. 1.

The original breadboard version of the linear used conventional circuitry and components.

Individual plug-in air-wound output coils were used, and the results were quite satisfactory. For the cathode input circuit, I used a heavy copper-tubing inductor, with a No. 4 copper wire inside the tubing, with taps for the various bands. This method was later discarded and replaced by the present system using a filament choke, and switched Miniductors for the cathode tank. More on that later.

Pi-Network Inductor

While in the process of eliminating "bugs" in the breadboard version, I came across an article by W4BRS on using a toroidal-core tank coil in linear amplifiers.¹ I decided to give that scheme a try, and used the design by Mr. Klein for the 1000-watt coil. This coil is wound on a core consisting of two $2 \times 1\frac{1}{4} \times 0.55$ -inch ferrite rings (Amidon T-200-2²) fastened together with epoxy cement. The cores are then cemented

¹ Klein, "The Whole of the Doughnut," 73, June, 1967.

² Amidon Associates, 12033 Otsego St., N. Hollywood, Calif. 91607.

While there may be some readers who will have access to the components necessary to duplicate this amplifier, the value of this article to most readers will be in the interesting mechanical design and circuit features, which may be applied in the construction of any high-power grounded-grid linear.

* 8 Main Lane, Penfield, New York 14526.

between two $2\frac{3}{16} \times 1\frac{3}{16}$ -inch rings cut from $\frac{1}{4}$ -inch polystyrene sheet. These rings keep the winding slightly spaced from the core to increase the breakdown voltage. I did not groove the rings as described by W4BRS, so the turns of wire have a slightly larger diameter than his.

It was necessary to reduce the inductance, because of the extremely low plate impedance of the tube, in order to arrive at the desired circuit Q . Thus, my coil, wound with No. 10 tinned copper bus wire, has 17 turns instead of the original 20, with taps at 11 turns instead of 13 for 40 meters, at 5 turns instead of 6 for 20 meters, and at 2 turns instead of 3 for 15 meters.

A separate air-wound coil having 5 turns of $\frac{3}{16}$ -inch silver-plated copper tubing, wound to an inside diameter of $1\frac{1}{4}$ inches and a length of 3 inches, is used for 10 meters.

An article in an earlier issue of *QST*³ might tend to discourage the use of ferrite-core tank coils. I can only say that the losses in the toroid coil described, when used in this amplifier, did not appear to be greater than those experienced with air-wound plug-in coils. A series of tests was made, alternating between the toroid and air-wound coils. For the same power input and tank-circuit Q , the power output was found to be exactly the same using either type of coil on 40 meters, and slightly higher using the toroid on 80 meters. Similar checks were not made on the higher-frequency bands, but the power output measured when using the toroid on these bands was comparable to the output obtained on the two lower-frequency bands.

The pi-network band switch, S_{1D} is similar to the one used by W4BRS — a tap switch taken

³ Watson, "Relative Merit of Toroidal and Conventional R.F. Inductors," *QST*, June, 1968.

from a surplus BC-375 antenna tuning unit. These switches are available from many surplus dealers for a dollar or so.

Cathode Circuit

A tuned cathode circuit of fairly high Q is used to minimize drive requirements and reduce distortion.⁴ This circuit involves an additional tuning control, but its adjustment is not a critical procedure, and the tuning can be preset by calibration for each band. It is necessary to retune only if you move 100 kHz. or more. The components are mounted in a $6 \times 5 \times 4$ -inch Minibox. The input tuning capacitor is a 2-gang broadcast-receiver-type variable of about 700 pf. total capacitance. On 80 meters, an additional fixed capacitance of 750 pf. is switched into the circuit, and on 40 meters, an additional 250 pf. is switched in to achieve the desired Q .

The individual coils for each band are mounted directly on a ceramic 3-gang 6-position switch with 30-degree detent. (Obviously, if both cathode and plate switches are to be turned with a common knob, the detent of both switches must be the same.) The input and output band switches are ganged together by a ladder-chain and sprocket system.

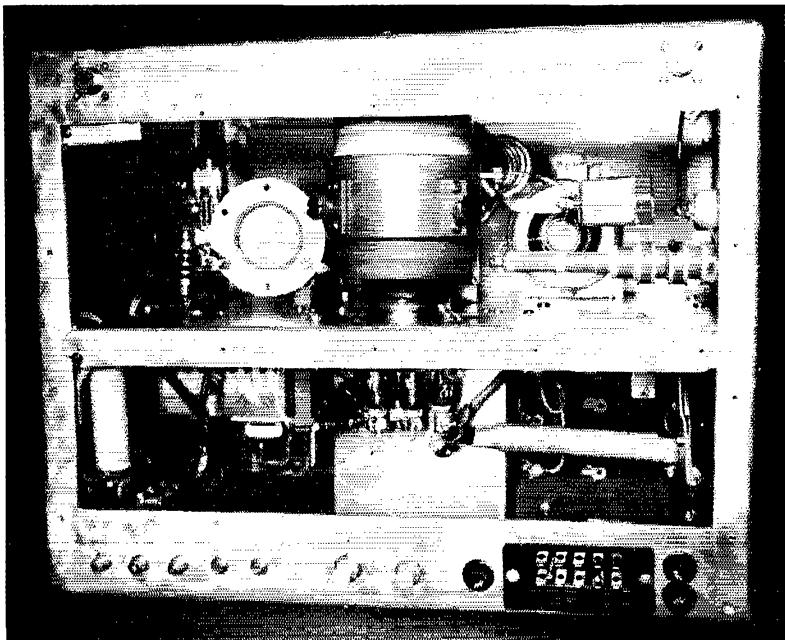
Since building the linear, an excellent article⁵ has appeared, describing a fixed-tuned input circuit using a pi network with band-switched-slug-tuned coils. Such a unit would have the advantage of eliminating the need for tuning the cathode, and would also be much simpler to ad-

(Text continued on page 23)

⁴ Orr, Rinaudo and Sutherland, "The Grounded-Grid Linear Amplifier," *QST*, August, 1961.

⁵ Gimmicks and Gadgets, "A Tuned Input Circuit for Grounded-Grid Amplifiers," *QST*, May, 1968.

Rear view with back cover removed. The plate-circuit r.f. choke is mounted against the right-hand wall in this view. The high-voltage connector is in the upper right-hand corner. The r.f. output connector, at the upper left, feeds into a $4 \times 2 \times 2$ -inch Minibox which houses components of the power output indicator.



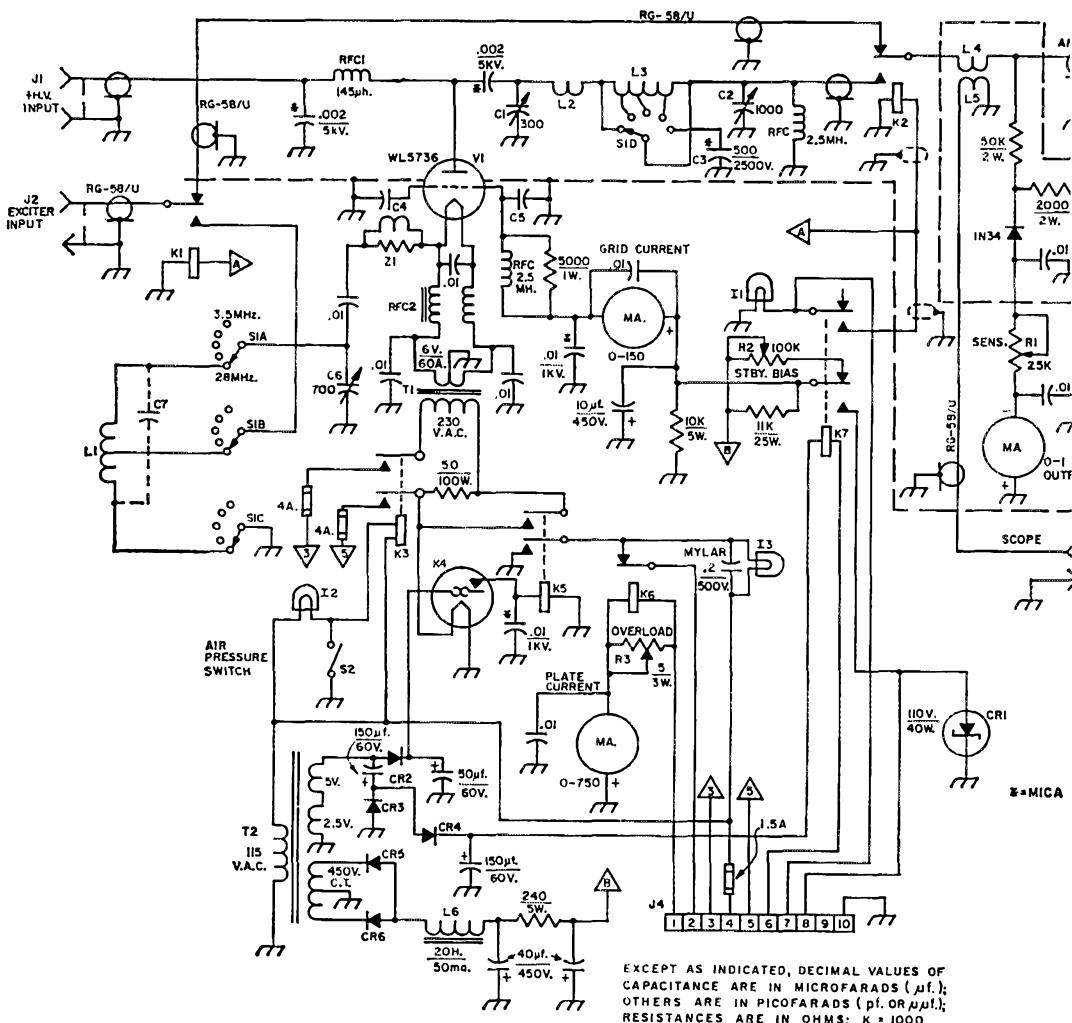


Fig. 1—Amplifier circuit, including a portion of the power and control circuitry. Polarized capacitors are electrolytic; unless indicated otherwise, other fixed capacitors are disk ceramic.

C₁—10-300-pf. vacuum variable, 4-kv. minimum (Jennings UCS 300).

C₂—7-1000-pf. vacuum variable, 500-volt minimum (Jennings UCS 1000).

C₃—Two 250-pf., 2500-volt mica units in parallel.

C₄, C₅—0.0082- μ f. silver mica (only two capacitors are shown, although there are four, one at each grid terminal).

C₆—Dual variable, approx. 350 pf. per section, sections in parallel (receiver r.f. type).

C₇—2500-volt mica capacitor—750 pf. for 3.5 MHz., 250 pf. for 7 MHz. None used on other bands.

CR₁—110-volt 40-watt zener diode (four 27.5-volt 10-watt units in series).

CR₂, CR₃, CR₄—Silicon diode, 250 p.i.v., 500 ma.

CR₅, CR₆—Silicon diode, 1000 p.i.v., 500 ma.

I₁, I₂, I₃—115-volt neon panel lamp.

J₁—High-voltage chassis-mounting coaxial receptacle (UG-568/U).

J₂—Phono jack.

J₃—Chassis-mounting coaxial receptacle (SO-239).

J₁—10-contact chassis-mounting male jack (Cinch-Jones P-410-DB).

K₁—S.p.d.t. coaxial relay, 115 v.a.c.

K₂—S.p.d.t. coaxial antenna relay, 115 v.a.c.

K₃—D.p.s.t. relay, 115 v.a.c.

K₄—Thermal delay relay, normally open, 115 volts, 10 seconds (Amerite 115N010).

K₅—D.p.s.t. relay, 12 v.d.c.

K₆—Overload relay, normally closed, 50-ohm, 50-ma. coil.

K₇—D.p.d.t. relay, 24 v.d.c., 240-ohm coil.

L₁—3.5 MHz.—15 turns No. 18, $\frac{5}{8}$ -inch diam., 8 turns per inch.

7 MHz.—Similar to above, 9 turns.

14 MHz.—5 turns No. 16, $\frac{5}{8}$ -inch diam., 4 turns per inch.

21 MHz.—Similar to above, 3 turns.

28 MHz.—Similar to above, 2 turns.

(See text for adjustment of tap.)

L₂, L₃—See text.

L₄—1 turn No. 14, 1-inch diam.

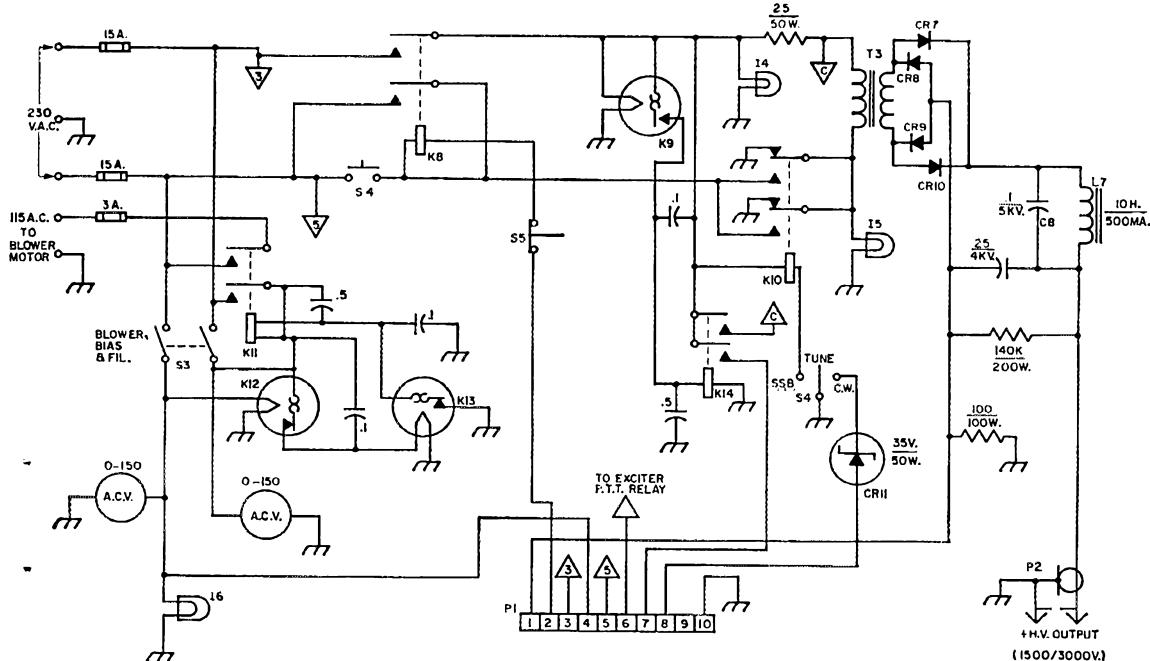


Fig. 2—Plate power-supply circuit, including the balance of the control circuitry. Capacitances are in μf ; resistances are in ohms. Capacitors are paper, mylar, or oil-filled.

CR₇, CR₈, CR₉, CR₁₀—Each consists of ten 1000 p.i.v., 1-ampere silicon diodes in series, each diode shunted by a 0.01- μf . ceramic disk capacitor and a 0.5-megohm, $\frac{1}{2}$ -watt resistor.

CR₁₁—35-volt, 50-watt Zener diode.

I₄, I₅, I₆—115-volt neon indicator lamp.

K₈, K₁₀, K₁₁, K₁₄—D.p.d.t. relay (Guardian 240-2C-115 v.a.c., or equivalent).

K₉—Normally-open thermal delay relay, 115 volts, 2 seconds (Amperite 115NO2).

K₁₂—Normally-closed thermal delay relay, 115 volts,

2 seconds (Amperite 115C2).

K₁₃—Similar to K₁₂, 120 seconds (Amperite 115C120).

L₇—10-henry 500-ma. filter choke.

P₁—10-contact plug (S-410-CCT).

P₂—High-voltage coaxial plug (UG-710A/U).

S₃—D.p.s.t. toggle switch.

S₄—S.p.d.t. center off rocker switch (Cutler-Hammer 8134K20A1M52, or equivalent).

T₈—High-voltage transformer: 3600 volts, r.m.s., 1 ampere (Peter W. Dahl Co., 3314 Diamond Drive, El Paso, Texas 79904).

L₅—2 turns insulated wire tightly coupled to L₄.

L₆—20 henry 50-ma filter choke.

R₁—Output-meter sensitivity control, 25,000 ohms, linear.

R₂—Standby bias adjusting control, 100,000 ohms, linear.

R₃—Overload adjusting control, 5 ohms, 3 watts (Mallory MR10B, 10 ohms, suitable; use 10-ohm 2-watt shunt if needed).

RFC₁—Plate-circuit r.f. choke (National R175A, Raypar RL-100.)

S_{1A-B-C}—3-section, 3-pole, 5-position ceramic rotary switch, 60-degree index. Every other contact on an 11-position 30-degree switch (Centralab 2523) may be used to obtain 60-degree indexing.

S_{1D}—High-power ceramic rotary switch, 5 positions, 60-degree indexing (Millen 51001, or surplus; see text).

S₂—Air-pressure switch (see text).

T₁—Filament transformer; 6 volts, 60 amperes, 230-volt primary (Westinghouse).

T₂—Power transformer: approx. 450 volts, c.t., 50 ma., 5-volt and 2.5-volt filament windings.

Z₁—5 turns No. 14 wound on and connected across a 68-ohm 2-watt resistor.

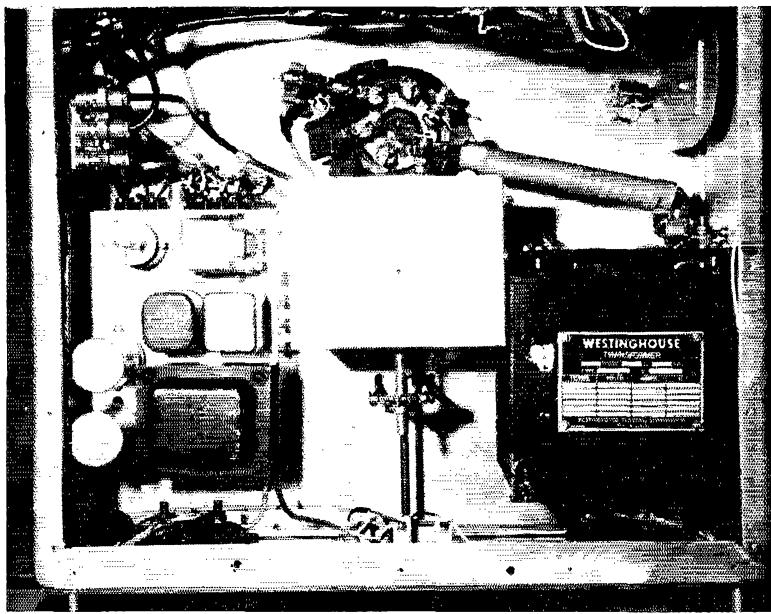
(Text continued from page 21)

just for minimum s.w.r. I would recommend that any prospective builder consider this arrangement in lieu of the one shown here.

The filament choke was purchased from William Deane⁶ for a modest sum, but of course, the enterprising ham could wind his own.⁷ This one is wound with No. 8 wire on a 7-inch length of $\frac{1}{2}$ -inch ferrite rod. However, since the filament draws 60 amperes, I believe that I would use a 1-inch diameter rod and No. 6 wire if I were going to wind my own. It should cause less heat and less voltage drop. The latter was not a problem in my case since I simply changed the tap on the filament transformer primary to give the desired 6 volts at the filament prongs.

⁶ William W. Deane, W6RET, 8831 Sovereign Road, San Diego, Calif. 92123.

⁷ Lamson, "A Filament Choke for Grounded-Grid Amplifiers," QST, October, 1961.



Bottom view, showing the bias- and relay-power chassis at the left, input-circuit compartment at the center and filament transformer and bifilar choke at the right. The shaft of the input band switch carries a sprocket and ladder-chain belt connecting to a similar combination on the shaft of the output-circuit band switch above deck, through slots in the chassis plate. The blower air-pressure switch is at the upper right, close to the blower intake opening.

Parasitic Suppressor

Some difficulty was experienced with a parasitic suppressor which required much experimentation, but the final version functions very well indeed from 80 to 10 meters. I started with a conventional suppressor in the plate lead of the tank circuit, using a few turns of heavy copper wire and a 20- to 100-ohm 10-watt Gobal resistor. This suppressed the parasitics all right, but the resistor heated excessively. After replacing several resistors and winding at least a dozen different inductors, I decided to try a different tack by eliminating the suppressor in the plate lead, and inserting one in the cathode circuit instead. This solved the problem immediately, and there is no heating at all. The suppressor consists of 5 turns of No. 14 wire wound on a 2-watt 70-ohm carbon resistor, and is mounted directly at the filament prong of the tube, in series with the lead to the cathode tuning circuit. I have never seen a suppressor used in this fashion before, and there may be reasons why it may not always be advisable, but it certainly works well for me with no apparent insertion loss.

Power Supply

Filament and bias supplies are built into the amplifier unit, as indicated in Fig. 1. I also made use of the filament windings on the bias-supply transformer in a voltage doubler, to obtain 12 and 24 volts d.c. for two of the relays. This would not be necessary, of course, if a.c. relays were used throughout. I just happened to have the d.c. relays on hand. The high-voltage supply, and some of the metering and control circuitry, are in a separate external unit. The diagram of this section appears in Fig. 2. C_8 and the filter choke L_7 form a circuit that is resonant at the

ripple frequency of 120 Hz., when the choke has maximum inductance (with bleeder load only). This keeps the output voltage from soaring toward the peak transformer value when the amplifier load is removed.⁸ With the high resting current (250 ma.), the voltage regulation is otherwise very good.

Notice that the negative side of the high-voltage supply, including the filter capacitor and bleeder, is not grounded to the power-supply chassis, except through the 100-ohm resistor. This resistor is a safety measure to assure that if both power-supply and amplifier chassis are grounded to earth, as they should be, high voltage will not appear between the negative line and chassis, should the overload relay coil and shunt, or the meter burn out.

Control Circuitry

Blower, bias and filament power is applied by closing S_3 (Fig. 2). Closing S_3 causes I_6 to light and applies 115 volts a.c. to the coil of K_{11} , the return being through the normally-closed contacts of K_{13} . K_{11} applies blower power through its upper set of contacts, and latches itself closed through the lower set of contacts. Closing S_3 also applies heater power to K_{12} , a 2-second-delay thermal relay. Heater power is also applied to K_{13} through the normally-closed contacts of K_{12} . However, K_{12} opens 2 seconds after closing S_3 and, since K_{13} has a 120-second delay, heater power is not applied to K_{13} sufficiently long to cause it to operate, so K_{11} remains energized.

Closing S_3 also applies 115 volts, through terminals 4 of P_1 and J_4 , to the primary of T_2 , the power transformer in the bias and relay

⁸ Pappenfus, Bruene and Schoencke, *Single Sideband Principles and Circuits*, McGraw-Hill, 1964, p. 224.

power supply (Fig. 1). If the blower air stream has closed S_2 , I_2 is lighted and K_3 is actuated, turning on the filament. (Unless air pressure is up to normal, neither filament nor plate voltage can be applied. This avoids possible damage to the tube from overheating.) K_3 also applies heater voltage to K_4 and, after a delay of 10 seconds, the contacts of K_4 close, actuating K_5 which shorts out the 50-ohm filament series resistor, applying full voltage to the filament. The initial reduction in filament voltage (to approximately 4 volts) prevents the 300-ampere surge that would otherwise hit the cold filament and reduce its life span.

Closing of the contacts of K_5 lights I_3 , and also applies ground (through the normally-closed contacts of the overload relay K_6 , and terminals 2 of J_4 and P_1) to the coil of K_8 (Fig. 2). K_8 can then be actuated to light I_4 and apply line voltage to the primary of the high-voltage transformer T_3 through a 25-ohm resistor, by closing S_4 momentarily. (The resistor limits the rectifier surge current to a safe value.) K_8 latches closed through its lower set of contacts.

The closing of the contacts of K_8 also applies heater voltage to K_9 . After a delay of 2 seconds, the contacts of K_9 close, actuating K_{14} . One pole of K_{14} shorts out the 25-ohm series resistor to apply full voltage to the transformer primary, while the other pole lights indicator lamp I_1 (Fig. 1) via contacts 7 of P_1 and J_4 .

If the mode switch S_4 (Fig. 2) is in the tune position, K_{10} remains in the normal condition. In this condition, K_{10} grounds one primary terminal of T_3 , applying 115 volts to the 230-volt primary, and the high-voltage output is approximately 1500 volts. With S_4 in the s.s.b. position, K_{10} is actuated, lighting I_5 and applying full 230 volts to the primary of T_3 . In this condition, the output voltage is approximately 3000 volts. With S_4 in the c.w. position, K_{10} returns to the low-voltage position, and the bias is also lowered by switching CR_{11} in parallel with CR_1 (Fig. 1), through terminals 8 of J_4 and P_1 . This

gives just about the right values to run a kilowatt input on c.w., and the efficiency appears to be quite good. Running the linear at full plate voltage is impossible on c.w. unless you can get special permission from the FCC to run a couple of kilowatts!

The high-voltage supply may be turned off by momentarily opening the normally-closed switch S_5 (Fig. 2).

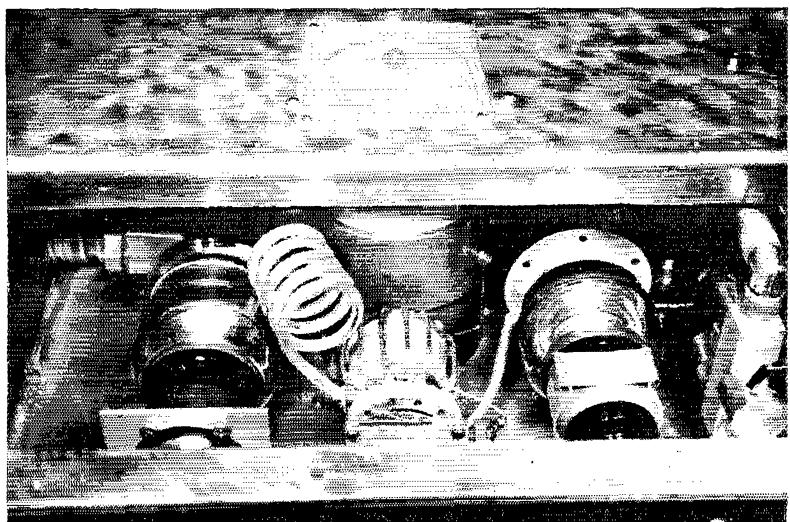
When S_3 is opened to shut down the amplifier, K_3 opens, turning off the filament; K_4 opens, causing K_5 to open. This opens the coil circuit of K_8 , so that the high voltage cannot be turned on.

Opening S_3 also opens the heater circuit of K_{12} , and the contacts of the latter return to the normally-closed position. Since K_{11} is locked in the closed position by its own lower contacts, the blower is still running, and heater voltage is applied to K_{12} through the contacts of K_{11} and K_{12} . Two minutes later, the contacts of K_{13} open, causing K_{11} to open and shut the blower down.

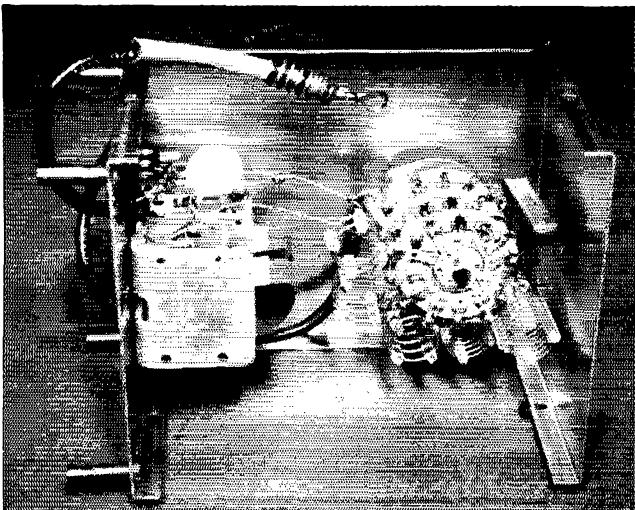
K_7 (Fig. 1) is actuated by the p.t.t. relay in the exciter through contacts 6 of J_4 and P_1 . In the normal or stand-by position, the stand-by bias can be adjusted by means of R_2 . In the transmit position, normal operating bias, regulated by CR_1 , is applied to the grid. The upper contacts of K_7 serve to actuate K_2 to shift the antenna from the driving transceiver to the amplifier, and to actuate K_1 which shifts the output of the transceiver from the antenna to the input of the amplifier.

The overload relay K_6 is set to trip at 750 ma—not to protect the tube but to protect the power supply! When this current is exceeded, the contacts of this relay open. This opens the holding circuit of the power relay, K_8 , turning off the high-voltage supply.

Should the blower pressure fall below normal value, S_2 will open. This releases K_3 to shut off filament power. When the contacts of K_3 open, heater voltage is removed from K_4 , and its contacts open. This, in turn, causes K_5 to open,



Top-deck view, showing the output pi-network components, tube chimney and antenna relay. Notice the lip bent down along the front edge of the permanent part of the top cover. This bears against a similar lip bent down along the rear edge of the removable portion of the cover to provide good shielding contact.



Detail view of the input-circuit compartment. The coils are mounted directly on the switch. Spacers are used on the top side of the box to bring the capacitor shaft to the desired level on the panel. The parasitic suppressor, Z_1 , terminates a short length of RG-58/U coax which makes the connection to the tube filament.

which opens the holding circuit of the power relay, K_8 , turning off the high-voltage supply.

Construction

The layout of components is not highly critical. The arrangement shown in the photographs seemed to work out best for the specific components that were used. Physical rigidity in the cabinet is necessary to support the weight of the heavier-than-usual tube and filament transformer. Adequate shielding between input and output circuits is essential, and an arrangement that will permit short connections between components in the r.f. circuitry is a must.

So far as was possible, components were salvaged from the junk box, or selected from surplus stocks. It is assumed that a prospective builder will have access to sources of supply other than the usual parts distributors, or he would not be considering the project to begin with. I was fortunate enough to have two surplus outlets in the vicinity, and several visits were made during the course of construction. Conventional air variables could be substituted for the vacuum capacitors, although it might involve some tank-coil pruning at the higher frequencies to compensate for the higher minimum capacitance of the air unit.

The air-pressure switch, S_2 , is homemade, using a Microswitch as the basic unit. A similar switch, made by Rotron, is available from Barry Electronics.⁹

The linear is built into a welded enclosure 17 inches wide by 14 inches high by 15 inches deep, made of $\frac{1}{8}$ -inch aluminum. A 14 × 19-inch steel rack panel serves as the front.

The top of the cabinet consists of two pieces. The rear half is welded permanently in place, and has a 3-inch screened opening for the chimney. The chimney support is cut from a piece of $\frac{1}{8}$ -inch aluminum and is welded to the underside of the top before assembly. The front portion of the

enclosure top is removable as are the back and bottom plates. The cabinet is completely air-tight, except for the air input and output openings.

The chassis is a sheet of $\frac{1}{8}$ -inch aluminum welded across the enclosure at a point halfway between the top and the bottom. The 4-inch hole for the tube is cut before welding.

The upper deck contains the output-circuit components, antenna change-over relay, scope pickup coil and relative-power meter. The lower deck is filled with the filament transformer, bias-and-control chassis, cathode tank coils and band switch, input coax relay, filament choke, overload relay and plate and grid milliammeters.

The tube has four grid and two filament pins at its base. No socket is used, the tube being suspended by the external anode which is clamped into the chimney. I used four 8200-pf. silver mica capacitors (one from each of the four grid terminals) to a common ground, to minimize inductive reactance and thereby lessen the possibility of instability on the higher frequencies.

A 10-contact connector at the rear of the cabinet is used to carry the a.c. and control voltages from the power supply. RG-8/U and a high-voltage connector, type UG-56SU, are used for the 3000-volt supply line. A coax connector is used for the antenna connection. Phono jacks are used for connecting to the transceiver and scope, and three additional jacks were installed for future use. Two potentiometers are mounted on a lower rear panel, one (R_3) for adjusting the overload relay, the other (R_1) for the relative-power meter.

To prevent excessive noise, the blower is mounted in a wooden box, lined with foam rubber, and placed about 20 feet away from the linear. The air is conducted through 25 feet of flexible muffler pipe purchased from Sears-Roebuck.

Adjustment

You will need about 150 watts to drive the linear to the legal limit. The output of my SB-100 falls a little short of this, even though I souped it up a bit. I get about 140 watts, as measured by the Bird Thruline Wattmeter. Tuning of the amplifier is conventional and reference should be made to the *ARRL Handbook* and the *ARRL* sideband manual for complete instructions.

⁹Barry Electronics, 512 Broadway, New York, N. Y. 10012.

The taps on the input coils should be set initially at about two thirds of the way up from the ground end. Start out the loading procedure by switching the high-voltage primary to 110 volts (tune position of S_4), and then switch to 220 volts for a quick fine tuning on the dummy load. At 3000 volts on the plate, I load the linear to about 600 ma. plate current which, together with the input to the exciter, gives about 2000 watts p.e.p. input. Tuning is fairly broad and settings can be calibrated in advance so that no further tuning is required after applying power; just set the dials at the predetermined points for the frequency being used. Calibration at 100-kHz. points should be adequate.

Another point on loading. Loading the amplifier to maximum relative power at low voltage will not give you the correct loading for full voltage. You will have to back off on the loading and retune slightly. However, after calibration has been completed, it will not be necessary to use the tune position at all, and "touch-up" tuning at high voltage can be done occasionally to make sure that correct calibration is retained.

The final adjustment of the input circuit consists of moving the tap in either direction for lowest s.w.r. between the exciter and linear. This is done for each band and is the most time-consuming adjustment of all, but there is no other way of doing it. A dummy load should be used, of course, and the adjustment should be made with the linear operating near the center of each band. The s.w.r. is essentially unity on all bands when the adjustment is completed. It is very important that the amplifier be tuned to exact resonance and properly loaded during the foregoing operation.

Grid current will be approximately 60 ma. at 600 ma. plate current when the amplifier is properly loaded at 3000 volts on the plate. The grid meter will barely fluctuate on single sideband. Resting plate current is about 250 ma. at 110 volts bias. The biasing voltage is not critical, but anything less than 110 volts may cause problems in keeping the amplifier within the legal power limit. The plate meter should kick up to about 300 ma. on voice peaks.

Conclusion

Operating results have been extremely gratifying. The amplifier is completely stable on all frequencies, with no evidence of regeneration right down to 10 meters. The breadboard version showed regenerative effects on 15 and 10, but this was cleared up when the shielding was completed in the final version.

The output appears to be a faithful reproduction of the input, and reports have always been excellent. Distortion products appear to be low, although no accurate means of measuring the distortion is available. A nearby receiver evidences no splatter, and a nice, clean and sharp signal is apparent as judged by the ear. Output power was not the criterion in mind when the amplifier was planned, but it appears to have normal efficiency for an AB₂ linear on all bands. The efficiency is just above 60 percent as mea-

sured with the Bird Thruline Wattmeter, and allowing for fed-through power.

There has been no problem with TVI, even when the amplifier was used in its earlier breadboard version without shielding. A lot of the credit for this is due, I think, to the toroidal core tank coil, which is virtually a shielded coil, leaving very little stray r.f. to float around the shack.

The amplifier may be operated at lower plate voltage and still run the legal limit with a suitable adjustment of the bias. Bias voltages should be set for a resting plate current of approximately two thirds of the amount of d.c. plate current drawn on voice peaks. It goes without saying that the bias regulation should be excellent, or distortion will result. If you plan to use a high-output exciter, such as the Swan, it will be necessary to swamp some of the power to avoid exceeding the legal limit. Or, an a.l.c. circuit can be incorporated in the linear, adjusted to limit the output. I found that a.l.c. was not necessary in my case because of the limited driving power available.

As for the tube, it is a real workhorse, with power to spare, and should give years of trouble-free service. I have a few plans in mind for future modifications of the linear. I've already mentioned W1CIP's tuned input circuit, but I also plan to add a phase detector¹⁰ for tuning the amplifier, and a loading indicator,¹¹ using a single zero-center meter for both purposes with a double-throw switch. With such a system, it will be possible to tune and load the linear while operating on single sideband, avoiding the necessity of tuning with a full carrier into a dummy load. By setting the dials to predetermined points, one will be able to make touch-up adjustments while operating. As mentioned earlier, the amplifier has been more than pleasing in results, as well as a pleasure to tune and operate, and not unsightly to behold. A lot of effort went into its design, but most of the time spent was in the actual metalwork, which is time-consuming and patience-testing for the average ham. However, it is well worth the effort, and is a challenging project for the homebrewer. Costwise, I have invested a total of about \$100 in it, plus the parts utilized from my junk box. The results per dollar are impressive.

DST

¹⁰ Same as 8, p. 166.

¹¹ Same as 7, page 170.

Changes of Address

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



Gimmicks and Gadgets

An Electronic Paddle

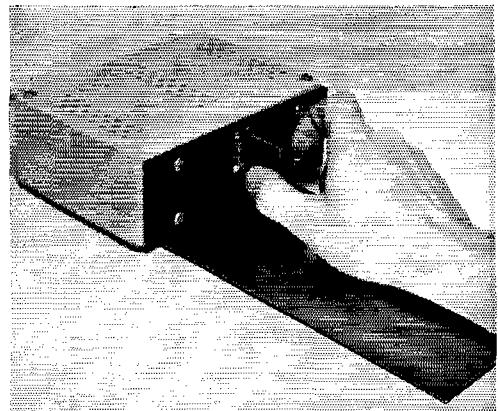
BY KEN STONE,* W7BZ

To operate an electronic keyer, it's usually necessary to move a mechanical paddle back and forth. Here is an electronic approach to the keyer paddle employing contact plates rather than a movable paddle. It features low cost, simple construction, no springs or contacts to adjust, and has all the advantages of the double-lever mechanical paddle. It can be built for about ten dollars.

Circuit Description

Referring to Fig. 1, the circuit of the electronic paddle consists of two identical d.c. amplifiers driving reed relays. One half of the circuit is used as a dot switch and the other half as a dash switch. The 2N697 silicon transistor, which has low leakage currents, is used in all six stages. When the base lead of Q_1 is open, the leakage currents are so low that the relay, K_1 , in the collector lead of Q_3 is not energized. Bridging a resistance as high as 10 megohms or so between the base circuit of Q_1 and the positive terminal of the battery causes base current to flow in Q_1 , turning on the stage. Because the base-to-emitter junctions of Q_1 , Q_2 and Q_3 are in series, once Q_1 draws base current and becomes operational, Q_2 and Q_3 do likewise. This energizes K_1 , closing the relay's contacts, which in turn complete the dot circuit of the electronic keyer used with the paddle. The operation of the dash switch is identical and involves Q_4 , Q_5 , Q_6 and K_2 . Both dot and dash switches can be operated at the same time, corresponding to the closure of both levers on a mechanical paddle.

The bridging is done by the high resistance contact made when the operator's fingers or thumb touches one of two brass plates (insulated from each other and the box housing the transistors and relays) while his wrist or forearm is



The electronic paddle in use. For reliable keying, the operator must rest his wrist or forearm on the large brass plate in the foreground while he operates the paddle.

resting on a brass plate connected to the ground side of the circuit.

No on/off switch is included in the unit, since the battery drain is minute when the paddle is not in use.

Construction

As shown in the photographs, the unit was constructed in a $4\frac{3}{4} \times 6\frac{1}{2} \times 2\frac{1}{2}$ -inch surplus box; however, a Minibox will serve just as well. The transistors and relays were mounted on a $2\frac{1}{4} \times 4$ -inch piece of Vectorbord, and the wires pushed through the holes and connected together. Parts layout is not critical.

The paddles were made of $1\frac{1}{8}$ -inch high by $1\frac{1}{2}$ -inch long sheets of brass bent into L-shaped pieces having a $\frac{1}{8}$ -inch lip. They were insulated from each other by a $1\frac{1}{8} \times 1\frac{3}{8} \times 1\frac{1}{8}$ -inch piece of plastic which was glued between them and they were insulated from the box by a $6\frac{1}{8} \times 2\frac{1}{4} \times \frac{1}{8}$ -inch sheet of plastic. The spacing and size of the paddles can be varied to suit the builder.

A $10\frac{1}{4} \times 4\frac{3}{8}$ -inch sheet of brass was used to make the ground plate. It was fastened to the bottom of the box, and the box and plate were connected to the positive terminal of the battery. Dr. Scholl's footpads were used as a nonskid cushion on the bottom of the box. They come in 6×6 -inch sheets and can be used to fit any size box.

The plates used for the paddles and the ground plate should not be made of aluminum because the oxide always present on aluminum is a fair good insulator. Brass is recommended, but stainless steel will make a good substitute.

*641 Grant Avenue, Twin Falls, Idaho 83301.

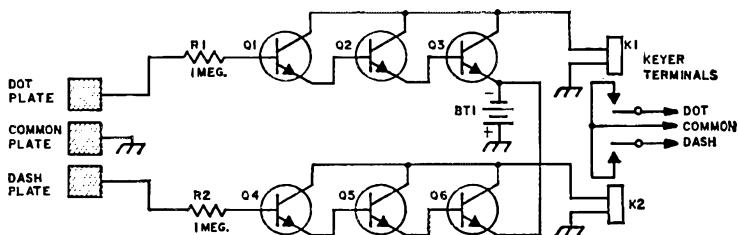


Fig. 1—Schematic diagram of the electronic paddle. Details of the three plates are given in the text.

BT₁—9- to 27-volt battery, depending on relays used. See text.

K₁, K₂—Miniature normally open s.p.s.t. reed relay, 10-ma. coil (Kidde Doranic 24MM-2C used, James Electronics RC-6603 suitable).

Q₁ through Q₆, inc.—2N697 or similar silicon n-p-n transistor. R₁, R₂—1-megohm, ½-watt composition.

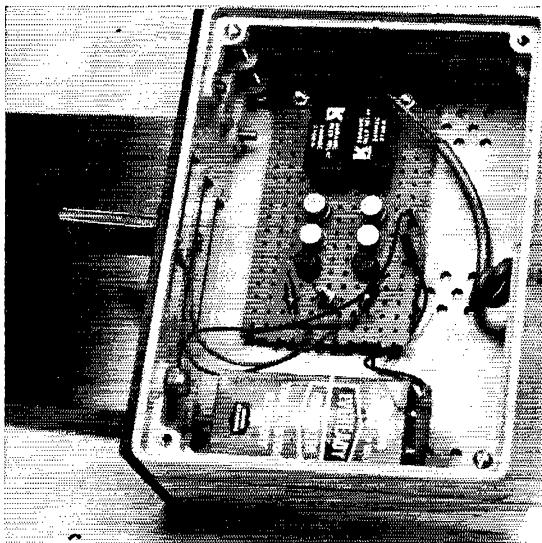
Testing and Operation

The unit should be tested before connecting it to the keyer. After checking the wiring for errors, connect the battery to the paddle. Then connect an ohmmeter across the contacts of dot relay K₁, and with a wire jumper, short the ground plate to the dot paddle. The meter should indicate a closure of the relay contacts. Check the dash side in the same manner. If closure is indicated on both sides, see if you can operate the paddle with your thumb and fingers. The relays should operate smoothly with just the lightest touch. If you find that considerable pressure of your fingers is necessary to get the relays to operate, increase the battery voltage. Nine-volt transistor radio batteries are helpful here because they can be connected together by their own connectors. The author's unit works fine with only nine volts, but has operated successfully with eighteen or twenty-seven volts. At the higher voltages, however, an increase in temperature may cause the leakage currents of the transistors to become too high. Therefore, the lowest voltage consistent with good operation is suggested. Don't try to get more sensitivity by removing the 1-megohm resistors in the paddle leads, since jumpering the paddles to the ground plate will then damage the transistors.

To keep r.f. and other strays out of the transistors, use a good ground between the paddle box and the keyer and use shielded leads. If the paddle passes the ohmmeter check, but gives poor operation of the keyer, look for transients in the paddle or keyer or both. Normal filtering techniques should solve the problem.

Some operators may object to the ground plate, but a little use may overcome this objection. In one experiment a fourth transistor was added to the circuit of each amplifier, and the thing worked without the ground plate; however, some instability was experienced. Anyway, the plate does keep the paddle from walking around the table.

QST



A look inside the paddle box. The two rectangular objects near the top of the photograph are small reed relays. Q₁ through Q₆ are in the center, and R₁ and R₂ are between the transistors and the battery.

Strays



From the 38th floor of the Hotel New Yorker, scene of the 6th annual conference of The Catholic Inter-American Cooperation Program (CICOP) in January, messages went out daily to Latin American amateur stations over the facilities of the International Mission Radio Association, K2ESE/2. In foreground is Sr. Barbara Campanile, M.M., of the Bronx, N.Y., who is stationed at Maryknoll, N.Y. (WA2VVI). In the rear is Marie Sutter, of The Grail, Loveland, Ohio, (WA8LEI).

Some Notes on Solid-State Product Detectors

BY DOUG DEMAW,* W1CER

Several solid-state product detectors are described, and comparisons of their performance are given in practical terms. Any one of the circuits can be used at the end of an i.f. strip for demodulating s.s.b. or c.w. signals. All of the detectors were tried as front ends for simple direct-conversion receivers of the type described by W7ZQI and W7WKR in November 1968 QST, and should be of interest to the designer of that type of equipment.

THE product detector is regarded by some amateurs as a mysterious device which can be used in receivers of inferior performance to cure a host of ills inherent therein. Though a product detector, *per se*, is not a panacea for most receiver ailments, it is an important part of any good s.s.b. receiver. The accepted definition of a product detector is that it is a linear demodulator in which two signals are multiplied together to produce a resultant a.f. signal output. The two input signals are usually the i.f. output and the b.f.o. signal, which are closely related in frequency. (Actually, any b.f.o./diode-detector combination is a product detector, since its output is proportional to the product of the b.f.o. and signal voltages.) A properly-designed product detector should be capable of delivering an a.f. signal that is low in audio distortion and intermodulation (IM) products.

It is believed by some that the measure of a product detector is its inability to deliver an output signal when the b.f.o. is turned off. Although some circuits do exhibit that characteristic, it does not mark them as good product detectors. Conversely, if output still exists from the detector when the b.f.o. is disabled, this does not mean that the circuit is not a product detector while the b.f.o. is operating.

The distortion developed in product detectors is the result of improper b.f.o. injection levels in most cases. Maximum distortion occurs when the b.f.o. and incoming signal levels are the same. The actual value of the b.f.o. injection voltage required depends upon the level of the i.f. signal at the detector input. Ordinarily the i.f. input level is between 0.05 and 0.5 peak volts. The magnitude of the b.f.o. signal should be at least 10

times that value to assure minimum distortion. This means that between 0.5 and 5 volts of b.f.o. injection is required. In some solid-state receivers proportionately lower i.f. and b.f.o. voltage levels are used, but the ratio between them should remain the same.

Depending upon how well balanced a detector circuit is, there may be some b.f.o. energy in its output. All components other than the desired a.f. information should be minimized if good product-detector performance is desired. The b.f.o. injection level, as mentioned earlier, is set to assure minimum IM distortion. The better the circuit balance, the greater will be the b.f.o. carrier suppression. Ordinary r.f. bypassing will reduce the b.f.o. voltage level at the detector output to an acceptable figure. If too much b.f.o. voltage appears at the detector output, it can reach the i.f. stages of the receiver by being radiated from the circuit wiring. If the unwanted i.f. injection is severe enough, the i.f. stage affected may not have sufficient dynamic range to keep it from overloading. Similarly, excessive b.f.o. voltage may reach the grid, gate, or base of the first audio amplifier stage and cause overloading or desensitization of that part of the receiver. The b.f.o. of any receiver should be well isolated from the rest of the circuit, preferably by means of shielding, to lessen the chance of stray coupling into sections of the receiver other than the detector.

The foregoing attributes, at least, are the criteria for good product-detector performance. They are set forth here to serve as guideline when building home-made receivers which use product detectors. These rules were observed during the design of the product detector described in this article.

Some Practical Circuits

Shown in Fig. 1 are four product detector circuits that were built and tested in the ARRL lab. At A, two 1N67A diodes are connected back-to-back in the W1DX adaptation of a vacuum-tube diode circuit designed by Doug Norgaard, W6VMH.¹ The main advantage of this circuit is its simplicity and its ability to handle high signal levels without overloading. By using the diodes back to back, the last i.f. transformer can have a high-impedance secondary winding because the high back resistance of CR_2 prevents the detector from loading the secondary of the transformer. If CR_1 were used by itself, it would be necessary to tap the diodes down on the secondary of T_1 to minimize loading.

* Assistant Technical Editor, QST.

¹ QST, July 1948, p. 11.

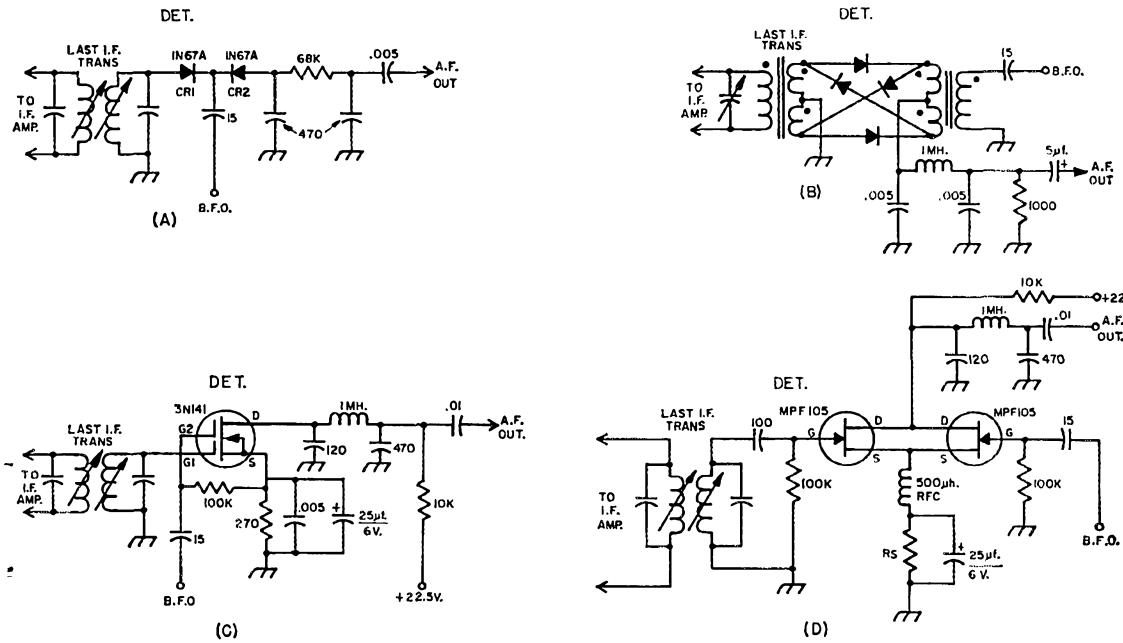


Fig. 1—Examples of four solid-state product detectors. At A, the two 470-pf. capacitors and the 68,000-ohm resistor form a simple r.f. (or i.f.) filter. At B, a 1-mh. r.f. choke and two 0.005- μ f. capacitors comprise the filter. Filtering is provided by the 1-mh. chokes and their associated bypass capacitors in the drain leads of the circuits at C and D. Source-resistor bypassing for audio is used at C and D to boost the a.f. output from the detectors. R_s , at D, should be determined experimentally for best conversion gain and IM characteristics. A value of 1200 ohms worked well in the circuit shown. The circuits at C and D can be operated from a 9- or 12-volt supply by eliminating the 10,000-ohm drain-load resistors and replacing them with small audio chokes whose d.c. resistance does not exceed approximately 1500 ohms.

effects. This circuit has a fairly high noise level, hence requires good i.f. amplification ahead of it to override the noise. In a test circuit a 10- μ v. signal (at the detector input) was required to produce an audible c.w. note while feeding the detector output into a typical receiver-type audio channel.

A diode ring demodulator is shown at B, Fig. 1. This circuit is similar to the one described by Hayward and Bingham in November 1968 *QST*. Trifilar-wound toroidal transformers are used at the input and output sides of the detector to permit proper impedance matching and good circuit balance. B.f.o. carrier suppression is good with this type of detector, and the noise figure is somewhat better than that of the circuit at A. Four 1N67A matched diodes were used in this model, but the hot-carrier diodes used by Hayward might provide superior performance. An RCA CA3019 diode-array IC should be ideal in this type of circuit, offering near-perfect diode matching by virtue of the diodes being on a common silicon chip. With this product detector a 1- μ v. signal produced an audible c.w. note (the same audio amplifier was used with all of the circuits shown in Figs. 1 and 2).

In the circuit of Fig. 1C, a dual-gate MOSFET

is shown as a product detector. The 3N141 is an N-channel silicon, depletion-type, dual insulated-gate FET. It has two channels, each with an independent control gate. Designed specifically for mixer applications, the 3N141 has a wide dynamic range which permits it to handle high signal levels. The signal applied to Gate 2 modulates the input-gate (Gate 1) transfer characteristic. This method is said to be superior to the more conventional square-law mixing method because the latter can be accomplished only in the nonlinear region of the mixer's transfer characteristic. Since mixers and product detectors operate in the same manner, the 3N141 was selected for these tests. Signal isolation between the two gates is good, helping to confine the b.f.o. signal to the desired part of the circuit. With this detector a 0.5- μ v. signal produced a perfectly audible c.w. note at the output of the audio amplifier. The noise figure was extremely low and the conversion gain was good.

Two MPF105 JFETs are used in the product-detector circuit at D, Fig. 1. In this source-follower circuit the gates of the two transistors permit high-impedance input for both the b.f.o. and i.f. signals, while at the same time offering good isolation between the two signals. Con-

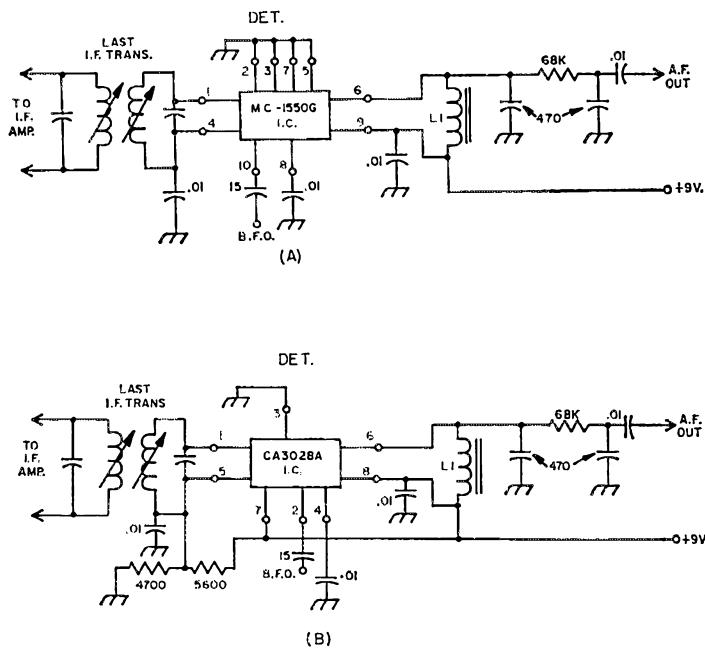


Fig. 2—Circuits for two integrated circuit product detectors. Though the MC1550G has provision for external biasing it was found that part of the circuit could be grounded to the chassis with no apparent variation in performance. L_1 is a small a.f. choke. The circuit at B is quite similar to that shown at A, but uses a CA3028A IC. It does use external bias (4700 and 5600 ohm resistors). The bias-divider values were chosen for best overall detector performance and do not follow the ratio recommended by RCA for mixer service. Both of these circuits perform well over a supply voltage range of 5 to 13 volts with no circuit changes required. The higher supply voltage, however, permits higher signal levels before overloading takes place.

nected as shown, this circuit offers some balance through phase cancellation of signal and b.f.o. currents flowing in the common-drain and common-source portions of the circuit. A 1- μ V. signal was sufficient to produce an audible c.w. note when the output from this detector was passed through the test amplifier. The noise figure was low, but so was the conversion gain.

Integrated-Circuit Detectors

While investigating product-detector performance it seemed like a good idea to try some differential-amplifier ICs in circuits similar to those of Fig. 1. As indicated in Fig. 2, two types were tested. A Motorola MC1550G i.f. amplifier was used in the circuit at A. Its performance proved to be excellent. The outstanding feature was the conversion gain of the detector — far greater than any of the circuits of Fig. 1. This means that the audio amplifier which follows this detector need not have as much gain as that required for the circuits of Fig. 1, or that the i.f. gain ahead of the detector can be somewhat lower than in conventional circuits. This feature should be appealing to those wishing to design simple, low-drain superheterodyne receivers. This detector has good carrier isolation. A 0.1- μ V. input signal produced an audible c.w. note at the output of the amplifier. The b.f.o. injection level was 1 volt, peak. Very little difference in overall performance was noted while varying the supply voltage from 5 to 12 volts.

An RCA CA3028A differential-amplifier was tried in the circuit of Fig. 2B. This IC is designed for use in i.f. amplifier and mixer circuits. It is quite similar to the MC1550G, but is approximately three dollars lower in cost. Connected as shown, its performance was almost identical to

that of the circuit at A. A 0.2- μ V. signal provided an audible c.w. note. The conversion gain is quite high with this circuit, offering the same possibilities for use in simple receivers as the circuit at A.

With any of the circuits described in Figs. 1 and 2 the preceding i.f. amplifier chain should have some type of gain control, manual or automatic, to prevent the input signal to the detector from becoming high enough to cause overloading. If these circuits are to be used with existing receivers it may be necessary to lower the gain of the first i.f. stage through modification of the cathode biasing circuit, thus assuring that overloading will not take place at high incoming signal levels.

The b.f.o. used while testing these circuits was similar to the JFET oscillator shown in Fig. 3. Depending upon the size of the injection coupling capacitor, between 0.5 and 5 volts can be obtained for b.f.o. input to the detector. A value of 15 pf. provided the 1-volt level (r.m.s.) used in these tests.

Direct-Conversion Receiver Tests

After going the complete route on product-detector testing, or at least so it seemed, the thought occurred that it would be interesting to try each of the circuits in a direct-conversion receiver lashup similar to that of Hayward and Bingham. Each was tried, and the best overall performance was obtained from the circuit shown in Fig. 3. The 75-meter band was selected for an operating frequency because of its closer proximity to the a.m. broadcast band than any of the other h.f. bands; this permitted the receiver to be tested for cross-modulation from the b.c. band. This is a real problem when check-

ing receivers at ARRL Hq., because several broadcast-station towers are nearby. The ARRL test antenna — a center-fed dipole — has several volts of b.c.-band r.f. on it at all times, a condition which is difficult to deal with.

The receiver uses a double-tuned toroidal input circuit for obtaining good front-end selectivity. A three-section variable capacitor tunes both input inductors at the same time that it tunes the b.f.o. The three tuned circuits track over a range of 3.7 to 4 MHz. (The low-C tanks were employed only to permit the use of the small 3-gang Miller variable capacitor. Higher values of C would aid the selectivity by increasing the Q of the three coils.) The b.f.o. drain-supply voltage is regulated by a 6.2-volt Zener diode. Output from the CA3028A IC detector is coupled to a 2-kHz. audio filter by means of a small interstage transformer T_1 , which provides an impedance match between the detector and the audio filter. The a.f. gain control, R_1 , terminates the filter in its characteristic impedance.

Output from the audio filter is amplified to headphone level by a 2N3391A low-noise hi-fi preamplifier transistor. Far more audio gain is available than is needed for 2000-ohm phones.

The entire circuit draws only 30 mA. from a 12-volt supply. Its performance is astonishingly similar to that of many low- and medium-priced communications receivers with respect to sensitivity and output-signal quality. The same is true of cross-modulation and overloading characteristics. Of course, single-signal c.w. reception is not possible nor is there any a.g.c. provision. During nighttime tests with only a 2-foot-long clip lead for an antenna, the band was a mass of signals. Reception of c.w. and s.s.b. signals was excellent. When copying a.m. signals it is necessary to tune them in as one would on an s.s.b. receiver — at zero beat. A sharp c.w. filter was installed (900-Hz. peak). Some "ringing" showed up, but it was not serious enough to impair the copy.

(Continued on page 52)

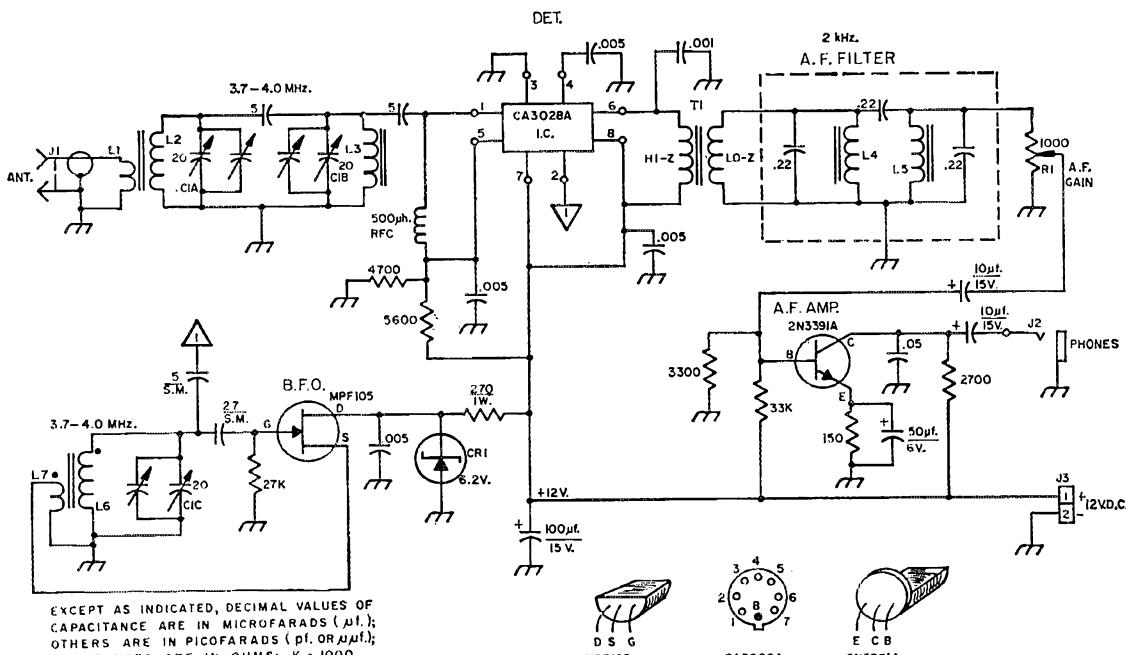


Fig. 3—Schematic of the simple direct-conversion 75-meter receiver. Fixed-value capacitors (except those in the audio filter) are disk ceramic. S.M. = silver mica. Capacitors with polarity marked are electrolytic. The 0.22- μ F. capacitors in the a.f. filter are low-voltage mylar. Fixed-value resistors are 1/2-watt composition unless noted differently. The variable capacitors shown in parallel with the three sections of C_1 are trimmers, and are part of C_1 .

C_1 —Three-section 20-pf. per section variable (J. W. Miller 777-VC).

CR_1 —Zener diode, 6.2 volts, 1 watt (Motorola HEP-103 or similar).

J_1 —Antenna connector, SO-239 type.

J_2 —Two-circuit phone jack.

J_3 —Two-terminal power connector (male).

L_1 —5-turns No. 24 enam. wire space wound over L_2 .

L_2 —75 turns No. 24 enam. wire bank-wound evenly over Amidon T-68-2 toroid core (60-inch length of

wire). (Amidon Associates, 12033 Otsego, N. Hollywood, Ca. 91607.)

L_3 , L_4 —Same as L_2 .

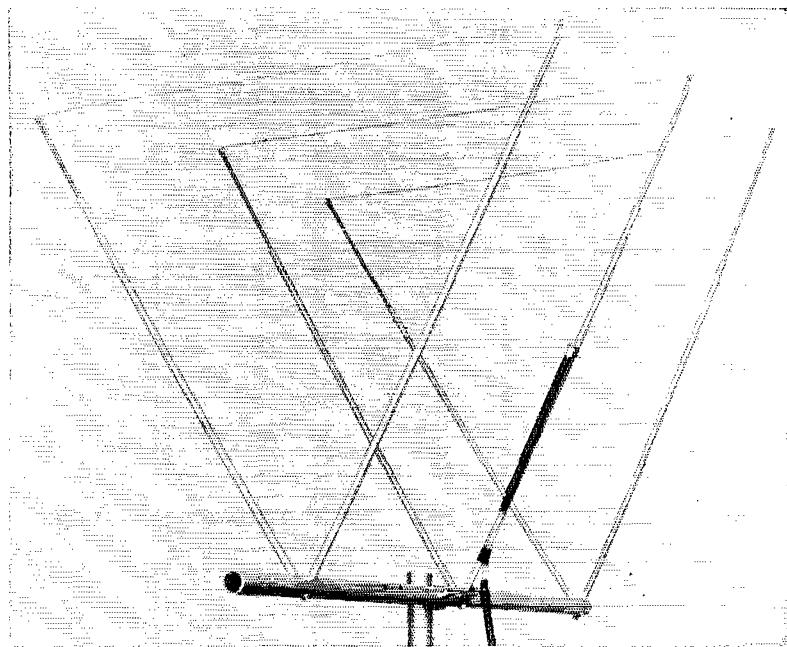
L_5 , L_6 —88-mh. telephone toroid coil (see QST Ham Ads).

L_7 —18 turns No. 24 enam. space-wound evenly over L_8 (observe correct polarity).

R_1 —1000-ohm, audio-taper carbon control.

T_1 —Transistor interstage transformer, 10,000-ohm primary to 1000-ohm secondary (Argonne AR-109; use 1/2 of secondary winding).

● Beginner and Novice



The completed three-element beam with gamma match. The beam is light enough to be supported by a TV U-bolt.

The Delta-Loop Beam On 144 MHz.

Construction Dope For A Three-Element Antenna.

BY LEWIS G. MCCOY,* WIICP

SINCE the appearance of the articles on the Delta-Loop beam in a recent issue of *QST*¹, there has been considerable discussion among hams as to v.h.f. possibilities with the beam. This article describes the construction of a 3-element version of the Delta Loop for the 144-MHz. band. However, before getting into actual details about this antenna, a word or two is in order about beam antennas for Novices just getting started in ham radio.

Beam Antennas

As most beginners know, when r.f. power is fed to an antenna the antenna radiates the energy. A theoretical antenna — and the reason we say theoretical is that such an antenna would be impossible in actual practice — is an isotropic antenna. An isotropic antenna is one that radiates *equally* well in *all* directions. If we could take an antenna and cause it to radiate better in some directions than others, it naturally follows that our signal would be stronger in some directions

than others. For example, a half-wave dipole is essentially a bidirectional antenna, radiating better in two directions than in others. If the isotropic antenna is said to have unity gain, then our half-wave dipole will have a gain of 2.14 decibels over the isotropic antenna in the dipole's favored directions.

While we won't go into detail explaining the decibel, it is a unit of measurement and briefly, when applied to power measurements, 3 db. would be equivalent to doubling your power and

Just about everyone says that if you like to experiment with antennas, there is no place like the 2-meter band. Well, here is an antenna that should excite the interest of the v.h.f. gang. Excellent front-to-back ratio, all the good points of the quad without the faults, these are just a couple of the features of the Delta-Loop beam.

* Novice Editor.

¹ Habig, "The HRH Delta Loop Beam," *QST*, January, 1969.

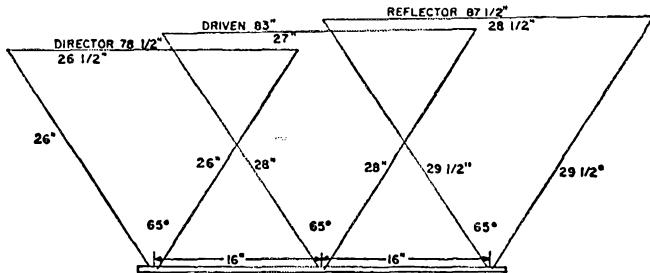


Fig. 1—This drawing shows the critical dimensions of the elements for the three-element Delta Loop beam. The 16-inch dimension between elements doesn't need to be exact because with this type construction, any given element has its vertical members offset by the dimension of the tubing.

10 db. would be the same as increasing your power 10 times. One can quickly see the advantage of having an antenna where the energy is concentrated in a desired direction. If we can rotate such an antenna, and aim the antenna with its maximum gain in the desired direction, this is even more desirable.

Lest the Novice be misled at this point it is a good idea to point out that there are some practical size and height limits in rotating antennas. For example, some beginners have written in asking for construction information on rotatable beam antennas for 80 meters! Just so you have an idea how big such an antenna would have been for a two element array, each element would be about 135 feet long and mounted on a boom about 50 feet long and if that isn't tough enough, in order for the antenna to do any practical work it should be at least 135 feet high! However, as we go higher in frequency, we quickly reach a region where rotatable beam antennas are not only desirable, but practicable.

The three-element antenna described here should have an estimated forward gain of around 8 to 10 db.² (over an isotropic antenna) and a front-to-back ratio of over 25 db. On some of our tests, the measurements showed up to 35 db. signal rejection off the back. (The limit of measurement in our testing set-up.)

The Three-Element Delta-Loop Beam

The beam shown in Fig. 1 consists of a driven element, a reflector, and a director. Two methods of feed are described, one with coax using a gamma match and the other with a type of T matching, for 300-ohm Twin-Lead. Some v.h.f. men prefer using Twin-Lead, while others like coax. One important point here: never use the smaller diameter coax, either RG58/U or RG59/U for feeding an antenna at v.h.f. — always use the larger diameter RG8/U or RG11/U, or better lines. The smaller diameter coax has very high losses at v.h.f. and while the large-diameter coax costs more per foot, the lower loss characteristic far outweighs the difference in cost.

The elements used in the Delta-Loop beam are approximately one wavelength long, or about

1/3 wavelength on a side. "Plumber's Delight" type construction is used in the beam — that is, all of the elements are completely metal and are mounted directly on a metal boom. The antenna described here was designed for 145 MHz. but it is a simple matter to change the element lengths for any part of the band.

The formula for the driven element is $L = \frac{12036}{f}$ where F is the frequency in Megahertz and L is the answer in inches. For 145 MHz. this figures out to a driven element of 83 inches. The reflector is made about 5 percent longer and the director, about 5 percent shorter.

Constructional Information

The elements for the antenna are made up from $\frac{3}{8}$ - and $\frac{1}{4}$ -inch aluminum tubing. The tubing we used is Alcoa Co. type 6061-T6 and it comes in 12-foot lengths. The $\frac{3}{8}$ -inch tubing has a wall thickness of 0.058 inch and an inside diameter of 0.258 inch. This takes the $\frac{1}{4}$ -inch diameter size very nicely. The boom is made from 1-inch diameter tubing.

We did some checking on the availability of the above types of aluminum. The city of Hartford, for example, has a population of about 150,000 and there were three supply houses that had, or could order the tubing. Check the Yellow Pages in your area for aluminum suppliers. If you live in a large city, or near one, it shouldn't be any problem obtaining the stock. As far as could be determined, there is no mail order house that sells tubing so if you live in a rural area, you'll either have to plan a trip to the city or improvise.

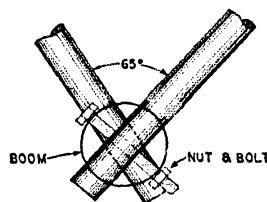
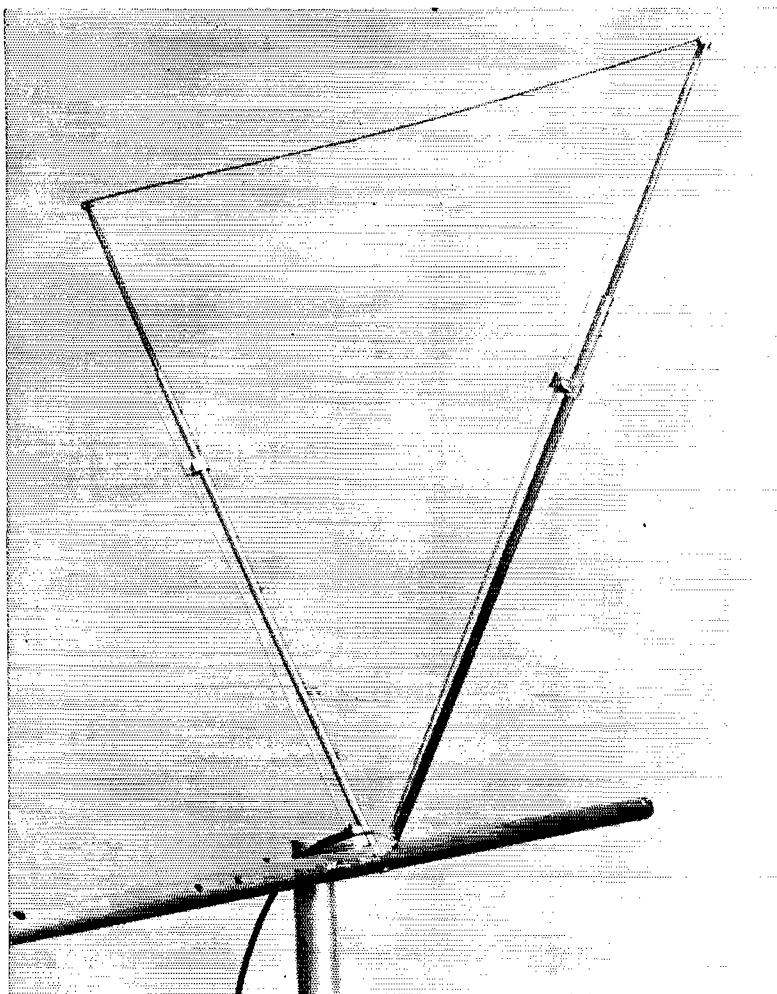


Fig. 2—This shows the details of the element-to-boom mounting.

² Lindsay, "Quads and Yagis," QST, May, 1968.



This shows a driven element with the modified T-match system. The T-match bars are supported at the mast on Isolantite stand off insulators.

The horizontal member of the elements, the top section, is made from aluminum welding rod, $\frac{1}{8}$ -inch diameter. This material is available from any welding shop. Also, aluminum ground wire could be used for this purpose.

Constructing the antenna is quite simple. First, cut the $\frac{3}{8}$ -inch stock into two-foot lengths and the $\frac{1}{4}$ -inch stock into 16-inch lengths. Before attempting to drill the boom to accommodate the tubing, make up a template for the 65-degree angle from a piece of stiff cardboard. Next drill three holes, $\frac{3}{8}$ -inch diameter, one at each end of 32-inch boom and one in the center. The best method of keeping the holes in line is to drill one hole at one end of the boom and insert a length of $\frac{3}{8}$ -inch tubing into the hole. The tubing in the hole will provide an alignment point or center for drilling the other two holes.

Next, place the 65-degree template on the boom and drill one of the other support holes. Once this hole is drilled you can insert a length

of tubing and drill the remaining holes in a line. The $\frac{7}{8}$ -inch sections are held in place in the boom with a nut and bolt, $1\frac{1}{4}$ -inches long by $\frac{1}{8}$ -inch diameter as per Fig. 2.

When making up the elements, all measurements are made from where the element enters the boom; the portion of the element extending through the boom is not counted. If it is desired to make the elements adjustable, the $\frac{3}{8}$ -inch tubing can be slotted with a hack-saw and a clamp made up to compress the slotted section over the $\frac{1}{4}$ -inch tubing. However, we made our elements by inserting the $\frac{1}{4}$ -inch tubing to the proper dimension and then locking it in place by drilling a hole through the two pieces of tubing and inserting a self-tapping screw. The ends of the $\frac{1}{4}$ -inch tubing at the tops of the elements are flattened in a vise, or with a hammer, and then drilled at the ends to take a No. 6 nut and bolt. The cross members are held in place by these nuts and bolts.

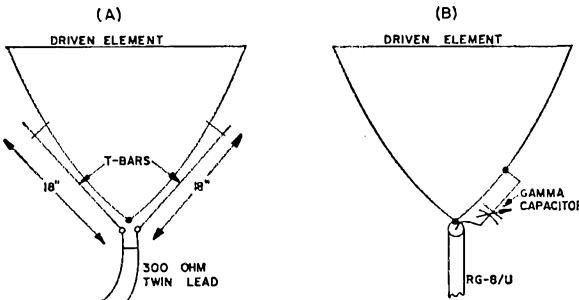


Fig. 3—At A is the T match type feed and at B, the gamma match.

Matching Sections

The T-matching system consists of two matching sections made up from the $\frac{1}{8}$ -inch welding material, each 18 inches long. Fig. 3A is a drawing of the driven element and the matching lines. Two standoff insulators, about $\frac{1}{2}$ inch high are mounted adjacent to each other on the boom directly at the base of the driven element. The two lengths of $\frac{1}{8}$ -inch rods are secured at the standoffs and by the shorting bars, and positioned approximately $\frac{1}{2}$ -inch from the element members.

For the gamma match, a length of modified RG8/U coax is used. The photograph and Fig. 4 gives the details for making the gamma.

Matching Information

When matching with the T match and Twin-Lead type feed, a transmatch and s.w.r. bridge are needed. Details for making a combination unit are given in a recent issue of *QST*.³ The set-up consists of a transmitter; coaxial line to the s.w.r. bridge; and then coaxial line from there to the transmatch. In place of the 300-ohm twin lead, a non-inductive 300-ohm load is placed across the transmatch terminals that would normally take the feed line to the antenna. Four 1200-ohm, 1-watt carbon or composition resistors in parallel will provide a 4-watt, 300-ohm dummy load. Tune up the rig in a normal manner with the power reduced to no more than four watts output, and switch the s.w.r. bridge to read reflected power. Adjust the transmatch so that the s.w.r. bridge shows a match in the coaxial line. Next, remove the resistor load and replace with the 300-ohm line to the beam.

³ DeMaw, "A 2-Meter Transmatch with S.W.R. Indication," *QST*, March 1969, p. 39.

The T-match shorting stubs should then be adjusted so that the s.w.r. bridge shows a match. Do not touch the adjustments of the transmatch as it is set for a 300-ohm load. The idea is to have the T-match adjusted so that the beam is a direct substitute for the resistor load without a change in the bridge reading. We found that the shorting bars were about 15 inches up from the boom when a match was achieved.

The gamma match for the coax line is adjusted by a combination of pruning the length of outer braid, and moving the shorting clamp up or down the element. We found that a match was achieved with a shield length of $8\frac{1}{2}$ inches and the shorting clamp $13\frac{1}{2}$ inches up from the boom. In making the adjustments, the modified section of coax, from the point where the braid is attached to the boom up to the shorting clamp should be taped flush to the element. Before actually installing the antenna in place, the gamma section should be taped at any open points to prevent moisture from getting into the coax, and to prevent the braid of the gamma section from shorting to the boom at an undesired point.

Installation

The antenna is very light and TV hardware and rotators can be used to install the beam. The antenna is light enough to be held by a TV-type antenna-to-mast U-bolt.

If this is your first experience with a beam antenna on v.h.f. you may be in for a surprise. You have to aim the antenna in the desired direction or you may not even hear what would be a strong signal. In other words, a signal that is S9 off the front of the beam may be completely inaudible off the sides or back.

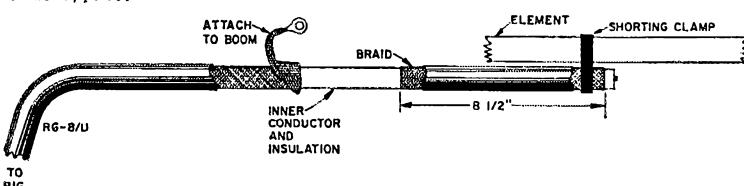


Fig. 4—This shows the method of making up the gamma matching section. The distance from the shorting clamp to the boom was $13\frac{1}{2}$ inches in our case. The length of the section where the braid is removed is five inches. In the actual installation, any openings in the coax are sealed with tape to prevent moisture from getting into the coax.

Amplified A.G.C. for the Heath Mohawk Receiver

BY GEORGE G. MILER, JR.,* K4HEB/W4ZOJ

THE original a.g.c. system in the author's Heath Mohawk receiver did not limit strong s.s.b. signals sufficiently to avoid overloading the product detector; also, the release time constant was not long enough to prevent an objectionable rise in noise between words. Installation of the a.g.c. system to be described has overcome these objections. It should be possible to apply the same system to most other receivers with only slight changes.

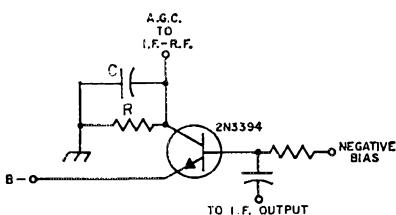


Fig. 1—Basic amplified a.g.c. circuit.

Basic Circuit

The basic control circuit is shown in Fig. 1. The 2N3394 n-p-n transistor is slightly forward-biased. Since the transistor is only slightly conducting, there is a very small voltage drop across R_1 , and there is very little a.g.c. voltage applied to the r.f. and i.f. amplifiers. A signal is coupled from the output of the last i.f. stage to the base of the transistor. If the negative peak of this signal is greater than the forward bias, it will cause the transistor to cut off on part of the negative half of the cycle, and conduct more on the positive half. This will cause the voltage drop across R_1 to increase, biasing the r.f. and i.f. amplifiers more negative, and reducing their gains.

The a.g.c. is filtered by C_1 . The transistor is cut off over most of the negative half of the cycle of the i.f. driving signal, and the a.g.c. level is held by C_1 . The a.g.c. time constant is equal to the product of R_1 and C_1 . A very small increase in average base current causes a large a.g.c. action. The a.g.c. action will reduce the amplifier gain sufficiently so that the transistor will be only slightly reverse-biased on negative peaks. A.g.c. action is delayed until the base is reverse-biased. The output of the i.f. amplifier is then limited to this level by the a.g.c. system.

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Practical Circuit

Fig. 2 shows the complete a.g.c. circuit that was used in the modification. To obtain the degree of control desired, a.g.c. was applied to the second 50-kHz. amplifier, as well as to the 1682-kHz. amplifier and r.f. amplifier controlled by the original system. The base driving voltage for the a.g.c. system is taken from the output of the second 50-kHz. i.f. amplifier in the Mohawk. The a.g.c. load resistor, corresponding to R_1 in Fig. 1, is made up of two 1-megohm resistors, R_7 and R_8 , in series. (The low resistance R_6 is included to limit the collector current when the a.g.c. line is grounded to turn the a.g.c. off.)

The voltage at point A is approximately 5 volts positive, relative to ground. If the transistor is cut off, CR_2 will be biased forward, and will clamp the r.f.-amplifier a.g.c. line to ground, keeping the r.f. amplifier at full gain. This clamp will not be removed until the transistor is driven sufficiently into conduction by the i.f. signal to increase the voltage drop across R_8 to the extent that point B becomes negative in respect to ground. This negative voltage at point B reverse-biases CR_2 , and the clamp is removed. Thus, a.g.c. control of the r.f. amplifier is delayed until the driving signal becomes large enough to cause CR_2 to be reverse-biased. This delay in r.f.-amplifier a.g.c. is desirable to avoid degrading the signal-to-noise ratio until the signal is well above the noise level. The clamp is not applied directly to the a.g.c. lines to the i.f. amplifiers, since the transistor will continue to draw current through R_6 and R_7 , even with the input end of R_7 at ground, or at a fairly negative potential, because the emitter is still biased negative in respect to the collector. The a.g.c. delay on the r.f.-amplifier line can be increased by increasing the value of R_1 .

The 0.005- μ f. capacitor C_3 provides a suitable time constant (about 0.01 second) for a.m. reception. The longer time constant provided by the addition of C_4 (about one second) is used for s.s.b.

Other receivers may require a change in the values of C_2 and R_4 .

S Meter

The original S-meter circuit used in the Mohawk will not work with this a.g.c. system, because the meter is connected to measure the amplitude of the signal applied to the detector. Since the signal at this point is now held more or less constant, the S meter was reconnected to measure the a.g.c. level, which is propor-

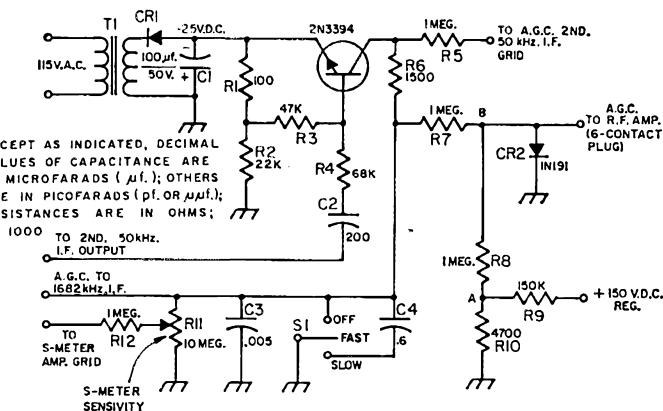


Fig. 2—Complete circuit of the amplified a.g.c. circuit for the Mohawk receiver. Capacitors are ceramic, paper, or Mylar, except where polarity indicates electrolytic. Resistors are 1/2-watt composition.

CR₁—Silicon diode, 200 p.i.v., 125 ma. (RCA 1N3755, or similar).

CR₂—Germanium diode (1N191).

R₁₁—10 megohm control, linear taper (IRC PQ 11-143, or similar).

S₁—D.p.d.t., center off, toggle switch (Cutler-Hammer 7591K6, or similar).

T₁—Power transformer: 10/10/40 volts, c.t., 100 ma. (Stancor TP-2).

Other component labels are for text-reference purposes.

tional to the input signal, if the signal is above the a.g.c. delay point. The S meter will read zero on weak signals with this circuit, therefore it is not accurate at low levels. But it is good for any signal that is well above the noise generated within the receiver.

Modification

The 25 volts can be obtained from a 20-volt transformer and rectifier, or a diode can be added to the high-voltage winding of the power transformer, using a voltage divider to drop the

voltage to the required level. The author used the former method, mounting the transformer in space available on the right-hand apron of the chassis, just forward of the filter choke. The 150 volts is taken from the VR tap on the Mohawk supply.

The original 100-ohm S-meter adjusting control was removed from the chassis, and re-

(Continued on page 52)

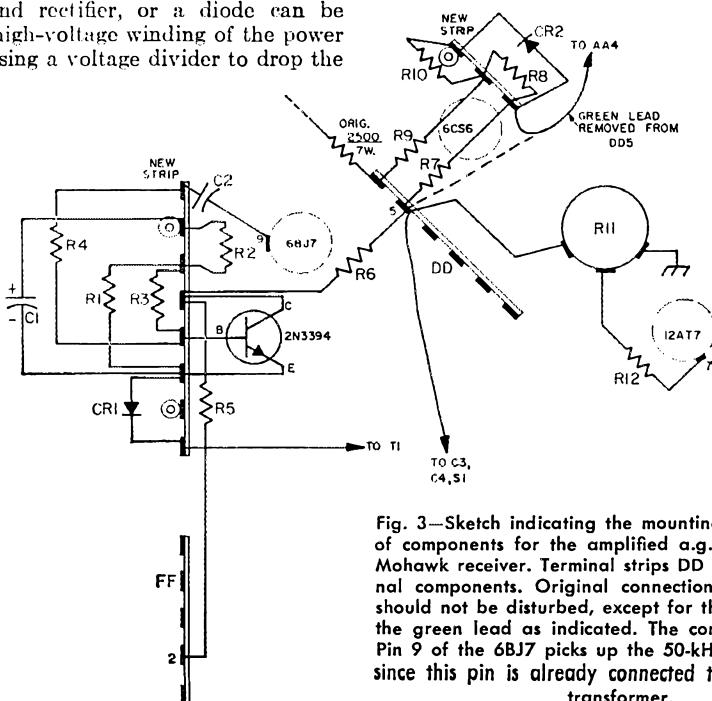


Fig. 3—Sketch indicating the mounting and connection of components for the amplified a.g.c. system for the Mohawk receiver. Terminal strips DD and FF are original components. Original connections to these strips should not be disturbed, except for the transferring of the green lead as indicated. The connection of C₂ to Pin 9 of the 6B7J picks up the 50-kHz. driving signal, since this pin is already connected to the i.f. output transformer.

Converting A Popular 6-Meter Rig to V.F.O. Operation

Heterodyne Adaptation for the QST "Two-Band V.H.F. Station" and Handbook 50-MHz. Transmitters

BY GEORGE JONES,* K1QDR

At the insistence of several friends who were active on the v.h.f. bands, the author decided to give the frequencies above 50 Mc. a try. The multiband rig described in several editions of the *ARRL Handbook*,¹ 1966 and earlier, looked attractive, and when completed proved to be a fine setup for getting started on 6. Before long it became apparent that a good v.f.o. would be very helpful, as run-of-the-mill surplus crystals seemed to be in use by almost everyone, and QRM on these channels was often heavy. But the signals of most v.f.o. rigs heard on 6 left much to be desired, so something better than the usual 8-MHz. v.f.o., to replace the crystal, was in order.

Having built a stable 5-MHz. v.f.o., we decided to try heterodyning to 50 MHz. in the former crystal oscillator and multiplier stages. This was done easily by installing a 6AF11 Compactron, in place of the 6CX8 oscillator-multiplier tube originally used. This interesting little bottle contains a triode and a tetrode to replace the comparable elements in the 6CX8, and it has another triode that could be used to boost the output of the external v.f.o., and provide some additional isolation. Examination of the original layout showed that the changes could be made with only one additional chassis hole, and a slight

* 16 Amy Road, Framingham, Mass. 01701.
¹ "A 50 through 432-Mc. Transmitter," *The Radio Amateur's Handbook*, Editions 40 through 43, Chapter 17. A similar transmitter, described in *QST* for August, 1961, and appearing in both editions of *The Radio Amateur's V.H.F. Manual*, Chapter 6, can be modified in the same manner.

enlargement of the socket hole, to accommodate the socket for the 6AF11. The outward appearance of the transmitter would be little changed, as may be seen from Fig. 1.

The schematic diagram, Fig. 2, shows the circuit changes. One 6AF11 triode, V_{1A} , is a 45-MHz. overtone oscillator. The other, V_{1B} , is an amplifier for the 5-MHz. v.f.o. signal. The tetrode, V_{1B} , is a mixer. The two signals from the triodes are applied to its control grid, and the sum frequency is taken from the plate circuit. This is comprised of L_4 and C_1 in the *Handbook* transmitter, or L_3 and C_1 in the *QST* and *V.H.F. Manual* version.

Any good v.f.o. tuning the 5-MHz. range will do. Ours uses a Nuvistor, operating at low plate voltage. Checks using a stable receiver show less than 50 Hz. drift, after a 15-minute warmup. With the heterodyne method of getting to 50 MHz., this stability is translated to the v.h.f. signal. Further details need not be given here, except to say that any good v.f.o. with 2 to 3 volts minimum output should do. If the author were starting from scratch, transistors probably would be used.

Adjustment

Tuning up the new circuitry is not difficult, but a good dip meter is desirable, in order to be sure that the intended 50-MHz. output is secured. There is also a heterodyning product at 40 MHz., and it is also possible to pass on the 45-MHz. energy from the crystal oscillator, if tuning is not

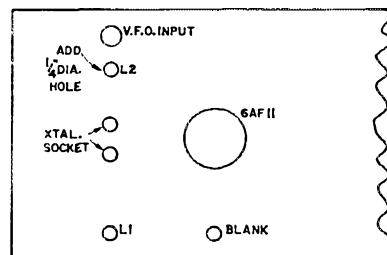
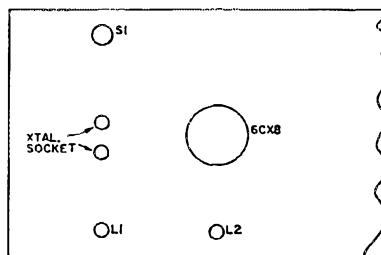


Fig. 1—Only one additional hole is needed to install a 6AF11 heterodyning unit in the 50-MHz. transmitter described in several editions of the *ARRL Handbook*. The socket hole for the former 6CX8 must be enlarged to take the Compactron socket. The *QST* and *V.H.F. Manual* rig has a slightly different layout, but uses a similar circuit and may be modified in the same way.

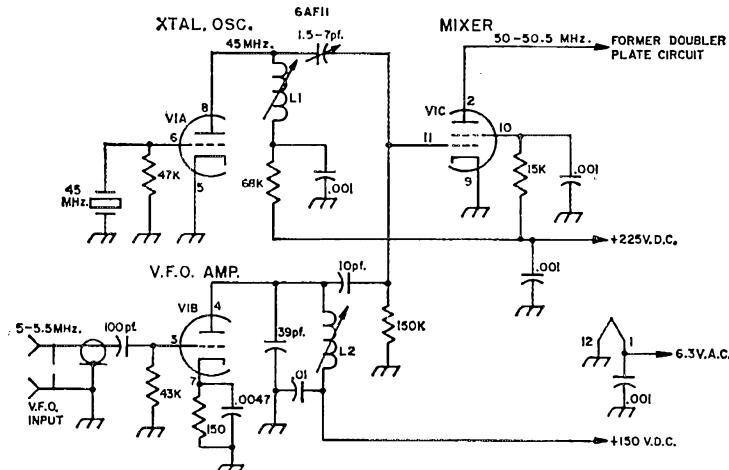


Fig. 2—Schematic diagram of the heterodyning stages that replace the crystal oscillator and first frequency multiplier in the 50-MHz. transmitter. The 45-MHz. crystal is a third-overtone type.

L_1 —10 turns No. 24 enamel closewound on $\frac{3}{8}$ -inch iron-slug form. L_2 —50 turns like L_1 .

done with care. The tuned circuit of the v.f.o. amplifier, L_2 , should be set at approximately 5.25 MHz., and left there. Output from the mixer should be fairly flat from 50 to 50.5 MHz. if this is done. Should it be low in a most-used segment of the band, adjust the circuit for best output in the desired frequency range. Adjust the plate circuit of the crystal oscillator, L_1 , so that the crystal will start every time. Be sure that this stage is actually oscillating on the desired overtone frequency, and not on the crystal fundamental frequency. The latter can happen if the tuned-circuit Q is too low, or if it is not actually tuned to the desired overtone frequency.

Drive to the mixer should be kept as low as possible, and still get the needed output level. Too much output from the 5-MHz. stage can result in the second or higher harmonics of the v.f.o. mixing with 45 MHz., and producing output in the TV channels. Excessive coupling from the crystal oscillator may help to pass on the 45-MHz. component along with the desired 50-MHz. energy. A good check on the possibility of unwanted output in the TV range is to monitor the lower TV channels on a TV receiver which has a high-pass filter installed to prevent its being overloaded by the 50-Mc. signal.

The modified 50-Mc. transmitter has been in use for some time now, and many checks have been made for possible spurious output without turning up any, when the rig is adjusted as outlined above. Stability is very superior to that generally heard from v.f.o. rigs on 6, in which the oscillator-multiplier method is used for frequency control. I have had the pleasant experience of being called by s.s.b. operators, who then compliment me on the stability of the signal. Being able to move about the band at will is a great operating aid, now that the practice of calling on

the frequency of the station to be worked is becoming more widely used all the time.

Most operation on the 6-meter band is in the first 500 kHz., so a tuning range of this width is not a great handicap. If higher frequencies are needed a crystal at 45.5 MHz. can be inserted in the crystal oscillator. It is probable that frequencies up to at least 51 MHz. could then be covered without major retuning. Going higher in the band would very likely require retuning of L_1 and the r.f. circuits of the transmitter proper.

QST



No April Fool is this box of labels from QST wrappers partially destroyed in a post office truck fire near Boston early in February. A week later another p.o. truck burned near Hartford, causing loss or damage to 167 mail bags! We're getting scorched bits of letters, checks for renewals, etc., where material can be identified. If your QST or some correspondence has apparently gone astray, this may be the reason for delay or no response.

Application of Broad-band Balun Transformers

BY R. H. TURRIN,* W2IMU

New low-loss ferrite materials used for toroidal cores can provide efficient and compact balun transformers for broad-band r.f. work at wide power ranges. Presented here are some new and useful applications.

THE ferrite-core broad-band transformer has been with us ever since the development of low-loss, high-permeability ferrite materials. The term "broad-band" is relative. Typically, ferrite toroidal-core baluns have bandwidths of 10 to 1, such as for the frequency range from 3 to 30 MHz. However, for some applications much greater bandwidths may be obtained. These transformers are low loss and may be constructed sufficiently large to handle the full legal transmitter power level, if desired. They must be terminated resistively for proper operation, at impedance levels from 5 to 1000 ohms. The higher-resistance terminations tend to decrease the useful bandwidth. The application of balun transformers to antenna problems has

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been covered by a number of others.^{1,2} McCoy has thoroughly discussed the need for baluns in antenna systems.¹ This article will describe other forms and uses for broad-band ferrite transformers.

Fig. 1 shows some basic transformers and a few applications. Figs. 1A and 1B show the basic 1:1 and 4:1 baluns. The 1:1 balun has been modified slightly from previous designs in that the third winding has been separated on the core from the bifilar winding. This modification results in improved balance at the higher frequencies with no change in other characteristics. The third winding is a core magnetizing winding which is effective only in extending the low-frequency range of the balun. The third winding may be omitted entirely if operation is confined to frequencies above about 10 MHz.

Fig. 1C is a two-stage transformer wound on a single core, and has an impedance step-down ratio of 4:1, unbalanced-to-balanced. This version may be very useful in feeding close-spaced beams where the driven-element impedance can be lower than 20 ohms.

¹ McCoy, "Is a Balun Required," *QST*, December, 1968.

² See other references listed at the end of this article.

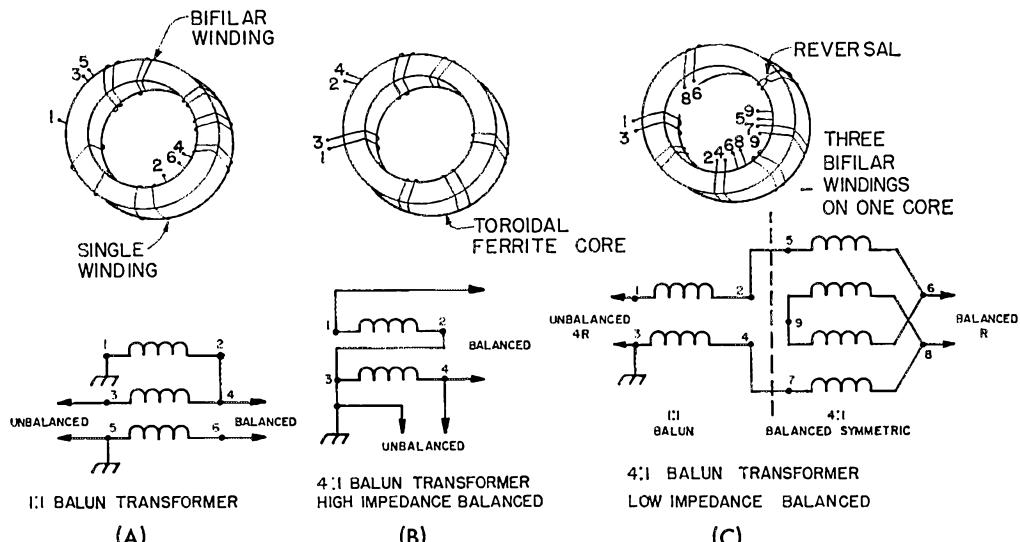


Fig. 1—Basic broadband balun transformers and a few applications. Bifilar windings are six to ten turns, depending on the ferrite-core permeability. In the formulas associated with Figs. 1D and 1F, k equals the ratio of the number of tapped turns to the total number of turns in the tapped winding. A suitable ferrite material is Ferramic Q₁ with a permeability of 125. Very small size cores may be used for receiving and low power applications. For full-power applications a 2½-inch o.d. Ferramic Q₁ core with ½-inch cross section wound with No. 14 Formex copper wire, seven turns per winding, is recommended. See text for discussion of applications.

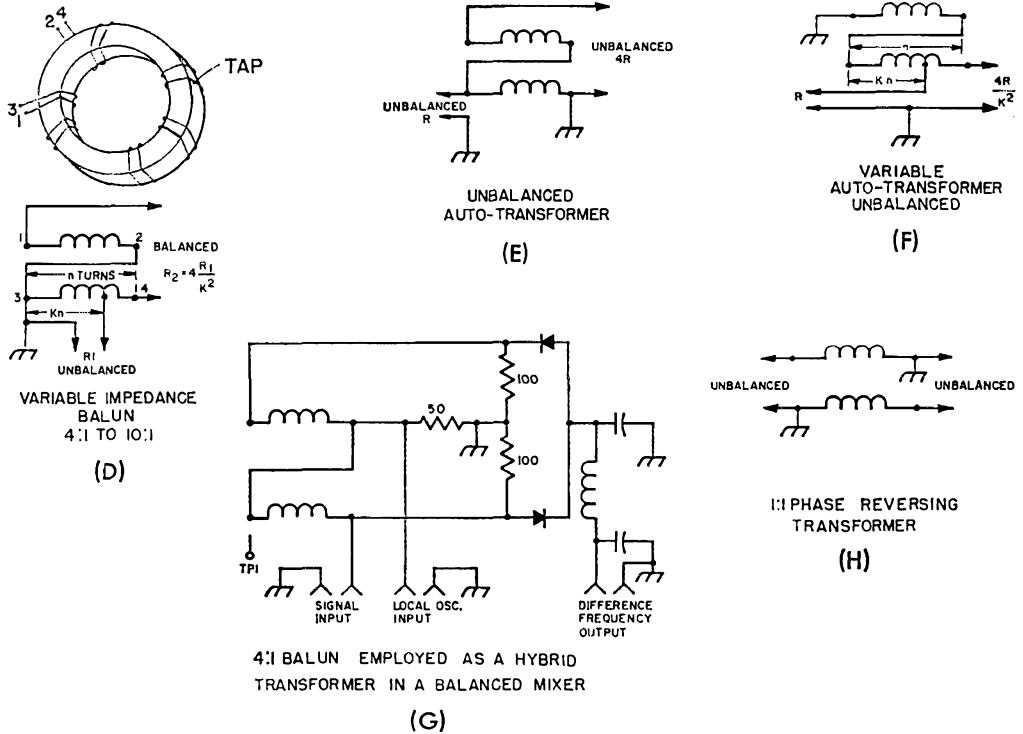


Fig. 1 (Cont.)

Fig. 1D is an innovation combining a variable-impedance transformer and a balun onto one core, and resistive ratios of from 4:1 to 10:1 may be obtained with this arrangement. Although still higher ratios may be obtained, the bandwidth will suffer. For single-band operation, the number of turns on the windings may be altered for minimum reactance.

Impedance ratios in the range 1:1 to 4:1 may be obtained by replacing the 1:1 balun portion of Fig. 1C with the variable-impedance balun of Fig. 1D simply by changing the wiring connections in Fig. 1C.

Fig. 1E shows the 4:1 balun transformer connected as an unbalanced autotransformer. This arrangement is especially useful as a broadband interstage transformer between transistor amplifier stages, and as an input or output line-matching transformer.

Fig. 1F is a variable unbalanced autotransformer. For balanced impedance levels less than the unbalanced levels, it will be necessary to employ a cascade of two transformers on separate cores. Figs. 1F connected to the unbalanced end of the transformer in Fig. 1C will give transformation ratios of 1:1 down to 1:4.

Another use of the 4:1 balun transformer is shown by Figure 1G. Here the transformer is used as a 180-degree hybrid transformer in a balanced mixer, modulator, or phase detector. For best broadband operation, terminating resistors are included. Similarly, the 4:1 balun

transformer may be employed as a 3-db. power splitter and phase-reversing transformer. The common or balanced terminal of the transformer, shown as TP_1 , has interesting uses. For instance, a detector connected between this terminal and ground will serve as an indicator of parallel-mode currents on a balanced transmission line when the transformer is used to connect a coaxial line to a balanced two-wire transmission line.

Finally, Fig. 1H shows a 1:1 polarity-reversing transformer with d.c. isolation between input and output. This transformer is useful in phasing problems with both circuits and antennas.

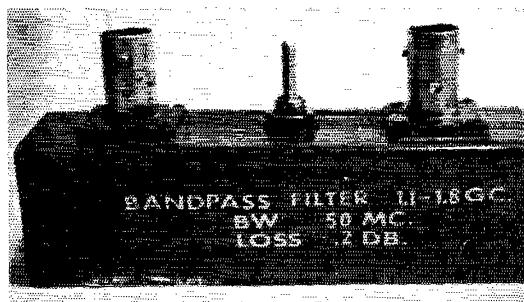
Because these transformers are broadband, they are all useful in short pulse application with MHz. repetition rates.

A few variations of the ferrite-core balun transformer have been shown along with applications. Fig. 1 is presented as a guide and reference for these transformers. It is suggested that for further construction details of the cored transformers, the reader consult the references. **[QST]**

References

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- DeMaw, "Toroidal-Wound Inductors," *QST*, January, 1968.
- Turkin, "Broad-band Balun Transformers," *QST*, August, 1964.
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A Simple Filter for the 1215-MHz. Band



BY E. E. BALDWIN,* WØRUG

EASY and inexpensive to make, the bandpass filter shown has a 3-db. pass band of 20 MHz. at 1296 MHz. An evening spent with soldering iron and tin snips will do the job, and any desired portion of the frequency range from 0.9 to 1.5 GHz. may be selected. The filter greatly reduces interference from other services in the form of stray responses such as images, signals produced by unwanted frequencies in the injection chain, and so on. Although not intended for high power, it should handle up to 100 watts without problems.

The original purpose of the filter was to eliminate the image-frequency noise when making noise-figure measurements with a 1296-MHz. mixer having a 30-MHz. i.f. output. If the receiver front end is broad, and converts the image as well as the desired signal, the result is a "double sideband" noise figure. This indicated noise figure is up to 3 db. better than the actual noise figure.

The problem is this. The noise generator

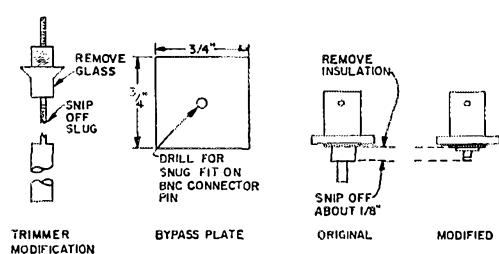
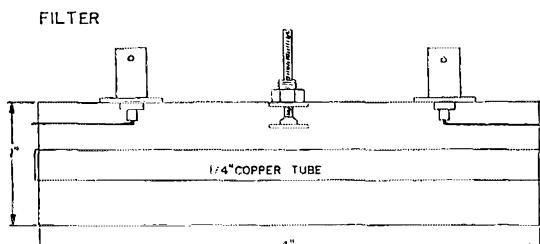
* 10650 N. 75th St., Longmont, Colo. 80501.

presumably is flat over most of the r.f. spectrum, so up to twice the noise power reaches the mixer, through the image plus the desired response. In practice, we want to receive only one frequency, and we employ various tuning methods to do this. Without them our simple mixer gives an indicated noise figure of, say, 9 db., when it may actually be 12 db., as far as hearing a weak signal is concerned. A simple filter, adjusted properly, can prevent this 3-db. error in noise-figure measurement.

Filter Construction

Probably the best material to use in home construction of this filter is thin copper sheet, such as the readily-available flashing copper. You will also need a 4-inch piece of $\frac{1}{4}$ -inch copper tubing and a pair of connectors. I used UG-290A/U, a type BNC with Teflon insulation, which fits nicely and is easy to use.

The basic unit is a tuned half-wave line, with inductive coupling in and out, and a disk-type tuning capacitor to resonate the line at the



MIXER VERSION

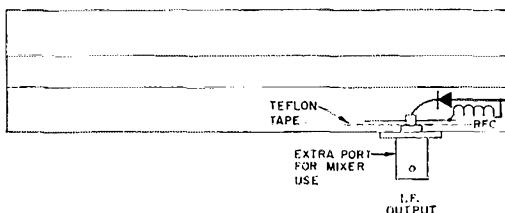


Fig. 1—The filter is a half-wave line, tuned at the center with a disk-type capacitor. BNC fittings are used for input and output coupling $\frac{1}{4}$ inch from each end. Adaptation for mixer service is shown at the lower left.

A stud from a glass trimer is adapted to serve as the mounting for a disk-type tuning capacitor, upper center. The BNC fittings should be modified as shown at the upper right. The bypass plate, center, is used in the mixer adaptation only.

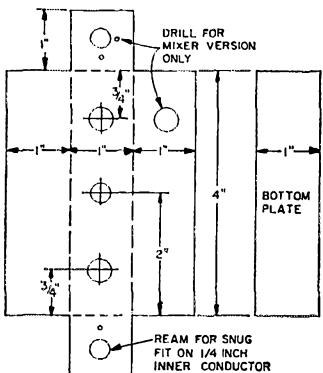


Fig. 2—Principal dimensions of the flashing-copper case for the filter.

desired frequency. This capacitor was made from a broken glass trimmer, JFD VC11G. The remaining glass was removed from the base, then the adjusting screw was snipped off just below the slug, as shown in Fig. 1. Parts from slug-tuned coil forms can be used similarly. A small disk of between $\frac{3}{8}$ - and $\frac{1}{2}$ -inch diameter is then soldered to the lead screw where the slug was cut off. The disk can be cut from the scraps of copper left over when making the main body.

A 3×6 -inch piece of copper is needed for the main body, which is 1 inch square and 4 inches long when completed. If you want to cover the bottom, another 1×4 -inch piece is needed.

Actual assembly is not difficult, although some soldering skill is needed. First, scribe the outlines on the copper as shown in Fig. 2. It is best to make the holes next before cutting or folding anything, since a small piece of copper can "hang up" on a drill bit and, if it spins around with the drill, can be dangerous to your hands.

After drilling the holes, cut to the scribe marks, then fold into a 1×4 -inch box. Next, cut off all but about $\frac{1}{8}$ inch of the pins on the BNC fittings and mount them on the box. The corners of the box can be soldered at this time. Next, install the tuning capacitor and attach the input and output links to the connectors, but leave the grounded ends unsoldered in the small end holes. Then slide the 4-inch copper rod or tube through the center holes and solder the ends in place, doing the coupling-link soldering at the same time. Any excess material extending beyond the ends of the box may be removed with a file and the solder joints cleaned up at this time.

A filter having the measurements given will produce about a 20-MHz. passband and about 0.5 db. insertion loss. By bending the coupling links closer to the center conductor, a wider passband and lower loss may be obtained. Conversely, a sharper passband and higher loss is obtained by increasing the clearance at this

point. A bottom plate is not required, but some slight improvement in performance will result if one is used.

Several of these units have been made in the range of from 0.5 to 2.0 GHz. and have been found to be very handy.

Mixer Version

A simple mixer may be constructed by adding a third connector as shown in Fig. 1. A scrap of copper and a bit of Teflon tape form a u.h.f. bypass at this port, and if a good diode is used, you will have a simple and effective mixer. Best noise figure depends upon the quality of the diode, and the level of drive to the local oscillator port. I used a "hot-carrier" diode type TIV 305. These cost only a couple of dollars, and work very well. It is wise not to use a soldering gun around them as their breakdown voltage is low and the field around a soldering gun can induce voltages high enough to ruin them. This is also true of many other solid-state devices, such as ICs, FETs, and regular transistors. Better stick to an iron, or at least do not operate the trigger of your gun when the tip is near the diode.

In summary, the unit has about 0.5-db. loss and 20-MHz. bandwidth when used as a filter. The s.s.b. noise figure of the mixer may be around 10 db. if a good diode is used and enough drive is provided. Nominal input and output impedances are about 50 ohms.

All in all, a handy gadget.

QST

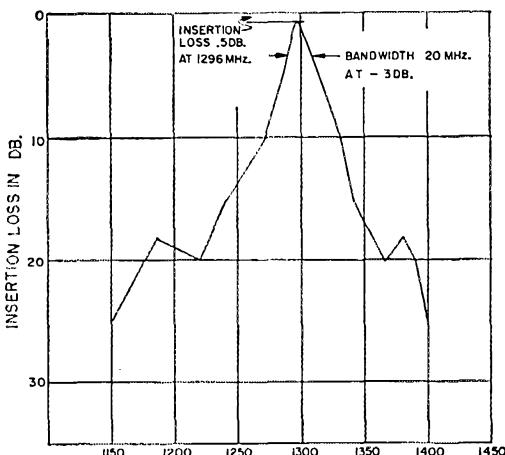


Fig. 3—Insertion-loss curve for the 1215-MHz. filter, with the dimensions given.

**SWITCH
TO SAFETY!**



Hints and Kinks

For the Experimenter



MOBILE BURGLAR ALARM

A simple homemade burglar alarm, which can help prevent the theft of mobile equipment, is shown in Fig. 1. When S_1 is in the closed position, opening any of the car doors (four in my model) causes the dome lights to go on. This triggers the SCR, Q_1 , by completing its gate circuit. As a result, relay K_1 , which is in the cathode line of Q_1 , closes and horn L_{S1} sounds. Emergency flasher K_2 , in series with the horn and the battery, causes the honking to be intermittent. The alarm continues to operate until S_1 is opened to remove power from CR_1 .

Since most cars use dual horns, a single horn was chosen to signal that a burglary was taking place. The distinctive sound of a pulsating single horn is more likely to attract attention and scare off a would-be felon than the car's usual horn system, and it is less likely to encourage a friendly police officer or other well-meaning Samaritan from frantically jerking wires at random in order to shut off what he thinks might be a stuck horn button.

Referring to Fig. 1, the parts within the dashed lines were mounted in a $5 \times 4 \times 3$ -inch Minibox, and the unit was bolted to the car at a fender bulge under the hood. The single horn was also mounted under the hood.

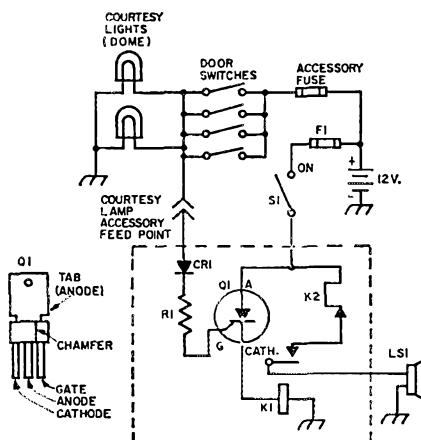


Fig. 1—Schematic of the mobile burglar alarm.

CR_1 —50-p.i.v. silicon rectifier, any current rating.

F_1 —7-ampere in-line fuse.

K_1 —S.p.s.t. relay, 10-ampere contacts; 12-volt d.c. coil, 3-amperes or less.

K_2 —12-volt emergency flasher (Ideal 522).

LS_1 —Single 12-volt horn.

Q_1 —4-ampere SCR (General Electric C106Y1).

R_1 —220- to 470-ohm composition, 1/2 watt.

S_1 should be installed in a location that is difficult for a thief to discover but, at the same time, is easy for the owner to reach. Under the hood, behind a bracket or brace, is usually a good spot.

To use the alarm, close S_1 when you are ready to leave the car. Don't forget to open the switch when you return. — Sol Davis, W3WPN

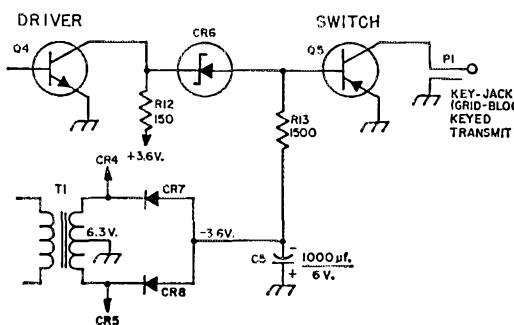


Fig. 2—Solid-state switch for the "Micro-TO Keyer." K_1 and CR_3 have been removed from the original circuit and replaced by R_{12} . Q_4 and T_1 are original components. Resistance is in ohms.

C_5 —Electrolytic.

CR_6 —2.4-volt Zener (Motorola 1N5221).

CR_7 , CR_8 —1-ampere, 50-p.i.v. silicon (Motorola 1N4001).

P_1 —Phone plug.

Q_5 —2N398A.

R_{12} , R_{13} —1/2-watt composition.

SOLID-STATE SWITCHING FOR THE "MICRO-TO KEYER"

THE "Micro-TO Keyer" described by K3CUW in *QST* for August 1967 can be made entirely solid state by the removal of the keying relay and a diode and the addition of a switching transistor and a few other components. Referring to Fig. 2, R_{12} has been substituted for K_1 and CR_3 in Q_1 's collector circuit. CR_6 and R_{13} establish cutoff bias for the switching transistor, Q_5 . Negative bias voltage is obtained from two diodes, CR_7 and CR_8 , in a full-wave arrangement across the original 6.3-volt filament transformer, T_1 , and C_5 provides the necessary filtering.

If a 2N308A is used at Q_5 , don't permit the open-circuit voltage from the collector of the transistor to ground to exceed -105 volts, and don't let the transistor's collector current exceed 35 ma. when the key is closed. If a different switching transistor is used, be sure to stay within its ratings and, if necessary, change the value of R_{13} to provide sufficient bias to cut off Q_5 when the key is open — Donald E. Christensen, W6DZM

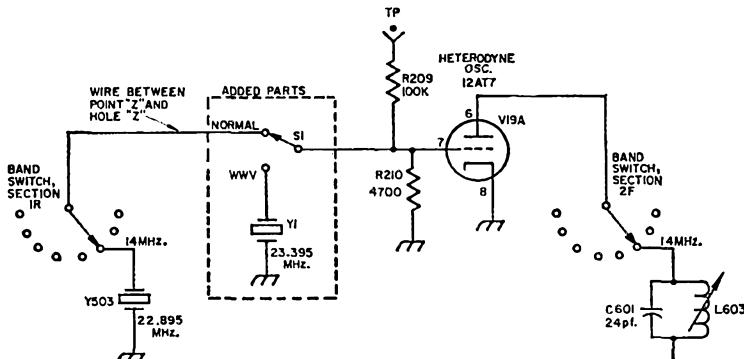


Fig. 3—Modification to the heterodyne oscillator in the SB-100 for 15-MHz. WWV reception. S_1 , an s.p.d.t. toggle or rotary switch, and Y_1 , a 23.395-MHz. third-overtone crystal, are the new components which have been added.

WWV ON THE HEATH SB-100

THE 15-MHz. signal transmitted by WWV can be received on the Heath SB-100 by adding a 23.395-MHz. crystal and a s.p.d.t. switch to the transceiver. As shown in Fig. 3, the added switch, S_1 , is used to substitute the 23.395-MHz. crystal, Y_1 , for the 22.895-MHz. crystal, Y_{503} , used in the heterodyne oscillator when the transceiver is on 20 meters. As a result, WWV (15 MHz.) appears at 500 on the main tuning dial when the BAND switch is set at 14.0. The heterodyne oscillator plate coil, L_{603} , for the 14-MHz. band may have to be slightly readjusted so that the new crystal will oscillate, and the DRIVER PRESELECTOR control will need to be set at slightly less than fully clockwise for best reception of WWV. Because the plate coil adjustment is on the slow side of the oscillator peak (SB-100 manual, pg. 92), output should be no more than slightly compromised.

To modify the transceiver, refer to Pictorial 3-15 in the SB-100 manual. The connection from the crystal band switch to the grid of the heterodyne oscillator, V_{19A} , is made by the wire that goes from point Z on the BANDPASS circuit board through hole Z in the RF-DRIVER circuit board. Open this lead and wire in the added components according to Fig. 3. The parts can be mounted on a bracket, and the bracket secured with existing screws that hold the BANDPASS circuit board to the chassis. — Al Wells, K6HA

(To prevent possible out-of-band operation, when transmitting make sure S_1 is not in the WWV position. — Editor)

PREVENTING ROTATOR FREEZE-UP

DURING several central Ohio winters, I put up with curtailed activity on my favorite DX bands when the rotator gear train froze in near and below freezing weather. A wrap-around heater element used to keep water pipes from freezing just did not do a satisfactory job because its cutoff temperature was 40 degrees Fahrenheit. A little more heat was needed.

After discarding several ideas because of their expense or unadaptability, the thought occurred to me to try an electric flatiron. The XYL's junk box produced two usable but outdated electric irons. A few preliminary checks were

made inside the shack. It was found that a rather thin sheet of plastic would not deteriorate if the iron was set near its lowest temperature setting. Furthermore, sitting on a cold basement floor, the iron had a duty cycle of about five seconds on and about four minutes off. The cost of operation was negligible. In order to prevent possible movement of the heat control once the proper spot was selected, the control was held in place with a few turns of plastic tape. The flatiron cord was wrapped around the handle and then the whole thing was covered with a piece of plastic to waterproof it.

A check after one complete winter's operation revealed no rust or other deterioration of any sort. In my particular case, the gear train is a part of the motor assembly, and the whole thing is waterproofed by an aluminum box which covers it. Although the flatiron was a good inch from the closest portion of the gear train, once the heat got through, the warmth prevented the rotator from freezing. The flatiron was simply tied on with a rope.

Those who have the gear train mounted in a circular outer housing should be able to fabricate a square metal outer cover large enough to accept the business end of the flatiron. For safety, it is suggested that the a.c. line cord be heavy enough to handle the full amperage of the iron, even though the iron is on for only a few seconds in each several minute period.

— Gene Ferguson, W8NPF

NOTES ON THE THREE-WIRE TESTER

A 115-volt three-wire tester is a good thing to have around. I use one constantly to check out new and altered installations. However, the unit described in the "Hints & Kinks" column of QST for January 1969 uses neon lamps whose lens colors do not correspond with those adopted by the manufacturers of three-wire testers. This could be misleading and confusing. To agree with the standard, I_1 in the Hint & Kink should have a red lens, I_2 should have a white lens, and I_3 should have a yellow lens. To avoid any confusion in following the original text, throughout the article change white to red, amber to white, and red to yellow. — Ted Witowski, W1RLV

Technical Correspondence

A NEGLECTED FORM OF BALUN

Technical Editor, QST:

Among the various devices for going from 50-ohm coaxial cable to a balanced open-wire line, how many old-timers remember the "Alford" circuit? It does not seem very well known now, but it has several features that make it worth keeping in mind.

First, it is extremely simple: just one variable

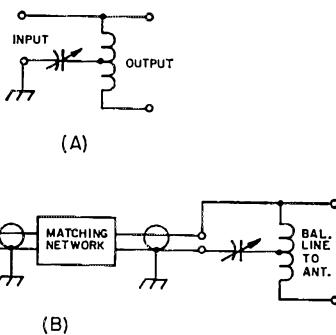


Fig. 1

capacitor and one mid-tapped coil (or two equal coils), Fig. 1A. Second, the capacitor can be calibrated once for all in terms of operating frequency, regardless of the impedances to be connected to the input and output terminals. Third, the circuit produces equal and opposite voltages on the output terminals regardless of what they are connected to (when the capacitor is properly adjusted, of course).

The drawbacks are that the capacitor must be set to the operating frequency and that plug-in coils should be used for operating in widely different bands. This means that the chief use for the circuit would be inside the shack when an open-wire line is brought in from the antenna. Also, the impedance transformation ratio is fixed, so in order to provide a 50-ohm load for the transmitter, a separate impedance-matching network must be used, either in the input line or the output line. If in the input line, it can be a simple L-type network such as described by K7KOK in *QST* for December 1968. In this case the entire setup would be as in Fig. 1B, where the s.w.r. bridge is added to show when the matching device is adjusted to give a 50-ohm termination to the cable from the transmitter.

The circuit of Fig. 1A is easily calibrated by means of a grid-dip meter. With the output terminals both grounded, and the dipper set to a given frequency, adjust the capacitor to give a dip. Then mark the frequency on the dial. Repeat for various frequencies, and then the dial can be set for any operating frequency without further complication.

If we call the input impedance of the output line the "load," then the input impedance is one-quarter of the impedance of the load in parallel with the inductance. Thus, if the load is small compared with the coil reactance, the transformation ratio is 4 to

1. But the exact ratio is not important when matching is done separately as in Fig. 1B.

One final note: a rather large capacitance may be needed since it tunes the two coil halves in parallel bucking, and if the coupling between the halves is large, this may be a rather small inductance.—Walter van B. Roberts, W2CHO/K4EA, R.F.D. 1, Box 454, Englewood, Florida 33533.

AURAL SELECTIVITY

Technical Editor, QST:

For some time I have wondered why I was better able to copy c.w. signals through interference if I kept the pitch of the desired signal relatively low. Perhaps others have been curious about this also.

An explanation of this phenomenon was found recently in *Introduction to Radar Systems*, by M. I. Skolnik. In Chapter 9, Mr. Skolnik presents a curve of the effective passband of the ear, as a function of frequency. As can be seen from Fig. 2, over the range of approximately 200 to 1000 Hz, the effective band-width is less than 60 Hz. Above 1000 Hz, it begins to widen rapidly. The original source of this curve is "Basic Correlates of the Auditory Stimulus," by J. C. R. Locklider in *The Handbook of Experimental Psychology*. This source also contains much more material on the subject of hearing.

Fig. 2 indicates some of the theoretical basis for the selection of 800 to 1000 Hz. as a popular center-frequency range for audio filters. Unfortunately, no data was found on the slope of the sides of the ear's handpass curve.—Ronald A. Jacob, W5BJG/WB4GYX.

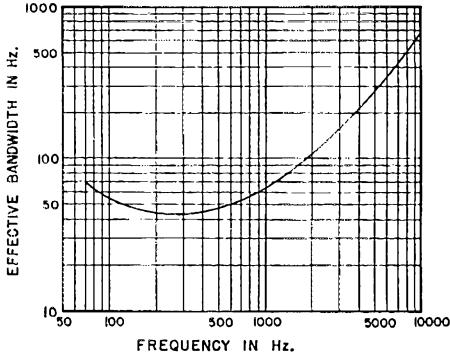


Fig. 2

BLOWER CONTROL

Technical Editor, QST:

With reference to W6SAI's article in September 1967 and W6AOI's letter in January 1968, on blowers:

Q. Must one cool 4X150s during standby? A. Some manufacturers ignore the question, but at least one says, "Yes."

Q. Must we put up with the blower noise while receiving? A. No, use a dropping resistor.

Q. What if the blower runs OK with resistor, but needs more voltage to start? A. Use an incandescent lamp for dropping. The cold resistance is low, permitting enough current for starting, but the hot resistance is high, holding down the current and the noise. Of course, a relay shorts out the lamp during transmitting intervals, so as to bring the blower up to normal speed. A 40-watt 115-volt lamp worked fine for me.—William L. Smith, W3GKP, 1525 Spencerville Road, Spencerville, Md. 20868.

A METHOD OF GENERATING RTTY TONES

Technical Editor, QST:

One method of generating RTTY signals is to feed frequency-shifted audio tones into an s.s.b. transmitter. The tones must have good stability, waveshape and be of equal amplitude. For the home constructor, two further requirements are usually essential — the equipment must be simple and also easily put on frequency. The method to be described combines all of these features.

If the inductance in an *LC* oscillator can be reduced, the frequency will increase. With reference Fig. 3A, the resonant frequency of the tuned circuit can be given as

$$F_1 = \frac{1}{2\pi \sqrt{C(L_1 + L_2)}}$$

assuming no mutual coupling between the coils. If L_2 were removed from the circuit, the frequency would increase and the resonant frequency would then become

$$F_2 = \frac{1}{2\pi \sqrt{CL_1}}$$

The inductance can be found by juggling these two equations, giving

$$\frac{L_1 + L_2}{L_1} = \left(\frac{F_2}{F_1} \right)^2$$

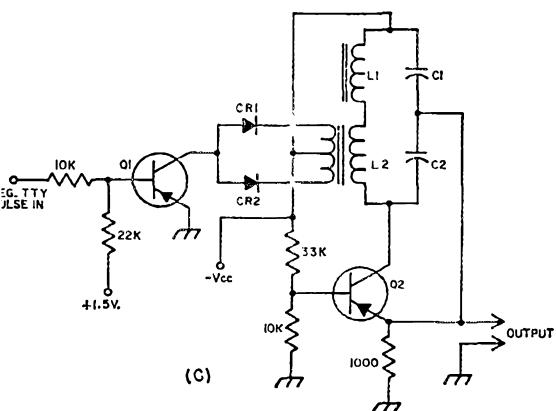
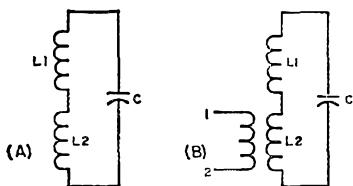


Fig. 3—(A) Fundamental resonant circuit; (B) Transformer arrangement for changing frequency by short-circuiting terminals 1 and 2; (C) Practical circuit for audio frequency-shift keying. Circuit values are discussed in the text.

Substituting the RTTY tone frequencies of $F_1 = 2125$ Hz. and $F_2 = 2975$ Hz., we get

$$\frac{L_1 + L_2}{L_1} = \frac{(2975)^2}{(2125)^2} = (1.4)^2 \cong 2$$

therefore

$$L_1 = L_2$$

It can be seen that an *LC* oscillator may be shifted the necessary 850 Hz. in frequency for RTTY simply by adjusting C for a frequency of 2125 Hz. with both inductances in circuit, and then removing one inductance from the oscillatory circuit. The most obvious method of removing L_1 or L_2 from the circuit is to short the inductance with a relay contact. A second method that lends itself to electronic keying, and works extremely well, is as follows: With reference to Fig. 3B, if a short circuit is placed across one winding (terminals 1-2) of L_2 , a short circuit will be reflected across the other winding; thus in this condition L_2 has been effectively removed from the oscillatory circuit.

A practical circuit is shown in Fig. 3C. L_1 and L_2 were wound on small pot-core assemblies approximately 2×1 cm. using 38 S.W.G. enameled wire. In the test circuit, all windings had about 350 turns, the primary of L_2 being center-tapped. C_1 and C_2 were in a 2:1 ratio, approximately; this is not very critical, and their total value was adjusted so that with both pot-cores in circuit the frequency as measured on a digital counter was 2125 Hz. When the primary of L_2 was shorted, the frequency was measured as 2964 Hz. Bearing in mind that the formula was only worked out to the nearest whole number and that pot-cores have inductance-adjusters to take care of any slight discrepancies, this overall error of 11 Hz. is near enough. Actually it was only a minute's work to obtain both desired frequencies.

The oscillator is basically a grounded-base Colpitts circuit, although the capacitor was left off the base to improve the waveform.

When Q_1 is cut off, the diodes are nonconducting. No rectification of the audio tone occurs as the diodes are back to back. When Q_1 conducts, both diodes conduct through Q_1 . Keying transients are prevented from reaching the oscillatory circuit due to the center-tapped primary of L_2 causing current cancellation in the secondary winding. When both diodes are conducting, they put an effective short across the primary of L_2 , thus causing the frequency to alter. Q_2 may be any small-signal germanium transistor with a current gain of about 30. Diodes CR_1 and CR_2 must have low forward resistance. Diode-connected germanium transistors were used in the test circuit to obtain a forward resistance of 5 ohms. Q_1 was a silicon transistor capable of passing 50 ma.

When viewing the keyed waveform on an oscilloscope, it was observed that there were no keying transients, and that both tones had the same amplitude. The waveshape of each tone was excellent and no distortion of the sine wave was noticeable. The output level was in the order of 4 volts peak to peak, depending on the supply voltage. Supply voltages of 6 and 9 volts were tried and the circuit performed well.

No attempt has been made to give values for L_1 , L_2 , C_1 , and C_2 as materials for the inductors will vary at different suppliers. However, it should be possible to duplicate this circuit or obtain other desired shifts, using the above formulas and adjustment procedures. — L. V. Gibbs, ZL2AVF, Makara Radio Station, Private Bag Karori, Wellington, New Zealand.

A Hidden Mobile Antenna



Fig. 1.—The "Hidden Antenna" installed on the author's car.

BY J. WAYNE WALLER,* W4TZB

A SURVEY OF the amateurs who operate mobile would undoubtedly show that most have lost at least one antenna by 1) theft, 2) driving into the garage or carport with the antenna up, or 3) hitting an unexpected tree limb. One excellent alternative to the standard whip, presented by K1KLM in *QST*, July 1968,¹ is to place a horizontal "Army Loop" antenna² on top of the car. Such an arrangement, however, is so unusual that it attracts attention and actually invites theft.

After concealing my transceiver by remote controlling it in the trunk,³ I decided to try going one step further and conceal the antenna. One possibility considered was to have the car roof replaced by a fiberglass roof and place a horizontal loop underneath it. The cost of having a special top fabricated, however, was prohibitive. Suddenly it occurred to me, "Why not use the car itself as the loop?"

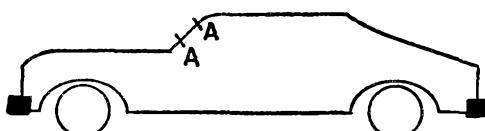


Fig. 2

Preparing the Loop

Fig. 2 shows the basic silhouette of an automobile. Note that the roof, vertical pillars, and lower body form a loop! The next question was where to break the loop for a feed point. It appeared that the least amount of body work would be required by breaking the loop at the

"A" pillars at the windshield as this is the narrowest section of metal in the loop.

Thus points AA in Fig. 2 were chosen. To avoid possible damage to the windshield, it was removed and then a one inch section of each A pillar was cut out. Copper straps were welded at points AA on the passenger side of the car to provide connections to the matching network, and then the one inch gaps were filled with epoxy. Due to the mechanical strength and the dielectric properties required, only epoxies meeting military specifications MIL-L-2105B should be used. While you can probably remove the windshield yourself, replacement should be done by an experienced body shop, as improper installation will cause water leaks.

The Matching Network

Since the car loop could not conveniently be broken at its electrical center, it is not a balanced load. As indicated in Fig. 3, the capacitors C_1 and C_3 which are normally ganged together must here be tuned separately to compensate for the unbalance of the car (remember the car itself is "ground"). Since "Army Loop" antenna-matching networks are normally designed to match a radiation resistance of approximately 0.5 ohms while the car body may have a resistance of several ohms, a resistance of 0.44 ohms was placed in parallel with points AA to improve the impedance match. This resistance is composed of fifty ordinary 2-watt, 22-ohm carbon resistors in parallel. If the transmitter output is more than 100 watts, larger wattage resistors will be necessary.

* 3610 Sevier Heights Rd., Knoxville, Tenn. 37920
1 Bridges, "The MABEL Antenna," *QST*, July 1968.
2 "The Army Loop in Ham Comm.," *QST*, March 1968.
3 Waller, "Remote Control for the NCX-5," *QST*, May 1968.

Tired of breaking mobile antennas? XYL complain about the appearance of your car? This may be your answer!

Ground Problems

Normally the car body serves as a common ground for a mobile installation. However, since the body itself is the antenna, the transceiver and secondary side of the power supply *must* be insulated from the car ground system. In my case, with the transceiver sitting on a foam rubber pad in the trunk,³ this was not a problem. However, where the transceiver is hung under the dash, some method must be devised to insulate it from its bracket.

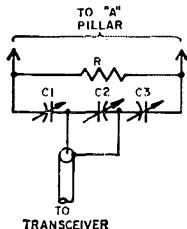


Fig. 3—Matching network for the mobile antenna.

C₁—C₃—1500pf. variable capacitors.

C₂—500pf. variable capacitor.

R—50 22 ohm, 2-watt resistors in parallel for 0.44 ohms total.

Conclusion

Fig. 1 shows the completed installation of the "Hidden Antenna." **WARNING:** *It has not yet been determined whether or not the r.f. energy absorbed by the human body while sitting in the strong r.f. field at the center of the loop is harmful. With this antenna MOBILING MAY BE HAZARDOUS TO YOUR HEALTH.* **[QST]**

Hamfest Calendar

Alabama — The Birmingham Hamfest is scheduled for May 4.

California — The Murray School Radio Club in China Lake is planning a seminar for May 3 from 8:00 A.M. to 3:30 P.M. There will be speakers, films and demonstrations.

California — The 27th Annual Fresno Hamfest will be held on May 2, 3, and 4 at the Tropicana Lodge in Fresno. For reservations and registration write Fresno ARC, P.O. Box 783, Fresno, Cal. 93712.

Illinois — The Annual Banquet of the Chicago Suburban Radio Association will be held on Saturday, April 19 at the American Legion Hall, 1116 5th Ave., Maywood, Ill. Contact WA9CCQ, 3122 Clinton Ave., Berwyn, Ill. 60402 for information.

Indiana — The Madison County (Indiana) ARC, Inc., invites all amateurs to the spring Swap Shop — QSO — Auction to be held on Sunday April 20. There is no charge for this event that begins at 1:00 P.M. at the county Civil Defense Headquarters located four miles north of Anderson, Ind. at Linwood. All hams are invited to bring along what they would like to swap or auction.

Kansas — The Jayhawk ARS, Inc., announces another big Jayhawk Hamfest, Sunday, May 4 at the George J. Meyn Community Center, K-7 Highway and Kansas Turnpike (across from Agricultural Hall of Fame), Bonner Springs, Kansas. Lots of fun for all . . . entertainment, swap tables, contests, displays, and group meetings. For more information contact Jayhawk ARS, P.O. Box 1144, Kansas City, Kansas 66117.

Louisiana — The Fifth Annual Hamfest sponsored by the Baton Rouge ARC will be held May 3 and 4 at the Bellemont Motor Hotel starting at 1:00 P.M. The Banquet will also be at the Bellemont beginning at 7:30 P.M. Saturday. Sunday's activities will be at the UCT Park on the Hammond Highway. These are the same locations as last year. For information write WA5MHS, Baton Rouge ARC, P.O. Box 53194, Baton Rouge, La. 70805.

Michigan — The SEMARA Swap/Shop will be on April 13 at Cannon Memorial.

New York — The Broome Hamfest will be held April 19. Write W2MTA for more details.

New York — The Northern Chautauqua ARC is holding its annual Banquet on April 19. Inquiries to K2PCQ.

New York — The Rockaway ARC Spring Auction will take place on Friday evening April 25 at 8:00 P.M. at the American Irish Hall, Beach Channel Drive at Beach 81st

St., Rockaway Beach, N.Y. Doors will be open at 6:00 P.M. to accept items for sale. One dollar donation will be accepted at the door. For information write to Rockaway ARC, 9 WB2DVK.

Ohio — The Dayton Hamvention will be held on April 26 at Wampler's Arena Center, Dayton, Ohio. Technical sessions, exhibits, outstanding ladies program. For details write Dayton Hamvention, Box 44, Dayton, Ohio 45405.

Washington — The Skagit ARC of Washington State will hold its 16th Annual Banquet at the Bryant Grange Hall Saturday April 19th. An all-day program is planned with Northwestern Division Director Thurston and Vice-Director Bennet and other ARRL officials on hand, special activities for the women, and a tour of the Navy's mill on-watt radio station at Jim Creek planned. Advanced registration for this tour is required. For further information contact Norman G. Ray, W7LFA, 14005 132nd Avenue, N.E., Kirkland, Wash. 98033. **[QST]**

COMING ARRL CONVENTIONS

May 9-10 — Michigan State, Grand Rapids.

May 21-25 — New England Division, Swampscoot, Mass.

June 13-15 — Pacific Division, Sacramento, Calif.

June 20-22 — NATIONAL, Des Moines, Iowa.

July 4-6 — Rocky Mountain Division, Salt Lake City, Utah.

July 5-6 — West Virginia State, Jackson's Mill.

August 16-17 — West Gulf Division, Amarillo, Texas.

August 29-30 — Great Lakes Division, Louisville, Ky.

October 11-12 — Roanoke Division, Huntington, West Va.

October 17-19 — Southwestern Division, San Diego, California.

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

Notes on Solid State Product Detectors

(Continued from page 83)

The three tuned circuits were shifted to the 20-meter band by shunting them with short lengths of Miniductor stock. Good sensitivity, audio quality, and stability resulted. Comparable performance was obtained from the detector circuit of Fig. 2A. The circuit of Fig. 1D came out as a close runner up, but needed somewhat more audio amplification to provide satisfactory headphone volume.

Some Observations

As might be expected, a fair amount of oscillator radiation takes place from the antenna system when these detectors are used as receiver front ends. The amount of radiation depends upon the carrier-suppression qualities of the particular detector used. The better the detector balance, the lower will be the level of radiation. Because of the low power level at which the b.f.o. operates, any radiation that does occur will be heard only in the immediate area where the receiver is used. Adding an r.f. stage ahead of the detector should eliminate the problem. Adding an r.f. stage suggests that some audio-derived a.g.c. could be developed and used to control the gain of the r.f. stage, an added operating convenience.

Since the circuit of Fig. 3 should work well from 160 through 6 meters if the proper values are used in the tuned circuits, it should appeal to the operator who enjoys building low-power portable equipment.² Its performance is as good as or better than that of the popular Command series of receivers. Addition of one of the small imported audio-amplifier boards will provide more than ample gain for loudspeaker operation. In fact, the output from the 2N3391A will drive an RCA CA3020A audio IC to full rated output.

The tuned circuits can be unganged to permit separate peaking of L_2 and L_3 with a two-section variable. The b.f.o. can be tuned independently with its own single-section variable. The entire 3.5- to 4-MHz. range can be covered if each section of C_1 is increased to 50 pf. Plug-in converters could be used to cover the higher bands if this were done.

Whether the circuits described in this article are used as conventional product detectors or as front ends for direct-conversion receivers, they should perform well if the guidelines set forth here are followed.

[QST]

² An improved 80-through-10-meter version of this receiver will appear in a subsequent issue of *QST*.

Amplified A.G.C. For The Mohawk Receiver

(Continued from page 89)

mounted directly across the meter terminals. R_{11} was then mounted in the vacated hole.

The original a.g.c. switch was replaced by a d.p.d.t. toggle switch with center off position

(S_1). One set of contacts controls the a.g.c. time constant, while the other set of contacts shorts the S meter when the a.g.c. is turned off. C_3 and C_4 were mounted between terminals of this switch.

All of the components originally connected to Pins 1 and 2 of the 6BJ7 were removed. The 1-megohm grid resistor was also removed from Pin 1 of the second 50-kHz. i.f. amplifier tube socket. The 0.01- μ -capacitor on the 1682-kHz. amplifier a.g.c. line was replaced by a 0.005- μ f. unit.

The remaining components of the new circuit (all small) were mounted on two terminal strips, as shown in Fig. 3. One of these strips is mounted on a power-transformer mounting screw (near the filter capacitor) while the other is mounted on a mounting screw of the 6BJ7 socket (near the band switch). Most of the components can be soldered to the terminal strips before mounting the strips in the chassis.

Before making the connections to original terminal strip DD, as shown in Fig. 3, find the green wire that runs from Terminal 5 of this strip to Terminal 4 of the 6-pin plug socket AA. Also find the green wire that runs from DD5, through the wiring harness, to the converter socket AE5. Disconnect these wires from DD5, and connect them instead as shown in Fig. 3. (This separates the r.f. amplifier and converter from the a.g.c. line to the 1682-kHz. amplifier.)

The author did not find it necessary, but if one wants to include the first 50-kHz. i.f. amplifier in the a.g.c. control system, it can be done by disconnecting the grid resistor of this stage from ground and connecting the disconnected end of the resistor to the collector terminal of the transistor.

The Mohawk works very well after the modification. Strong s.s.b. signals are very clear and do not overload the detector with the r.f. and i.f. manual gain controls at maximum. There is very little change in output volume regardless of the strength of the incoming signal. The manual i.f. gain control can be turned through its full range with only a slight variation in output volume. The signal-to-noise ratio on weak DX signals is good, but strong local signals do not overload the front end. The author thinks that this modification is well worth the effort, for it is a pleasure to be able to sit back and listen to the weak DX signals without having a local blast your eardrums out.

[QST]

**SWITCH
TO SAFETY!**



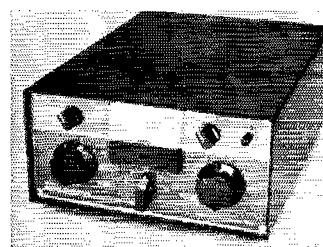


Recent Equipment

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



Drake MN-2000 Matching Network



EXCEPT for a larger power-handling capability and consequently larger-sized components, the MN-2000 matching network uses basically the same circuit and has the same features as the MN-4 matching network described in October 1967 *QST*. On each of the amateur bands between 3.5 and 30 MHz., either unit will match the 50-ohm output impedance of a transmitter to the input impedance of a coaxial feed line having a v.s.w.r. as high as 5 to 1, even if the input impedance is reactive; if the input impedance is resistive, v.s.w.r.s considerably in excess of this ratio can be managed. To put it another way, either unit can match to 50 ohms a reactive load having a resistive component in the 10- to 250-ohm range.

Both the MN-4 and the MN-2000 have a built-in power and v.s.w.r. meter, and the reflectometer circuit included with each transmatch is similar. Like its little brother, the MN-2000 uses a pi matching network, with a series capacitor for tuning out the reactance in the load. Each matching network is adjusted in the same fashion, power and v.s.w.r. readings are taken in the same manner in both units, and the instruc-

tion manuals contain similar data. Because of these many likenesses, mainly the differences will be discussed here.

The MN-2000 is rated to carry 1000 watts continuously and 2000 watts p.e.p. The meter in the MN-2000 has three scales: the first is calibrated from zero to 200 watts, the second is calibrated from zero to 2000 watts, and the third is marked off in voltage standing-wave ratios from 1 to 1 to 10 to 1. A front-panel switch is used to select the desired range.

Referring to Fig. 1, an abbreviated version of the matching network circuit, input capacitor C_1 consists of nine capacitors (some ceramic and some mica), and pi inductor L_1 consists of two tapped coils connected in series. As the band switch is moved from the 10-meter position to the 80-meter position, the capacitors are progressively connected in parallel, and less and less of L_1 is shorted out. The value of C_1 varies from 340 pf. on 10 meters to 2160 pf. on 80 meters. C_2 and C_3 are identical 245-pf. variables. C_2 is designated RESISTANCE TUNING, and C_3 is designated REACTANCE TUNING.

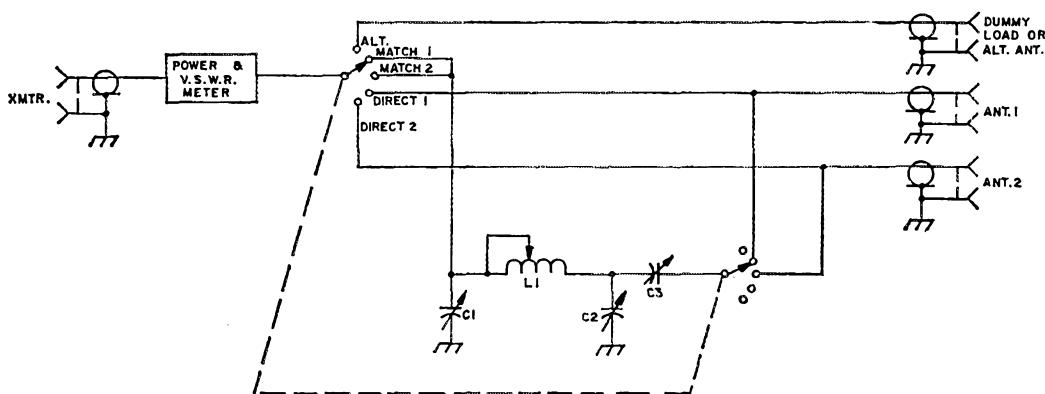
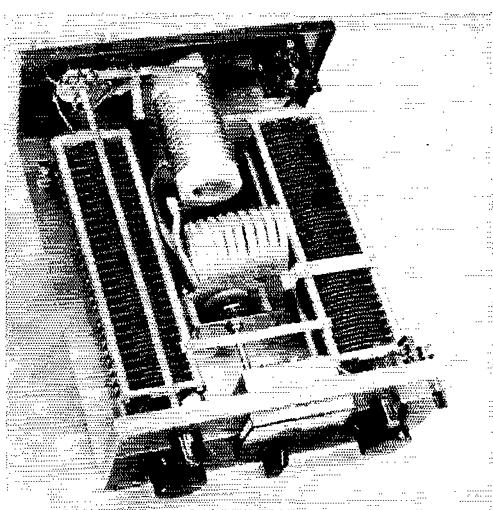


Fig. 1—Partial schematic of the MN-2000. Component designators are for text reference.

As can be seen from the schematic, the power and v.s.w.r. meter works in all positions of the antenna selector switch. In the ALTERNATE position, the transmitter output is fed directly to a coax fitting to which a nonreactive 50-ohm dummy load can be connected. This permits the transmitter to be properly tuned up into a 50-ohm load and thereafter left alone during the adjustment of the matching network. However, if desired, an alternate antenna can be connected to this fitting instead. In the MATCH 1 and MATCH 2 positions, the transmitter signal is fed through the matching network to either of two coax fittings. This allows the operator to use either of two antennas without the necessity of having to disconnect one cable and connect another. In the DIRECT 1 and the DIRECT 2 positions, the transmitter output is fed directly to the selected antenna, bypassing the matching network and permitting the v.s.w.r. of the antenna to be read directly.



Interior view of the MN-2000 Matching Network. The REACTIVE TUNING capacitor is on the left, and the RESISTIVE TUNING capacitor is on the right. Between the variables are the band switch and the two coils that make up the pi inductance. Portions of the air-wound coil are used on 10, 15 and 20 meters, all of the air-wound coil and a part of the ceramic-wound coil are used on 40 meters, and the total inductance of both coils is used on 80 meters. Partially hidden by the air-wound inductor are fixed input capacitors at the rear of the band switch. In the upper left corner of the photo is the antenna selector switch, and in the upper right corner is the circuit board that supports the components of the directional coupler. A rectangular aluminum cover shields the meter from the rest of the circuit. Not shown here is a U-shaped aluminum piece used to completely shield the exposed circuitry of the transmatch. The outer cover shown in the title photo is used mainly to contribute to the unit's attractiveness; because of the inner shield, there is no need to worry whether or not the painted cover is making adequate contact with the chassis to provide sufficient shielding.

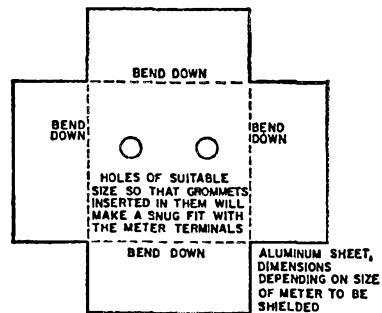


Fig. 2—Details of the easy-to-make meter shield used in the MN-2000.

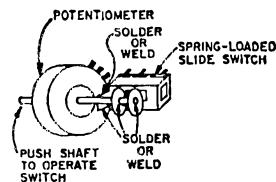


Fig. 3—Drawing showing how the reflectometer switch and control were combined to save front-panel space.

A couple of mechanical features in the MN-2000 may be of interest to those who build their own gear. The meter shield was formed by cutting a sheet of aluminum to the shape shown in Fig. 2, drilling two clearance holes for the meter terminals, inserting grommets in the holes to prevent shorts, and making a right-angle downward bend at each set of dotted lines. Two nuts on each terminal hold the shield tightly against the chassis and secure connecting wires to the terminals.

Apparently to save panel space, the forward-reverse switch of the reflectometer was combined with the meter calibration and sensitivity control. Fig. 3 shows this mechanical innovation.—WV1YDS

Drake MN-2000 Matching Network

Height: 6 inches.

Width: 10 $\frac{3}{4}$ inches.

Depth: 1 $\frac{3}{4}$ inches.

Weight: 11 pounds.

Price Class: \$160.

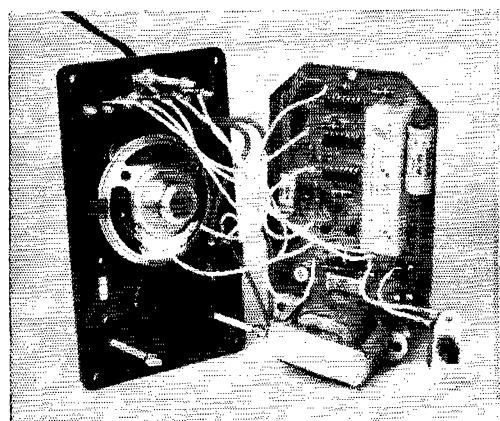
Manufacturer: R. L. Drake Company,
Miamisburg, Ohio 45342.

M & M Electronics EK-1 Electronic Keyer



SPACE-AGE integrated circuits allow many functional stages to be included in a small physical area. This technology is certainly used in M & M's model EK-1 "DAH-DITTER" electronic keyer. The keyer unit, including a.c. power supply, sidetone generator, and speaker, is built into a bakelite enclosure measuring $3\frac{3}{4} \times 6\frac{1}{4} \times 2\frac{1}{4}$ inches. The keyer contains three integrated circuit packages, along with several discrete components. Using modern digital computer techniques, the EK-1 generates fully self-completing and properly spaced dashes and dots at a perfect 3 to 1 duration ratio. A "clock-pulse" generator is adjustable for code speeds between approximately 5 and 40 w.p.m.

There are only two controls on the unit. One control is used for turning the unit on or off and for adjusting the code speed. The second control is a mode switch, which may be used to activate and hold the keying relay closed for transmitter tune-up. No weight control is provided because the weighting is established by circuit logic. The keyer may be used with any s.p.d.t.-action center-off key.



The DAH-DITTER completely opened for a peek at the components. The D-88 keying relay and the power transformer are the most prominent components on the printed circuit board. The MC723P, MC724P, and MC790P integrated-circuit packages occupy the upper center of the board. The functions of the counter, NOR gates, and inverters are performed in the ICs. Four transistors are used in the clock, amplifier, and sidetone generator stages. The power supply uses a solid-state full-wave bridge rectifier.

A block diagram of the EK-1 keyer is shown in Fig. 1. The keyer output depends entirely upon the states of three J-K flip-flop stages connected as an electronic counter. Except for some inter-coupling connections, the counter operates in a manner nearly like that of a 3-bit shift register with parallel input loading and a clocked serial output. Closing either the dash or the dot keyer contact to center inserts a binary coded message into the flip-flop memory of the keyer. The message is then "clocked out" serially, bit by bit, and is decoded as a dash or a dot, depending on the input.

In the following discussion, a binary "1" in any of the three counter flip-flops is represented by a "high" voltage at the Q output, and a "0" is represented by a "low" \bar{Q} output. Although inverted from the usual terminology associated with IC flip-flops, this representation is used here to avoid conflict with the theory of operation section of the instruction manual.

Two NOR gates decode the binary logic. Through NOR gate "A," a binary "1" in either FF-1 or FF-2 is decoded as an output key-closed function. A binary "0" in both of these stages represents a key-open function. Through NOR gate "B," a "1" in either FF-1 or FF-3 turns the clock on, and also disables the center key input terminal. A "0" in both FF-1 and FF-3 turns the clock off and "enables" the center key terminal. With the keyer turned on but not being keyed, the resting state of the counter flip-flops is 000.

Now if the dot and center contacts of the key input are shorted together, the clock is immediately turned on, but one dot-length in time is required before the first output pulse appears. The voltages at the inputs of the flip-flops set the counter state at 011, from left to right in Fig. 1. The "1" in FF-2, through NOR gate "A," causes the output relay and sidetone generator to be keyed. The "1" in FF-3, through NOR gate "B," keeps the clock gated on even though the keying contacts may subsequently be opened.

When the first clock pulse is generated, one dot-length after activation, the counter state advances to 001. With binary zeros in both FF-1 and FF-2, the keying relay opens and the sidetone generator is turned off, ending the dot. However, the "1" in FF-3 keeps the clock turned on and the key input disabled, so the key input

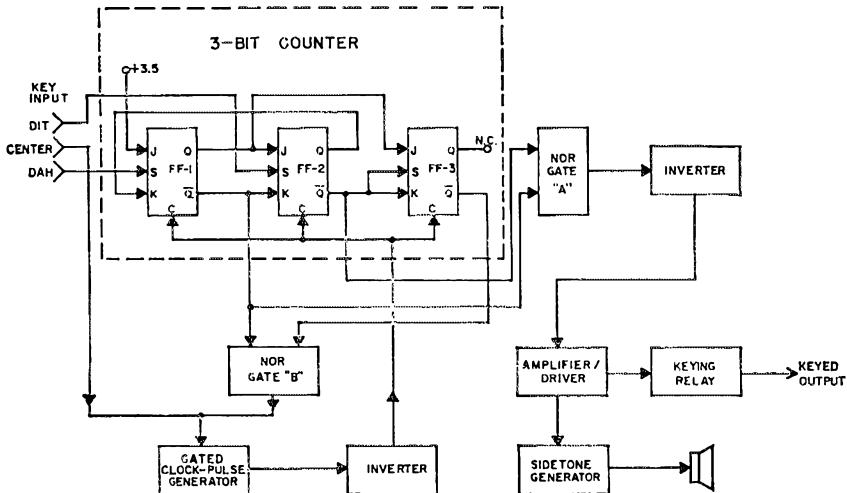


Fig. 1 Block Diagram of the Model EK-1. The heart of the unit is the 3-bit digital counter.

has no effect on operation. Later when a second clock pulse is generated, two dot-lengths after the key input was activated, the counter state advances to 000, and the clock is turned off. Thus, the spacing between character elements is self-completing. The counter has now returned to its resting state, with the key input enabled. If the dot and center contacts remain shorted, the cycle will repeat itself. Other than about a 1-microsecond delay in starting the clock at the beginning of each cycle, the dots and spaces have a perfect 1 to 1 ratio. (This delay is negligible, even at the highest code speeds.)

If the dash and center key input contacts are closed, the clock is started and the counter state is set at 100. Through the NOR gates, the output relay and sidetone generator are keyed, and the clock remains gated on. One dot-length later, when the first clock pulse arrives, the state of the counter is set at 111. (Here is where the M & M circuit differs from a straight-forward shift register. The unique method of interconnection permits the equivalent of a 4-bit memory — a three-unit dash plus a one-unit space — to be obtained with only three flip-flop stages.) In this 111 condition, the clock remains on and the output remains keyed. Two dot-lengths after activation, the clock advances the counter state to 011. Again the clock stays on and the output is keyed. Three dot-lengths after the dash initiation, the counter is advanced to a 001 state. The keying relay and sidetone generator are deactivated, ending the dash. The clock remains on for one more dot-length, and then the counter is advanced to the 000 state, again enabling the key input. Therefore the dash-to-space or the dash-to-dot ratio is precisely 3 to 1.

The digital logic of the counter does not permit the use of a "squeeze"-type keyer. Simultaneously shorting the dot and dash contacts to center disrupts the normal sequence of binary

bits occurring in the counter, resulting only in shortened dashes at the output.

The speed control adjusts the speed of the train of clock pulses. The front-panel marks around the control are not calibrated in code speed, but merely provide a reference to allow repositioning of the control each time the keyer is turned on. It was found that the first half revolution of the control did not greatly increase the code speed above 5 w.p.m. The next quarter revolution brought the speed to the 15- to 18-w.p.m. range, and the last fraction of a turn boosted the speed to a rapid 40 w.p.m. This limits the ability to visually reset the control to the desired speed at the higher code rates, but the control does not have a "touchy" feeling if adjustment is made while sending. The very wide range of speeds available with a single control should appeal to every c.w. operator from the beginning novice to the "high-speed key merchant."

A reed-type relay is used in the "DAIIL DITTER" for output keying. The contact

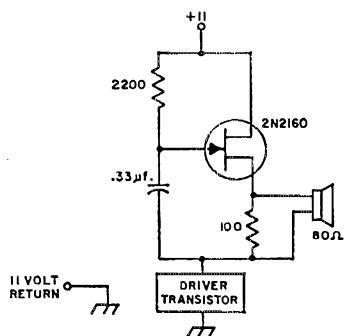


Fig. 2. The EK-1 Sidetone Generator. Resistances are ohms.

are rated at $\frac{1}{4}$ ampere for a resistive d.c. load, $\frac{1}{2}$ ampere peak. While this average current is not exceeded in most modern transmitters or transceivers using grid-block keying, key-click filters or r.f. bypass networks can cause much larger peak currents upon initial relay closure. When in doubt about the effective resistance in the keyed circuit of a grid-blocked transmitter, M & M recommends that an external resistor be placed in series with the relay contacts, its value being two ohms for each volt of grid-block bias. Similar precautions are applicable to cathode-keyed transmitters. Too much contact current may cause relay sticking and will shorten the life of the relay.

The self-contained sidetone generator and speaker is a convenient feature if the unit is used for code practice sessions. However, if the operator prefers headphones for copying received signals, it is necessary to remove the headphones to hear the sidetone during transmission, unless other means are available for monitoring one's "fist." No way is provided to disable the sidetone generator during operation.

Fig. 2 shows the schematic of the sidetone generator circuit. The oscillator is keyed by the driver transistor stage shown in block form. The driver stage acts as a switch to open and close the oscillator chassis return. No volume or pitch controls are provided. The pitch of the tone is perhaps higher than most c.w. operators prefer. In two units checked, the sidetone frequencies were measured as 1884 Hz. and 2143 Hz. In the second unit with the higher pitch, the manufacturer used a 0.22- μ f. capacitor in place of the 0.33- μ f. value shown in the schematic. Adding a 0.1- μ f. capacitor in parallel with the 0.22- μ f. value lowered the tone to 1514 Hz. A 0.22- μ f. capacitor across the existing capacitor lowered the tone to 1047 Hz. Still larger values lowered the frequency even more, but sluggish sidetone generation resulted. Any of the frequencies obtained had a pleasing quality, and the higher pitches were not objectionable to this writer.

Only one difficulty was experienced with the "DAH-DITTER" during on-the-air tests. The keying wire externally connected to the dash screw terminal became intermittently shorted to the head of the adjacent screw extending through the front panel for securing the printed circuit board. This mounting screw is grounded at the board. The symptom of the problem was intermittent and seemingly delayed dash generation. Of course the cure was simply to dress the lead properly.

The EK-1 keyer is a compact and well-constructed unit. An instruction manual with detailed information on connection to the transmitter and on operation is included. The instructions also show how an ordinary "bug" keyer may be used with the EK-1. As a trouble-shooting aid, the schematic includes voltage measurements taken throughout the circuit, although removal of the integrated circuits from the printed circuit board without special tools is not recommended. As a rule, integrated cir-

cuits operate for thousands of hours without failure, so a defective IC is unlikely, but factory service is available at a reasonable fee if required.
-- K1PLP

M & M Electronics EK-1 Dah-Ditter Electronic Keyer

Height: 6 $\frac{1}{4}$ inches.

Width: 3 $\frac{3}{4}$ inches.

Depth: 2 $\frac{1}{4}$ inches.

Weight: 26 $\frac{1}{2}$ ounces.

Power Requirements: 110 volts, 50- to 400-Hz. a.c., 5 watts.

Price Class: \$35.

Manufacturer: M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30328.

The Gamma Match

(Continued from page 15)

actance could be inserted by adjustment of a size 5 Selsyn generator at the transmitter when the beam was in final position about seven feet above the top of the pole.

When s.w.r. measurements were made at the transmitter it was found that a perfect match could be obtained over the c.w. portion of 14 MHz. by adjustment of the capacitor at each frequency, but with the 39-inch rod length and the other beam dimensions used, minimum s.w.r. at 14.25 MHz. occurred with the maximum capacitance of 150 pf. Fig. 6 shows the s.w.r. vs. frequency when maximum capacitance is used.

Conclusions

As a result of the trouble experienced with the initial installation of a wide-spaced 14-MHz. Yagi-Uda that employed different element spacing and lengths than previously used at W3HEC, an analysis of the matching problem has been made that seems to be valid on the basis of the experimental results obtained. It was found that matching required a shortened driven element when the Z_0 of the transmission line formed by the gamma rod and driven element is on the order of 250 to 300 ohms. Further computation was made for $Z_0 = 550$ to 600 ohms and it was found, using the analysis described, that a resonant driven element could be matched using the higher Z_0 . However, bandwidth may not necessarily be improved using the resonant driven element and higher- Z_0 matching section. As seen from Fig. 6, the bandwidth when tuned for a match at 14.225 MHz. is adequate without readjusting the gamma section for operation in the c.w. portion of the band. (The s.w.r. was obtained using a G-R 916A bridge, and impedance measurements obtained with the bridge were plotted on a Smith chart to obtain s.w.r.) Performance of the beam is good, a front-to-back ratio of 20 db. is obtained, and the pattern width appears to be as expected.



Requiem For Radio Row*

BY GERALD SAMKOFSKY,* W2YSF

THE other day some business took me downtown to Cortlandt Street, (actually I had to take the Hudson Tube train to New Jersey). As always in the past, I glanced down the street as if trying to bring back memories of old Radio Row. Alas, gone forever is that fabled Mecca born from Marconi's vision . . . all I saw was a vast excavation . . . for progress had toppled our idol and was replacing it with another gigantic idol in praise of "World Trade" . . . The World Trade Center of New York.

Gone forever were the treasure troves of surplus. Gone were the happy days of the regenera-

* 201 Eastern Parkway, Brooklyn, N. Y. 11238.

tive receiver, the era of the spark gap, the brass based 201s, 211s, and the first a.c. tubes . . . McCullough tubes with the filaments going through the top of the tube, the 99s which made my first portable outfit possible. Oh, for a glimpse into the windows of such fabled stores as "Blan the Radio Man," Try-Mo Radio, the king of low priced short-wave kits. Gone is Lettone Radio whose genial owner could find anything you wanted in his poorly lit aisles, and who can forget Mr. Leopold of Leeds Radio who never priced his goodies so high but that I could come home each weekend laden with wireless delights.

Yes, gone forever are the mysteries that were "Wireless Radio," the 2½-mh. r.f. chokes wound on a mutated Singer treadle sewing machine, the transformers which automatically turned us into muscle-bound athletes . . . simply by carrying them home, the disbelief on the faces of spectators watching Television as displayed via an early Baird TV set using a large scanning disc. Lucky was the ham who owned a Hammarlund Comet-Pro or a Super-Wasp, and regularly each Saturday bought such used magazines as *Short Wave Craft*, *Radio-Craft*, *Radio News*, *Radio* and, of course, the ever-popular red-cheeked *QSTs* . . . all at only 5¢ each or 6 for 25¢!

I remember my first job as "radio-wireman" earning 50c per tube wired (4-tube set, \$2.00) and the men who made so many things possible . . . Hugo Gernsback with his many publications, Ben Monsheimer one of the first businessmen to offer radio items at surplus prices, Gould



Cortlandt Street in the early days of Radio.

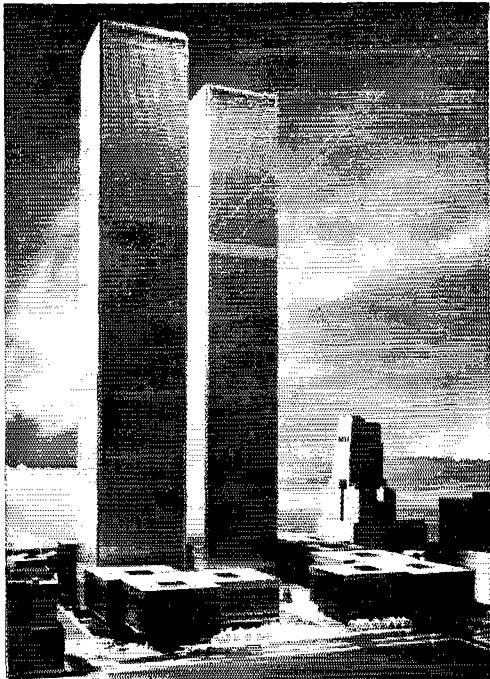


Radio Row during its last days. The above view is looking east from West St. toward Cortlandt and Washington Streets.

An artist's conception of the new World Trade Center which will stand in the Radio Row area. (The Port of New York Authority photograph)

Green who built hand-made grid leaks almost 50 years ago (still operating Cortlandt Radio), the venerable Ben Wolfe who was one of New York City's first radio tube dealers (still going strong today at 82), the Krantz brothers, toothy Murray Baum of G & G Radio. Yes, and gone forever are the many unknowns who pioneered Wireless into Radio into Electronics toiling in dimly-lit rooms, backrooms and even basements.

Gone forever my home away from home and



to you who are new to hamdom . . . how can you ever know what you have lost now that Radio Row is no more.

And many years from now, as men fly to the stars, will you tell the young men of that day about the wonders of the 60s, 70s and 80s? Will you treasure the sights of today as we did so many years ago?

DST

NEW BOOKS

Reference Data for Radio Engineers, fifth edition, published by Howard W. Sams & Co., Inc., New York; 1137 text pages plus 41-page index, 7 X 10 inches, hard covers. Price \$20.

The "Federal Handbook" has been out of print for a long time, and its return to availability should be welcome news to those who have had to borrow from owners of the fourth edition. The new edition has been redone completely, with a larger format and improved typography; together, these account for the fact that a substantial increase in content has been achieved in only a few more pages than were in the fourth edition.

Of the forty-five chapters, seven are completely new, representing subjects that were not of widespread interest, or not sufficiently developed, when the fourth edition was published. The new ones are No. 2, International Telecommunication Recommendations, principally covering standards for wire transmission and compatible radio-relay systems; No. 20, Microminiature Electronics, containing a comprehensive list of definitions as well as a description of design and manufacture of integrated circuits; No. 31, Switching Networks and Traffic Concepts, of interest to the telephone engineer; No. 33, Navigation Aids; No. 34, Space Communication; No. 37, Quantum Electronics, covering masers, lasers, and associated devices; and No. 40, Reliability and Life Testing. Together, these account for 136 pages, or over ten percent of the text.

The remaining chapters bear essentially the same titles as in the preceding edition, and in most of them the material

has been expanded to include new data. One subject, magnetic amplifiers (No. 14), seems to have reduced coverage, and a few others such as image-parameter filter design (7), simple band-pass filter design (9), attenuators (10), and bridges and impedance measurements (11) have changed comparatively little. The mathematical sections are likewise much the same in this edition — after all, the formulas and tables don't change much with the years!

It would be impracticable in a short review to cite all the additions to data that can be found in this new edition. To illustrate the updating, however, the frequency chapter (2) now includes a discussion of time, types of frequency standards, and complete information on the NBS time and frequency services; the components chapter (5) has material on the newer resistor and capacitor constructions, along with data on methods of testing; there is extensive data, much on current products, in the chapter on properties of materials (4); the section on rectifiers and filters (13) now includes treatment of thyristors; a large section on non-linear systems has been added to the chapter on feedback (15); and stereo is included in the sections on broadcasting (28) and electroacoustics (35), with the latter chapter also containing much added material on speech. As a last mention, that happy hunting ground of all handbooks, Miscellaneous Data (41), now has a lot of information on power wiring, from the National Electrical Code.

Valuable as ever, the new edition will predictably be a "must" for anyone engaged in technical work in electronics. We have only one fault to find: The new format, while pleasing in appearance and very readable, often puts charts and diagrams several pages away from the text that refers to them. Which probably is just an indication of the difficulty of the make-up problem in a book of this nature. — W1DF

Results, 35th ARRL November Sweepstakes



November 9-10 and 16-17, 1968

REPORTED BY BOB HILL,* WIARR



NOVEMBER 1968 was an eventful month: national elections, Veterans Day, incentive licensing, Thanksgiving — and, of course, our very own brand of fragrant air-pollution known as the Sweepstakes. No less than 1987 wild-eyed (or at least bleary-eyed) combatants submitted their SS diaries, of which 1121 documented Morse memoirs and 866 spoke volumes on voice. All 75 sections were represented in the log collection, and 164 section awards (75 c.w., 73 phone, 16 Novice) will be entrusted to the tender mercies of the Post Office along about mid-April.

The relatively minor rules changes instituted this year seemed to be popular with, or at least acceptable to, the majority of entrants. Despite a reduction in the low-power phone multiplier (from 1.5 to 1.25), the high A3 scores still were larger than comparable code tallies even though more phone than c.w. ops chose to sock it to 'em with amplifiers. Specifically, 307 (35.5%) turned on the big phone juice, but only 219 (19.5%) felt the necessity for QRO on c.w. The use of A and B precedences, based on power input, added an interesting fillip to the proceedings — as well as spicing more than a few exchanges with choice comments of disbelief! Minimum criteria for section awards (either a score of at least 10,000 points or three single-operator entries) proved to be small hindrance, as only VE2 and VE7 on phone failed to qualify one way or the other. Dupe sheets, mandatory if you had 200 or more QSOs, helped no end in the gruesome task of processing logs — and so did the fact that most of the gang elected to use our new 8½-by-11

forms. All in all, a vast improvement in reporting.

Every SS is the same, but every SS is different. We checked the atlas and observed that Canada apparently is still located right where it always was, but you couldn't prove it by hundreds of disconsolate SSers with large numbers of un-checked-off VE stations. West Indies signals, on the other hand, seemed to be everywhere. Vermonters were abundant on phone, elusive on c.w. KZ5s were unearthed by only a handful of lucky 'Stakers. Good news: WA9IAT/5 will be stationed in the Canal Zone next year. Bad news: VE8BB expects to pull out of Yellowknife in favor of VE6 before the next fracas. Proposed rules changes ranged from ludicrous to ingenious. And this year, as always, we were accused of heartlessly scheduling the SS right in the middle of football games and final exams.

Those Messages

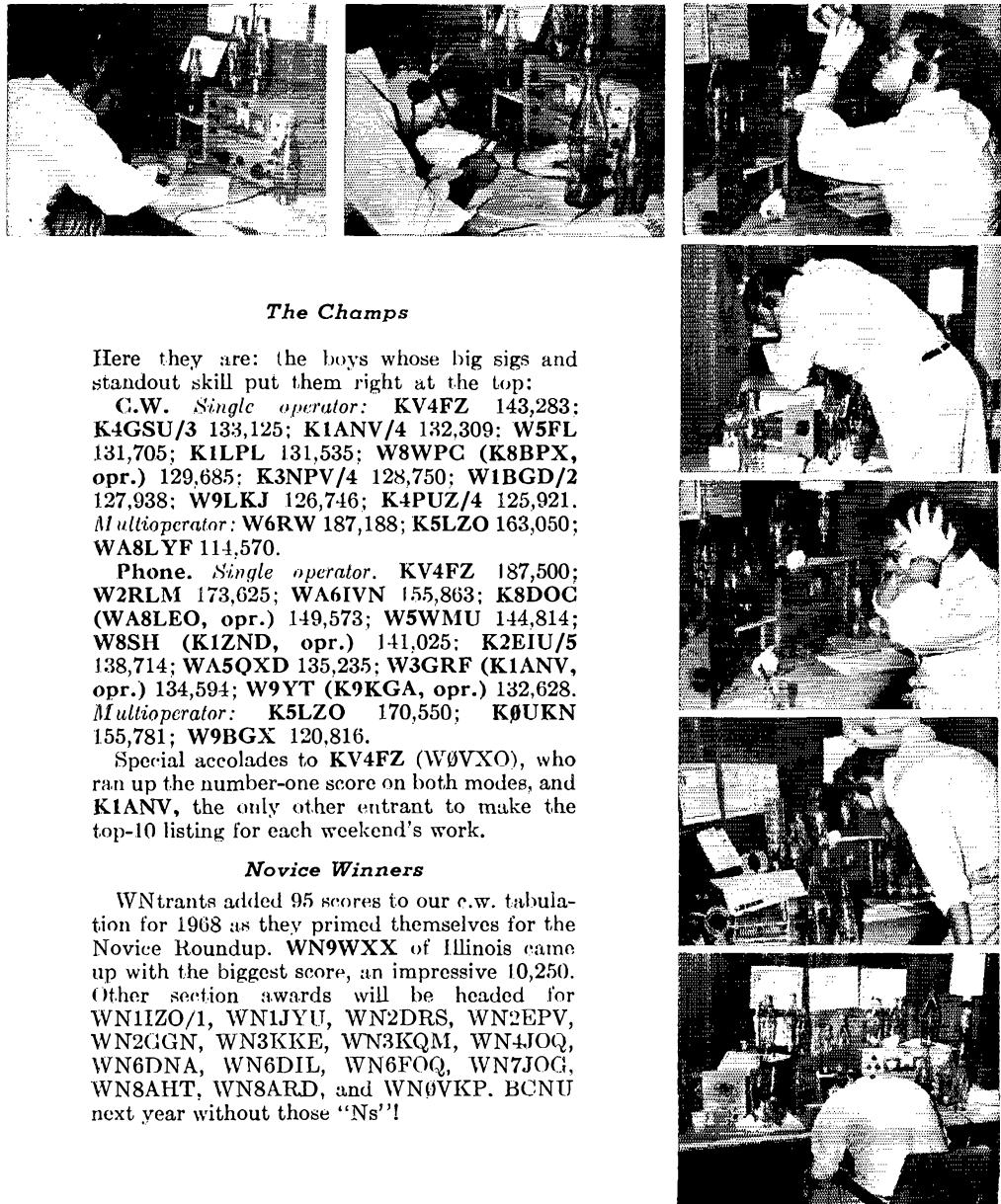
It is once again our mournful duty to report that, in all too many cases, the spirit was willing but the QTC flesh was woefully weak. Message after message had bits of (usually unnecessary) punctuation sprinkled around like paprika in a salad — but blithely omitted from the word count. An even more frequent lapse was the failure to put down necessary handling data: when and to whom the message was sent. If you're still unsure of proper message form, we recommend a good stiff shot of Operating Aid 9A or our booklet "Operating an Amateur Radio Station," both available from the Communications Department. W1ZJE will gladly send you either or both, so why continue to flub that bonus kilo-point?

* Assistant Communications Manager, ARRL

"It was as much fun as also" — A Confused K6

"The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood . . . who knows the great enthusiasm, the great devotion and spends himself in a worthy cause . . . who in the end at best knows the triumph of high achievement and at worst fails while doing greatly so that his face shall never be with those cold and timid souls who know neither victory nor defeat."

—Theodore Roosevelt (via WAØSDC)



The Champs

Here they are: the boys whose big sigs and standout skill put them right at the top:

C.W. Single operator: KV4FZ 143,283; K4GSU/3 133,125; K1ANV/4 132,309; W5FL 131,705; K1LPL 131,535; W8WPC (K8BPX, opr.) 129,685; K3NPV/4 128,750; W1BGD/2 127,938; W9LKJ 126,746; K4PUZ/4 125,921.
Multioperator: W6RW 187,188; K5LZO 163,050; WA8LYF 114,570.

Phone. *Single operator.* KV4FZ 187,500; W2RLM 173,625; WA6IVN 155,868; K8DOC (WA8LEO, opr.) 149,573; W5WMU 144,814; W8SH (K1ZND, opr.) 141,025; K2EIU/5 138,714; WA5QXD 135,235; W3GRF (K1ANV, opr.) 134,594; W9YT (K9KGA, opr.) 132,628.
Multioperator: K5LZO 170,550; KØUKN 155,781; W9BGX 120,816.

Special accolades to KV4FZ (WØVXO), who ran up the number-one score on both modes, and K1ANV, the only other entrant to make the top-10 listing for each weekend's work.

Novice Winners

WNtrants added 95 scores to our c.w. tabulation for 1968 as they primed themselves for the Novice Roundup. WN9WXX of Illinois came up with the biggest score, an impressive 10,250. Other section awards will be headed for WN1IZO/1, WN1JYU, WN2DRS, WN2EPV, WN2GGN, WN3KKE, WN3KQM, WN4JOQ, WN6DNA, WN6DIL, WN6FOQ, WN7JOG, WN8AHT, WN8ARD, and WN9VKP. BCNU next year without those "Ns"!

Affiliated Club Competition

Each year we present an engraved coco-bolo gavel to the ARRL-affiliated club whose members tally the largest aggregate scores. Each year we're hard-put to find a new way to say that the **Potomac Valley Radio Club** heads the list once more; they've been boss club since 1964! For the second time running, K1ANV was big man for PVRC on c.w. and phone. The **Frankford Radio Club** of Philadelphia battled gamely but had to settle for runner-up position again, with W3YUW supplanting perennial high-scorer W3GM (ex-W3BES) as champ on mike and key. Still in their first year of existence, Connecticut's **Murphy's Marauders** captured third spot with the only other score over 2 meg, and nip-and-tuck races between W1YK (K1TKS, opr.) and WA1DJG on c.w., and K1JHX and K1THQ on phone. The **Indian Hills Radio Club**, boasting many of the Cleveland area's finest competitors, bettered their 1967 score by 500K. Fifth rung was grabbed by the **Central Michigan Amateur Radio Club**, paced both A1 and A3 by transplanted Marauder K1ZND. Not far behind, the **Minnesota Wireless Association** fulfilled their potential shown last year, doubling that score and being the only other club to exceed a million markers.

On a breakdown by mode, here's how tho 1,000,000-plus groups stood:

C.W.	Rank	Phone
Potomac Valley RC	1	Potomac Valley RC
Frankford RC	2	Frankford RC
Murphy's Marauders	3	Indian Hills RC
Minn. Wireless Assn.	4	Murphy's Marauders
Indian Hills RC	5	Central Mich. ARC
Central Mich. ARC	6	Minn. Wireless Assn.

Only thirty-six clubs submitted letters this year, as against 46 for the previous SS. With over 1200 affiliated clubs on the ARRL roster isn't it time *your* gang made a showing? If you aren't affiliated as yet (a simple, painless and free procedure), W1ZJE has all the information you need—drop her a card requesting our "club kit."

A-Bombs (and B-Plus)

The following comments need little more amplification than the signals they describe:

"It is absolutely amazing that 85 percent of the stations with precedence A were 15-20 db. louder than the Ba.—K9KDI." It seemed to me that 90 percent of all stations I worked claimed the A multiplier. Since Collins, Heath and Drake are very popular, I am assuming these people either (1) used an alternate rig, (2) found an efficient easy way to reduce their input, or (3) hedged on the truth."

AFFILIATED CLUB SCORES

Club	Score	Entries	C.W. Winner	Phone Winner
Potomac Valley Radio Club	4,231,662	81	K1ANV/4	W3GRF (K1ANV, opr.)
Frankford Radio Club (Pa.)	3,134,839	71	W3YUW	W3YUW
Murphy's Marauders (Conn.)	2,195,520	54	W1YK (K1TKS, opr.)	K1JHX
Indian Hills Radio Club (Ohio)	1,800,402	46	W8QXQ	WA8PZA
Central Michigan Amateur Radio Club	1,131,369	32	K8UDJ (K1ZND, opr.)	W8SH (K1ZND, opr.)
Minnesota Wireless Association	1,066,214	21	W8YCR	W8UBT (WA8QLK, opr.)
South Jersey Radio Association	723,387	26	WB2UVB	W2EPA
West Valley Amateur Radio Club	666,990	15	WB6OLD	WB6OLD/6
Connecticut Wireless Association	597,557	11	W1BGD/2	W1BGD/2
Nittany Amateur Radio Club (Pa.)	557,258	33	K3HKK (K3AHT, opr.)	K3HKK (K3AHT, opr.)
Oak Park Amateur Radio Club (Mich.)	549,609	20	K8HLR/8	K8HLR/8
Miami Valley Amateur Radio Contest Society (Ohio)	546,579	17	W8WPC (K8BPX, opr.)	WA8MCR
West Park Radiops (Ohio)	527,375	26	K8CFH	K8CFH
Radio Amateurs of Greater Syracuse (N.Y.)	526,278	20	K2KIR	W2DIZ
Candlewood Amateur Radio Association (Conn.)	426,077	10	W1CSM	K1MOT
Suburban Amateur Radio Club (Pa.)	421,067	11	WA3DCM/3	WA3EYJ
128 Contest Club (Mass.)	404,657	8	W1BPW
Niagara Frontier DX Association (N.Y.)	350,884	8	WA2BEX	WB2YQH
Lafayette Amateur Radio Club (La.)	317,907	6	W5WMU
Columbus Amateur Radio Association (Ohio)	312,913	7	W8QDH
Suffolk County Radio Club (N.Y.)	234,823	13	K2ZYR	WB2UZU
South Hills Braspounds & Modulators (Pa.)	227,690	6	WA3KOS	WA3KOS
Westside Amateur Radio Club (La.)	213,867	7	W5ERR
Louisville's Active Radio Operators (Ky.)	165,833	6	K4FU
Radio Club of Tacoma (Wash.)	126,129	7	K7VPF	WA7HPK
Ruskin High School Amateur Radio Club (Mo.)	108,476	5
Gallatin Amateur Radio Club (Mont.)	102,885	6	WA8ATY/7
Binghamton Amateur Radio Association (N.Y.)	78,644	7	WB2NJN	WB2OMY
Chicago Radio Traffic Association	60,185	5	W9REC
R. F. Hill Amateur Radio Club (Pa.)	53,854	9	WA3HMU	W3PNL
Associated Radio Amateurs of Southern New England (R.I.)	34,990	6	WAIIUR
Boeing Employees Amateur Radio Society (Wash.)	31,960	4
ARINC Amateur Radio Club (Md.)	24,515	5	W3AWN
Chaminade High School Radio Club (N.Y.)	19,230	3
University of North Carolina Amateur Radio Club	10,248	3
Lake Success Radio Club (N.Y.)	7,221	6	W2NBI

WA8ULF. "Our antenna technology would spurt forward if some of the 'A-power' boys would only divulge their antenna secrets in a *QST* article. My creditability gap is widening!" — **WØNHW.** "I didn't like claiming high power when I heard the boys with their so-called A 'low-power' stations blasting my receiver. I've been on long enough to tell a kW from 120-150 watts." — **W1DPE.** "Let's drop the multiplier — more 40-over-9 signals from 150-watters than from the KWs. Who's kidding whom?" — **K2RA.R.** "I would like to believe everybody ran the power they claimed, but I have operated too many contests with good antennas at both power levels to believe that certain contestants were able to hold a frequency and maintain a top rate with 150 watts." — **WAØSDC.** "May I say there were a number of 'low-power' stations with extraordinarily loud signals and a lovely humming sound (final-amp cooling fan) in the background. This is nothing short of disgusting and reflects poorly on their 'amateur' spirit." — **K1GUD/1.** "As expected, a number of stations claiming A power sounded like a precedence of C would have been more appropriate." — **W6DQX.**

While not wishing to tar everybody with the same brush (it is possible to put out a pretty respectable signal with 150 watts with an outstanding location and superior antennas), we can't very well deny that a little unprincipled SSkullduggery goes on every year. Who are these boos kidding, you ask? (Wonder what they see when they look in the mirror?) Eliminating the power multiplier would eliminate all but the 1000-watts-plus dishonesty, but there has been no concerted demand from the field to take this action.

Telegraffiti

"I had to drop out of the contest two times: once to see Agent 86 marry 99 on Saturday, and again to watch Joe Namath almost beat Oakland on Sunday. It's a good thing that the SS was better than most TV over the weekend." — **WA3GKI.** "Big thrill was working Arizona at 8:30 P.M. EST on 40 meters." — **WN3KFR.** "Had a hamming of a time!" — **WA3HOM.** "Next year will operate portable from VE2." — **W3DVC.** "This check of mine (14) is a nuisance. It is so incredible that there are many calls for repeats. But I was 3TR in those days." — **W3TN.** "It's insane but fun." — **WA3IRQ.** "This is the first SS I've participated in since 1933 as second op for W9IYA." — **W3KK.** "Half the fun was staying awake contest night on No-Doz tablets; the other half was trying to stay awake during classes Monday." — **WN3KQM.** "There were two really funny things in the SS. The first was staying awake all Saturday night and the second was staying awake in class on Monday." — **WA3JRA.** "Took time off to re-string antenna after being hit by a squirrel in mid-air." — **WN3JYV.** (Next year walk on the ground and you won't get hit by squirrels!) "We finally got the 80-meter vertical up at 2 A.M. Sunday and the reflected power was more than the forward." — **WA3DJQ.** "The Canadians must be a week behind." — **WB2CXL.** "Beat last year's score in one-third of the time. If I keep this up I will be averaging 21 QSOs per minute in the 1973 SS." — **WB2ZPB.** "I knew I should never have helped K2KIR raise that dipole Saturday morning!" — **K2KTK.**

"I like the rules as is. Does that make me reactionary?" — **K2UBC.** "Interesting note: lower CK numbers more likely to show down for slower ops than those in 60s. Very helpful in not needing reports. Saved time in long run." — **WA2AIV.** "Too many bad signals. Perhaps returning the RST report to the exchange and stressing the need for honest reporting would help." — **WA2SSJ.** "First Field Day I have worked but had a great time! Keep 'em up. Good practice." — **WN2** (And just think: when June rolls around you'll be able to go out on Sweepstakes!) "Where were the VEs? In both weekends they were conspicuous by their absence." — **K3XV.** "Wow!" — **WA3DEI.** "Never knew I could send c.w. while asleep." — **WA9RPD.** "Was a blast!" — **WA9RFF.** "My XYL likes to copy over my contest logs but she doesn't like me operating in them. Figure that one out." — **K9JUU.** "Let's try the Field Day power multipliers next year:

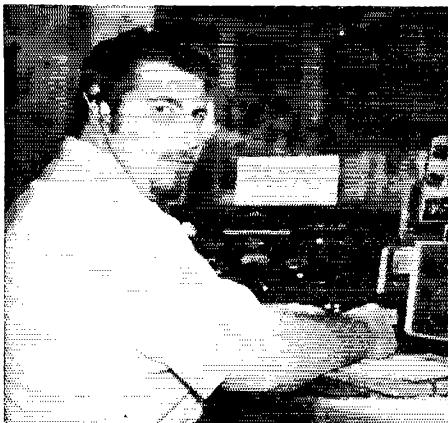


Making the clean sweep, and just missing the top-ten list on c.w., was **K4WJT** of South Carolina, who numbers a 5-element 20-meter beam, a 3-element 10- and 15-meter rotary, and an inverted vee for 40 and 80, among the other assets not visible here.

10, 50 and 200 watts. I think it would add interest to the contest." — **W9NYJ.** (Well, it would add *something*.) "One cannot drop into an occasional test like this and do well, any more than he can drop into a bowling alley once a week and average 200. But the SS is the only game I play that I can have so much fun losing." — **W9WEN.** "This is my third SS. The first and second in 1933 and 1934 as W7DLN and this year for the first time in 34 years." — **W9CTI.** "Operation was with a World War II SX-28 and a 1DX-40 that had to be pounded on the side every 5 minutes. Had to enter the Canadian phone bands on c.w. and talk them into switching from phone to c.w. for some of those tougher sections." — **WA0PRL.** "Before the SS it's a 'CQ SS' tape loop; after the contest it's a 'wait till next year' stuck record." — **WA0OVW.** "k5LZO score must be unreal! Seems impossible." — **W5WMU.**

"Enjoyed logging the FB OTs, who still have commanding fists and sigs. During the SS nobody really grows older, just dead tired!" — **K5AEU.** "This was my first SS and I was amazed at how many operators were awake so late (not me)." — **WB4FEC.** "In the wee hours one fella asked for a complete repeat because he'd fallen asleep." — **W4VCT.** "Yankee ingenuity: I hooked up a big rubber band over the tuning knob of my receiver and the VFO knob of the transmitter and instant transceive, no plugs, cables or switches." — **WA8ZDT.** "Sure was fun running 800 milliwatts, but most guys will not listen to an S2 signal." — **WA8MCQ.** "Anybody else want to join the 'K2ZFX please come back' club?" — **K8BPX**, opr. at W8WPC. "Where were all the VEs?" — **W8RMG.** "Where was Canada?" — **WA8TGX.** "W6BIP can't be the only c.w. op in S.F." — **WA8CWU.** "For check sheets being a requirement, very few seemed to be keeping them during the contest." — **WA8LWH.** "There's a special place in Hell, right behind the ovens, where they put those guys who decide to break in their keyers on SS!" — **WB2DLW.** "Where were all the VEs?" — **WA2BLB.** "This was my first contest in 52 years. I had to repeat my CK 16 almost every time. Many ops took time to give me a courteous 'good luck dr OT' or a 'bless ya dr OT'." — **W2CU.** "Thank you for the absolute and total annihilation of our self-confidence and morale." — **WB2UQH.** "One thing wrong about the SS announcement in *QST*: here, 'CQ SS' dominated the TV screen!" — **WB2FEH.** "What a bang-up ending! Five minutes to go and WA0CTX, North Dakota, answered my CQ for section 75!" — **K9AZJ.** . . . In fiddling with some post-SS statistic, **WA9OT** found that just over 50 percent of his 321 QSOs had been licensed less than ten years. . . . "Keyer problems all weekend (r.f. — I cured it after the SS) made me sound like a drunken stumblebum." — **W1ECH.** "Sweepstakes: you have to make a *sweep* for Murphy's Marauders or your life is at stake." — **WAIQJ.** "It is unimaginable how much can go wrong with a station on a given November weekend after 12 years of trouble-free operation." — **K2GLQ/1.** "I could describe the SS in two words: *very interesting!*" — **WA1DYU.** "This is the first time I've used the XYL's clothesline for an antenna in 32 Sweepstakes contests." — **KH6IJ/1.**

"Very frustrating living next door to Vermont and not working it." — **W1DXB.** "Found the college computer to be a valuable asset in computing and reporting our



How do K5LZO and second op WA5LES do it? Well, it helps to have an "SS Box" consisting of two d.p.d.t. relays so that two transmitters are ready on two bands without ever being simultaneously operated; then toss in a couple of impulse counters for keeping the numbering sequential; add two synchronized digital clocks and two keyers set to the same speed; add graphs and charts and years of experience and you've got the formula for success.

The boys have their sights set on 1200 QSOs per mode next year!

scores. Maybe pretty soon we can have the computer operate the whole contest for us." — WA1CRT. "I hope that enough Vt. stations got on to take the QSL load off my back. I keep running out of QSLs." — WA1GRR. "After ten years as a masochist in the 'all-out effort,' I regained sanity and tried the '75 in '75' trick. A relentless search for KZ5 failed, and in a desperation attempt I snagged HP1XHG in Panama as a suspicious substitute. But a stubborn conscience disallowed counting it for the coveted 'clean sweep.'" — K7CTI. "Another great one! Sure the bands more peaceful here compared to that crossfire in Maryland last year as WA3LYW." — WA7LFG. "Several Novices sent NR, pree, CK, sec, time, date, full QTH, my RST, name, address, wx, and even their rig! All this is bad enough—but when sent at 5 w.p.m., well . . ." — WN7ITG. "I hate the SS. The exchange is horrible, operating second-rate, and even KH6IJ can't compete from here. So why did I beat my head on the wall for 19 hours?" — KH6GPO. "This contest sure seems like too much work, but every year I prepare and get into it. Guess I am feeling my years—41 years with W6BIP." — W6BIP. "Two hours before the end, my keyer began to fail. Thirty minutes of patient waiting while it sat in the freezer with the pork chops solved the problem." — K6VOO. "The requirement for check sheets produced a noticeable reduction in 'second' calls. Spent six uneasy hours with beams north on low-payout bands until VE4TO came through with the coveted 75th section, then I went into retirement raising WB2s." — W4KFC.

"This single-weekend-per-mode seems to always catch me when the home-team Redskins are playing at home—and after all, those season tickets did cost \$6 each." — W4WBC. "The XYL thinks I'm crazy, and I'm beginning to think she has a point." — W5QNY. "Wish some of those WB6s would accept the fact of a WA7 having a check of 58, instead of wasting valuable minutes asking me to repeat first my CK, then my call, then my CK, then my call, ad nauseam! Think I'll stick to CD Parties from now on." — WA7KUW. "Looks like once again I'll have to buy new supply of QSLs instead of new piece of gear. Well, that's where my money goes." — WA7CLF. "The general absence of the Canadians was depressing. Only a handful were heard, with the exception of VE7s, who were plentiful." — W4GRG. "My mother's coffee kept us awake, as it could stand without a cup." — WB4EYZ. "Really *boss* contest. Just one hang-up: when two (or more) ops call you on c.w., how come they're always zero-beat with each other, but not with you? Another thing: how come all the W1s live in Connecticut during the SS? Vermont seems to be depopulated that weekend." — WB4FLW. "Had a hard time explaining that Nov. 16 was really my birthdate, hi." — KP1CRT. "Wish I had another year down here. I'd come on like a truckload of turkeys, multiop and every-

thing." — K5FKT/KP4. "Of course I anticipated the difficulty in copying my call and was not disappointed when many stations requested several repeats on it. However, there were some operators who were really sharp, and these copied it the first time with a one-by-one callup."

— 8R1Y/W4. "Getting too rough for an old-timer like myself, a winner in the first Sweepstakes (Illinois)." — W7DIL. "Nominations: I respectfully nominate WB8— as Lid of the Century! He failed to QSL my msg after seven repeats ranging from 25 w.p.m. down to 5. Canadians for Non-Participation Award." — W7AYC. "If it's possible to see a thing in sound, the Novice 40-meter band resembled a bucket of worms, all crawling, on SS night. Whee!" — WN6CWF. "K9ZMS worked 713 from W9YT and W6DQX 724 from W6RW in the 1967 SS. Our hopes for 1467 QSOs from both operators at W6RW in 1968 were a bit optimistic." — W6RW. "The family may now resume watching TV." — WB6YUQ.

"This year I thought I'd really cool it with a new quad. Naturally I bought it six weeks in advance—plenty of time to get it up on a new tower. But of course the trucker 'lost' the tower for five weeks, and . . . you guessed it, Saturday 15 minutes before the contest I was still stringing wire." — W6GEB. "Thought only Santa Claus swooped down one night a year bellowing *ho-ho-ho*." — K2KGE/5. "Next year I'll be stationed in the Canal Zone and hope to give everyone a KZ5 multiplier. Didn't hear KZ5 on phone or c.w." — WA9IAT/5. "Midway through contest, part of left hand went numb; after contest, doctor said must have bruised what is called 'pianist nerve' on sharp edge of operating desk. Six weeks to heal. Back next year with dull edges." — K5RPC. "Worked all states in 8 hours and 5 minutes, and all sections in 15 hours and 32 minutes. Really pleased to achieve our five-year goal of over 1000 QSOs on each mode, and next year we will be there shooting for 1200!" — K5LZO. "I QRTd for landlady to listen to Ukrainian folk-dancing music on her hi-fi—and to avoid eviction." — VEGMA. "I might recommend sewing a piece of sponge-rubber into the shirt-sleeves of those who suffer (as I do) from 'contest elbow'." — VE7XF. Conditions very frustrating. Probably my last SS from this QTH; look for me from VE6-land next year." — VE8BB.

"The SS is probably the most ridiculous way imaginable for a supposedly grown-up amateur to waste an entire weekend. Unlike Field Day, it proves nothing about ability to carry on under emergency conditions. Unlike the DX Competition, it is highly unlikely to add to DXCC scores. It doesn't give participants a chance to renew old acquaintances and form new ones, as day-to-day ragchewing does; and it is of very dubious value as training for efficient and orderly handling of traffic. Perhaps for these very reasons it is for many of us the most enjoyable event in the amateur calendar. In the immortal words of thousands of losers down through the years: 'Just wait till next time!' " — VE3FXZ.

Phone-etics

"Worked W8USP and WA8USP in order." — W3NX. "Why not include shoe size with the preamble?" — K3GYS. "Rotor broken with beam fixed s.e." — K3LJZ. "Met a group of 'gentlemen' on 75 who were kind enough to tell me quite a few interesting facts about my ancestors; they spoke like real authorities and were good enough to go back several generations. Very informative." — W3CBJ. "Found out what the c.w. men claim: the brain is the best filter you can use for cutting through the QRM." — WA2DVU. "First attempt after 19 years as a ham." — W2BSI. "I really shook up a classmate by answering her phone call with 'W9YH, go ahead' during the thick of the activity." — WA9OBP, opr. at W9YH. "Have been in every SS since my first one in 1954 and the pace is getting pretty tough for an ole geezer like me." — W9RQM. "Down with the power multiplier." — W5WMU. "Would you believe N.C. was my last section for a clean sweep?" — K4LPW. "Please, don't repeat unless you're asked to! Check your dupe sheet before you call or answer a station; that's what it's for. And keep it up to date! Get as close as possible to the frequency of the station you're calling. Set your VOX control for fast release." — K1ZND, opr. at W8SH. "I must be crazy, cuz I like the SS the way it is." — WA8ZDT. "How would you like to work: in the same contest, from the same town, for the same club, mostly on the same band, at the same time, with almost the same call as W8USP? Boy, you almost have to beg for QSOs. Check your log again, OM: we have not worked!" — WASUSP. "I'm 13 years old and in the 8th grade. Just got that long-awaited Extra Class license." — WA8TKW. "I think it would be more interesting to give the operator's age instead of birthdate. This gives you more info on him." — W8GFH. "Once again my superb location paid off handsomely. I am on top of very high ground here in the town of Rye, and my shot to the west and south is all down gently-sloping ground. The nearest obstruction to my signal in those directions is on the other side of a valley about 8 miles away. This explains why many fellas commented that I had a very big signal for the A-power category when I was only using the little NCX-3 and 80/40 inverted vees and a Hy-Gain 203B for 20." — WA2CLO. "Felt like election day, watching the states roll in." — WB2BCI. "Whatever happened to the dummy load?" — W2LEJ. "Most enjoyable; a true test of man and machine." — WA2COL. "Contacts were plentiful, but sections were as easy to pull as impacted wisdom teeth. After hunting, digging, and tailending, I'm convinced the easiest way to work all sections is to call CQ, selecting time, frequency and beam heading according to sections needed and best rate." — WA8SDC. "I wish more people would compete in the SS for the operating skills which one acquires from such tests. I could really tell a contest operator when handling traffic during the tornado disaster which struck our community this spring." — K6YVU. "Couldn't get excited." — WA9HHH/I. "Happiness is finding out that the section winner of last year is operating from a different section this year!" — K6TWT. "What a ball to be in Nevada." — WA7BAV. "Few things are more disgusting than not working your own section after calling the guy across town for over an hour." — K7YUJ. "Had W.I. and KZ5 stations call me!" — WA1CYT, opr. at W1WE. "Took about five minutes to untangle all the Susans and Uniteds when WA9SUU and K5USU called simultaneously! Upon being advised of the Quebec shortage, VP9BY obligingly went down in the foreign phone band and brought back a VE2." — W4KFC. "Have worked some in every SS since 1929 and have always tried to work all sections. This is first time I have ever done it." — W4DS. "One of the best parts of the contest was hearing a Six on 80 meters say, 'The last guy that called me asked me for my ZIP Code!' " — WA7FH/6. . . . K6SDR started off the SS by working six KH6s in a row! . . . "My SS expedition to the 'rare' Santa Barbara section turned into a nightmare of engineering problems, and my home section (Orange) ended up by being rarer than Santa Barbara. No more SS portables for me!" — K6YNB/6. "Decided to try high power this last time in STEX. On phone it proved to be worth it. Increasing from last year's 80 watts to 500 watts, I realized a 56-percent increase in QSOs and 8-percent increase in score." — K2EIU/5.

"Wait till next year!" — E. Murphy

LED SECTION BOTH MODES

(Calls in boldface scored over 100K each mode)

W3YUW	WA6IVN	WA0EMS
K4PUZ/4	WB6OLD	WØWLØ
K2EIU/5	WA7FHA	KH6CPQ
WA5RTG	WA7KUW*	KV4FZ
W5WMU	K7UKC	VE7XF
W6BIP	K1ZND/8**	VE8BB

*K9LBQ/7 phone

**K8UDJ c.w., W8SH phone

THIRTY-FIFTH SWEEPSTAKES CONTEST

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is award winner for that Section unless otherwise indicated. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indicates d.c. power up to and including 150 watts (multiplier of 1.25), B over 150 watts (multiplier of 1). . . . The total operating time to the nearest hour, when given for each station, is the last figure following the score. . . . Example of listings: W3GAU 68,320-376-72-A-14 or final score 68,320 number of stations 376, number of multipliers 72, power factor of 1.25 total operating time 14 hours. . . An asterisk denotes Novice certificate winner; double asterisk indicates Hq. staff member, ineligible for award. Multi-operator stations are grouped in order of score following single-operator station listings in each section tabulation.

C.W. Scores

ATLANTIC DIVISION

<i>Delaware</i>	W3CEI	7999-120-27-A-15
W3GAU	68,320-376-72-A-14	7739-76-41-A-13
W3NX	54,710-391-70-B-16	6975-79-36-A-4
W3TCF	51,543-389-53-A-18	6181-110-23-A-13
W3NNK	48,850-290-66-A-22	5460-84-26-A-6
W3DRD	36,484-213-69-A-15	3825-77-20-A-5
K3COO	16,620-139-18-A-7	WA3INC
WA3GKI	10,450-110-38-A-10	WA3IYC
WA3HXJ	8316-101-42-B-8	W3DVC
WN3KFR	5075-77-28-A-16	W3ARK
WA3KFF	2575-53-25-B-10	WA3ABN
		WA3CMD

<i>Eastern Pennsylvania</i>	WA3IMG	748-23-13-A-2
W3YUW	125,344-669-75-A-24	WN3JAG
WA3DSZ	115,560-642-72-A-20	WA3HBQ
W3GHM	101,353-572-71-A-24	WA3GZP
W3GM	91,515-518-71-A-20	K3LBG
W3DQG	85,860-477-72-A-19	K3LWR/3 (K3LWR, WA3DBQ)
K3HTZ	83,710-460-72-A-24	16,975-370-67-A-20
WA3DCM/3	82,640-517-61-A-24	
WA3ATX/3	81,763-455-71-A-24	
W3ALB	77,928-427-73-A-24	K4GSDU/3
W3NOH	68,850-405-68-A-16	133,125-751-71-A-24
W3BIP	65,800-360-72-A-21	W3LN
W3CNS	56,958-353-65-A-20	117,070-636-73-A-24
W3KT	55,040-314-64-A-18	W3DPJ
K3DPQ	52,731-327-65-A-23	WA3HTQ
W3KV	48,510-308-63-A-18	100,080-556-72-A-20
K3JGJ	44,370-261-68-A-18	K3WUW
W3GRS	39,270-231-68-A-12	W3AZD (K3OAE, opr.)
W3OV	36,260-196-74-A-15	Maryland-D. C.
W3MWC	32,705-214-62-A-8	92,316-617-74-B-24
W3ADE	32,313-275-47-A-20	K4GSU/3
W3MPX	32,110-204-61-A-16	135,630-139-68-A-17
WA3IJU	29,037-265-53-A-17	W3MFJ
W3NNL	28,270-152-72-A-17	101,740-584-69-A-24
W3EAN	27,376-232-59-B-9	W3FEP
K3OIO	25,420-249-41-A-16	100,080-371-64-A-24
W3ADZ	25,020-139-72-A-14	K3ANA
W3PHR	24,738-219-57-B-18	35,840-224-66-A-17
K3LJZ	21,700-140-62-A-8	W3MVB
WA3HOM	21,632-208-52-B-20	WA3AMH
K3IAM	21,198-139-61-A-14	K3CKT
K3BNS	20,790-205-42-A-10	W3HVM
W3JET	19,323-131-59-A-10	W3TN
K3INP	19,316-241-38-B-11	14,850-132-45-A-16
WA3JQO	17,550-180-39-A-17	W3DYA
WA3HNU	16,320-137-48-A-15	14,625-150-39-A-11
WA3HLR	14,720-129-46-A-19	WA3GYV
K3RFB	14,312-128-52-B-14	13,725-122-45-A-19
WA3FBP	12,525-117-30-A-15	K3WKA
		13,500-100-54-A-7
		K2DEB/3
		10,043-104-39-A-10
		WA3IRQ
		9969-146-25-A-11
		9450-135-28-A-12

W3QCB 8360- 88-3A- 9 WB2FWG 4375- 50-3A- 6 W9REC 25,190-164-59-A-17 WA9NSR 32,505-197-66-A-12
 W3AXV 6280- 61-33-A- 4 WB2ZCC 4048- 05-23-B-15 W9HPG 21,625-150-63-A-14 K9YBC 27,405-190-58-A-9
 WA3KLP 4844- 79-25-A-12 WA2WMT 3413- 51-27-A- 4 W9ARFFF 22,085-176-52-A- 8 W9AIIHZ 26,335-233-16-A-24
 W3KAM 4720- 65-24-A- 7 W2DIQ 2613- 48-22-A- 3 W9EY 19,138-146-50-A- 9 K9GDF 24,540-208-18-A-9
 W3KK 4513- 80-23-A- 6 K2KQS 2300- 50-23-B- 5 W9AVPP 16,643-162-42-A-23 WA9YBML 14,688-123-47-A-22
 WN3KQM* 3710- 53-28-A-16 WB2RHJ 1765- 19-17-A- 5 W9ATKK 15,558-117-54-A-12 WA9OMO 13,344-117-51-A-6
 W3AWN 3480- 60-29-B- 9 K2UAN 1106- 10-14-B- 7 W9JCK 14,850- 99-73-U-11 W9AVKU/9 14,000-180-32-A-13
 K3EVB 2438- 32-25-A- 3 K2UVF 940- 21-20-K- 4 W19JRN 11,025-151-30-A-15 W9FBC 8,663-105-33-A-8
 WN3JCH 1550- 31-20-A- 7 WB2DNN 720- 18-16-A- 2 W9NWXX* 10,250-106-41-A-24 W9ARTU 8063- 76-13-A-9
 WN3JYV 1350- 38-18-A-15 WN2HIDY 605- 24-11-A-16 K9TNA 10,080-106-18-H-14 W9ATXN 7525- 90-29-A-12
 WN3KCP 1050- 3-1-A- 1 WN2GPP 191- 11- 9-A- 4 W9AUOT 9,063-125-29-A-14 W9SQN 6120- 73-31-A-7
 W3CBJ 1003- 1- 1-A- 1 WN2FHJ 163- 12-10-A- 4 W9FHG 8,860-105-32-A-13 W9CTI 5458- 59-37-A-13
 W3EHY 781- 29-14-A- 4 W2PA 3- 1- 1-A- 1 K9JUU 7,425- 99-30-A- 7 W9TXF 5400- 60-36-A-10
 WN3LEH 423- 17-13-A- 7 W2TOP (W2TOP, WA2UZ) 900- 99-KY 6230- 90-28-A- 6 W9ERW 4920- 82-30-A-7
 W3WZL/3 (10 oprs.) 99,281-537-75-A-23 WA2BCK (WA2BCK, K9YVY 5520- 69-32-A- 8 W9AVCK 3900- 69-30-A-12
 W3ZKH (K3EST, W3ZKH) (WN2EKW) 15,744-168-18-B-17 K9RVF 5250- 60-35-A- 7 W9AVN 1023- 3- 3-A-1
 92,850-620-75-B-24 W3DVO (K9OP!) Western Pennsylvania 9W9YEF 5003- 87-23-A-17 W9RTA 1013- 27-15-A-2
 W3DVO (W3DVK, K9OP!) 101,101-606-69-A-24 W9WR 4883- 63-31-A-19 W9NZAZ 548- 19-14-A-5
 W3DIO (WA3s HUJ HWW 14Q) K3HUK (K3AHIT, opr.) 9W9WLF 3,828- 58-33-H- 15 W9NYCY 416- 20- 9-A-22
 62,497-501-02-B-24 WA3IXN 101,101-606-69-A-24 W9VOX 2,928- 47-26-A-10 K9JEK (K9JEK, W9QYQ, WN9-
 56,513-363-63-A-24 WA3KUH (WA3KUH, opr.) 9W9YVX 2,126- 46-21-A-15 55,264-108-68-B-24
 WA3DJQ (7 oprs.) W3NEM 50,625-335-70-A-23 W9NWNT 2070- 39-24-A-20 DAKOTA DIVISION Minnesota
 47,351-321-61-A-24 WA3KOS 59,153-125-70-B-17 W9ZPC 1313- 35-15-A-10 98,005-578-68-A-24
 WA3JRA (WA3s HJJ JRA) 22,248-207-54-B-17 K3XV 50,985-309-66-A-20 W9NYLD 1120- 32-14-A-24 W9YCR 98,005-578-68-A-24
 22,358-181-50-B-18 W2EBW 50,592-377-68-B-24 W9ZEN 930- 31-12-A- 3 W9AA (W9BE, opr.) 96,934-577-67-A-22
 WB2MOQ 20,750-166-50-A- 7 WA3EPI 15,743-321-57-A-24 W9NZQJ 780- 21-16-A-10 W9BUT (WA9BLK, opr.) 95,264-108-68-B-24
 W2EA 19,086-187-39-A-15 WA3KOI 37,280-233-64-A-19 W9GXR 578- 21-11-A- 3 W9UBT (WA9BLK, opr.) 94,130-537-71-A-23
 W2KF 15,805-119-63-B-11 K9JLJ 77,073-441-63-A-15
 K2BG 14,950-130-16-A-11 W9AIH 71,553-142-09-63-A-19
 W2HDW 12,163-140-35-A- 6 W9ARAG 66,163-395-67-A-14
 WB2ZEU 11,002-163-27-A-12 K9CNC 65,535-386-68-A-24
 W2EPA 9720-115-10-B-11 W9PAN 55,840-349-64-A-12
 WB2MRD 7310-114-26-A- 5 W9AIJW 35,100-220-62-A- 8
 WB2ZPB 5968- 77-31-A- 5 W9ASBN 27,860-199-56-A-18
 WN2DBB 4406- 71-25-A-22 W9ARWH 17,250-150-46-A-16
 K2VU 748- 32-17-B- 6 W9LAJ 14,790-116-51-A- 9
 W2PAU (W2s ESX PAU) 79,898-479-67-A-24 K9ZXE 10,923- 63-63-A- 9
 K2AA (W2FYS, W3CXO) 55,275-334-65-A-24 W9UCU 9,500-100-38-A-21
 W2REB (K2PWV, W2REB) 40,750-399-50-B-24 W9PRT 9,922-115-42-B-13
 K2ZOM/2 (K2ZOM, W2FYS) 10,578-130-11-B-10 W9QNT 8160-100-34-A-15
 K2ZOM/2 (K2ZOM, W2FYS) 55,275-334-65-A-24 W9VWKP* 4275- 61-30-A-24
 W2REB (K2PWV, W2REB) 40,750-399-50-B-24 W9BUTU 2535- 41-26-A- 8
 K2ZOM/2 (K2ZOM, W2FYS) 10,578-130-11-B-10 W9BVGD 2275- 50-20-A-20
 W2FXA (WB2YQH, opr.) 53,075-331-65-A-24 W9BF 1400- 28-20-A- 6
 K2AA (W2FYS, W3CXO) 55,275-334-65-A-24 W9VIS 1395- 32-18-A-10
 W2REB (K2PWV, W2REB) 40,750-399-50-B-24 W9KUI 882- 32-14-B- 7
 K2ZOM/2 (K2ZOM, W2FYS) 10,578-130-11-B-10 W9ATLN 250- 10-10-A- 2
 W2FXA (WB2YQH, opr.) 53,075-331-65-A-24 W9BPR (W9BPR, DKA PRL) 99,720-551-72-A-24
 K2AA (W2FYS, W3CXO) 55,275-334-65-A-24 W9YC (K9QXQ, W9BPM) 7,500-568-68-B-24
 W2REB (K2PWV, W2REB) 40,750-399-50-B-24 W9BYC 56,410-352-63-A-19



With a Henry 2K and TA-36 supplying the necessary comph, K1KDP ("the Kosher Dill Pickle") breezed to the number-one phone standing in Western Mass.

Western New York
 K2KIR 120,014-671-71-A-24 WA3GZQ 6720- 85-32-A- 8 W9NZDO 193- 11- 7-A-—
 K2KTK 110,500-600-73-A-23 WA3NLW 6318- 82-39-I- 8 W9NYXY 26- 5- 3-A- 1
 WA2BEX 75,020-484-62-A-24 W9NYUH 23- 3- 3-A-—
 W2MTA 74,500-147-60-A-24 K3KMO 375- 50-28-A- 3 W9YUH 23- 3- 3-A-—
 W2FR 67,563-355-75-A-22 K3EXE 3331- 53-17-A- 5 K9VEW (K9s UTM BVW)
 K2JD 60,996-142-09-B-18 WA3GSB 2889- 55-27-B- 9 73,980-412-72-A-24 W9SMV 84,993-614-71-B-24
 W2FXA (WB2YQH, opr.) 52,000-325-64-A-16 WA3GJU 2475- 55-18-A- 2 W9YII (7 oprs.) W9NZAZ 3136- 49-32-B-12
 K3JH/2 47,850-365-66-L-21 K3KZK 2310- 42-22-A-14 W9AUML 114,100-682-70-A-24 W9ONML 1800- 39-24-B- 1
 WA2CAL 46,530-314-58-A-22 WA3JS 1200- 31-16-A-14 W9ARWL/9 (WA8RWL, W9BWU 510- 17-15-B- 2
 WA2CPQ 45,625-290-60-A-20 WN3KKG 1023- 3- 3-A- 1 K9DEG, WA9NBA) 18,020-170-53-B-21
 WB2SMD 32,523-249-54-A-12 WA3HSE 660- 25-11-A-18 South Dakota
 WB2VVZ 24,910-192-53-A-19 WA3JB3N 330- 33- 8-A- 5 W9SMV 84,993-614-71-B-24
 WA2FDF 24,750-225-14-A-16 WA6KPF/3 10- 2- 2-A- 1 W9NZAZ 73,980-412-72-A-24 W9ARWL 1800- 39-24-B- 1
 W2SSC 24,671-191-51-A- 5 3- 1- 1-A- 1 W9AUML 53,075-331-65-A-24 W9NZX 293- 13- 9-A-10
 K2UBC 22,323-171-53-A-16 WA3GTE (WA3s GTE HAL) W9BF (WA2BJ, opr.) DELTA DIVISION Arkansas
 WA2DHS 21,313-172-50-A-16 29,588-262-45-A-17 WA3DEI (4 oprs.) 57,120-424-68-R-18 WA5RTG 63,300-357-70-A-23
 WB2NIN 21,000-201-50-B-18 9945-118-34-A-19 W9JOO 50,573-308-65-A-18 W5BED 45,988-327-69-B-12
 WB2WII 20,813-185-15-A-20 K9TTM 31,350-220-57-A-17 W9NZUK 62,790-366-69-A-18
 WA2SWW 18,620-195-19-15 W9DGA 28,500-250-55-B-10 W5CR 35,800-241-58-A-17
 WB2ZOW 18,375-150-19-A-17 W9AEBR 25,650-180-57-A-14 W5WG 32,550-233-56-A-21
 WA2AIV 17,632-153-18-B-21 Illinois K9HYV 5960- 64-31-A- 4 WB2UFG/5 2240- 32-16-A- 5
 W2TFL 16,233-151-43-A- 8 W9LJK 126,746-700-73-A-24 W9QLW 3520- 55-32-B- 5 W5JFB 158- 9- 7-A- 1
 WA2BPH 13,829-150-37-A- 9 W9RCJ 98,986-530-71-A-24 W9NZMT 1069- 29-15-A-12 W9HGT (4 oprs.) 233,088-267-64-B-19
 K2KBI 12,328-118-48-11- 9 K9BGL 84,121-607-69-B-24 Wisconsin WA5RSA (WA5s RSA RSB)
 WB2OMY 11,428- 97-13-A-16 WA9WSL (K9MBR, opr.) 116,979-637-73-A-24 1872- 39-24-A- 5
 W2DIZ 9750-100-35-A-10 82,440-451-72-A-16 W9RQM 103,751-569-73-A-24
 W2EMW 9555- 91-42-A- 8 WA9OTD 68,000-100-68-A-18 W9HIX 103,751-569-73-A-24
 K1DK/2 9500-100-38-A-13 W9KQO 51,165-232-73-A-20 K9CAN 98,185-533-73-A-24 Mississippi
 WA2SSJ 8343- 91-33-A-12 K9KDI 43,066-354-61-B-12 W9YT (WA9AIB, opr.) K5AEU 118,213-681-70-A-24
 WB2QKQ 8232- 98-42-B-14 WA9QBM 40,950-252-65-A-10 78,300-470-68-A-18 K4RIN/5 34,788-485-70-A-20
 WA2EQA 6565-104-26-A-19 K9DUA 38,000-304-50-A-20 W9NYJ 73,838-422-70-A-24 WA5OYU 31,752-232-03-B-23
 WB2ZCZ 6335- 91-35-B- 8 W9GFF 36,263-202-70-A-12 W9VEN 71,080-420-68-A-24 Tennessee
 WN2EPV* 6311- 76-33-A-23 W9FVT 31,350-220-57-A-17 W9ATPT 62,889-393-63-A-24
 WB2EQR 6290- 74-34-A-18 WA9RPD 20,680-247-53-A-16 W9ANVY 45,750-300-61-A-21 K4PUZ/4 125,921-689-73-A-24
 WB2ABV 6045- 93-26-A-16 W9AUID 28,620-213-54-A-16 W9CHD 42,160-272-62-A-17 K4LPW 100,376-568-71-A-23

W2EIK/4 89,815-507-71-A-24
 W4SQE 85,560-496-69-A-24
 WB3FEC 75,668-513-59-A-23
 WA3UAZ 48,393-267-71-A-12
 WB3GTT 36,988-269-55-A-24
 WB4FNN 19,125-170-45-A-10
 WA4NEC 13,060-134-36-A-7
 WA4ZUI 8483- 87-39-A-17

GREAT LAKES DIVISION

Kentucky
 WB4AIN/4 79,753-437-73-A-22
 K4FU 79,440-424-74-A-22
 W4VCT 45,513-334-55-A-24
 W4LW 20,382-209-49-B- 9
 K3LSX/4 9800-103-40-A-12
 W4JKC 3408- 47-29-A-10

Michigan
 K8UDJ (K1ZND, opr.) 123,830-693-71-A-24
 K8HLR/8 97,665-575-68-A-24
 W8VPC 96,560-544-71-A-23
 W8DQL 94,530-552-69-A-24
 K8HKKM 92,744-229-55-A-24
 W8WUU 76,160-448-68-A-23
 K8BGZ (W8TJQ, opr.) 75,000-400-75-A-24

WA8YQO 68,800-431-64-A-23
 WA8LWK 66,163-401-65-A-20
 W8OQH 62,465-303-62-A-23
 W8GTT 57,330-364-63-A-22
 WA8ZDT 46,398-353-66-B-21
 WA8UON/8 45,873-311-59-A-24
 WA8VGM 41,275-270-60-A-24

W8PVI 36,728-250-59-A-20
 W8DM 29,400-245-48-A-17
 WA8MAM 27,966-231-47-A-13
 W8BW 27,384-245-56-B-13
 W8GAI 26,095-239-42-A-10
 WA8YCV 22,950-201-45-A-20
 WA8MOA 18,658-222-34-A-21

WA8YIR 17,225-134-52-A-18
 W8AP 15,210-145-49-B- 6
 WA8WON 12,731-147-35-A-11
 W8EGI 12,363-101-45-A- 8
 WA8VU 11,750-100-47-A- 5
 WA8ZAV 8460- 95-36-A-15
 WN8AHT* 8360- 99-32-A-22

W8MSK 7525- 86-35-A- 6
 W8FX 7392-132-28-B-12
 WA8VGQ 5536- 63-36-A- 5
 WA8VRB 4880- 61-32-A- 5

K8ETU 3813- 62-31-B-10
 W8JUP 3575- 65-22-A- 9
 WA8ZZZ 3525- 47-30-A- 9
 W8MPD 3510- 52-27-A- 5
 W8SCW 3424- 51-19-A- 4
 WB8AKG 2700- 57-20-A-12
 W8SS 2535- 39-26-A- 4
 WN8BZG 2150- 43-20-A-17

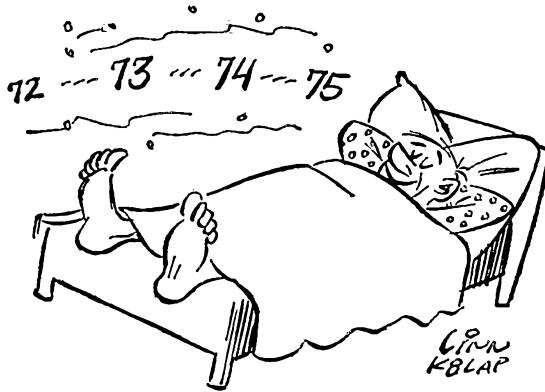
WA8LNU 1849- 44-17-A- 8
 WA8MCQ 1485- 34-18-A- 7
 K8RCT 1063- 5- 5-A- 1
 WA8LAY 1023- 3- 3-A- 1
 WN8ASR 650- 28-10-A-15
 WN8ZJM 400- 16-10-A- 4
 W8TWJ 220- 11-10-B- 2
 WA8QCU 140- 8- 7-A- 1
 WA8VZK 8- 2- 2-A- 1

WA8LYF (WA8s GUF LYF) 114,570-637-72-A-24
 WA8WCZ (WA8s VMS WCZ) 114,570-637-73-A-24
 ZDR 15,263-355-51-A-20
 WA8JQV (WA8JQV, WN8ADH) 15,428-133-58-B-14

W4BBB (5 opr.) 7286-101-29-B-15
 Ohio
 W8WPC (K8BWPX, opr.) 129,685-701-74-A-24
 W8QXQ 115,701-630-73-A-24
 W8QDH 103,740-581-69-A-24
 W8RQO/8 103,180-553-72-A-24
 W8AEB 97,625-550-71-A-24
 K8CHH 89,760-528-68-A-23
 K8NEB 83,749-490-69-A-24
 W8VYU 82,210-514-61-A-24
 K8EHN 76,603-432-70-A-24
 W8OYI 76,590-414-71-A-14
 WA8SHL 74,245-479-62-A-23
 WA8APY 71,610-131-66-A-20
 K8VAK 64,003-400-63-A-23
 WA8IQX 54,163-329-65-A-23
 WA8RCN 54,100-329-68-A-21
 W8GFII 52,020-291-72-A-13
 K8RMK 50,823-352-58-A-17

"CLEAN SWEEP" HONOR ROLL

Worked All 75 Multipliers



CQ
K8LAP

Both modes: W1BGD/2, W4KFC, K5LZO*, WAØSDC.

C.W.: W2FR, WB2YPM, W3GN, W3WZL/3*, W3YUW, W3ZKH*, W4UHI, K4WJT, W6RW*, K8BGZ (W8TJQ, opr.), WA8CWU, W8YCP, W9JCK, KØAZJ.

Phone: W2DXL, W2RLM, W3GRF (K1ANV, opr.), W4BVV, W4DS, K4FU, K4HAV, K4LPW, K5AEU, K4BVD/6, WA7FFU, W8LAX, W8LXU, W8SH (K1ZND, opr.), W9GEG, W9GIL, W9RQM, WA9TCW*, W9YYG (WA9QNU, opr.), KØUKN*, KP4AST, KV4FZ.

* Multioperator

W8MXO	50,508-287-69-A-19	WA8REN	4800- 60-32-A- ~	WB2SIH	38,860-335-58-B-23
W8FMG	50,112-348-72-B-23	W8IRG	4625- 50-37-A- ~	WB2JBQ	37,628-260-58-A-16
W8YCP	50,100-333-75-B-13	WN8ZBT	4620- 77-24-A-18	WB2FUV	8415-102-33-A-16
W8B3K	48,510-291-66-A-24	WN8BZK	4176- 71-21-A-16	WB2HEM	7830-108-29-A-15
W8RSW	47,450-325-73-B-18	WA8WAK	3850- 70-22-A-12	W2JKJ	4843- 77-26-A-7
W8UPH	47,160-393-60-B-18	WA8VTD	3600- 60-24-A- 4	WN2GHQ	1916- 40-21-A-24
WA8PZA	47,125-235-58-A-16	W8DWP	3338- 55-17-A- 5	WN2FEL	3- 1- 1-A- 5
W8IPA	47,090-277-68-B-22	WA8LVT (WA8LWH, opr.)	42,600- 18-18-A- 2	WA2BHN (WA2s BHN DFI)	29,738-21-50-A-14
W8GOE	44,555-281-62-A-18		2620- 36-18-A- 2		
W8CEA	42,160-340-62-B-16	K8MLO	1870- 34-22-A- 5		
W8ETU	41,610-262-62-A-14	WA8WSP	1760- 33-22-A- 7	New York City-Long Island	
W8JUP	40,563-276-59-A-11	W8AQZ	1750- 35-25-B- 4	W2AJR (WA2UWH, opr.)	
WA8ZZZ	37,120-256-58-B-21	WB8BZX	1470- 23-21-A- 6		94,670-551-68-A-24
W8MPD	35,618-291-59-A-20	K8STK	1383- 17- 9-A- 5	K2ZYR	69,870-411-68-A-23
W8SCW	32,065-218-57-A-12	W8UEX	1350- 30-18-A- 3	W2DSC (WB2DZZ, opr.)	
WB8AKG	30,808-233-53-A-16	W8IANW	1260- 13- 8-A- 6		56,273-389-61-A-24
W8SS	29,879-226-53-A-16	W8SZP	1238- 33-15-A- 5	W2MT	45,675-307-60-A-17
WN8BZG	28,098-224-63-B-17	W8VUV	910- 27-14-A- 6	WB2SEQ	42,735-260-66-A-19
WA8LNU	27,245-181-58-A-11	WA8YTU	756- 30-11-A- 8	WB2WXR	41,250-250-66-A-24
WA8MCQ	26,100-174-75-A-18	W8HYV	634- 20-13-A- 4	WB2PJH (WB2EZG, opr.)	
K8RCT	23,760-226-59-A-11	W8N8BPD	410- 22- 8-A-11		35,381-283-51-A-21
WA8LAY	20,100-224-62-A-21	K8AMZ	2- 1- 1-A- 1	W2GFF	32,603-191-69-A-18
WN8ASR	18,100-204-51-A-24	K8MMH	2- 1- 1-A- 1	W2ZV	30,313-175-67-A-21
WN8ZJM	17,160-192-52-A-16	WA8RVM (WA8X VMX RL)	28,912-194-62-B-12	WA2APO	27,885-218-52-A-16
W8TWJ	16,185-173-42-A-19	W8LT	93,603-520-72-A-22	K2UAR/2	21,165-180-54-A-24
WA8QCU	15,263-355-51-A-20	K8DHT (K8QY DHT NPI)	22,183-229-37-A-14	WB2YKU	23,400-212-56-B-12
WA8WCZ	15,263-355-51-A-20	WA8LWH (WA8s LVT LHV)	79,755-614-65-B-24	WA2VDA	21,120-175-48-A-19
ZDR	15,263-355-51-A-20	W2UAL	77,160-148-68-A-24	WB2BF1	18,308-199-16-B-13
WA8JQV (WA8JQV, WN8ADH)	15,428-133-58-B-14	WB2DUS	12,813-125-41-A- 8		16,575-130-51-A-22
WA8BBB (5 opr.)	7286-101-29-B-15	WA8RVM (WA8s X VMX RL)	29,018-219-53-A-23	WB2TYR	6920- 30-37-A-11
W8EX	22,578-159-71-B-14	WA8OPD (WA8s FWR OPD)	22,603-520-72-A-22	WA2DZG	6080- 83-32-A-14
W8AUTX	22,183-229-37-A-14	K8DHT (K8QY DHT NPI)	22,400-212-56-B-12		
W8AJW	19,061-150-51-A- 6	WB2YKU	79,755-614-65-B-24		
WA8BGE/8	18,755-134-53-A- 6	W2UAL	77,160-148-68-A-24		
WA8ENH	18,165-173-42-A-19	WB2BF1	12,813-125-41-A- 8		
WB8BKO	14,218-127-47-A-15	WB2DUS	12,813-125-41-A- 8		
WA8BUL	13,936-134-49-B-11	WA8RVM (WA8s X VMX RL)	29,018-219-53-A-23	WB2TYR	6920- 30-37-A-11
W8IQI	13,555-187-27-A-22	WA8OPD (WA8s FWR OPD)	22,603-520-72-A-22	WA2DZG	6080- 83-32-A-14
WA8VZK	12,075-106-46-A-13	K8DHT (K8QY DHT NPI)	22,400-212-56-B-12		
WA8S1	11,362-150-38-B- 6	WB2YKU	79,755-614-65-B-24		
W8POR	10,435-102-37-A-15	W2RPZ	5187- 67-39-B-12		
WA8MCR	9984- 96-52-B- 6	W2DMZ	16,445-151-44-A-12		
WA8APJ	9950-107-40-A-19	WB2RNL	4681- 53-35-A- 8		
WA8SEV	9500-100-34-A-19	WB2HAE	4263- 55-31-A- 5		
WB8BM	7800-100-32-B- 6	WA8VXP (WA8s VXP WBL)	3480- 48-29-A- 5		
WA8PJA	6153-107-23-A- 2	WB2DRL	2800- 57-20-A-15		
WA8OPH	6125- 70-35-A- 6	WB2TYK	2250- 50-18-A- 2		
WA8YMZ	5644- 84-34-B-15	WB2UZU	2145- 39-22-A- 9		
WA8NARD*	5270- 70-31-A-20	WB2YKL	2138- 45-19-A- 4		
WA8RCN	51,400-329-68-A-21	WB1BGD/2	127,938-677-75-A-24	W2UNS	1740- 29-24-A- 1
W8GFII	52,020-291-72-A-13	WB2YPM	57,938-311-75-A-16	WN2DFD	1680- 56-12-A- 7
K8RMK	50,823-352-58-A-17	WB2DXL	44,960-281-64-A-10	WN2EYW	1450- 30-10-A-11

HUDSON DIVISION

Eastern New York



MIDWEST DIVISION

WN2GOR 1085-31-11-A-13
WN2CZO 413-16-11-A-5
W9IBX/2 384-32-6-B-3
W2TN1 360-16-9-A-4
WN2GMC (WN2s DHO (GMIC) K9WNV/0 633-24-11-A-4

Iowa

K0AZJ 90,156-476-75-A-22
WA6TOT 43,680-321-56-A-18
K9WNV/0 38,518-252-62-A-23
WB8SDC 29,650-192-73-B-11

Northern New Jersey

WB2RKK 97,721-567-69-A-24
W2YT 81,510-495-66-A-24
WA2ATO 69,360-108-68-A-24
WB2YEW 61,703-435-57-A-24
WA2FYT 38,775-282-55-A-16
WB2DAA 37,118-304-49-A-23
WB2DLW 33,810-243-56-A-20
WB2WPX 32,620-233-56-A-15

W2DMJ 29,353-198-59-A-11
W2NEP 28,365-186-61-A-10
WB2BLB 25,062-175-55-A-15
WB2ZER 24,300-180-51-A-16
WA2BCN 42,070-166-58-A-24
WA2AMM 22,765-159-58-A-14
WA2DZU 19,780-173-46-A- -

WA2CWX 18,840-157-48-A-12
WB2LHL 18,705-174-43-A-18
W2DEN 18,563-135-55-A-11
WA2EUX 16,688-224-39-A-23
WB2QQU 12,480-158-32-A-17
WA2ANT 12,420-108-40-A-13
WB2BW 11,760-98-48-A-16
W2HTR 10,200-136-30-A-9
WB2ABL 8820-85-42-A-6
WA2DNB 7515-84-36-A-16

WB2CATS 6020-80-37-B-7
W2ZEP 6630-78-34-A-6
WB2WZ 6038-115-21-A-9
WB2AMV 5500-100-22-A-3
WA2CXH 4418-57-31-A-9
WB2NSV 4320-72-24-A-8
W2CU 3800-50-28-B-9
WB2MPP 3770-52-29-A-14
WN2GGN* 2674-48-25-A-10
WN2GUY 2340-40-24-A-17
WN2FIG 1500-30-20-A-14
WN2LJR 281-13-9-A- -
WA2BHZ 270-16-8-A-4
WA2DRR 125-14-5-A-10
W2GLQ/2 (4 opns.) 44,864-279-63-A-23

Kansas

WB1NH 68,392-468-72-B-19
WB1YC 52,858-287-67-B-24
K9ECV/0 40,894-247-65-A-20
K9BWI 39,293-259-62-A-17
K9FPC 29,615-195-50-A-14

WB1TR 7000-100-35-B-17

WB1TAS 6083-81-38-A-24

WB1LGS 5363-65-33-A-12

WB1ZJ 2736-47-29-B-2

WB1JYU* 2 WB1JAD/1

WB1JED 13,760-160-43-B-14

WB1JED 7500-75-40-A-8

WB1JMC 5140-64-43-A-10

WB1AW (WB1PR, opr.)**

K9BXU/1

WB1OYD 20,500-165-50-A-12

WB1ADW 15,050-140-43-A-12

WB1JHU 13,760-160-43-B-14

WB1HSN 2559-50-21-A-2

WB1JZD 2438-45-66-B-23

WB1JHO 1863-23-15-A-2

WB1JGA 1650-21-13-B-7

WB1JVV 1446-51-13-A-16

WB1IJO 1180-10-9-B-1

WB1ZTN/1 200-10-8-A-1

WB1CP* 90-6-6-A- -

WB1EXO 15-3-2-A-2

WB1ZL 15-3-2-A-2

Poised, witty, charming and articulate, WA0OVW topped often-scarce North Dakota on phone, took second spot on c.w., and also wrote this caption.



Washington

	ROANOKE DIVISION	
K7UKC	97,750-551-72-A-24	
K7VPF	74,506-461-65-A-24	
WA7JCB	36,448-340-19-A-19	K4MPE 88,481-198-71-A-24
W7GYF	31,500-200-61-A-8	WA1FFW 76,410-132-72-A-23
W7EXM	29,946-245-62-B-18	WB4BFX 10,038-152-54-B-13
WA7LFG	28,975-190-61-A-19	W4VON 4762-57-33-B-4
WA7HPK	23,40-173-52-A-21	WN1JQO* 3848-60-27-A-4
WA7TYZ	14,728-137-43-A-11	WN4ILQ 3139-49-27-A-14
WA7EYN	14,288-128-45-A-14	WN4IBY 1374-52-20-A-12
W7FCG	12,000-100-48-A-16	W4WE (WA1CYT, opr.) 40-4-4-A-1
WA7JPC	7600-80-38-A-15	
K7BZE	7410-73-39-A-6	W4VC 48,749-334-59-A-22
WTETO	3968-62-32-B-6	K4ZA 39,270-231-68-A-23
WA7BYF	3188-51-25-A-14	WB4JEZ 38,290-227-66-A-19
WN7KOB	2063-45-22-B-15	K4WJT 123,375-658-75-A-24
WA7GYR	444-19-12-B-1	K6QPH/4 74,308-113-71-A-13
WA7ACQ	440-16-11-A-3	WB4CPE 42,25-1260-65-A-13
WN7KWF	200-19-5-A-19	W4YFQ 1496-32-19-A-12
WN7ITG (2 oprs.)	1575-37-20-A-13	

PACIFIC DIVISION

	East Bay
K6VVA/6	105,968-603-71-A-23
WB6TOJ (WB6HJDH, opr.)	
	58,558-37-67-B-23
W6KG	57,312-398-72-B-16
K4RAD/6	57,183-343-66-A-24
WB6BBC	21,840-184-54-A-19
W4BWD	13,300-143-38-A-18
W6DOD	9000-100-45-B-12
WN6DIL*	8170-86-38-A-19
WN6FWJ	5033-65-33-A-23
WN6OBZ	2025-46-20-A-19
WN6IQX	578-26-11-A-11
W6CU	144-9-8-B-1

Hawaii

KH6GPQ	54,940-328-67-A-9
K2SSX/KH6	39,595-249-62-A-8
KI6AA	12,320-131-47-B-18

Nevada

K7KIA	72,381-530-69-B-23
WN7KQS	2475-57-20-A-23
WA7BAV	120-15-8-B-8

Sacramento Valley

WA6SVY	70,000-501-70-B-24
W6EGX	59,415-350-68-A-21
WA6JDT	16,930-108-50-A-9
W6NKR	6460-76-34-A-6
WN6JZV	1348-41-58-A-13
W6VUZ	938-25-15-A-2

San Francisco

W6BIP	66,952-158-72-B-24
WB6WPZ	30,525-205-60-A-22
W6WLW	30,140-189-62-A-20

San Joaquin Valley

WA6IVN	129,315-708-74-A-24
WB6WKR	38,880-252-64-A-*
WB6RSS	27,056-190-55-A-15
W6HYK	31,000-100-31-B-6
WB6WGR	2440-36-26-A-4
K6DNY (K6DNY, WB6WQV)	30,233-209-58-A-12
	61,755-152-69-B-23

Santa Clara Valley

K6EBB	103,320-57-172-A-21
K4HVD/6	51,870-100-65-B-13
K6VOQ	45,788-281-06-A-17
W6GJV	41,659-265-63-A-23
WA6LFA	37,840-286-61-B-22
WB6VBV	30,233-209-58-A-12
WAGCR	17,340-136-51-A-16
W6HUP	9458-98-39-A-10
K6LKG	5410-64-31-A-4
W6IGU	1318-31-17-A-4
W6EZPC	650-21-7-A-6
WA6GZG	114-7-7-A-5
WB6RGR (WB6VPV, WB6s RGR)	31,930-207-62-A-*
WLE)	

North Carolina

K4MPE	88,481-198-71-A-24
WA1FFW	76,410-132-72-A-23
WB4BFX	10,038-152-54-B-13
W4VON	4762-57-33-B-4
WN1JQO*	3848-60-27-A-4
WN4ILQ	3139-49-27-A-14
WN4IBY	1374-52-20-A-12
W4WE (WA1CYT, opr.)	40-4-4-A-1

W4NH	56,229-357-63-A-13	WR4GDO	12,863-147-35-A-12
W4MYA	55,590-327-68-A-17	W4YZC	10,703-100-39-A-4
W4TKR	51,251-315-68-A-20	W4GHW	4456-59-31-A-10
W4ZM	51,880-318-64-A-*	WB4HF	2375-50-19-A-4
W4EZ	51,260-361-70-B-15	W4SPQ	1665-38-18-A-9
K4CG (WB4KPW, opr.)	50,173-330-61-A-24	W4HFH	1013-3-2-A-1
		WB4KFF	538-22-10-A-4

ROCKY MOUNTAIN DIVISION

West Virginia

W4VC	48,749-334-59-A-22	West Virginia
K4ZA	39,270-231-68-A-23	
WB4JEZ	38,290-227-66-A-19	W8HRQ
W4GF	38,250-250-58-A-12	60,390-396-61-A-23
W4JAT	33,152-250-64-A-13	W3EYF
WB4HRA	31,593-279-44-A-22	8-237-25-37-A-21
W4GTS	30,703-216-55-A-11	WB83KIC
K4RDU	30,209-256-59-B-16	11,083-109-37-A-21
W4RAE	29,640-247-60-B-17	
WB4BV	28,785-205-57-A-11	Colorado
W4WBC	28,000-200-56-A-12	WA6CVS
W4KXV	25,861-183-57-A-9	W6LRN
W4PNK	24,150-173-56-A-8	77,661-60-145-A-23
W4WRM	21,856-178-17-A-11	K7NHF/0
W4BFA (W4ZCY, opr.)	20,118-222-16-B-9	KMEDG
	13,278-114-17-A-15	W6UAT
K4JYM	9,WGATA	39,513-237-65-A-15
W4TFX	13,056-129-51-B-9	W9KRG
		38,198-233-66-A-14
		27,668-219-51-A-14
		WA0SNL
		17,875-125-51-A-10
		WA0AMR
		10,519-96-15-A-17
		W0KAU
		12,403-59-29-B-2
K0MIC (4 oprs.)		K0MIC (4 oprs.)
		41,344-278-63-A-20

New Mexico

W5QJH	101,410-703-72-B-24
W5QNY	67,503-405-67-A-24
W5DZA	43,249-310-57-A-19
K5MAT	30,271-200-61-A-12
W4SROU	5200-65-10-B-11
WN5TVO	4083-61-30-A-16
WA5TPK	3105-47-27-A-8
WN5UCY	770-30-14-A-10

Utah

WA7KUW	121,611-682-71-A-24
K7CLS	80,920-477-68-A-24
W7CYH	78,553-163-67-A-23
W7BAJ	13,624-131-52-B-10

Wyoming

WA7FHJ	70,324-453-63-A-23
WA7CLF	49,100-296-65-A-19

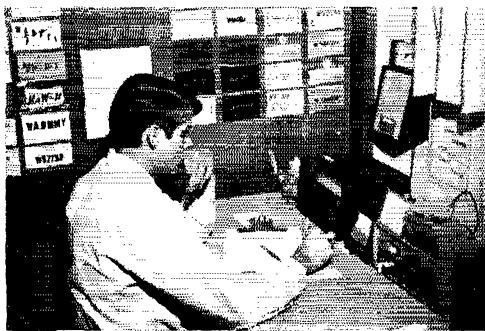
DIVISION LEADERS

C.W.

Single Operator	Multioperator	Single Operator	Multioperator
K4GSU/3	W3WZL/3	Atlantic	W3GRF W3ZH
W9LKJ	K9VBW	Central	W9YT W9BGX
W0YCR	WA0PRL	Dakota	WA0CPX WA0CJU
K4PUZ/4	W5HGT	Delta	W5WMU WA4JCF
W8WPC	WABLYF	Great Lakes	K8DOC K8RMK
W1BGD/2	W2GLQ/2	Hudson	K2RLM W2SZ
WA0EMS	WA0TKV	Midwest	WA0SDC K0UKN
K1LPL	W1ET	New England	K1JHX K3YFD/1
K7UKC	WN7ITG	Northwestern	K7UKC WA7FID
WA6IVN	K6DNY	Pacific	WA6IVN K7ZRZ/KH6
K1ANV/4	Roanoke	W4KFC W4CA
WA7KUW	K0MIC	Rocky Mountain	K9LBQ/7 K7QEZ
KV4FZ	W1BIH/KV4	Southeastern	KV4FZ W4MCM
W7DI	W6RW	Southwestern	WB6OLD/6 WA6FWF
W5FL	K5LZO	West Gulf	K2EIU/5 K5LZO
VE5US	VE7BXQ	Canadian	VE4SD VE7SV



All hail **WN9WXX** (above), whose 10,250 points led not only Illinois WNs but all 95 Novice entrants. Another fine tally was turned in by **WN7JOG** (below), of Oregon, who amassed 8238 markers in less than 16 hours with the help of a 3-element beam up 40 feet.



WA7EWG 15,588-200-43-A-9 **West Indies**
WA7GYQ 14,330-126-43-A-11 **KV4FZ** 143,283-783-74-A-23
WA7FKD 2002-47-22-B-5 **KP4AST** 37,570-221-68-A-22
WT5QT 1995-38-21-A-6 **K5FKT/KP4** 26,950-196-55-A-20
WIBHII/KV4 (W is BIH PJJ) 77,860-577-68-B- -

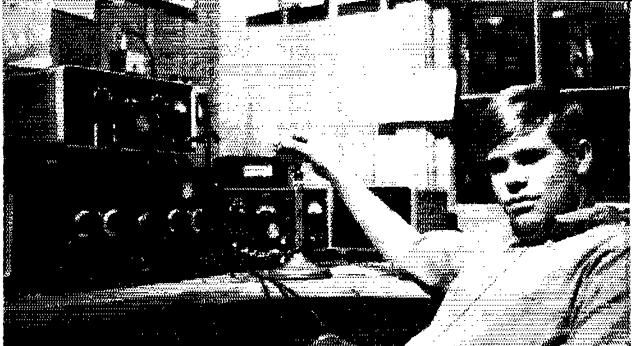
SOUTHEASTERN DIVISION

W4MKU	19,125-153-51-A-17	W4UHI	97,000-520-75-A-22	West Indies
W4GRG	12,396-77-74-B-10	WA4SSB/4	8873-91-39-A-12	
WB4IAKE	7600-100-38-3-21	KR1Y/W4	6992-92-38-A-9	
W4CBG	6018-72-42-B-8	WN4KAW	2025-50-20-A-15	
WB4EOW	3750-60-25-A-11	WN4JFL	10-2-2-A-4	
WB4IYZ (WA1AVUG, WB4IYZ)	12,000-100-18-A-14			

Alabama

Western Florida

WA5RTG has been doing a fine job of keeping Arkansas available in nearly every contest these days. Stan is equipped with S-Line, 4-element Hornet tribander, 40-meter dipole and 80-meter inverted vee.



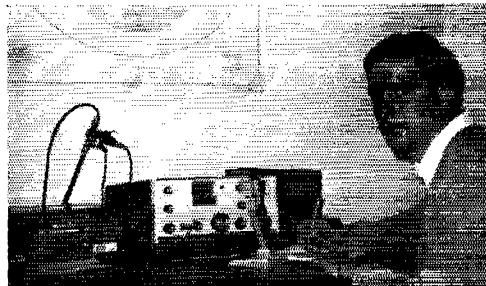
WA3IXF	11,029-135-41-B-20	WB2RCB	65,550-385-69-A-21	CENTRAL DIVISION	WA9TMU	6715-82-34-A-8
K3DPQ	10,500-106-40-A-10	WB2YQH	55,718-323-69-A-19		W9VDB	6300-75-42-B-6
WA3EGD	10,250-100-41-A-6	K2DJD	53,924-399-68-B-18	Illinois	W9EBR	2695-49-22-A-5
K3PSW	10,000-100-50-B-8	W2DIZ	47,970-314-61-A-18		W9DGA	700-25-14-B-1
WA3JKB	9488-129-30-H-9	W2GV	31,309-182-69-A-14	W9BF (WA8MOG, K9ULF)	48,348-361-68-B-17	
K3GYS	7920-96-33-A-6	WB2QAP	28,755-228-61-B-16	W9YYG (WA9QUN, opr.)	41,790-300-70-B-15	
WA3CAID	7379-97-31-A-14	WA2BEX	19,305-198-39-A-11		W9YB (4 oprs.)	26,130-201-52-A-21
W3EQA	6799-75-37-A-5	WB2VDX	17,024-134-64-B-10	W9DOB (WA8IJZ, opr.)	48,348-361-68-B-17	
K3LJZ	4991-61-33-A-4	K1DIK/2	15,628-138-53-B-13	K8MFD	80,190-418-72-A-24	
WA3HJR	3815-55-28-A-7	WB2VHT	14,973-114-53-A-13	W9YGN	73,663-418-71-A-18	
W3FIIR	1805-48-19-B-6	WB2VVK	13,685-119-46-A-12	W9GEG	59,625-399-75-14-24	
K3LBG	140-10-7-B-1	WB2BSI	10,689-112-35-A-13	K9BGL	57,780-419-68-B-19	
K3MTK (5 oprs.)		WB2SSC	9,250-125-37-B-4	K9HDL	53,960-304-71-A-21	
	19,200-413-48-A-22	WB2HDM	9,243-120-39-B-21	WA9RAT	45,225-348-67-B-16	
WA3CNM (WA3 CNM HED)	37,274-285-51-A-16	WA2GQF	8715-83-42-A-13	W9YWX	42,140-301-70-B-16	
WA3JQX (WA3B IBD JQX)	3645-81-18-A-24	K2KIR	7380-82-36-A-3	W9RAQ	4,880-355-60-B-22	
WA3FAZ (WA3B FAZ KIQ)	1088-32-17-A-5	K2KTK	6800-85-40-B-4	W9KVF	40,300-260-62-A-22	
<i>Maryland-D.C.</i>		K2OVI	6565-101-26-A-4	W9AUAG	38,365-282-53-A-24	
W3GRF (KIANV, opr.)		WB2ALY	3011-53-29-A-13	W9YQT	32,000-200-63-A-14	
	13,549-715-75-A-24	WB2FZG	2150-35-38-A-5	W9GYN	31,800-179-70-A-19	
W3AZD	117,238-803-73-H-24	WB2ZCZ	2000-42-29-B-6	W9CHC	28,386-252-57-B-12	
WA3AMH	91,620-509-72-A-24	WB2RJJ	1785-34-24-A-3	W9AHD	27,645-198-57-A-18	
W3IN	86,215-194-69-A-23	WB2ABV	1025-5-2-A-1	W9YWX	22,134-184-62-B-8	
W3CBJ	80,730-470-69-A-24	W2EWO	488-15-13-A-3	W9DRE	15,998-120-54-A-16	
W3KMV	63,561-378-67-A-24	WA2YFB (WA28 ADU YFB,	WA9QCH	15,375-159-41-A-11		
W3ALVB	61,776-429-72-B-16	WB2GPR	11,760-106-44-A-15	K9BQL	14,700-150-49-B-12	
K3WUW	61,668-380-65-A-17		WB2GPR	9WJTT	12,200-122-50-B-10	
WA3IJR	61,543-397-61-A-24			WA9TKK	11,070-83-54-A-11	
K3JYZ	57,800-355-64-A-15					
WA3GLP	56,388-347-65-A-24					
K3NIPV	36,123-223-63-A-9					
W3EUE	29,700-198-60-A-15					
WA3LKII	28,028-286-49-B-17					
W3TVM	25,080-170-62-B-12					
WA3KEG	17,262-137-63-B-8	K2EIU/5	793	KV4FZ	1000	
W3GK	17,172-160-54-B-7	KV4FZ	783	W8SH	939	
W3TRE	15,195-134-37-A-16	K4GSU/3	754	W2RLM	935	
W3AXW	15,195-110-49-B-7	K4FSL	752	W4ETO	935	
W3CRE	11,760-112-25-A-2	W4KFC	749	K2EIU/5	933	
W3J1P	11,600-106-44-A-15	K1ANV/4	721	WA0SDC	877	
WA3JRA	10,094-103-49-H-12	K1LPL	711	WA0EMS	868	
WA3IZC	9458-97-39-A-9	WA6IVN	708	KP4AST	859	
W3FA	9245-97-34-A-6	K3NPV/4	702	K4RIN/5	855	
W3AWN	8800-110-40-B-9			WA6IVN	848	
W3FSF	7094-63-39-A-12					
W3ML	7020-72-39-A-5					
W3CSZ	5600-71-32-A-6					
W3MFJ	4240-53-32-A-6					
W3HII	3876-57-31-B-7					
W3PWO	3816-53-36-B-6					
WA3GKII	3465-64-22-A-7					
W3DPJ	2160-49-18-A-2					
W3ZKH (K3EST, ZS2KH)	112,962-757-74-B-24	W2OW (WB2s NJN ONLY)	K9VBW	10,036-109-37-A-13		
W3WZL/3 (2 oprs.)	68,310-502-68-B-24	RHD) (WB2s GYE SMD)	K9TNA	S800-100-42-B-18		
W3FT (7 oprs.)	6851-96-29-A-~	WB2BNM (WB2s GYE SMD)	WA9CUK	8100-90-45-B-11		
		20,500-152-52-A-~	WA9QVE	7260-67-44-A-11		
			WA9VMW	7260-88-33-A-5		
			K9KXK	6082-71-44-B-22		
			WA9UUU	5530-80-28-A-11		
			W9VBV	3600-72-42-B-3		
			W9JNY	3594-58-25-A-6		
			W9RIUH	2380-112-7-A-9		
			WA9QNU/9 (W9YYG, opr.)	1395-31-18-A-2		
				13,978-24-15-A-5		
			W9ZPC	1020-34-12-A-5		
			W9GXC	788-21-15-A-5		
			W9PFD	616-28-11-B-22		
			W9UOK	525-38-6-A-4		
			WA9YVV	525-38-6-A-4		
			W9BGX (K9VHE, W9ICE)	10,156-17-33-A-2		
			WA9VHE	120,818-839-72-B-24		
			W9EUN (WA9 LUD T/A)	YEX)		
			WA9TCW (WA9s TCE, TCM)	68,985-379-73-A-24		
			WA9TCW (WA9s TCE, TCM)	67,275-452-75-B-23		
			WA9TQW (WA9s TCE, TCM)	60,555-370-66-A-23		
			WA9QJU (WA9s TCE, TCM)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA9HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	10,093-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	4440-75-30-A-4		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		
			WA0IAH (K9s LIL ZX)	98,031-565-69-A-24		
			WA0HIRM (WA9s HIRM IAW)	13,750-138-50-B-13		
			WA0UCU	3038-53-30-A-16		
			WA0BFT	2475-50-20-A-7		
			WA0IAW	1225-15-6-A-1		
			WA0CJU (8 oprs.)	101,939-753-68-B-24		



Sixteen-year-old **WA7GWU** (above), helped to make Utah very available on phone with this neat setup driving a pair of 813s; radiation was by means of a Hy-Gain 203BA, TA-32JR, and an inverted vee.

A super location paid off for **WA2CLQ** (upper right), in the form of Eastern New York voice honors in a close race with W2DXL.

North Carolina c.w. leader **K4MPE** (right), poised to attack the pileup for a new section. Phil had a little easier time of it this year with W4NQA (now W1ETU) having left the state to work at ARRL Hq.



WA1CJE (WA1s CJE JAD)

57,493-377-61-A-2

W1CW (W1CW, WA1HOL)

49,615-282-69-A-21

W1YYM (W1s CW YYM, WA1HOL)

20,110-156-49-A-2

WA3HGV/1

23,625-182-51-A-16

W1DPE 18,668-183-52-H-8

WIWMH 7,140-105-31-A-8

W1PLJ 4992-78-32-B-12

W1IUI 4153-76-22-A-8

W1RPF 3375-54-25-A-6

W1AIXL 1890-35-27-B-7

W1AHUK 1210-15-7-B-1

W1AIX (5 oprs.)

62,238-151-69-B-24

W1AHDN (WA1s HDN IODO)

23,919-203-49-A-21

W1KN (4 oprs.)

23,794-208-47-A-18

WA1CJE (WA1s CJE JAD)

57,493-415-66-A-24

W1AKDC 28,478-246-58-B-19

KIGAX 22,684-216-53-B-12

W1GKJ 16,500-132-50-A-12

W1DIB 9250-127-37-B-6

New Hampshire

K1OBT 66,953-189-71-B-23

W1BUT 55,829-380-59-A-16

W1HXL 55,443-332-67-A-18

W1AKDV 51,474-373-69-B-22

W1FZ 28,404-222-62-B-11

Rhode Island

WA1GNQ 17,900-130-52-A-13

W1RFQ 9940-143-35-B-9

W1DK 4200-100-21-B-6

W1VH 3472-622-58-B-7

K1AGA 19,18-18-A-6

K1AMG 172-10-7-A-4

W1LJB (WA1s LJB ILOC)

48,384-378-64-B-24

Vermont

WA1HHN 51,992-400-67-B-15

W1OBX/1 44,818-310-57-A-18

WA1HXU 22,302-208-54-B-12

W1FES 3949-59-20-A-4

K3YFD/1 (7 oprs.)

72,509-414-71-A-24

W1AQ (5 oprs.)

22,495-205-55-B-14

Western Massachusetts

K1KDP 93,312-619-72-B-24

W1YK (KITKS, opr.)

55,690-393-66-A-17

WA1ABW 23,503-193-57-A-13

W1EOR 600-16-15-A-1

W1IRV 240-15-8-B-3

NORTHWESTERN DIVISION

Alaska

K5MIQ/KL7

13,959-149-47-B-15

KL7GJX 1790-48-30-B-5

Idaho

W7CNL 51,460-324-66-A-24

W7HOU 48,351-279-69-A-21

W7IY 3734-70-33-A-16

Montana

W7TYN 65,280-388-68-A-20

WA1ATY

W7NML (W7NML, WA1TQY)

16,402-151-51-B-13

W7NML (WA1TQY)

59,220-423-70-B-21

W7HDD (W7HDD, IAL)

56,700-360-63-A-17

W7FO/T (14 oprs.)

36,600-240-61-A-24

Oregon

K7WWR 92,340-565-72-A-23

W7FJZ 13,644-109-58-B-18

Washington

K7UKC 116,314-814-72-B-24

WA1EFU 194,500-600-75-B-24

W7FOE 101,309-596-69-A-24

W7CXD 20,235-255-60-A-12

W7LFG 20,125-142-57-A-17

W7JCH 16,600-140-56-A-15

W7FCG 19,250-140-55-A-20

W7JRY 16,800-112-60-A-17

W7CJL 12,200-108-49-A-8

W7HPK 4725-54-35-A-11

WA7ACQ 1378-29-19-A-3

WA7IYX 1330-28-19-A-4

W47GYR 1026-27-19-B-1

W7ATFID (4 oprs.)

63,030-386-66-A-19

K7NWS (W7WNY, WA787)

FHG JBM

15,912-156-51-B-8

PACIFIC DIVISION

East Bay

K6TWT 56,280-420-67-B-23

W6KGG 45,292-338-67-B-15

W6DOD 42,336-336-63-B-19

W6ABWD 25,383-207-51-A-19

WB6TZQ 2768-41-27-A-2

Hawaii

KH1GPQ 83,780-472-71-A-10

KH1GLU 37,879-247-63-A-14

KH16AA 9546-113-43-B-14

KH16GLP 8480-108-40-B-15

K7ZRZ/KH116 (4 oprs.)

81,322-564-73-B-20

Nevada

WA7BAV 61,820-468-70-B-24

K7YUJ 52,468-345-62-A-16

W7TZL 29,574-239-62-B-10

Sacramento Valley

WB6UVH 54,615-331-66-A-22

WB6INP 47,950-275-70-A-22

WB6MZN 47,980-267-71-A-15

WB6JDT 10,169-129-57-A-14

WB6VSC 17,480-189-38-A-17

W6NKR 2683-37-29-A-2

San Joaquin Valley

WB6IP 68,620-470-73-B-22

WA6CPY 30,240-244-63-B-18

San Joaquin Valley

WA6IVN 155,863-848-74-A-24

K6JRR 60,465-33-74-A-27

WB6MJC 34,100-224-62-A-12

WB6RYA 10,973-106-12-A-17

W3HYK 3232-51-32-B-1

WB6RSS 1090-6-6-A-6

San Francisco

K4BVD/6 112,650-754-75-B-22

K6VGW 50,375-397-65-B-21

K6LKG 4880-61-12-A-6

W61GU 1925-35-22-A-10

W6YL (9 oprs.)

59,478-432-69-B-24

Santa Clara Valley

K4BVD/6 112,650-754-75-B-22

K6VGW 50,375-397-65-B-21

K6LKG 4880-61-12-A-6

W61GU 1925-35-22-A-10

W6YL (9 oprs.)

59,478-432-69-B-24

North Carolina

WA4FFW 69,414-510-69-B-20

WA1CYT, (opr.)

10,200-103-104-A-7

W4FV 6766-101-31-B-7

W4DM 6766-211-21-B-1

W4FV 624-20-16-B-3

W4DM 88,600-616-70-B-23

W4FV 91-7-7-B-1

WA1CYT/4 8-2-2-B-1

W4FV 91-7-7-B-1

W4FV 91-7-7-B

Eastern Florida

WA4ETO (WA4LUG, opr.) 92.201-511-69-A-24
WA4UFW/4 92.201-511-69-B-22
WA4JFP 64.994-477-69-B-19
WA4JJD 52.768-405-6X-B-19
WA4JLE 31.303-243-63-B-14
WA4JIO 26.622-230-58-B-13
WB4FLW 20.625-162-50-A-17
W4PKL 20.620-97-50-B-17
WB4IAE 6300-71-36-A-6
WA4NYJ 4080-102-40-B-6

Georgia

K4VUD/4 45.773-370-51-A-23
WB4KGJ 32.610-205-64-B-24
K4HAV 31.200-208-75-B-20
W4TYE 30.280-244-60-B-12
W4MCM (K4DJK, W4MCM) 138.450-923-75-B-24
WB4EMF (WB4S EMF HUO) 44.352-336-66-B-22
WB4AYP (WB4S AYP GDO) 30.680-236-52-A-19

West Indies

KV4FZ 187.500-1000-75-A-23
KP4AST 128.850-859-75-B-24

Western Florida

WA4IVY 77.280-565-69-B-24
K4OSE 64.610-427-71-B-21
WA4RKK 26.640-167-64-A-12

SOUTHWESTERN DIVISION*Arizona*

W7UDG 86.013-500-70-A-18
W7FCM 27.878-190-59-A-11
K7UHN 36.483-251-57-A-18
K7NHL 553-17-13-A-3
WA7IFD (WA7Y DUB IFD) 52.560-443-60-B-12

Los Angeles

WB6OLD/6 101.643-569-71-A-24
WB6UHF 84.340-464-72-A-24
K6HEP 70.350-406-70-A-24
WB6GEN 60.350-340-71-A-16
K6MP 38.305-427-69-H-16
K6YFZ 52.095-304-69-A-22
WB6KPN 50.456-294-69-A-16
WB6YNL 41.319-301-55-A-19
WB6LAT 38.506-253-61-A-17
WB6ZEP 32.200-221-60-B-21
WA6STJ 27.563-175-63-A-24
W6RCV 18.036-167-54-B-12
W6DQX 14.688-154-18-B-10
W6AG 13.536-152-17-B-14
WB6NFO 13.268-88-61-A-18
WB6WUV 9848-101-39-A-13
WA6MIC 6622-77-43-B-7
WA6DPF 3375-20-27-A-7
WB6WFX (WB6S TAH WF) 47.250-300-63-A-22
WB6TVH (WB6S CNA TVH) 30.385-200-59-A-20
WB6UJU (WA6CSD, WB6S JU) ZMI
 43.588-196-51-A-19
WB6SLU (2 optrs.) 12.263-109-45-B-14

Orange

WB6YHV (K6TJJ, opr.) 79.735-438-74-A-22
WA7FHD/6 29.070-171-68-A-18
WA6HKW 27.776-226-62-B-12
KH6ASQ/V6 26.964-204-53-A-16
WB6YBL 16.953-164-42-A-16
WB6ZCO 13.983-119-47-A-12
WA6WFW (WA6WFW,
WB6YXA) 54.944-404-68-B-22

San Diego

WB6CWO/6 60.434-151-67-B-21
WB6KDF 41.789-337-62-B-16
WB6VA 12.220-105-17-A-9
K6SDR 6498-88-38-B-3
WA6DUP 2378-41-29-B-6

Santa Barbara

WB6ULR 83.638-590-71-B-22
WB6AQW 16.695-127-53-A-7
WB6TA 11.750-100-17-A-7
WB6RFU (WA6JXH, opr.)
 7875-77-42-A-7
W6BHZ (multiopr.)
 52.190-315-68-A-24

WEST GULF DIVISION*Northern Texas*

WA5QXD 135.235-732-74-A-24
K5RHZ 130.488-715-73-A-20
W5ZO (K9RHIN, opr.)
 83.973-613-69-B-22

Southern Texas

K5YAA 71.485-434-68-A-18
W5QZQ 44.760-274-64-A-18
WA5LUM 44.419-260-69-A-11
WA5LSM 33.875-295-60-A-17
WA5POK (WA5LZO, WA5LES)
 20.796-168-63-A-12

Oklahoma

W5PWG 106.375-575-74-A-23
WA5RYM 61.473-359-67-A-18
WA5TSL 30.835-239-51-A-16

CANADIAN DIVISION*Alberta*

VE6AGV 41.688-299-58-A-14
VE6MA 39.588-246-63-A-17
VE3FQJ/W6 13.020-110-84-A-12
WSILH/VE6 6503-78-34-A-5

British Columbia

VE7XF 9240-88-42-A-7
VE7AQT 8348-82-42-A-11
VE7SV (VE7 LIG SV)
 65.808-457-72-B- -

Manitoba

VE4SD 55.251-452-63-B-20

Ontario

VE3BOG 34.770-285-61-B- -
W8JKD/VE3 9810-109-45-B-14
WA2GKE/VE3 3651-70-33-A- 6

VE3DPG 3528-63-28-B- 8
VE7HQ 1026-27-19-B-12
VE6FOX (4 optrs.)
 39.760-341-57-B-21

Quebec

VE2BJ 1225-35-14-A- 3

Saskatchewan

VE5TO 34.069-201-65-A-22

Yukon-N.W.T.

VE6AS 20.634-181-57-B-16

Check logs:

W1ZD, **WA2DEY**,
W4JZZ, **W4MYA**, **WA7IIQ**,
KL7GCV

Disqualification

In accordance with Sweepstakes Rule #7, the phone entry of WA3GJU has been disqualified because of log discrepancies. **[OST]**

ARE YOU LICENSED?

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

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1BKY, Manley E. Wood, Seabago Lake, Maine.
W1CAU, Kendall S. Curtis, Saugus, Mass.

K1CEO, Andrew J. Parasso, Newburyport, Mass.
K1FYI, Carmine DeLorenzo, Revere, Mass.

W1HCL, George E. Sprague, Quincy, Mass.
 ex-1PX, Albert W. James, Manchester, Mass.

W1PWN, ex-W9CKP, Bob Willits, Boston, Mass.
W1QBSE, David G. Ford, Wallingford, Conn.

W2AFI, Ransford Ferris, Wappingers Falls, N. Y.
W2AZS, Charles Bouteiller, Locust Valley, N. Y.

W2IGY, David Broadhead, Mayville, N. Y.
W2PRG, Thomas W. Stewart, Merchantville, N. J.

W2TNT, C. Louis Gray, Hackettstown, N. J.
W3CJG, Frank J. Assante, Bowie, Maryland.

W3HBE, Charles P. McNemar, Jr., Wilmington, Delaware.

W3QYE, Jack B. Wagner, Lewistown, Pa.
W3UH, Dr. Arthur A. Cope, Hamburg, Pa.

W3VZA, William Freker, Pittsburgh, Pa.
W4CSX, James E. Tramel, Nashville, Tenn.

W4FKN, Russell A. Law, Atlanta, Ga.
K4LWT, William H. Sexton, Nashville, Tenn.

W4PQP, William T. Meiers, Nashville, Tenn.
W5ALZ, Hal Worrell, Jackson, Mississippi.

W5ARZ, William E. McCormick, Wynne, Arkansas.

W5NSN, John Brooks Braffett, Albuquerque, N. M.
K5PAT, Chester Wathen, Anthony, N. M.

K6RWK, William M. Baugh, Richardson, Texas.
W6AA, Cecil Cronkhite, San Diego, Calif.

W6BJ, Jasper D. Hossack, Sacramento, Calif.
K6MTX, Elton J. Jones, Cupertino, Calif.

K7CJZ, Floyd F. Black, Sparks, Nevada.

K7DFR, Eddy S. Geddes, Greenacres, Montana.

W7LZJ, Hamilton Rhodes, Edmonds, Wash.

W7OZR, Barney L. Nelson, Yakima, Wash.
W7UFR, Dilburn Tussing, Bend, Oregon.

W7ZI, Charles F. Brown, Yakima, Wash.

W8AZD, Chester Gresak, Benwood, W. Va.

W8COW, Jesse O. Ellison, Saginaw, Mich.

K8JBN, Almon Yager, Clyde, Ohio.

K8KCL, Phil E. Rech, Jr., Ferndale, Mich.

K8LYF, Robert L. Spitzer, St. Joseph, Mich.

W8MCC, Harold I. Swart, Greencush, Mich.

K8TWL, Manus Blackburn, Hopkins, Mich.

K8VID, Bristol G. Gross, Padon City, W. Va.

K8WFR, Frank White, Logan, W. Va.

W8WS, Coy V. Patterson, Kalamazoo, Mich.

WA9IIR, John L. Annerson, Weyauwega, Wisc.

K9IGS, Richard Hawkins, Terre Haute, Indiana.

ex-9IL, Ralph R. Batcher, Douglaston, N. Y.

W9LYG, Evan E. Richards, Waynesville, Ill.

WA9MCP, Paul J. Koenig, Wheaton, Ill.

W9PA, Millard J. Threlkeld, Chicago, Ill.

W9PYM, Joseph T. Collins, Mequon, Wisc.

W9RQF, Frank Bowlin, St. Charles, Ill.

W9RVF, Glenn E. Walkington, Alton, Ill.

K9UNZ, Ernest Buckley, Evanston, Ill.

W9VES, Phillip Simmons, Evanston, Ill.

K9WRK, Clifford Owens, Jeffersonville, Ind.

K9YRI, Clyde Hummell, Canton, Ill.

K9GFL, Roy M. Verdon, St. Paul, Minnesota.

W0GKN, Carroll D. Little, Bedford, Iowa.

W0HUB, Albert W. Oliver, Hutchinson, Kansas.

K9MEJ, Lester E. Tourbier, Manhattan, Kansas.

PY1HO, General Roberto C. A. Jatahy, Rio de Janeiro, Brazil.

G3CCW, C. C. Wilson, Liscard, Wallasey, Cheshire, England.

VE3FOV, T. C. D. Churchill, Carrying Place, Ontario, Canada.

VE3LJ, Valentine Sharp, Markham, Ontario, Canada.

VK3NB, A. Nickerson, Camberwell, Victoria, Australia.



April 1944

... Light-beam communication makes the front cover, which shows Hollis M. "Deke" French, W1JLK, squinting through his "rig." This is a battery-operated portable affair and may be used for either voice or blinker communication. Voice modulation is accomplished by varying the filament current of the lamp. Believe it or not, this works, although the percentage modulation is very low.

... K. B. Warner addresses his remarks this month to servicemen-hams overseas. He pleads with a very small minority who can't help rag-chewing on military channels and to those who can't keep their screwdrivers in their pockets — always trying to "improve" a rig when it doesn't really need it. In some up-front areas monitoring stations have had to be set up and those caught are dealt with in ways known to the military. By and large, though, the hams are doing a bang-up good job and their experience is invaluable when quick and emergency repairs are in order.

... The Alaskan Communications System is described by T/4 Gail Fowler. Hams are, of course, on hand and many of the combat and other incidents are related. Pretty bleak place, the Aleutians.

... For the advanced constructor, A. D. Mayo, Jr., W4CBD, describes a 12-tube superhet with bandspread and general coverage. While I'm not going to read through this completely with a view to building one, it is apparent that here is a real rig of professional quality that some of us left at home might consider. Boy, the bottom view of this affair indicates that a lot of planning went into the placement of parts, etc.

... Paul M. Segal, our general counsel, has at his own request been ordered to active duty in the Pacific theater. He will serve in the Special Projects section of ODNC.

... Jack Gould, in his feature column in the N.Y. Times, has some sympathetic remarks concerning the radio amateur, pointing out what a job they are doing in the armed services. In the post-war scrambling for frequencies with all sorts of pressures from this, that or the other claimants, let it not be forgotten that the radio amateur has earned his salt.

... Well, let's have a little technical discussion. Dr. Truman A. Gadwa, W2KHM, talks about ohmmeter circuits. I know a couple of hams who might very profitably read this article.

... More on light beams, etc. Frank Williams, W6LUE, gives some good pointers on focusing, adjusting the position and orientation of filament, etc.

... We have a couple more stories on Hams In Combat. I should like to see these, in due time, all put together. They would make interesting and exciting reading. A. C. Jones, W3NE, finally got a job as radio operator on a tanker. There was plenty of action round and about, especially in the Caribbean. — WIANA

ARRL QSL Bureau

The function of the ARRL QSL Bureau System is to facilitate delivery to amateurs in the United States, its possessions and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about $4\frac{1}{2}$ by $9\frac{1}{2}$ inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below: W1, K1, WA1, WN1 — 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, W3KKT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.

W4, K4 — H. L. Parish, K4HXF, RFD 5, Box 804, Hickory, North Carolina 28601.

WA4, WB4, WN4 — J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.

W5, K5, WA5, WN5 — Hurley O. Saxon, K5QVII, 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.P. Box 555, Portland, Oregon 97207.

W8, K8, WA8, WN8 — Paul R. Hubbard, WA8CXY, 921 Market St., Zanesville, Ohio 43701.

W9, K9, WA9, WN9 — Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60216.

W0, K0, WA0, WN0 — Alva Smith, W0DMA, 238 East Main St., Caledonia, Minnesota 55921.

KP4 — Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, P.R. 00902.

KZ5 — Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.

KH6, WI6G — John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, Hawaii 96701.

KL7, WL7 — Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.

VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N.S. VE2 — John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.

VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.

VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.

VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.

VE6 — Karl Tettehaar, 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.

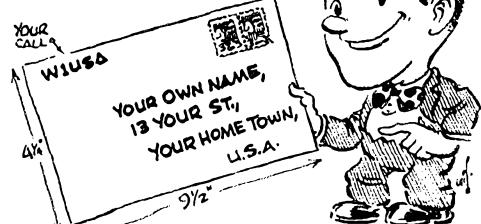
VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newfoundland.

VO2 — Goose Bay Amateur Radio Club, P.O. Box 232, Goose Bay, Labrador.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

* These bureaus prefer 5 x 8 inch or #50 manila envelopes.

**IS YOURS ON FILE
WITH YOUR QSL MGR?**



AMATEUR RADIO PUBLIC SERVICE



In the Public Interest, Convenience, Necessity

HRH

CONDUCTED BY GEORGE HART,* W1NJM

Emergency Check List

THE recent northeaster which howled through New England and the Middle Atlantic States paralyzed traffic flow and closed many businesses (including your headquarters) for one day, but fortunately there was no cut-off of communications. If there had been, how many amateur stations would have been able to operate?

A good question. How about you? Is your station 100% dependent on commercial power? Electric power is so dependable, these days, that more and more we are taking it for granted, burning our independence bridges over it behind us. If or when electricity does fail, the problem is now not so much how to put up with the inconvenience; it is closer to *survival*. Houses cannot be heated. There are no cooking facilities, no hot water or in many cases no water at all, no lights, no refrigeration — not even television! And in better than 90% of the cases, your regular station equipment is inoperative. After all, what is the percentage in the investment in an emergency generator when commercial power is available 99.9% of the time? Especially investment in a generator large enough to supply the full requirements of the average home, these days?

Yes, indeed, should there be a blackout such as that which occurred unexpectedly a few years ago in the entire northeastern area, only a small handful of amateur stations would be capable of operating. The matter should be given some consideration by every public-service-conscious amateur. Try asking yourself the following questions:

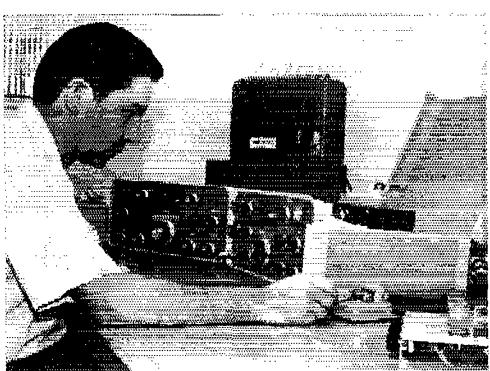
- 1) If electricity were suddenly cut off, could I put *any* amateur equipment on the air?
- 2) If I could, am I prepared to utilize it intelligently? That is, do I know where the local nets operate, am I familiar with their procedure, have I kept in touch with the local preparedness leaders? Am I registered in AREC or RACES?
- 3) How about mobile gear? If I have gear installed in the car, how long would it take me to get to it and put it into operation in an emergency? If not, how long would it take me to install it?
- 4) How about portable gear? Do I have units that can be quickly transported to a place where emergency power is available that can be put on the air in a jiffy? Pre-cut antennas, complete with any necessary quick-installation or erection gimmicks? Pre-arranged agreements with agencies

or other concerns or organizations where I could borrow the small amount of power and space necessary to operate a modest transceiver for local v.h.f. contacts?

5) If I do have some capability in the above areas, am I prepared otherwise to sally forth on missions at the request of local amateur or other leaders? Tools ready? First aid kit? Car gassed up? An emergency supply of food ready to throw in car? Drinking water? Eating utensils? Clothing, blankets, tooth brush, etc., in case I have to stay out overnight? Mike, key, headphones, pencils, pads, flash light? Identification? Special signs or placards to help get me through police road blocks if necessary? A million and one things may be needed that will be overlooked if the call is sudden and urgent. Think of them *now*, and at least make a list of them. Even better, keep most of them "at the ready" at all times.

Does the above sound somewhat reminiscent of Field Day? It should. Going out on an emergency mission is a lot like going out on FD, but is a lot more hurried and serious. Nevertheless, FD preparations are good practice. Make a list of things you will need, this FD, then time yourself on how long it takes to collect them, throw them in the car and be on your way. If it takes over an hour, this is too long. A half hour should be sufficient, if you are well organized.

If nothing else, make yourself an emergency check list and keep it at your operating position or somewhere handy. When or if the call to action comes, you won't have suddenly to try to recall what-all you need. What's that you say?



K6KOL Roy holds an Official Relay Station appointment and is active on the Northern California Net.

*Communications Manager, ARRL

You're too old to be going out on an emergency mission? Rubbish! Even if you are, your check list may be useful to someone who just hasn't bothered.

How To Join ARPSC

Subsequent to the latest "scolding" we delivered to the amateur fraternity in general for not being well prepared (Jan. *QST*, p. 58) a letter was received saying, in effect, that this is all very well, but why don't we tell someone just *how* to join these emergency-preparedness groups we talk about all the time?

A most valid point. There are more potential joiners than there are potential leaders, but any information directed at the former is just plain incomplete without instructions on *how* to do what we are exhorting them to do.

How to join AREC? See your local ARRL emergency coordinator. Who is he? You can get this information readily from your SEC, SCM (see p. 6) or from headquarters. Sometimes (alas, all too often!) there is none, in which case your AREC registration will be kept on file by your SEC until or unless you or some other registrant in your vicinity steps up. Your willingness to participate is a good step and should be known, even if neither you nor anyone else in the vicinity has a willingness to lead. But *someone* has to lead, or there can be no AREC unit. Where this is the case, it is a problem to be solved by all you joiners.

How to join NTS? See your net directory, copy free from headquarters. As an AREC member in an active AREC group, you may already have an NTS connection and not even know it, through your local AREC net. However, your participation at section level would also be helpful. Just fire up the rig and report into whatever NTS net is operating in your section or covering it. NTS nets are listed with a double asterisk.

How to join RACES? See your local c.d. director, or your RACES radio officer if you know who he is. RACES is implemented by civil defense, but recognized by ARRL as a part of the ARPSC establishment; other than such recognition, and the desirability of coordination with AREC, there is no direct connection except as may be worked out at local level.

Information on "how to join" would not be complete without mention of the many other amateur public service groups not officially sponsored by the League that operate at various times and on various amateur bands. Your net directory can be of inestimable help in locating such groups if you find, for one reason or another, that you cannot take part in one of the ARPSC divisions.

And lastly, some mention should be made of MARS, which is a public service utilizing amateur operators but isn't exactly an amateur service. Each of the three armed services operates its own MARS program and "how to join" involves a multiplicity of addresses. Headquarters can supply you with a small MARS



John, W4PFP, is Phone Activities Manager of the Tennessee Phone Net.

informational leaflet which contains all addresses.

East Coast Amateur Radio Service

Hard on the heels of our information on the Midwest Amateur Radio Service, we now have further news about ECARS. Like WCARS and NIWARS, it operates on 7255 kc. from 0730 EST/EDT until band conditions start to deteriorate in the evening, under the direction of K1LTO, and for the same purposes — reporting of traffic accidents, getting aid to stranded motorists, reporting of hazardous weather or driving conditions and similar activities.

"All interested amateur radio operators," says the release by Public Relations Director W2CFP, "may become registered members of ECARS by sending two self-addressed stamped envelopes and a QSL card to ECARS, Radio Station WBZ, Boston, Mass. 02134. Among the activities planned for ECARS are organized liaisons with local and state police officials throughout the east coast states and as far inland as Indiana, Kentucky, Tennessee, Alabama, Mississippi and Louisiana. It is hoped that eventually the service will be able to publish a directory listing phone numbers of these various law enforcement agencies and other pertinent information for use as reference material by the stations monitoring the service frequency. Further information about ECARS may be obtained by contacting WA1KRN at the above address or David G. Flinn, W2CFP, 10 Graham Road West, Ithaca, N. Y. 14850."

We urge all amateurs, both fixed and mobile, who operate 40 meters daytimes, to check in on 7255 kc. and participate in this worthwhile activity. — *WINJ.M.*

Public Service Diary

On Nov. 19, while mobiling on two meters, VE2ALE came upon a three car accident at exit 21 of the Trans-Canada Highway in Montreal. VE2AKM, who was on frequency, notified the Provincial Police, who in turn dispatched a cruiser to the scene. VE2BU passed the accident a few minutes later and reported the police car had arrived. — *VE2ALE, SEC Quebec.*

WELCOME RADIO AMATEURS



On January 12 an AREC meeting was held in Louisville, Kentucky, to help plan for the SET, and to discuss other matters. Some of the officials attending were, left to right, K4AVX, K4YZU, W4VYS, W4OYI, W4BAZ, W8WC, WA4AGH, K4TRT and W4OTP.

At 1720 GMT on December 15, VE6AWN, EC for Calgary, Alberta, received a phone call from the city police requesting communications aid in the search for a lost six year old boy. Base stations on 75 and two meters were set up in a communications van. At 0400 police advised the amateurs to secure, even though the child had not been found. About twenty amateurs participated in the operation. The child was located, several hours later, with relatives who hadn't been aware a search was under way. — VE6AWN, EC *Calgary, Alta.*

At 1740 GMT on Dec. 16, YV5AAZ checked into the Coast Guard Net and advised NCS K4CG that an 11-year-old girl in Caracas was dying of a rare disease and that certain drugs were needed to save her life. The Food and Drug Administration in Washington was contacted, and advised that the requested drug was experimental and was not generally available. In addition, there was some governmental red tape that had to be cut in order to supply the drug.

The following morning, YV5AZC contacted K4CG in the Intercontinental Amateur Radio Net. W4ZXC, located at the Veterans Hospital in Lexington, Ky., and operated by WA4GHQ and W4IGI, was monitoring the frequency. Proper dosage information was obtained after it was ascertained that the hospital could supply the drug.

The single remaining problem was how to get the drug to Venezuela. The only available flight was to leave Miami at 2130 GMT, but it was already 1700. An Air Force trainer was finally obtained to fly the drug to Miami. The drug arrived in Caracas about midnight. Latest reports indicate the girl is recovering quickly. — K4CG.

On Saturday, Jan. 11, at about 1700 GMT, an explosion rocked the main natural gas pumping station two miles east of Sandusky, Ohio. The ensuing blaze necessitated a gas shut-down which left most of the city's 35,000 residents without heat.

Only a few minutes after initial reports were received, WA8WGD/mobile was at Erie County Red Cross Headquarters. K8ONV, EC for Erie County, was notified and the Firelands Amateur Radio Red

Cross Emergency Net went into operation. K8OHG and WA8AZN were mobile on 75 meters and immediately drove to Sandusky where a station was set up at that Red Cross Headquarters. K8WLP and K8ONV remained at their home stations maintaining liaison between the two meter net and the Ohio Single Sideband Net on 75 meters, which had gone into emergency session at the request of W8OUU. Communications were maintained among several Red Cross Chapters, civil defense units and the National Guard.

Temperatures were due to dip to near zero and about 15,000 homes and several hospitals were without heat. Even after the fire was out, gas service couldn't be restored until gas company personnel had visited all the homes involved to turn off the gas to ensure no secondary explosions and fires would occur. Amateurs in the surrounding counties, under the direction of ECs K8LFI, WA8MHO and WA8RWK, then went to work locating supplies of blankets, electric heaters and other necessary materials.

The OSSB, which had been in session during the entire evening of Jan. 11 under the direction of W8TV and W8NCV, secured early the following morning, but was reactivated at 1430 GMT Sunday. More than 50 amateurs participated in the area until the evening of Jan. 12 when most service had been restored. — W8OUU, SEC *Ohio.*

On Jan. 12, amateurs in eastern and central Nebraska were able to assist the Civil Air Patrol with communications in the search for a missing aircraft. A net was begun on 3082 kcs. with W0ERW as control station and with K0JKL/mobile at the airport. Eleven other stations participated in the operation which lasted two and one half hours until CAP could activate their own communication facilities. — K0ODF, SEC *Nebr.*

At 2100 GMT on Jan. 13, a pipeline carrying crude oil burst, flooding the south end of Lima, Ohio, with thousands of gallons of the black, inflammable liquid. A state of emergency was declared, and a 125 square block section of the city's residential area was evacuated because of the possibility of explosion and fire.

Allen County EC WA8RWK was contacted by the Red Cross director and was asked to provide communications for the evacuation. WA8FHC and W8TCL activated the six meter net while WB8AEI and K8DZX were dispatched to South Jr. High School where many of the refugees were being taken. K8YNC/mobile was sent to Perry School where more of the evacuees were located. A 75 meter station was installed at the Red Cross Chapter House. The Ohio Single Sideband Net was activated and stood by on frequency in case the need for long haul traffic developed. At about 0800 GMT the operation was secured when telephone communications were again available to the schools. — W8OUU, SEC *Ohio.*

On December 21, Nebraska was hit by a severe blizzard, closing many of the state's highways and rendering those still passable very hazardous. Telephone lines were down in many areas. A net was begun. During the 24 hours of operation, 130 stations participated passing school closing information and reports of the whereabouts of stranded motorists. W0s EWZ IRZ LOD, K0HNT and W40s BOK and EEI acted as net controls. — K0ODF, SEC *Nebr.*

The Ottawa Valley Mobile Radio Club put on a display of amateur radio activity for a period of two hours a day beginning Dec. 26 and ending Jan. 5. The National Museum of Science and Technology requested the exhibit, which elicited a large amount of public interest. — *VESDMU*.

Forty-seven Section Emergency Coordinator reports were received for the month of December, 1968, representing 16,123 Full and Limited members of AREC. This is four more reports and 18 more members than Dec., 1967. The following sections reported: Ala, Alta, Ariz, Ark, BC, Colo, Conn, Del, EFla, EMass, Ga, Ill, Ind, Kans, Ky, La, Mar, MDC, Mich, Minn, Mo, Mont, Nebr, Nev, NH, NMex, NLI, NC, NJ, Ohio, Okla, Org, Que, SD, SF, SCV, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WVa, WFla, WNY, WPa.

During the entire year of 1968, 519 SEC reports were received of a possible 888, for a percentage of 58.5. This is an increase of 23 reports over 1967 when the percentage was 55.9. However, only 55 different sections reported as opposed to 57 in 1967. Twenty-five sections reported 100 percent, a decrease of two from the previous year. The following sections reported 100 percent (figures in parenthesis are the number of consecutive years the section has had 100 percent reporting): EFla (17), SDak (9), Alta (7), Mo (5), Sask (4), Colo (3), Del (3), EMass (3), Mont (3), Okla (3), Org (3), Ark (2), Conn (2), Mar (2), Nebr (2), Que (2), SNJ (2), Utah (2), Nev, SCV, Tenn, Wash, WVa, WFla. These sections missed one report during the year: La, Mich, NH, NLI, NC, Ohio, SF, STex. These sections had perfect records, too; not a single report was received from any of them: Alaska, CZ, EBay, ENY, Hawaii, Ida, Iowa, Man, Miss, NDak, NTex, Oreg, RI, SJV, SC, Vt, WI, WMass, Wisc, Wyo.

Traffic Talk

The answer to the question "How do you count QNC's and bulletin transmissions?" recently asked, may be of interest to the traffic-handling fraternity. Actually, it's pure logic and follows the basic premise that any message, to be counted in anybody's total, must be "handled." The "handling" means sent and received; that is, sent by the transmitting station and received for by the receiving station. Then and only then does the transmitting station get one "relayed" (or originated) credit and the receiving station one "received" credit.

Thus, a QNC message to all net stations can be credited as an origination on the part of the transmitting station only if each member of the net receipts for it individually. This is not possible in the case of a general bulletin to all amateurs, so official bulletins cannot count as originated traffic. But a QNC is countable if you take the time to call the roll of the net for a QSL. Each such net station, when he "rajuhs" the message, may then count it as one "received."

Why can't the transmitting station count it as a "book of (however many stations are in the net)"? He can, but only if it is addressed and transmitted that way. In that case, he could count one "originated" for each three receiving stations who QSL for it, plus an additional origination for any over an exact multiple of three.

Gettin' so a man can't make an easy BPL any more, ain't it? — *WINJ.M.*

National Traffic System: WA9RAK reports troubles with RN5 representation on CAN. W6VNQ says net statistics are sad. Without SET, they would be even sadder. Just not

enough traffic. . . . WA6ROF reports the new MARS liaison arrangement is working out well. W7BQ says all spots on RN7 are filled, with a few ready alternates. W6LGG reports new members WA0LVW, W6LWA and WA0FGV/B all doing a fine job. TWN certificates were recently issued to W47's IFD GYQ and W6LRN by K7NIIH.

January Reports:

Net	Sessions	Traffic	Average	Representation (%)
EAN	43	3176	73.8	96.5
CAN ¹	29	1388	47.9	100.0
PAN	41	1818	44.3	100.0
IRN	72	1202	16.7	97.0
3RN ¹	58	701	12.1	99.6
4RN ¹	54	597	11.1	91.1
RN5	76	1650	21.7	95.6
RN6	82	1328	16.2	95.5
RN7	62	645	10.4	49.5
8RN ¹	58	493	8.5	98.3
9RN ¹	58	876	15.1	92.7
TEN	62	764	12.3	83.9
ECN ¹	55	233	4.2	80.6
TWN	73	569	8.5	71.5
Sections ²	2116	18,576	—	—
TCC Eastern ³	176	1471	—	—
TCC Central ³	113	1125	—	—
TCC Pacific ³	161	1383	—	—
Summary	2939	29,466	EAN	13.2
Record	3665	38,538	1,445	18.6

1969 SET information not included.

²Section and Local nets reporting (57): BUN (Utah); NMRTN (N.M.); WSSB, M6MTN, QMIN (Mich.); PTN (Me.); NCNS, NCN, CNN (Cal.); EPA, PTTN, WPA, EPAEPTN (Pa.); WSN (Wash.); MDCTN (Md.-D.C.); WSBN, WSSN, WIN (Wisc.); ILNN (Colo.); QIN (Ind.); NCNE, THEN (N.C.); OZK (Ark.); PVTEN, NJEPTN (N.J.); FMTN, VEN, TPTN, QFN, FPTN, NIIN (Fla.); NYS (N.Y.); VSBN, VN (Va.); OSN, OSSB, Franklin Co., BN (Ohio); LAN (La.); LLN (Ill.); CN, CPN (Conn.); GSN (Ga.); KYN, KTN (Ky.); MJN (Minn.); AENB, AEND, AENII, AENO, AENR, AENM (Ala.); MNN (Mo.); WMN (Mass.); TTN, TEX (Tex.); QKS (Kans.); GBN (Ont.).

³TCC functions, not counted as net sessions.

Transcontinental Corps. W3EML says January was a fair month with traffic totals about the same as last year but with an increase in percentage of successful functions. W7DZX reports conditions often bad, especially during the SET weekend.

January reports:

Area	Functions	% Successful	Traffic	Out of Net Traffic
Eastern	176	94.3	4008	1471
Central	123	91.1	2384	1125
Pacific	161	90.2	2197	814
Summary	463	92.0	8589	3410

The TCC Roster: Eastern Area (W3EML, Dir.) — W7s BJJ EFW EOB NJM, K1ESG, W2s, FR GKZ MTA PU SZ ZVV, K2RYH, W42s BHN BLV CAL UWA, WB2s OYE RKK, W3s AIZ EML MPX, K3MVO, W4s CZN NLC UQ ZM, K4KNP, W44EUL, WB4DX, K6CAG/1, WB6UTC/4, W8s AHZ INJ UM, K8KMQ, W4s OCG POS ZGC. Central Area (W6LXC, Dir.) — W4OGG, K1AT, W5s MI RHF, W9s CXY DND VAY, W4s RAK VZAI BWY, W8s INH LCX QQO, W4s DOU MLE SDC, K8AEM. Pacific Area (W7DZX, Dir.) — W6s BGF BNX IPC IPW VNQ VZT DYX, WA6LFA, WB6IIV, W7s KZ ZIW, K7HLR, W47s CLF IFD. Independent Net Reports:

Net	Sessions	Checkins	Traffic
7290	46	2098	1534
Service	4	115	129
75M ISSB	31	1286	405
Hit & Bounce	31	455	591
EASN	18	105	58
Mike Farad E & T	27	400	301

QST

Happenings of the Month

COVER WINNERS FOR 1968

Frequent photos of "Cover Plaque" winners appearing in this department may cause readers to ask what it is all about. In 1961 the Board established the award to honor the author whose article was chosen as best in each issue. The directors cast their votes by mail every month; the author whose paper receives the most ballots gets the actual printing plate used for that issue, chromium-plated and mounted on a polished walnut plaque.

During 1968, these were the winners:

- January: "Detecting V.H.F. Signals Too Weak to be Heard," by Alan Parrish, K1KKP
February: "Attache, Case RTTY," by David M. Krupp
March: "An Experimental All-Electronic V.O.X System for S.S.B.," by H. Rommel Hildreth, M.D., KOIIZF
April: "A Transceiver for 7-Mc. C.W.," by John P. Rasor, W6DMK
May: "Quads and Yagis," by J. E. Lindsay, Jr., W9IITII
June: "Automatic Band Scanner/Transmitter Monitor," by R. F. Latter, W2YFM
July: "The Double-Bazooka Antenna," by Charles C. Whysall, W8TYV
August: "The S.S.S.B. Mark I," by C. A. Lamontagne, VE2IB
September: "600 to 20,000 Meters," by William Fishback, W1JE (ex-W1IKU)
October: "Radiation Resistance of Inverted V Antennas," by Dale W. Covington, K4GSX
November: "The Mainline FS-1 Secondary Frequency Standard," by Irvin M. Hoff, W6FFC
December: "Synchronous Weak Signal Detection With Real Time Averaging," by W. R. Adey, M.D., WB6DEX and R. T. Kado, B.S.

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Another honor conferred by the Board is the Technical Merit Award. Created in 1953, it is to be presented annually to an amateur or group of amateurs for outstanding technical contributions to amateur radio. Nominations for the 1968 award may be submitted by any amateur to Vice President Wayland M. Groves, W5NW, 1406 West 12th Street, Odessa, Texas 79760 by April 15, 1969.

WILFUL DAMAGE BRINGS LICENSE SUSPENSIONS

A group of amateurs in the San Diego area were charged by the Federal Communications Commission with wilfully damaging, or permitting to be damaged, the radio apparatus or installation of a licensed radio station. The incident, on or about November 12, 1967, was in violation of Section 303(m)(1)(c) of the Commun-

ications Act and Section 97.127 of the amateur rules. Some of the group also were charged with other violations as well which were considered in arriving at the length of license suspensions:

William K. Ingram, WB6RBQ, San Diego; also used or operated a radio station on Broadcast Radio Service frequencies without a license, on or about October 9, 1967; amateur license suspended for one year beginning September 1, 1968.

Joseph S. Renzi, WB6FNV, San Diego; also on or about October 3, 1967, wilfully or maliciously interfered with the radio communications or signals of other radio stations, in violation of Section 303(m)(1)(e) of the Act and Section 97.125 of the Rules; suspension originally for remainder of license term (until April 16, 1969); after a hearing, reduced to three months, September 9 through December 9, 1968.

Norman A. Scott, WB6TRQ, Long Beach; also wilfully or maliciously interfered; operated in the broadcast band; transmitted music in violation of Section 97.115; transmitted A-3 in the c.w. band 14.0-14.2 Mc.; also transmitted a dead carrier (A0) on 7225 kc., in violation of Section 97.93; also operated his station without proper identification as covered in Section 97.87(a); license suspended for 18 months, effective September 3, 1968.

Brandon H. Sinay, WB6OFD, Lakewood; no other charges; six-month's suspension beginning September 5, 1968.

(Two other amateurs, charged in the same incident, were cleared by FCC.)

So far as we know, these were the first disciplinary actions against amateurs for wilful destruction of radio equipment; the 18-month suspension is also the longest finite punishment we've noticed (although there have been suspensions for remainder-of-term and revocations of station license which amounted to longer periods).

— · —

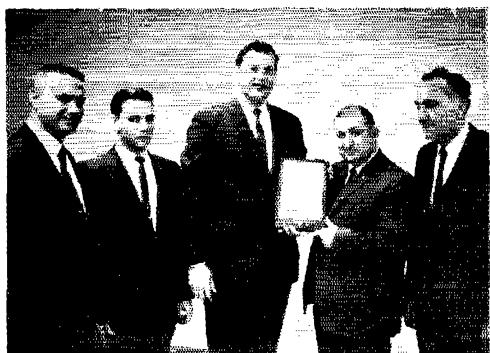
In an unrelated case, Terry D. Climer, WB4EHD, of Lebanon, Tennessee, received a six-month suspension of his license effective November 14, 1968, for causing wilful or malicious interference to communications of other radio stations on June 26, 1968.

C. Bertram Osborne, W4MF

We regret to report the death of C. Bertram Osborne, W4MF, of Chattanooga, Tennessee, in December. Bert was a past president of the Old, Old Timers Club; past president and past vice president of the Frye Amateur Radio Club, past ARRL QSL Manager for the fourth call area, and had been an assistant director of the Delta Division of ARRL for the past five years.



As part of a project—rounding up typical communications gear from the past—for the National Museum of Science and Technology, The Ottawa Valley Mobile Radio Club operated from the museum for 13 days in December and January. Much favorable attention of the press and the public was attracted by VE3RAM, here being operated by K7LRV/VE3 with VE3SH assisting. Other amateurs in the project included VE3DMU, VE3GX, VE3EMO, VE3BGH, VE3GFL, VE2NV, VE3CGO, VE3BEB, VE3GGQ, VE3LX, and VE3FRE.



Irvin Hoff, W6FFC (center) won the November Cover Plaque for his article, "Mainline FS-1 Secondary Frequency Standard." At the presentation were (from left) Dale Detwiler, W6SXO, president, Santa Clara County ARA; Ken Bower, WA6BKN; ARRL Pacific Director Doc Gmelin, W6ZRJ; and Al Gaetano, W6VZT, acting SCM, Santa Clara Valley.



ARE YOU LICENSED?

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



When members of the Gator Chapter, QCWA met recently at MacDill Air Force Base, Florida, briefing on Strike Command operations was part of the program. Here getting the word are Harold Bates, WA4FIU (center) and Elmer Huddleston, W4HFR (far right). Wearing the blazer is General T. J. Conway, W4EII, Commander-in-Chief, U.S. Strike Command. (USAF Photo)



Don Mix, (l.), the "sleepless wonder of 1TS," laid down his red pencil as an assistant technical editor of QST on December 31, after serving on the hq. staff since 1933. His boss, Technical Editor George Grammer W1DF, hands over a gift at the department's retirement party, shortly before year end.

Dale W. Covington, K4GSX gets the congratulations of QST Editor John Huntoon, W1LVQ upon winning the October Cover Plaque Award, Southeastern Director Chuck Bolvin, W4LVV and ARRL President Bob Denniston WØDX join in the ceremony.

WA1s IN NEW HAMPSHIRE GET PLATES

Call letter license plates have been available in New Hampshire under general "vanity" plate rules which permit any combination of up to five letters. Now, through the efforts of the Bow Radio Association, the six-digit group, WA1s and WN1s, may also get special plates. The first three digits will appear vertically at the left of the plate; the suffix in larger letters will occupy the right center.

The club urges all who have cars to apply for the plates so the state will get a fair return on its investment in the special dies needed for the job. The plates cost the amateurs \$5 a set.



W1JMA

HALLENSTEIN, FCC 1ST DISTRICT, RETIRES

Nathan Hallenstein, W1JMA, Engineer-in-Charge of FCC's first district, retired on February 26 after 17 years in New England and 39 years total service to FCC and its predecessor agencies. A graduate of Rensselaer Polytechnic Institute and member of Phi Beta Tau, engineering honor society, he's a familiar figure to hamfest and convention goers, having been a speaker and head-table guest at many, and supervising exams at others. Amateurs showed their appreciation by presenting W1JMA with a plaque at the 1962 ARRL New England Division Convention. Our best wishes in retirement, Nate!

W9WNV POSTSCRIPT

We thought few people, if any, would be led astray by continuing misstatements of W9WNV, this time published in November *CQ* magazine — even when they were repeated (at least partially) elsewhere. But when a prominent DXer and League official recently expressed concern over what he read, we decided it is time once more to set the record straight on at least one point concerning the lawsuit.

This, the most noxious of several items, was Dr. Miller's statement to the effect that he personally received \$2,500 from the League to settle the case. The fact is that (as October *QST* reported) he personally was not paid a cent. Our request of *CQ* for a retraction of this simple point got so bogged down with irrelevancies (although the publisher admitted he had determined to his satisfaction that "Dr. Miller did not personally receive any cash") that we decided any correction would come out more confusing than the original misstatement!

As was also pointed out in October *QST*, the League did pay legal expenses incident to the week-long taking of depositions in Hartford, as provided in the agreement published in that same issue.

AMATEUR RADIO WEEKS

Governor James A. Rhodes of Ohio has proclaimed April 20-26, 1969 as Amateur Radio Week in his state, marking the 17th annual Hamvention at Dayton. His statement also mentioned the "valuable potential emergency communications system ready for duty in event of local or national disaster."

Chasrs' Calendar of Annual Events, (Apple Tree Press, Box 1012, Flint, Michigan 48501; \$3.00) lists June 22-28, 1969 as amateur radio week; these dates, at League request, coincide with ARRL Field Day June 27-28 and with the majority of amateur radio weeks proclaimed almost annually by some 25 states and several cities. Many libraries use this guide to furnish ideas for displays: a good public relations opportunity for radio clubs!

WHO THE DEVIL IS WHO?

Twelfth in a Series of Call Conversion Charts

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

Now	Was	Now	Was	Now	Was	Now	Was
W1MU	W1FGL	W3VH	W3DPS	K6IZ	WB6IHL	W8IP	W8PJZ
W2FB	W2NOY	W3WF	W3LVU	K6ML	W6PLU	W8IZ	W8QQK
W2PL	W12WNR	K4IB	K4RXG	K6MU	W6FII	W8JC	W8GSE
W2RQ	W2DQW	W1RW	W4KCP	K6OD	W6IAI	W9DY	W9GFF
W2SF	W2AII	W4UK	K4KXK	K6OE	K6TYO	W9RC	W9DGA
W2VK	W2DNP	W5JG	W5CIO	K6OH	WB6IAQ	W9FN	W9MUR
W2YU	W2FEH	W5LK	W5MMT	K6OJ	WA6TMK	W9FS	W9WNM
W2ZS	W2SWC	W5LO	K5TQP	W6ZQ	WA6OTL	W9FT	W9VFZ
W2ZT	W2JJC	W5MB	W5CXP	WTNP	W7INS	W9FU	W9OVF
W3EK	W3VYX	W5MI	W5KRX	W8CH	K8INA	W6JK	W9OSX
W3RZ	WA3TJK	W5MQ	W5ERR	W8HT	W8KVZ	WBJL	W8TYH
W3TO	W3HHR	K6CN	KG6UN	W8HU	W8MOH		

Behind the Diamond

Number 14 of a Series



The Diamond's microphone this month picks up the unmistakably-Texan accent of **Dr. R. O. Best, W5QKF**, of Corpus Christi. Doc — he almost never has to answer to Roemer Orrell, his given names — was elected by West Gulf amateurs as their director for the term beginning January 1, 1961, and continued serving in that capacity until May 4, 1968 when his colleagues on the Board elected him a vice president.

W5QKF was first licensed in 1946, and has been active in the Corpus Christi

Amateur Radio Club, serving as secretary in 1951 and president in 1954. Section duties beckoned, too, for service 1956 to 1960 as section emergency coordinator for South Texas. He has also been radio officer for Region 3, Texas Civil Defense and is a member of the State Industry Advisory Committee (SIAC), a consulting body designated by the defense commissioner of FCC. His Board committee assignments have included two years on Finance, one on Public Relations and four on Membership and Publications, three as its chairman. Doc is a Charter Life Member of ARRL.

Our vice president, a dentist, and his vivacious wife Kathryn have two married children, Jack, W5RPH (also a dentist and also a Charter Life Member) and Betty.

W5QKF is also active in fraternal and civic affairs. He's a past grand master of Corpus Christi Masonic Lodge #189, past president of the Corpus Christi Rotary Club, and served as parade marshall for the 1964 Buccaneer Parade, his city's answer to the Mardi Gras.

Doc's first Board meeting was at Anaheim in 1961. During a social hour, a striking platinum blonde appeared fascinated with him — and vice versa — keeping a conversation going for a quarter hour or longer. Turned out to be Kathryn, wearing a wig she had borrowed from the wife of another director!

Stray \$

STUDENT SCIENCE PROGRAM

If you're a high school-aged radio amateur, here is an invitation to look into what may be the most stimulating experience of your amateur career. The National Science Foundation has awarded the University of Hartford in cooperation with the Talcott Mountain Science Center for Student Involvement, a grant to conduct a six-week Secondary Science Training Program for High-Ability secondary school students in Radio-Electronics and other scientific areas, to take place at the Science Center, Avon, Conn. (see *QST* for June 1967, pg 56).

Thirty students from across the country will be chosen to participate in the program which will begin July 7, 1969 and end August 15, 1969. Each student will investigate a selected area of study utilizing facilities provided by the Science Center. Included is an amateur station for 6 and 2 meters, an SCR 584 radar, a 20-foot parabolic dish, a television camera and tape system, and a wide variety of test equipment. To qualify for one of the thirty awards, a student must rank in the upper tenth of his class, have a junior class standing at the time of application, and be recommended by one of his

science teachers and his high-school principal. Room and board will be provided at the University of Hartford campus. Total fees will amount to about \$350. To ease cases of financial hardship, the National Science Foundation has provided a limited sum of money which can be used to help meet costs for participants who would otherwise be unable to attend.

Application forms are available from Dr. Bette J. Del Giorno, Director Q54, NSF SSTP, Environmental Sciences, University of Hartford, 200 Bloomfield Avenue, West Hartford, Connecticut 06117. Applications should be postmarked not later than April 15, to guarantee consideration.

Stolen Equipment

During the week end of February 8, someone broke into the Keystone V.H.F. Club of York, Penna. and the following equipment was stolen: Swan 250 transceiver, Serial No. F-233614 and two microphones. Anyone with information on this should contact the club secretary, LeRoy Frey, K3POR, 170 S. Albemarle St., York, Penna., 17402, tel.: 717 854 1203.

I.A.R.U. News



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

UK LICENSE FEE INCREASED

In the wake of a sharp amateur license fee increase in Canada, the United Kingdom has multiplied the cost of amateur licenses for G stations. Claiming "increased costs of administrative work," the amateur license fee was increased by \$2.50 to the now \$7.50. An increase took place of \$3.75 for mobile licenses. The *Radio Society of Great Britain* has registered protests over the fee increases and has offered suggestions for reducing the costs of operation.

VK HOSPITALITY

The VK2 Division of the *Wireless Institute of Australia* has set up a fine plan for welcoming foreign amateurs. A panel of host VK2 amateurs are available to greet visitors. A tour of the W.I.I. Divisional headquarters and associated facilities as well as personal visits with local amateurs are included. Many U.S. servicemen who are also radio amateurs have been recipients of this hospitality. The success of this gesture is attested to by the numbers of letters, Christmas cards, and other expressions of thanks received by the VK2s concerned.



EA3JE is shown after receiving the award for high continental scorer (Europe) in the 1968 ARRL International DX Competition, phone. Presentation was made by the *Union de Radioficionados Espanoles*, a member of IARU.

CONTESTS

The *Deutscher Amateurradio Club* announces the 1st RTTY WAE contest to be held April 26, 0000 GMT to April 27, 2400 GMT on amateur bands from 3.5-28.0 MHz. Logs should be submitted before June 10, 1969 to Uli Stoltz, DJ9XB, In der ostert 3, D-507 Plettenberg, W. Germany.

The *Liberian Radio Amateur Association* announces its annual field day, April 12, 1969, 0000 GMT through April 13, 2400 GMT, and invites all amateurs to participate. The call 5L2FD has been assigned by the Government of Liberia to be used during this jubilee year. Field day headquarters will be at Bernard's Beach, Sinkor, Monrovia, Liberia. Operation will be on 40, 20, 15, and 10 meters.

NOTES

The *Radio Society of Great Britain* advises that their QSL bureau will be closed from May 14 to June 3. Cards should not be sent so as to arrive during that period of time.

The DL4-DL5 QSL bureau address shown in the December, 1968 column should be corrected to be: DL4-DL5 QSL Bureau, Headquarters Stratcom, APO N. Y. 09056.

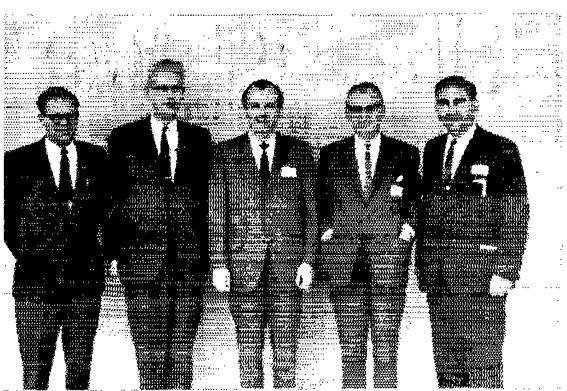


This is VP7NP in his shack with visitor (left) VP7NX. Arnold is secretary-treasurer of the Bahamas Amateur Radio Society, a Union member since 1965. The society has its own amateur station, VP7ARS, and an active emergency corps which swings into action during the hurricane months.

INTERNATIONAL LEADERS NOMINATE FOR CRISTOFORO COLOMBO AWARD

The presidents of International Amateur Radio Union member societies have been asked to submit nominations for the 1969 Cristoforo Colombo award sponsored by the Instituto Internazionale delle Comunicazioni, Genova, Italy. The award is issued in two categories: technical and humanitarian. The presentation of the awards will be on October 12, 1969.

Last year's awards went to G2FKZ for his study of radio propagation in the presence of auroral disturbances, and to the *Associazione Radiotecnica Italiana* (IARU member) for organizing emergency communications during the Italian 1966-67 floods and 1968 earthquake.



IARU officers and officials were well represented at the ARRL Southeastern Division Convention held in Miami during January. Shown from left are IARU secretary W1LVQ, IARU Region II treasurer VE3CJ, IARU president WØDX, 6Y5EM, and Jamaica Amateur Radio Association president 6Y5LA.



Recently hq. staffer W1IKE visited the Malta Amateur Radio Society to discuss matters of mutual concern. The photo shows Dick presenting an ARRL Handbook to MARS officers. From left to right are president 9H1U, chairman Henry Bell, secretary Christopher Warren, W1IKE, and treasurer Norman Polan.

DX OPERATING NOTES

Reciprocal Operating

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

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

Third-Party Restrictions

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

DX Restrictions

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

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

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



Correspondence From Members-

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

CONVERSATION DISCIPLINE

[In the February issue, *QST*'s editor W1LVQ offered some comments on the above subject and thereby triggered what may be the liveliest debate since incentive licensing. To cover the views of as many readers as possible, we've selected pertinent paragraphs or sentences rather than run fewer full-length missives. Hope we didn't chop your favorite passage! By the way, page 9 of this issue risks the editor's other hand in the hornet's nest.]

¶ You point out that amateur radio is a privilege, not a basic right, and that it carries with it responsibilities. This sense of responsibility includes a reasonable awareness that talking over the air is tantamount to talking in public. We all know that free speech does not include the right to cry fire in a crowded theater. But from this perfectly reasonable position you go on to an incredible conclusion, actually encouraging ham band vigilantes to patrol the airwaves deciding for themselves what is and what is not proper material for discussion. . . .

Let me quote that last paragraph for those who might have missed it —

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

As far as I am aware there is no law that bars licensed amateurs from discussing these or any other subjects beyond those dealing with the broadcasting of prurient or obscene material. People of good sense and good taste do, of course, know the limits of subject matter and comment when they are talking "in public" on the air. And of course there are those few who cross reasonable boundaries. But just as cures for the abuses of freedom of the press are inevitably worse than the abuses themselves, so are hasty, if well-meaning, monitoring and admonishing operations designed to keep hams "in line." Not only are they, I believe, illegal, assuming they interfere with legal transmissions, but they may be in themselves as immoral as the condition they seek to correct. . . . — Bill Leonard, W2SKE, New York, New York

¶ It's real good to see you fellers at headquarters protecting us hams from talk about politics and religion. If you let stuff like that go too far, you can't tell where you'll wind up. Why, somebody could think that he has the right to say anything he pleases, wherever he wants to, whenever he wants.

While we're writing unwritten laws, let's write one about not turning anybody in for breaking FCC rules. I know you can't come right out and say it, but it's good to know that we have the right to interfere with anybody who tries to talk politics or religion or anything else. I like the way you say "hooray for all 'unprincipled idiots'" who don't give their call sign when shutting somebody else up. It's real nice to know you'll help us. — Otis F. Bryan, WØKXS, Arlington, Va.

¶ Operating without call-sign identification is not just a procedure — it is an irresponsible act, and yet Johnny says "hooray" for them. — Vince Hultman, W7GQK, Los Angeles, Calif.

¶ Let's make one thing clear, Big Brother, you are not helping amateur radio by this sort of attitude. You take the side of the "unprincipled idiots" who flout the regulations. I never thought *QST* would say "hooray" for that type operation. You weaken your argument by this type of thinking. — Quent Johnson, WØGN, St. Louis, Mo.

¶ Your February editorial would have had much greater impact had the last paragraph hooraying unprincipled individuals who break anonymously been omitted. — Robert W. Schoening, WØBE, Bloomington, Minn.

[Editor's Note: Agreed. It was a poor choice of a punch line and—worse—drew attention from the real point of the editorial.]

¶ Your February editorial sounds like the name of a chapter from a "Big Brother is Watching You" textbook. Many conscientious amateurs will find your comments archaic. Others will rebel at being advised to carry on their discussions in a bar. — J. Bruce Siff, W2GBX, Buffalo, N. Y.

[Editor's Note: On the last point, at least, you're 100% right; sorry.]

¶ I find it incomprehensible that, in this enlightened and progressive age, ARRL has adopted such a pristine and atavistic stand on what type discussions may transpire on the air. Do you realize that you are advocating outright censorship? How does one reach a higher level of awareness and usefulness without free dialogue with another, regardless of mode?

Our government discusses so-called "sticky subjects" every day and in public. And you have the cavalier audacity to tell the ham that he doesn't have the right to exercise the same privilege. Bull! Your domino castle buttressed by the FCC obscenity rule is tissue-paper thin; ARRL should hire a new brace of writers.

And to you ARRL, if my outrage offends you, don't print it! — Lt. Mark M. Greenberg, WB4LDX, Ft. McClellan, Ala.

[Editor's Note: The editorial made no statement that amateurs do not have the right to discuss sticky subjects. It simply recommended voluntary continence — irregardless!]

¶ Clearly, radio is not the medium for testing the boundaries of obscenity. Political subjects, likewise, must be treated with discretion: if I am speaking with an amateur whose country is ruled by a dictatorship, I should consider the possibility of reprisals against him which might result from his discussing political issues on the air.

If, however, amateur radio is to serve one of its avowed purposes — the promotion of international understanding — then we, as operators, must have enough leeway to conduct meaningful communica-

tion. Friendly chats and discussions of technical topics make a valuable contribution to worldwide friendship and ought to be encouraged. In non-technical subjects, though, serious conversation usually involves the great issues of the day. It is trite, but true, that he who avoids all potentially controversial matters ends up saying nothing of significance.

Being a member of the university community, I believe in the possibility of intelligent, diplomatic dialogue between individuals who hold different viewpoints. Discussions of social, economic, or political issues need not, after all, resort to polemics, if the participants follow guidelines of simple diplomacy. Amateur radio in many parts of the world is limited to the educated elite, whose members have the sophistication required to make intercultural contacts without taking offense at opinions differing from their own.

In the light of these considerations, I believe we amateurs should reassess our attitude toward controversy. It would, as you suggest, be preferable for us to discuss such issues in the living room or in the bar, but if we are to talk meaningfully with foreign amateurs your recommendation is quite impractical. New, more flexible guidelines will place stiffer requirements on us as individual operators, in terms of exercising mature judgment and of being well informed in world affairs; but such a policy will, I feel, enhance today's amateur radio as a means of communication. — *Bain Cowell, K8LBQ, New Haven, Conn.*

¶ I know a game we can all play. Everyone turns on his rig and talks about the weather for as long as possible. The guy who stays intrigued the longest wins a free ARRL life membership. As a novelty, discussing the weather can be substituted with talking about how old you are.

But the game really isn't too easy. If you start discussing politics, you get sent to Intelligence Square; and you stay there until someone else mentions religion, morals, politics, or anything else which the leader considers vulgar. The restrictions are limitless! Recommended for ages 2 to 12. — *Michael J. Morone, WA9NXY, Indianapolis, Indiana.*

¶ The thrust of your position seems to be that unless we mind our P's and Q's and kowtow to the FCC, we are in danger of losing our frequency allocations. I do not accept the necessity of kowtowing to any government agency for any purpose whatsoever and I strongly urge all amateurs as well as all citizens generally to retake the reins of government, reassert their individuality and, reinserting their backbone, remember that they are the government. The Commission is charged with allocating frequencies in the public interest. It should be remembered that the frequencies belong to the public of which we are all a part, and that we are also a part of the public in whose interest the frequencies are to be allocated. These frequencies are not granted to us strictly as favors, but as a matter of right to a substantial segment of the public. . . . — *Lionel A. Waxman, WA3BWT, Philadelphia, Pa.*

¶ It is becoming clear that the ARRL is accustomed to "dealing" with the FCC in an atmosphere of ethical bribery. The next-to-last paragraph of the editorial is the evidence of this fact. This paragraph implies that amateur radio is really *not* in the "public interest" and that only by not bringing attention to this fact (by limiting the subjects of conversations to those sanctioned by the FCC) can we expect to

be allowed to retain our "privileges" as amateurs.

It is rather interesting that the 288,000 amateurs of the United States may represent the only segment of the "public interest" which has ever been specifically identified! The number of other persons who have benefited from the sum of the individual actions of this group is surely fantastic. The "public interest" is another wishy-washy phrase of those who wish to impose their will upon others in the name of the grey mass they see as humanity. — *Elliott R. Marsh, W2IIY, Endicott, N. Y.*

¶ The constitution of our Republic documents a grant of power by the people establishing a government to make and enforce laws which guarantee the individual the right to life, liberty and the pursuit of happiness by many means. The people are the source of all governmental authority . . . — *William C. Clark, W9EMP, Indianapolis, Indiana.*

[Editor's Note: Precisely! And — may the day never come! — if and when enough amateurs offend the sensitivities of enough people, ham radio will suffer accordingly.]

¶ Can you be serious in suggesting that "the best thing to do is steer completely clear of sticky subjects?" Can you really believe that "Freedom of speech does not include the right to offend a substantial segment of the population, domestic or world?" Justice Oliver Wendell Holmes presented a charge which sets a high standard for our citizenship: "A man must share in the action and passion of his times, at the risk of being judged not to have lived." Can amateur radio — even at the "risk" of the "rather high price" of losing some frequencies — do less than this? God forbid the day should ever come when it is no longer "in the public interest, convenience, or necessity" for citizens of this country to exchange views on any issue, on or off the air. — *Robert E. Alberti, W6TTX, East Lansing, Michigan.*

¶ Your thoughts are representative of the type of thinking that has held humanity back for long periods of time. Communication is one of the greatest assets human beings enjoy and it should be fully utilized if we are to survive our own emotions. What better service can we offer the public than for its citizens to have an opportunity to explore the minds of other human beings. Any discussion of any topic can always be categorized by someone as offensive, but this is good. Get on and give your opinion. You may straighten someone out or, even better, you may discover that what you have held sacred for so long is nothing but a stupid prejudice. This is what communication is all about. . . . I cannot believe that this editorial expresses the feelings of the majority of hams and I would very much like to see the nine-year-old mentality that composed the editorial be replaced by a mature adult who understands that when he writes he is cloaked in the semi-official garb of the spokesman for all hams. — *A. B. Salganick, W46NZV, Chula Vista, Calif.*

¶ Politics, religion and sex are "where the action is" in the world today. In order to make any progress in our major problems, most of which go back to these three areas, we must be able to discuss them frankly, openly and honestly, both on and off the air. — *Steve Brandt, WB6VV, La Canada, Calif.*

¶ Please advise on what frequency heated discussions on sex are being held! — *Len Clark, W6GFQ, N. Hollywood, Calif.*

¶ "It Seems to Us" has once again pontificated to the ARRL Membership disseminating what seems to me—and I am sure to many other League Members—the ultimate exclusion of what amateurs really are: individuals. This time it is "Conversational Discipline."

By the implication that the individual who attempts to discuss topics on the air other than rig, antenna, weather, and signal report jeopardizes the privilege of our hobby, the League in effect is suggesting an attitude which renders the very purpose of communication to worthlessness and severely undermines the future of amateur radio.

I feel very strongly that we set amateur radio too far to the sidelines and in different directions than we should. While we wallpaper our shacks with awards and participate with sheer mania in contests, we look to other of life's institutions to care for our larger interests of peace, security, and understanding while even a small share of our operating efforts would go so far in achieving these goals. I also feel very badly that the League has so little faith in its members that it feels amateurs cannot discuss and exchange ideas freely, without offense, and without argument.—*John E. Maass, K7JKZ, Everett, Wash.*

[Editor's Note: We tried to imply in our editorial considerable faith in League members. The editorial was intended as a call for leadership in showing continuing good judgment by avoiding heated discussions on offensive subjects.]

¶ For the past four years I have been operating c.w. on Navy MARS frequencies exclusively and have not even listened on amateur frequencies. As my license neared the end, I figured I had better conform with regulations and get some time in operating on the amateur bands on s.s.b.

I tuned up on 20, and was amazed at what I heard. One amateur was telling another that he was going to fill him so full of lead that he would look like a sieve. He also threatened to sue him for everything he owned. The other fellow accused him of kicking all his wife's teeth out. Another ham broke in from Texas and was called everything under the sun. (A station in Illinois was recording all this and offered copies to anyone who desired, including the FCC.)

After an hour or so of this, I decided to tune around the band. The theme of the day seemed to be phone patching, certificate hunting, political discussions, an engineer (I presume) from a commercial outfit in a round table project discussion with his field representatives, college picket lines and race.

I was always under the impression that we had the amateur bands only because government agencies believed they would be used for experimentation and advancement of the art—not for such goings on as in the above paragraph.

Things have certainly changed during the past four years (for worse). As it stands now, amateurs have absolutely no squawk coming when threatened by higher ups to take portions of the bands for other more fruitful purposes. They are certainly not being used for the purposes intended.—*L. F. Kylie, W7CKT/NQRPV, Arlington, Wash.*

¶ I believe ham radio is on the brink of some deep trouble that could involve us all. I'm referring to the cancerous growth of profanity, operating practices and the discussions of touchy subjects on the air. We had better get ourselves in resonance before this growth engulfs us. . . . —*Jack Spratler, WB0UGV, Costa Mesa, Calif.*

¶ Dialogue and debate are healthy and necessary ingredients to the maintaining of a free society. How else can I understand the views of a Californian concerning Viet Nam or the views of a New Yorker on civil rights or a New Mexican on conservation unless I can discuss these things with him and what better media do we have at our disposal than amateur radio? We hear the professional news medias condemned for allegedly presenting biased viewpoints of news stories and yet you would have us remain ignorant of possible happenings as we might be able to understand them from a first-hand accounting simply because the issue might be controversial.—*Jerry O. Braishaw, K4OEK, Danville, Kentucky.*

¶ Let me hasten to add that I am very much opposed to irresponsible utterances on the ham bands and that I believe there must be conversational restraints. But let those restraints be determined by intelligence and good taste—not by category. Surely good communications can include the communication of ideas, and ideas will usually find ideas in opposition. But the conflict of opposing ideas often leads to a higher truth.

For amateurs to pretend that sex, religion, or politics do not exist, as you propose, would be to encourage the all-too-abundant sterile discourse and inane blather that now permeates the ham bands and can hardly be said to be in the public interest or to reflect the intellectual capacity of amateur radio. Seems to me there ought to be a middle-of-the-road where hams are free to discuss controversial issues thoughtfully and courteously without being interrupted by self-appointed thought police who don't happen to dig the discussion.—*K. D. Hoogherhyde, W19W.MK, Bloomington, Indiana.*

¶ The world is well enough adjusted to the public discussion of controversial subjects to accept one man's opinion as just that. The world will not judge all amateur radio operators by the remarks of a few any more than you would judge all Negroes by the statements of Rapp Brown or all Germans by the statements of George Lincoln Rockwell.

I believe your reluctance to sanction the expression of controversial views between amateurs who desire to exchange them stems from a lack of confidence in the judgement and social conscience of the amateur fraternity. That we have a few radicals is well documented by correspondence during recent controversy. But let's not forget that while any nut can write a radical letter, on the air he has to find someone who will listen, and those listening are free to correct erroneous statements or extreme views not supported by the facts.

Let the large grey area of what is polite and appropriate regarding politics, religion, and sex be defined by the free interaction of intelligent amateurs. Those who are not sure can abstain or seek other conversations. But for those who wish to make ham radio a more interesting and enlightening means of communication, let them exercise their own judgment upon themselves and the stations they are in contact with regarding what is reasonable expression and what is malice in these areas. The result will be a balanced assortment of viewpoints and at least an approach to understanding for both the participants and the listeners with an occasional crackpot identified for what he is. Any listener who is offended can retune—he is there, after all, by his own choice.—*Gene W. Wilkerson, WB2FIL, Old Bridge, N.J.*

QST

HOW'S DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

You don't need a ham ticket to build stuff.
Your FCC license is for operating.

—W9VES

As a short-wave listener in the early 1930's, long before most kids his age were aware of anything above 1500 on a radio dial, a youngster was already digging deep for DX with a borrowed bloopie. . . . We reverently noted an article of his in the *Gale Echo*, periodical of our mutual Chicago grade school, titled "How to Tune a Short-Wave Receiver." The *tunc*, not build, was significant. Phil was born to be nearly 100-percent operator. . . . Very soon we saw him racing home from school on his sister's bike proudly wearing a ham call on the back of a big shaggy sweater. Oh, not so big; he wasn't a big guy. . . . In fact he came home from the next ARRL National Convention lugging a huge ham of the edible variety, awarded to him as the smallest attending amateur. . . . But he was a full grade ahead of us and thus unapproachable. The code, a breeze for Phil, was rough for us and we didn't manage our own call until high school. Then we made feeble QRM on 40 while he took the '39 SS for Illinois. . . . W9NUF, donor of that first receiver, remained Phil's chief engineer, devising such instruments as a neat T-40 breadboard rig and the first delta-matched wire Yagi in our part of town. Phil played the music in ARRL activities, working seventy countries back when only the first ten or twelve were easy. . . . By the time Pearl Harbor came along young Phil knew the entire h.f. spectrum and its vagaries like the back of his hand, hamming and s.w.l. experience the Navy soon came to appreciate. Just another good ham coming through for Uncle Sam. . . . At long last we were swiping DX from each other on 10 again, Phil doing most of the scoring. Postwar FDs, contests, skeds from college—we kept in touch. Phil later put his short-wave talents to work for the government once more, pushed his c.w. speed to around 60, and further sharpened his valuable amateur-developed knack at intercept. . . . Then, still footloose and fancy free, he joined the staff of ARRL's Communications Department where his yen for on-the-air activities helped brighten *QSTs* of the middle '50s. . . . His old maintenance chief had become entrepreneur W6BES out west, but the League's Technical Department chipped in to keep Phil on the air. He was always satisfied

that Heifetz never built his own Stradivarius, and that Babe Ruth never whittled a ball bat, not even from kits. . . . Work at ARRL gave Phil an appetite for printers ink, so it was back to Chicago and a go at the electronics catalog industry, a tough and exacting business. He plunged in and gave it his enthusiastic all as was his habit, still keeping a keen ear on the bands. . . . His favorite ARRL event became the annual Novice Round-up. Therein he was delighted to observe halting newcomers become alert, capable operators over a fortnight's accelerated activity. . . . Intense was the word for W9VES-W1ZDP-W3VES, ham spirit personified. It's hard to think of dynamic Phil Simmons now as a newly Silent Key.

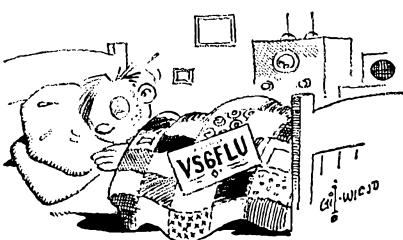
* * *

Thus in crude outline went the brief career of one ham's ham, and with it may we make a point: Tell us not in mournful numbers that too many radio amateurs are "appliance operators." Nay, say instead there are too few experts in that field. We've been privileged to know some masters intimately.

What:

Incidentally, we married the gal who belonged to that bike. But that's another story. . . . April 12th is the deadline for your *ARRL DX* Contest reports, gang. Large or small, HQ needs your results to paint the full picture. And now we ought to see what's doing on 14-MHz. voice frequencies. In the activity spot-check to follow, figures in parentheses represent kifz. above 14,000, and the digits outside parens go for Greenwich whole hours. Like this. . . .

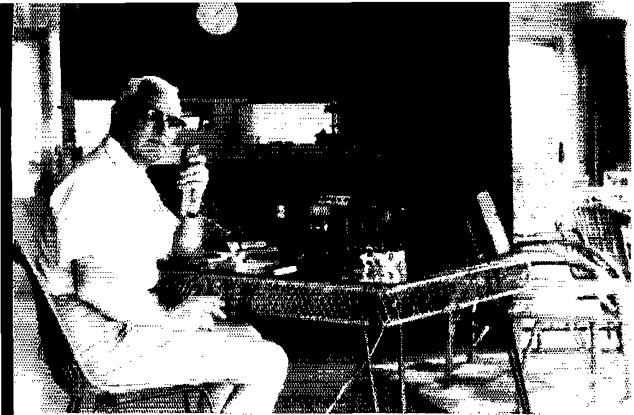
20 phone, then, courtesy correspondence from **W62DY** 2VOZ 3HNK 4NJB 4UF 4YOK 8IBX/2 8YGR, K4TWW, **WA5IDP** 2BHJ 3HIV 3IJD 5PUQ 7BOA 8MCQ 9TFM, **WB2BCI** 2DZZ 4GSS 6WLH/3, P. Kilroy and the club press: A2CAQ 17, APs 2HB (195) 12-15, 2MR (213) 12, 5HQ (207) 15-18, CEs 3ZN 6EG 8AA 12, 9AT (230) 23-1, 9AC (114) 5, 9AE 9AG (200) 10, CN8s AP (153) 8, GE HD (230) 3, COs 2FA 8RA, CPs 1GT IHW 1IE 1SQ 3CN 3CS (130) 21, 6HQ, CRs 4BA 4AE (202) 23, 4BK 3, 4BH (240) 2-3, 4BL



"I'D LIKE TO CATCH UP WITH THE GUY THAT GAVE ME THE FLU ON THE NEXT TO THE LAST NIGHT OF THE CONTEST."

—Revised and reprinted from May 1955 *QST* as suggested by W1UED and WB2UZU. (*QSLer of the Month?*)

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



8P6CY fired up in Barbados last November, concentrating on 21-MHz. phone from these cozy quarters. Bill was first licensed in '32 as W2BMH and now signs W8WUM when back home in Michigan.

(203) 3. 5SP (179) 7. 6AN (120) 17. 6CA (190) 17. 6CO (200) 4. 6DP 6GA 5. 6IS 6IV (170) 23. 6LF (115) 18. 6YL 7AQ (160) 18. 7CB 7CD (125) 18. 7CO (200) 5. 7DS (332) 19. 7FM (212) 4-5. 7HY 3. 7JA 18. 7PC 8AI (193) 23. 9AK (198) 13-14. CTS 1GD 1JJ 1. 1MW (296) 19. 1LN 1RS 1SQ (16-17. 2AA 22. 2AP (177) 18-19. 2AS (220) 18-19. 2AT 3AV 23. CXs 1AE 7AP (162) 1. DJ3AR/YB 17. DU1s AT 14. DBT (130) 9. FH 3. MR 13. EAs 6AR (180) 7. 6AS (270). GBC 8ET 8FE (129) 8. 9AQ (195) 16. E19N 20. ELs 2AB 2BL (153) 20. SJ. EP2s CB (198) 13. CH (248) 15. BQ 7. DA (194). DW (220) 13. ED (240) 14. FP 15. JP (185) 9. ET3s BSA 16. HEL (220) 18. F9s UC/FC (245) 5. IIS/FC 14. KY/FC (170) 8. FB8s WW XX 4. YY (100) 18. FG7s TC (142) 23. TH (120) XL (180) 20. XX (125) 19. FH8CD (135) 18. FK8s AC (332) 4. AU BB (116) 7. BR 12. FL8s AO (203) 14-15. DG (170) 16. FO8s BG BH 16. BQ BS CG (111) 18. FP8s AP CS (195) 17. FR7s ZC 17. ZD (105) 17. ZG (140) 18. ZJ (105) 17. ZL (238) 4. ZS. FY7s YD (190) 20. YG (247) 12. YQ (201) 10-11. YM (191) 1. YV. G3UHR/V02. GCs 2FZC (120). 3ULZ (193) 22. GD3FXN. HA5s AM (254) 16. CQ (332) 19. FW (270) 16. HB0s AG 22. LL (225) 9-20. HC8 8FN 2. 8RS (190) O-4. 0FF (210) 14. HH0DL. HIs 3AB (266) 2. 3AGU 18. 8BA (189) 12. 8LA 19. 8XEW 3. 8XPM. HK0s AI (234) 13. BIKW BKN (138) 7. BMO (163) 12. HL9s KQ TW (203) 1. 1U US UZ WI (163) 7-8. WQ 6. HPs LV (202) 4. IME IMB (215) 21. 2MD 3RC (145) 22. HRs 1CN (168) 21. 1DT 1KAS (196) 18. 1WVG. 2AFK (238) 21. 2GK 2RM 2SAM 2VFB 6GP. tabon Hs 1BD (215) 13. ILG 15. 3DR 14. HV3SJ (230) 16-18. IS1s LIO (270) 21-22. VAZ 18-19. IT1s EEE (205) 16. PLM (202) 16. JAs 4O 11-12. 6BLL 7EP (202) 3. JH10VM 1. JXs 10M (164) 16. 2BH (332) 15. 3DI 0. 3P (260) 17. KCs 4USA (260) 7. 4USC 4USE 4USG 4USH 4USI. 4USM 4USN (320) 23. 4USU 1. 4USV (256) 8. 4USX 4AAD 6AO 12. 6CO 6JC 13. KGs 4AA (318) 18-19. 4DO 20. 6ALV (270) 12. 6ARJ (295) 11. 6ST 10. KJ6s RZ (240) 6. CF. KL7s ERH ERK EGM EX FQQ GCK 9. KM6s BI DE (234) 13. KR6s AI 13. EB 13. IL JT 13. MB (270) 11. NR (280) 8. KS6s CA 10. CQ (250) 6-7. KV4s AA AM EY FC (185) 20. FZ (235) 12. KW6s AA (256) 7. LJ (248) 11-12. EL (310) 10-11. GH. KX6s HQ (230) 5. BU (241) 7. DC (300) 11-12. DQ GX. KZ5s AG HC 23. NF TI. LA8 1K 5KG. LG5LG (208) 15. LXs 1PH (245) 12. 1RN 14. 1SK 2FP (210) 19. LZs 1CC (200) 16. 2KKZ (209) 20. 2KST 0. MIs B (128) 8. D (191) 9. MP4s BBC 13. BBR BBW BCB 13. BEU BGR BGX (183) 13. BHD (145) 18. TAF 17. TCE TCF 17. MBJ (235) 18. OAs 2BH 8AO 8AQ (254) 5. OD5s AV 8. CN. OH6NY (192) 9. OR4Es (100) 17. OXs 3AY (190) 0. 3FO 3LP 5BA (188) 17. OYs 2BS (166) 18. 4HQ 18. 7S 7Z (257) 19. PJs 2AW 2CB 21. 2CQ 3CC 3CD (250) 0. 7IC (155) 22. 9AA (207) 12-13. PZ1s AP 19. CY BA (228) 2. BC (160) 19. BF (140) 6. BG (165) 18. DD 18. DF (160) 19. SL7AY/mm. SP5s ARG 3. BB. SVs 1AI GWA (254) 16. WDD WI WN (216) 2. WM1M (240) 16. TAS 1AC (212) 0. 11B 18. 1KT (192) 22. 2BK (150) 20. 3AB 18. 3AT 3CC (207) 23. TFs 2WLM 10. 3EA (165) 18. TGos EP (210) 1. RN (206) 19. UZ (223) 13. Tis 2IO 2JL 2WA 2XL 4AG 4FAZ 5CVA 6CAL TII1s AL (207) 23. AU (210) 21. OQ (235) 7. TL8GL (203) 21. TN8s A (223) 17. TR8AG (120) 18. TU2s AZ (292) 22. BC (272) 7. BD (120) 17. TY6ATE (202) 22. UAs 9AN 4. 9KAI (230) 13. 9KDL 0DG 0EH (190) 8. OYE (195) 3. OYP 4. UB5KDA. UD6s BD (195) 2-3. BR (230) 4-5. HB. UF6s CA (218) 5. CR (230) 18. DL FE (145) 5. KPA (216) 15. UW6s AA (213) 13. AW KAA 15. UH8AE 13. UI8s AG (204) 3. CD 3. MF (233) 2. UJ8s AC (208) 4-8. KAA (261) 13.

UL7s KBF LA. UN1KAI (223) 8. UO5s BM BZ (203) 16. UP2CL (165) 8. UQ2WX 16. UR2s AR KAW (220) 13. UT5s KTHI RP (145) 5. UWs 9WR (230) 14. OJE (209) 8. UY5s LK XS (212) 15-16. VEs 8MA 8MD (168) 1. 8OK 8RCS 8RX 18. 8YM 0-1. QNA (172) 17. ONH. VKs 4WFV/9 (215) 17. 7GC 7KJ 7RX 7TR 9BS (130) 7. 9DJ 9RB 11-12. 9RII (125) 8. 9RJ (312) 8. 9NT (220) 13. 9IJ (190) 9. 9JW 11. VO4 1CW 1HI 2AO 2JC 19. VPs 1AJ 20-21. 1AS 1CP 1LL 1TC (203) 13. 2AW (175) 21. 2AZ (277) 12. 2DAL (190) 22. 2GA2 2GA1 22. 2GAR (175) 21. 2GLE 20. 2GW 2GZ 2KF (202) 12. 2KM (160) 1. 2MK 2ML 2MO (198) 18. ZS2B 2SY 2VV (178) 6. 2VW 23. 2VY (235) 15. 5AA 22. 5AB 5CB (269) 23. 7DP 7NF 8DJ (220) 0. 8FL (220) 0. 8HZ (190) 1. 8JB (198) 1. 8JC (205) 2. 8JR 8KD (210) 23. 8KL 0. 8KN 0. 8KO (204) 10-11. 9BN 9CP 23. 9FZ 22. 9K 9MI 22. 9Qs 8BZ (130) 17. 8CC (215) 11. 8CG (222) 12. 8CI 9GA (250) 17. VRs 2DK (209) 11. 2FR (239) 7. 4EL (175) 12-13. 4FO 6TC (232) 8. VS 5MH (190) 12. 5TJ 6AD (121) 14-15. 6DR 12-14. 9MB (192) 16-17. VU2s AJW (232) 13. BX (203) 17. DKZ (185) 19. ED 13-14. KT 3. NP 13. TX 16. WW. W6BCW/4X4 15. XE 2RE 3LK. XPI1AA (199) 0-1. XV5CQ (120) 12. XW8s AL (208) 1. CS DY 11-12. YA1s DAN (237) 16. SG (214) 13. VR. YB0s AAB (207) 17. AR (215) 10-18. YK1AA (236) 13-14. YNIHF (332) 20. YO2BB (204) 16. Yss 1FSE 1JGE 1MAX 1MPG 1NISE 3. INEE 19. 2R4R 2REC. YUs 2NDV (202) 19. 3XTX (205) 15-16. ZB2s 1V (214) BC. ZC4GM (218) 14. ZDs 5D (206) 18. 5V 17. 5X 7GS (201) 0. 8GS 0. 8IL (338) 18. 8JL 1. 8Z 8NK 9BE. ZEs 1CX 1CY IJE 2IE 4IV (130) 19. 8JC (150) 17. 8JJ 8JW 14. ZF1s EP (196) 3. GC (195) 18. ZPs 3AW (160) 18. 5KA 1. 2Zs 2MJ (165) 18. of Marion isle. 2P 3C 19. 3JF 3LU. 3As 2AM 2CP (343) 9. 3AV 15. 4S7As 2. 4TA4Os (190) 0. 4X4s AS CW (175) 16. FQ (250) 23. IFP (214) 23. HG IX JU 5As 1ITK 18. 2TR 3TX (219) 16-20. 4TJ (213) 18. 4TF 4TR 15. 5TH (233) 20. SH3s JL (270) 20. KJ 16. 5N2s AJ 7. AX 7. ABF (127) 6. ABG (290) 12. 5R8s AM (120) 18. JS 16-17. BP (110) 17. CJ 22. 5TSD (202) 8. 5U7s AC (125) 18. AJ 19. AN 2. 5V4s AP (148) 18. EG (150) 17. SWIAD (178) 7. 5X5Ks (335) 15. 5Z4s AA (135) 18. ERR JH KL LH LR (183) 20. 6W8s BM (190) 18. DV (125) 19. 6Y5s AD (182) 23. GB UC (198-240) 12-13. 7P8AR (135) 18. 7Q7s AM (159) 15. EC 16. 7XOs BC (105) 18. WW (109) 17. 7Z3s AA AB (270) 16. 8P6s AH 1Z 21. CA 22. CC (168) 21. CD CT CV (244) 23. CX. 8OAYL 13. 8RIT (145). 202) 9-21. 9E3USA (230) 18. 9G1s BB BF (201) 22. CG (173) 8. 9H1s BL BM M (233) 15. K (202) 4. 9I2s BC (218) 15-16. BR JN (150) 19. LK 18. 9K2s AN (202) 13. AV 16. BV (202) 15. CK (202) 15-16. CB (201) 14. 9M2s DQ (210) 0. DW 17. DX (198) 13. NF 10-11. 9N1MM (270) 12. 9Q5s DG HF HI (110) 18. SN. 9U5s AC (120) 19. CR DP 20. SK 9Vs LE NR 15. OI ON 17. 9X5s AA (220) 16. BW 19. VF. 9Y4s AR (256) 22. EH (110) 18. VT (185) 12. all but a handful via s.s.b.

It's 20 c.w.'s turn for the "How's" spotlight next month, program presented by Ws IVAH 2IC0 2KSX 2LJF 3HNK 4YOK 6YKS 7BE 8RQV 81BX/2 8YGR. Ks 3CU1 4TWJ 5YUR 8DHT 0GVA. WAs 1FIUH 1GGN 1IDP 1IJMR 2APG 2BHJ 3GVP. 3HMR 3HIR 3ID 3JRY 3KOS 1GSS 4CTI 5PPZ 5SOX 8MCQ 8VBY 8YXE 9MQI 9SQY 9TFM. WBs 2RNL 4GTF and reporters to file. Then we'll get around to 15 phone. Ws 2DY 2LJF 3HNK 4UF 4YOK 8BQV 8YGR. Ks 5YUR 6TWT. WAs 1IDP 2BHJ 9Q1QI 9SQY 9TFM 9URY. WB2DZZ. P. Kilroy; (15 c.w.) Ws 1RGD/2 1EGM 2LJF 3HMR 3HNK 4YOK 7BE 8BQV 8YGR. Ks 5MGH6 9YUR. WAs 1FIUH 1KEK 2APG 2DOF 2FOR 3GVP 3JRY 5SOX 7BOA 8VXE. WR2s DZ2 RNL WNs 2DRS 2FEL 2GMIC 9WFL 9ZWR 9WEP. VE7RST: (10 phone) Ws 1EGM 2AOZ 3UHK 4UP 4YOK 8RQV 8YGR. Ks 1HDO 5YUR. WAs 8MCQ 9TFM. WB2DZZ: (10 c.w.) Ws 4YOK 8BQV 8YGR. Ks 5YUR 0GVA. WAIFHU. WB2RNL: (40 c.w.) Ws 1ARR 4YOK 8YGR. Ks 8DHT 9YRA 0GVA. WAs 1FIUH 2FOR 5SOX 7BOA 8MCQ. WB4GTL. VE3GHO: (40 phone) W8YGR. WAs 8MCQ: (80 c.w.) Ws 1BGD/2 1SWX. K8DHT. WAs 1FHU 2DQE 2FOR 8MCQ: (75 phone) WAs 8MCQ 9SQY: (160 c.w.) Ws 1BB 2RAA. K8DHT and more coming. Spring's still got that old DX sting!

Where:

AFRICA—"I'll be personally responsible for QSLing all contacts made with my callsigns," declares VQ8CC concerning VQ8s CCB and CCR. "Special arrangements will be used to distribute QSLs via bureaus within a few days of operation. Make sure you have self-addressed stamped envelopes on file at your local bureau. QSLs are not needed from stations that contact VQ8s CCB and CCR. If you do not receive your card within six months of QSO, send details of contact to VQ8CC." W4-BPD, planning to team up with Steve on St. Brandon and Rodriguez isles under the aforementioned calls, designates W4ECI as his own QSL manager for other Gus-stops out that way. W2XY, QSL tender for TJIAL, 6W8s DG DQ and 9U5SK, is former W2MES, address unchanged. "I now have the VQ9L log for QSOs from May through December, 1968, and will confirm any contact on receipt of s.a.s.e.," advises W4VWS. DL1HH's tenure as QSL aide for 5V4s AP and EG dates from the first of this year. Hermann also runs the DARC QSL bureau at Frankfurt. Geoff Watt's DX News-Sheet points out that ZS6OB helps ZS2PX push ZS2MT's Marion Island QSLs, also that F9HS has FB8XX's s.s.b. logs for contacts from December 20, 1965, through December 11, '66, at 21 rue La-viseur, 92 Meudon, France. Furthermore, FR7ZD expects to deal with FB8XX QSLs for recent QSOs by operator Maurice.

ASIA-TAIHY, chief of the TRAC QSL bureau at P.O. Box 699, Karakoy, Istanbul, Turkey, needs his own Stateside manager. Interested? "I usually receive logs every two weeks and can confirm all TA2EM QSOs," assures WODAK. "He's on 14-MHz. c.w. almost daily." WA8THG relays VE3ACB's disclaimer of VU QSL connections. FEARL's News lists HL9K-T-U-V-W as the current Korean callsign suffix sequence. Hmmm, five times 26 equals 130 potential HL9s.

OCEANIA-W4AAV, ex-W3JTC, expects to use his Manila DX1AAV call till June, Larry writes. "The DX prefix will be changed in the near future to DU1Z, the block for Philippine non-nationals. Meanwhile DX1HMI (W8HMI) and DX1IBJ have also been issued." According to DX News-Sheet all QSLs for Chatham visitors ZLs 1DS 1IL ITU and 2AFZ, who terminated action on the islands in late January, can go via ZL2AFZ. K6KA can confirm his own QSOs as guest operator Bill at VR-2AP in mid-March. WA6KGP, DU7SV's QSL agent, calls your attention to his new address: 5691 Mt. Acara Dr., San Diego, Calif., 92111.

EUROPE—"All QSLs for SK1-SL1-SM1 stations can go through me," offers SM1CXE. "Anyone missing cards for previous QSOs with this call area should advise me and I will try to be of assistance." "I no longer am QSL manager for TF5TP," notifies W2MUM. "Send cards direct." K9KLR announces. "As of February 1, 1969, I handle QSLs for GC3EML S.a.s.e. or s.a.e.-International Reply Coupons, are musts." . . .

W3NHK, QSL rep for CT1TZ and others, has a new address: P.O. Box 14, Norwood, Penna., 19074 G3UML, receiving many cards for VP1PV asserts he has no B.G. QSL managerial arrangements.

WHEREABOUTS—"Service temporarily suspended" is stamped on some overseas-bound surface mail returned to K3AC, WATBOA and others. Has to do with a shipping strike, so better make yours airmail for the nonce . . . "I've discontinued my services as QSL manager for 9Y4DS and SP6AE as of January 1, 1969," declares K9KLR, forced to terminate because of inadequate log liaison. . . . VERAONA secretary PJ2CD affirms, "Each of our six islands is now designated by a digit, to wit: Curacao PJ2, Aruba PJ3, Bonaire PJ4, St. Eustatius PJ5, Saba PJ6 and St. Maarten PJ7. PJ8 and PJ9 are issued to alien nonresidents; PJ1 and PJ0 will be used on special occasions. Revised callsigns became effective January 1, 1969." . . . Our QSLers of the Month" this month are F5OJ, G3EBR, GM3-IAA, HB0J, MP1BGW, WAs 6FC OKCR, VKs 2BKM 0KJ, VP8KL, YU2QK, ZL1AGO, ZS3HX and 3V8AA, plus QSL helpers W2CTN, Ks 4BHE 9U5M, WAs 3IKK and 4WAQ, all nominated by "How's" correspondents Ws 1SWX SYGR, K6TWT, WAs 21IU and 7B0A for outstanding pasteboard punctuality. Any snappy commendables regularly noted over your way? . . . 'Alp!' These italicized brethren need judges toward confirming contacts with hang-ups mentioned: W2DY, HL9US, W7FC, CP-6UY '67, UA2CA, VP2GC 9FU '67; W5YMB, VQ9VX; U79EF, CR4AE, VPs 2KJ '66, 5RB '66, V86AA, ZD7SD '67; K6TWT, FG7XE and K9KLR, FG7XF, UP2OV, XE4BA, VP2DAA, all '67 QSOs. Any 'alp?' . . . Ws 4VSW 7PCD and WA9SQY offer to perform as QSL managers for DX ops in need of such assistance, the rarer the better. . . . For direct reply, unless specifically waived, s.a.s.e., or s.a.e. with sufficient ARCs when appropriate, should be included in mailings to QSL managers. This is only proper when seeking postal response from anyone, for that matter. Time to check individual recommendations supplied by the "How's" crew, keeping in mind that each item is necessarily neither accurate, complete, nor "official". . .

CED7DW, Box 714, Puerto Montt, Chile

E14AG/W4, J. Maher, 6306 N. 30th St., Arlington, Va. 22207

EP2CH, c/o Topographic Tng. Team, P.O. Box 400, APO, New York, N.Y., 09205

KZ5TC, T. Casey (W1EII), 76 Oak Hill Rd., Westford, Mass., 01886

SK1s AQ BL (via SM1CXE; see text)

SU1MA, 46 Omar Ebnekhattab St., Heliopolis, Cairo, Egypt

TA1JX, Box 699, Karakoy, Istanbul, Turkey

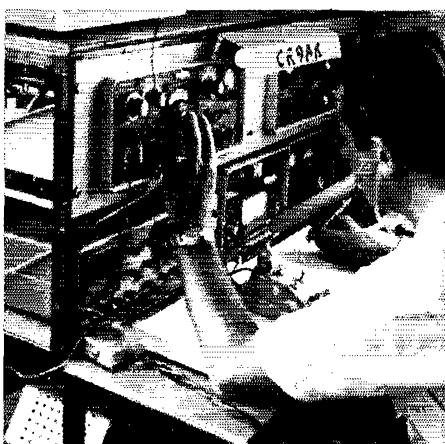
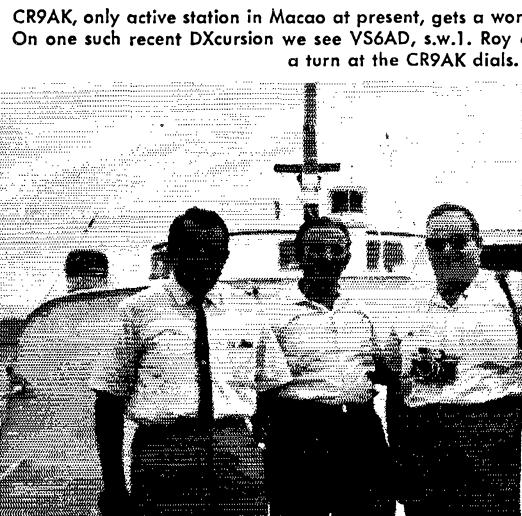
TF2WLJ, F1BS, Box 115, FPO, New York, N.Y., 09571

TY6ATE, B.P. 107, Nattingou, Dahomey

UA1KED, c/o E. Krenkl, RAEM, Chapligin Str. 1-A, Moscow, U.S.S.R.

VPIAJ, Box 350, Belize, British Honduras

VQ8s CCB CCR (to VQ8CC; see text)





TG9RN typifies the new breed of tireless Central American DX chasers. Tony is equally at home on 10, 15 or 20 sideband. (Photo via WA5SXC)

VV7TI, Box 573, Capurano, Venezuela

ZDSB, Box 255, Mbabane, Swaziland

ZS1ST, H. Connolly, Dassen Is., Lighthouse, c/o Green Pt., Lighthouse, Three Anchor Bay, Cape Town, So. Afr.

SZ4LS, Box 448, Nyeri, Kenya

6W8s DG DQ (via W2YY)

9G1GL, P.O. Box 625, Toma, Ghana

9J2BR, Box 122, Lusaka, Rhodesia

9K2BG, Box 5979, Kuwait

9K2BV, Box 5890, Kuwait

CR4BH (via WA2CMV)

CT1T (see text)

DU7SV (see text)

FP2FD (via WA5ERS)

FB8XX (see text)

FB8Z (to F3LO)

FW8DY (to KH6GLU)

GC3EML (via K9KLR)

H13ABB (via W2YY)

HK9GO (to HK3GQ)

HK8TU (to HK3RQ)

HU1P (via WB4BOJ)

ex-KA2JP (to W4FRU)

ex-KZ5IP (to W8HQV)

PJ6AA (via KV4AM)

PJ7VL (via W2CTN)

PY9EP (via PY1MB)

T5FTP (see text)

TJ1AL (via W2YY)

VK9AK (to K6KA)

VP2DAP (to KV4AM)

VP2DAQ (to K7TMK)

VQ9L (see text)

VR4EZ (via W2CTN)

XE6DUS (to K4FW)

XE6FT (to W7FT)

ZF1JF (to WIIHM)

ZF1RF (to W1SCS)

ZS3AW (via DJ3KR)

ex-ZS3EW (to ZS1ST)

5Z4RS (to RSEA)

6Y0A (via JARA)

8P6AE (see text)

8P6CY (to W8WUM)

9Q5HT (to DL5WB)

9U5SK (via W2YY)

9V4DS (see text)

9Y4PHO (to W7PHO)

Generous **Ws IARR** ISWX 1CW IYIM 2DY 3NNX 8BQV 8YGR, **Ks 20LD** 3CUI 3ANW 6KA 6WTW 9EU9 9YRA OGVA, **WAs 2APG** 3BGC 7BOA 9HHH, VO2AC and VE7BST supplied the foregoing QTH catalog, heavily helped by the Canadian DX Association *Long Skim* (VE3HJ), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), DARC's *DX-MB* (DL3RK), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, Nor. 72 T., England), Far East Auxiliary Radio League (M) *Xers* (KA2LL), Florida DX Club *DX Report* (K4GRD), 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., 12020), Northern California DX Club *D-Xer* (Box 608, Menlo Park, Calif. 94025), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB), VERON's *DXpress* (PAOs FX LOU TO VDV WWP) and West Coast DX *Bulletin* (WA6AUD).

Whence:

Europe—Oyez! DX hounds with contest fever still unabated will find several shindigs on this month's agenda to test their mettle. From 1200 GMT April 26th to 1800 the 27th you can choose phone and/or c.w. weaponry for battle in the 1969 PACC Contest sponsored by Holland's VERON wherein non-Netherlands will work as many PA/PE/PI people as possible, each once per band, 1.8 through 30 MHz, using the customary RS- or RST001, RST002, etc. serial swap. You earn three points per two-way exchange, total points to be multiplied for final score by the number of Dutch band-provinces contacted (province

abbreviations to be used are DR FR GD GR LB NB NH OV UT ZH and ZL). Each log, postmarked on or before June 15, 1969, should be sent to Contest Mgr. PAQVB accompanied by a signed statement that the participant has observed the contest rules as well as regulations for amateur radio in his country, to be eligible for possible certification of performance. At the same time you might request specifications on VERON's various worthy DX diplomas Not only that, USKA (Switzerland) invites amateurs throughout the world to participate in its 1969 Helvetia-22 Contest, a single-op phone and/or code affair scheduled to run from 1500 GMT April 19th to 1700 on the 20th, 1.8 through 30 MHz. The traditional RST001, RST002, etc. serials will be exchanged, and each HB station will add a two-letter abbreviation to indicate his canton (province). Every QSO counts 3 points, this total to be multiplied for final score by the number of band-cantons worked, and a given station may be contacted on different bands. To be eligible for possible certifications of performance, log entries must be postmarked to test manager HBOSR's address by May 20, 1969, separate one-side-only sheets for each band used, and including a signed declaration that contest rules were observed. Might as well include a request for scoop on USKA's highly valued H-22 diploma, an award based on QSOs with all Switzerland's 22 cantons. In last year's H-22 affair this is how our side finished in order of score: Ws 9IQD 1TX 3IDBX, WA5CBF, Ws 1FZ 3FU 2ZV 7LVI, WAOKDI, K9CYO, WAOAUB, Ks 1IIK 9VLZ, WGNEK, KIHVV, WAIFIU, Ws 9WQM 4AZK 4HOS, WB2WAD, K4RDU, Ws 2NCG 4UF, KSNQP, WODAK, K5MDX, WIAQR, Ks 2SBW 9ABQ, Ws 9QQE 2BZV, W9JKI, Ws 7JCB 9AMT, Ws 6BIL and IWAMI, with VEs 1AH 2L 8BB 1AE and 3DEB in that Canadian sequence. Continental topplers were W9JQLD, U4AKKC, U9WWB, PY2AS, 5WIAS and 9Q5HII. Of some interest is that U.S.S.R. entries outnumbered our gang 68 to 36 *Reminder:* PZK's International SP DX Contest comes off on the first week end of this month. Details appeared in our March pages G3HLW and K2HLW, aborted by W2RGU and K2SHIE, enjoyed a recent dinner get-together in New Jersey. Not only their suffixes are in common, David and Michael are both electrical engineers Where have all the Gs gone? Their TVI problems are "an unbelievable headache," testifies G3UML DL4TS reports that DL6QX is now president of Gateway to Europe Radio Club at Rhein-Main Airbase, club call DL4RM. Berne adds, "Hams visiting the Frankfurt area are urged to visit the club, giving prior notification to B. Welch, DL4TS, CMR Box 4488, APO, New York, N.Y., 09057. CN8AW, HS1RZ, OKIAJR and W2OKMI were recent visitors." SVOs WI and WN of Crete may drop over to Rhodes once in a while to augment SVOWY's output. SVOs WA and WMM may also join the lads in such a jaunt early this month.



4Z4NAI, 15-year-old Israeli Novice, gets his share of c.w. DX with 10 watts and a ground-plane. That DX-20 is all set for the time Eran claims his General ticket and drops the "N" from his call. 4Z4NAI attends an electronics school in Tel Aviv and is also very active in Boy Scout affairs. (Photo via K5YUR)

601GB, last mainstay on Somalia's DX front, recently closed down this Mogadiscio layout for return to the States. Too many African countries are staying rare and getting rarer. (Photo via WIYRC)

AFRICA—The Steve and Gus show, VQ8CC plus W4BPD, is due on the air at any time beginning with a visit to St. Brandon as VQ8CCB, to be followed by VQ8CCR Rodriguez doings. Clangos is possible but improbable, and Gus is expected to be in Mahe, Seychelles, by the 25th to tell the next stages of his own operational odyssey. C.w. spots for VQ8s CCB and CCR will be 25 kHz. inside the lowband edges; s.s.b. notches are 3795, 7095, 14,195, 21,245 and 28,495 kHz. Zero-beat work may occur on 21,395 and 28,605 kHz. On 160 the magic number is 1827 or as otherwise arranged. On solo Gus still likes (c.w.) 2352, 7026, 14,026, 21,026, 28,026; (phone) 3796, 7196, 14,196, 21,396 and 28,496 kHz. . . . WA2CMV can set up skeds with YL CR4BH on 20 voice. Bruce chats with Mary every other Wednesday "Ex-ZS3EW-ZS2SS starts a two-year lighthouse duty tour on Dassen island as ZS1ST," discloses K3MINW. . . . W4VSW apprises, "VQOL expects to be more active on 7045 and 21,305 kHz. around 1900 GMT." Five-Band-DNCC customers take note!

OCEANIA—VK3IQ ponders as to why the Gs have gone fishin', and some VKs as well: "About three years ago things began to change in Australia. Single-sideband, slow to take on here due to shortage of components for homebrew, began to get a grip. Commercial gear, once the realm of a fortunate few, began to be more freely available. It wasn't cheap, but many VKs felt they had earned decent rigs after years of makeshift gear; transceivers and beams began to sprout. A lot of my c.w. friends took to s.s.b., too, and when they did return to c.w. their higher power and beams killed me in the hunt. My few carrier-a.m. phone contacts with locals on 80 and 40 meters became very few, and c.w. contacts with locals fell off also. A solution would be to join the race and go to higher power and a beam. However, I have never had trouble with neighbors or the local council; a tower and beam would be sure to stir things up, and higher power could lead to TVI. In my case the cost also prevents such expansion, for I have children approaching high school age. Steady rise in the local noise level is another factor. All in all, ham radio for me is becoming more like frustrating hard work than the fun and relaxation it was meant to be. I still work 80 c.w. when static lets me but commercial QRM on 40 makes it useless at night; 20, 15 and 10 are too much PSE QSL 73 for a rag-chewer and are too dependent on conditions. My radio hobby has always been done cheaply; it now seems that those days have gone. I have just about 'gone' myself." VK6s CB and IZ, a couple of Yanks down under, are still going strong, though. WA9GGI says VK6CB is very active with an SB-100 into a 30-ft.-high dipole, and VK6IZ gets out consistently with just five watts of c.w. from one of the highest locations in Sixland. . . . DX1-HMI (W8HMI) remarks to WICW and the ARRL DXCC Desk, "Loosening of licensing restrictions here is mainly due to work with the radio control board over the past year and a half. Most of the opposition gradually wore down; in fact our most worthy adversaries are now our staunchest supporters. This has not been easy. I was off the air for my first 15 months in the Philippines." Pacifisms via aforementioned periodicals of clubs and groups: VE6-AJT points toward Manihiki after February's FW8DY and 5V1AS fireworks with KH4GLU. . . . CR8s AG, QRP a.m., AH with a 350 and quad on 15, and AI using an FL-200B/100B and TH-3 on 15 and 20 swap local Timor QRM. . . . ZLIDS of Chathams fame recounts, "Our operation was hindered by poor propagation conditions, poor line voltage and lack of a beam, but no equipment trouble developed during some 2500 QSOs with 105 countries using a 350, trap vertical and 3.8-MHz. dipole." Denis then visited California for some February eyeball contacts. Another active-type ham, possibly ZL3ABJ, is said to be stationed in those islands for the next few months, and the Campbells are supposedly represented by ZL4AF on 75-meter a.m. around 0800 GMT.



HEREABOUTS—"Recently got permission to operate in the U.S.A. and I'm on the air from Arlington, Va.," states E14AG/W4. Welcome to the land of QRM, John. . . . W8SQW writes, "When I was KZ5LP in 1948-'51 I had no trouble working some of the better DX, for a c.w. KZ5 was almost rare. Now I find DXing a far different story, being among thousands of other W/Ks. Though QRT for a couple of years I'm up to 190/177 worked/confirmed." W1EII takes his C.Z. turn now, advising, "I've been licensed as KZ5TC since August." "Got my Extra last spring and really enjoy those subbands," says WATBOA, still punching through with 811As. . . . KV4EY visits friend VP2VV on Bellamy cay when he goes to Beef island for VP2VY sport. . . . If perchance you worked four VO2s over March 22-23, 1969, Amateur Radio Club of Western Labrador (VO2AI) has a nifty certification awaiting you. VO2AC's advance announcement arrived a hair too late for last month's QST W3NNX tells W9HHH/1 that YS1NEE expects to use his HU1P call for another month or two "That old college life really cuts down DX activity," laments WA2APG. "Come summer the home station may be updated with an SB-101 and perhaps a tower with beam." LCRA's Independence of Colombia Contest is set for July 19th-20th. We'll mark the "How's" calendar for a rules run that month "Nearing a 14-AVQ DXCC with 102/97," estimates W7FCB, formerly W9VYX. You don't find many QSL-returns percentages running better than Dan's. . . . "Rebuilding my linear to compete with rising QRM," warns long-time Jeeves helper W3HNK who finds 28-MHz. sideband a DX treasure trove "That 5B-DXCC is really something to shoot for but I'll never live to achieve it," figures K3AC. "Still shooting for my first multiband 100." One-sixty keeps jumpin', W1BB's signal getting through to JA2CLI on January 26th at Japanese sunset time. No two-way yet but we know Stew will make it sooner or later. W2RRA swaps S8 reports with G3CFV on 1.8 MHz, while DXperimenting with one of those DDR ground-hugging horizontal loops described in the ARRL Handbook. K9SBL/m chatted with KV4FZ on 160-meter s.s.b., fine mobile DX on any band League Director W4KFC finds considerable interest in the possibility of a 5B-WAS to complement 5B-DXCC at the DX end VP8KO, lately offering So. Orkneys on 20 sideband, isn't enamored of pile-ups. . . . By early February K6s KA and UYC of Southern California DX Club awaited QSLs from 310 and 237 hand-countries toward their 5B-DXCCs. How's your own furious 500 coming along?

GST



CT1s MW and LN, left and right, are first-magnitude DX performers. They're usually friendly rivals in ARRL's annual DX free-for-alls. (Photos via WIARR)



CONDUCTED BY BILL SMITH,* K4AYO

Let's Talk About Meteors

IT has been almost two years since we discussed meteor scatter propagation. Each month we have a handful of inquiries about the subject; apparently some new blood is being drawn into the field.

The ionization caused by meteors burning in the earth's atmosphere can propagate radio signals 1400 miles or so. Such propagation, if it can be rightfully called propagation at all, was first discovered in the 20-meter band. Billions of meteors, nearly all of them no larger than a grain of sand, enter the earth's atmosphere daily and are incinerated. If it were not for our atmosphere, the earth's surface would look like that of the moon, pock-marked from meteor bombardment. Occasionally an unusually large meteor will enter the atmosphere; one so large that it may not be destroyed before striking the ground. Such a meteor, called a fireball, streaked across northern Mexico and the southern United States February 8th. That meteor was seen over thousands of square miles before it crashed into the rugged Sierra Madre Mountains of Mexico.

Meteor scatter is of little value to amateurs operating the high-frequency bands. Other forms of propagation are more reliable and predictable and provide plenty of contacts up to 1400 miles or so. On 50 MHz. meteors are responsible for most of what is commonly called ionospheric scatter, and sporadic *E* provides occasional DX up to 2500 miles or more.

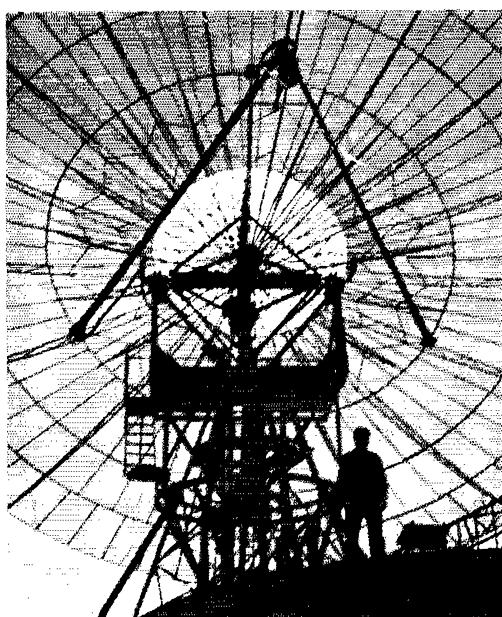
But when we go to 144 MHz., it becomes apparent that meteor scatter, or m.s., offers the most reliable way to make contacts beyond the 500-mile region. Like distances can be covered under exceptional tropospheric or auroral conditions, or the even more rare 2-meter *Es*. (There is reason to believe *Es* is more prevalent at 144 MHz. than was thought prior to last summer, but more observation is needed to support this.) Meteors are almost always present, and are, to some extent, even predictable.

There are two types of meteors, sporadic and shower. Sporadic meteors are the ones most commonly encountered by the earth as it spins through space. The shower meteors reappear on a more-or-less predictable schedule, the density of the shower varying from year-to-year. A reasonably accurate shower calendar appears in the May, 1967 *QST* v.h.f. column, and in both editions of the ARRL *V.H.F. Manual*. The most reliable annual showers are the August Perseids

and the December Geminids. The May Aquarids may also prove a reliable performer. The Leonids will never be forgotten by 2-meter m.s. fans after the fantastic display on November 17, 1966. That shower was dense enough that the ionization level supported continuous signals.

The most commonly heard m.s. signal is called a "ping." It lasts a fraction of a second, hardly long enough to be of any communication value other than to assure you that you are on the frequency of the station being scheduled. Bursts, from sustained ionization, of 5 to 10 seconds are common, and longer bursts up to 90 seconds aren't too rare. Two stations using s.s.b. skillfully can complete a contact on a single 10-second burst. C.w. may take a little longer. You can talk faster than you can push a bug or keyer. Most six-meter operators have heard signals that appear suddenly and disappear just as quickly. Most likely they were m.s. Many six-meter operators refer to these signals as "audio bursts," which is not entirely correct.

Because of ionization levels necessary to propagate meteor signals, 50 MHz. offers the neophyte the best place to experience m.s. This



RUI and his dish are ready for moonbounce skeds. See page 97.

*Send reports and correspondence to Bill Smith K4AYO, ARRL, 225 Main St., Newington, Conn. 06111.

type of propagation is much more common at 50 MHz, than at 144. The first m.s. contacts on 220 MHz, were made only last summer and this frequency offers a real challenge to the serious m.s. enthusiast. M.s. signals at 220 are much less common than at 144, and at 432 MHz, the likelihood of m.s. with amateur power levels is indeed remote.

Opinions on equipment needed for m.s. vary. Power? The more the better, but don't neglect trying m.s. because you're running a 5894. It is the antenna that delivers the goods. Stacked Yagi and collinear arrays top the list. Solid-state converters and preamps are finding more favor and should be considered. With the easy availability of good solid-state devices, there is no reason for a poor receiving system. If you're short of cash for high-power amplifiers and the like, spend what you can on a good antenna system and low-loss feedline. Those two items are the *best* amateur radio investment you'll ever make!

Except under unusual circumstances, m.s. contacts are made on schedule. Transmitting and listening periods are predetermined by the scheduling stations, and follow carefully timed sequences. WWV is the time standard. Sequences may vary from 5 seconds up. Five to 15 second periods are most adaptable to s.s.b. Most c.w. operators prefer 30 seconds, though longer periods are used occasionally. The information to be exchanged should be agreed upon before the schedule. It must contain no less than an exchange of calls and confirmation of the exchange. Most m.s. operators insist upon exchanging calls, a signal report, usually consisting of one letter and a number, and a confirmation. Such an exchange leaves no doubt that a valid contact was made.

When you feel you're ready to try m.s. DX, look at the 2-meter standings boxes in the column and select a station 800 to 1000 miles distance. You could write a letter requesting a schedule, but better yet check into the v.h.f. nets on 3.980 MHz. Sunday evenings after 0230 GMT --- or telephone him. Most hams don't like to write letters, but talk they will, and a night phone call costs only one dollar. I'm sure you'll find most m.s. operators, and especially those listed in the boxes, willing to schedule newcomers. They can also give you some tips not covered here.

Conventions and Awards

The Orlando (Florida) Amateur Radio Club's annual hamfest will be held April 26-27 at the Statler-Hilton Inn in Orlando. This hamfest draws nearly 3000 persons and is v.h.f.-oriented. Program chairman K4UIZ says this year's fare includes K0MQS speaking on moonbounce, W4AWS and W4GJO. This writer also intends to be present to meet southeastern v.h.f. buffs. Registration and room information is available from W4BKC, 736 Alfred Drive, Orlando, Florida 32810. The registration fee is \$1. Room rates vary from \$10 to \$15.

The Pacific Division ARRL Convention, June 13-15, in Sacramento, California will have a fine

50 MHz. WAC

The following stations have been awarded 50 MHz. WAC. They are listed in the order of issuance, the first in early 1958, the last on April 21, 1959.

W6BAZ	W6FZA	W5JXU
W6BJI	W6NLZ	W5UNH
W59DPS	W6QNM	W6TMI
K6GDI	W6IBL	W6PFP
W6QIN	W8ESZ	W4UCH
W9HGE	W6IC	W6AZT
W9SMJ	W6ZJB	K6KAO
W6OGW	W6DO	

v.h.f. program. W6DOR is looking for 35 mm color slides of v.h.f. stations to show during a slide talk. His address is Ev Taylor, 4100 Worthington Drive, North Highlands, California 95660. I'm sure Ev can return the slides to their owners if desired.

The Central States V.h.f. Society will hold their third annual conference in Boulder, Colorado August 15-17. Serious v.h.f. men are invited to contact W6EYE for details. A highlight of the conference will be a special tour of the National Bureau of Standards.

In Ontario, the old VE3BQN trophy has been replaced with a new one. It will be awarded tri-annually to the VE3 having the highest 2 meter score during ARRL v.h.f. contests. To be eligible, the applicant must submit his log to Dr. Ted Sparrow, VE3BQN, 125 Lytton Blvd., Toronto 12, Ontario. The score must also be published in QST. The winner receives a small trophy which he may keep.

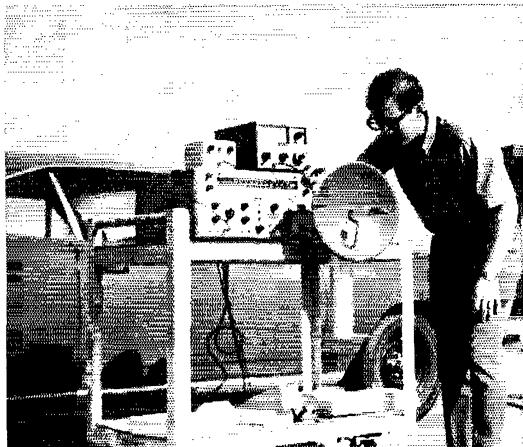
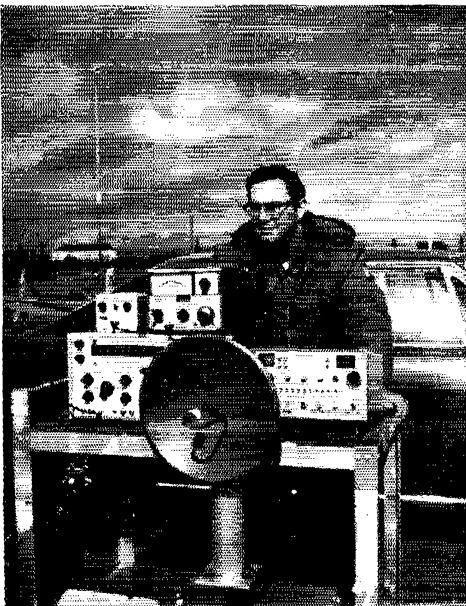
Thank you, Ted, for making this award available. We hope it will encourage more VE3 interest in 144 MHz.

Groups sponsoring v.h.f. meetings may send me their announcements for publication. Ninety days advance would be appreciated, as would photographs taken during the meetings, results of antenna measuring contests and so forth.

OVS and Operating News

50 MHz. got off to a slow start this year. Es was disappointing and very few openings were reported. But a solar flare on February 2nd made 50-MHz. buffs sit up and take notice. The first auroral signals were noted in New England as early as 1900 GMT by W1HDQ and in Canada by VE2AIO. By 2200 GMT, F₂ backscatter was being worked across the U.S. from Washington to Florida. We received the following account of the day's activity from VE2AIO.

The morning m.u.f. to the south and southeast was quite low, 35-36 MHz. At 1700Z, the 35.58 MHz. southwest U.S.A. paging channel was quite active. A few weak Spanish-speaking stations up to 40 MHz. were heard. By 1900Z, strong F₂ signals from California on 35.58 and strong auroral backscatter to 49 MHz. made too much interference to copy weaker F₂ signals. At 2000Z, Spanish-speaking stations peaking towards Brazil became much stronger up to 40 MHz. One hour later, 2100Z, the California 43.5 MHz. paging signals were very strong. South and Central America stations were logged to 45 MHz. By 2200Z, the 43.5 channel became completely jammed. The F₂ signals were much stronger than those having auroral character-



band amplifiers. The waveguide had to be switched manually between transmitter and receiver.
At the left, Marvin Wahl, W6FUV. Right, Dick LaMassena, W6ICJ, with the stations used in the experiment.

istics. Spanish stations from the south were at 47 MHz. Shortly after 2200Z, VE2AIO copied a Washington state station on 43.5, the first time he had heard a station that far north on F_2 . Auroral signals were difficult to find because of F_2 QRM and the 30- to 47-MHz. range sounded like 20 meters during a DX contest! The m.u.f. was rapidly rising and at 2215Z reached 48.6 to South America. At 2300Z the m.u.f. reached at least 49.9 MHz. to the south, but no six-meter signals from outside North America were heard despite positive indication 50 MHz. was open from 2230 to 2330Z to South and Central America. By 0000Z, February 3, the m.u.f. was dropping rapidly and auroral propagated signals took over.

VE2AIO says that while the Spanish-speaking stations were strong, their signals exhibited an unusual fluttery manner, not at all like true F_2 path signals. Geoff suggests a hint of TE, but there were no intermediate signals from the Gulf Coast, Florida or Cuba.

There were other observations of the unusual propagation. At 2200Z, K4RNG and K4QKR, both Florida, were hearing and working California stations and W7FN, Mercer Island, Washington, with all beams headed southeast. Direct-path signals were also present, but much weaker than the backscatter signals. K4RNG says W7FN was commenting on working stations throughout the U.S., from Idaho to New England, with his beam in southerly directions. Between 2200 and 2300Z, K4SAO, South Carolina, was copying W7FN, K4QKR and several Tennessee stations. His best beam heading was southwest! The backscatter disappeared at 2355 and he began hearing stations from the midwest to New England on aurora with the normal northern beam heading for aurora. In California, W6DOR says the backscatter peaked at 225 degrees from 2200 to 2245Z. He copied stations in southern California, W5 and WØ. There were

A new record for amateur communication in the unassigned region above 40 GHz. was set Feb. 9, by W6FUV/6, Sunnyvale, and W6ICJ/6, Mountainview, Cal. The distance was 2.3 miles. Laboratory-type Hewlett-Packard generators with about 10 milliwatts output, modulated with 1000-Hz. tone, fed small parabolic-reflector antennas. Receivers were a Scientific-Atlanta Model 1710 and a Microtel Model WR-200, followed by H-P narrow-

reports that KV4FU worked the U.S. west coast at this time, but Bob says he didn't. The only thing KV4FU noted during this period was weak Es on TV channel 3.

Late report: The ZK1AA beacon was copied in the Knoxville area Feb. 28. From W4LTJ, we learn that the c.w. signal was in for at least 45 minutes, beginning about 0130 GMT, running from just above the noise to very strong. The band was open to San Antonio at the time. Others hearing ZK1AA include K4KYI, W4ASD, WA4YKN and WB4DZF.

TE should be in full swing between North and South America by the time you read this. The "spring" season began for KV4FU on January 10. The first contacts were made on the 15th, as reported last month. Bob, VP2MJ and HI8XDS report frequent openings to South America since then. TE conditions will likely peak in April, just about the time Es begins appearing in northern latitudes. It would pay to be observant of evening Es between northern U.S. stations and the southern states. Es openings between 0000 and 0400Z could produce an Es to TE hook-up between South America and the northern U.S. A look at the globe may surprise you as to where South America is in relation to your particular location, it's southeast, not south! ZB2BC, Gibraltar, tells W3KWH of hearing the Rhodesian 50-MHz. beacon of February 14 via TE.

Late winter Es was at its expected seasonal lull. However, K7ICW, Las Vegas, reports an unusual Es backscatter opening on January 19. Signals from Arizona, Colorado and central California peaked southwest of Las Vegas. Thanks to all who sent reports this month. Each is appreciated, but space doesn't allow all to be printed.

Now these 50-MHz. briefs. KV4FU has returned to the United States. Bob says he expects to settle in Arkansas in early fall. He is considering serious 144 MHz. activity, as well as 50 MHz.

In the Caribbean, HI8XDS continues active with a kw. on the low end of the U.S. phone band. VP2MIJ will remain active on Montserrat through the middle of April, also on the low end, s.s.b. and c.w. Monty is Canadian VE3EVW.

K9AQP/1 says WA5IOD is now KX6HK on Kwajalein in the Pacific. He has a pair of 6146s, s.s.b., near 50.11. KX6HK's address is William Derby, Jr., P.O. Box 2027, APO San Francisco 96555.

W4GDS, now sporting a Captain's rating with United Air Lines, reports ZS4UH to be active in Kroonstad, South Africa. ZS4UH runs 160 watts and a 6-element Yagi 70 feet high. Crystal frequencies are 50 MHz. even and 50.028, c.w. and a.m. WB4KCL in Alexandria, Virginia wants South Carolina stations to join a morning net on 50.16. Fred forgot to mention the time. Write to him at 6810 Radcliffe Drive, Alexandria, Va. 22301.

144-MHz. aurora and moonbounce top this month's 2-meter news. On February 3rd, KGMYC once again worked SM7BAE in Sweden. Signals were good both ways and KGMYC used s.s.b. I've heard the tape of Mike's two-way s.s.b. contact with K0MQS on January 10th. Believe me, the s.s.b. signals were so good they could be understood with ease. Those fellows have a fine system.

KGMYC is changing locations. Mike and his family are moving 15 miles from their present Saratoga location. Mike says this will curtail his e.m.e. activities until fall.

K0MQS again nearly worked New Zealand's ZL1AZR on February 6th. The e.m.e. signals were good enough to make a contact but a foul-up in transmitting periods probably prevented what would have been the first U.S.A.-to-New Zealand 144 MHz. contact. They have schedules on February 18 and 19. If a contact is made then, it will be reported elsewhere in this column. K0MQS said his echoes on the 6th were so strong that they kicked his 75S3's S-meter two S-units over the noise. That is a pretty fair echo! K0MQS will change the firing direction of his rhombic this summer. He will beam east and begin schedules with European 144 MHz. moonbounce stations.

In Europe, Italian IIRUI says he is ready for e.m.e. schedules. He has a pair of 4CN250Bs and a dish he rates at 28 db. over a dipole. A picture of the antenna appears elsewhere in this column. He did not give its physical size. IIRUI is joined by IIAVB and IIIFIL in the joint project. Write to them in care of Mr. Roberto Ruisi, IIRUI, P.O. Box 511, Florence, Italy.

The February 2nd aurora reported in the 50 MHz. section accounted for a number of 144 MHz. contacts from Maine to Nebraska and south to Virginia. As on six, aurora was first noted about 1900Z and lasted into the early morning hours of the 3rd. The most impressive contact list comes from K4GGI/1, operator of W1MX, the station of the M.I.T. Radio Society, at Cambridge, Mass. Few reports contacts ranging from VE1PL in Nova Scotia, south to K4Q1F in Virginia and west to Michigan's W8YIO. W1MX worked 28 stations, all c.w. In Pennsylvania, W3UVB reports K1YOB, Maine; WA3BAO, Delaware; W3LUL, Maryland, and W9PBP and W9MVO, both Illinois. But as on 50 MHz., the aurora apparently was observed by a limited number of operators with few of the 144 MHz. regulars reporting.

There were also minor auroras on February 10th and 11th, but nothing unusual was worked. VE2LI had the most widely-heard signal in the northeast.

144-MHz. notes. K5TQP has changed his call

Fred is now W5LO. He asked whether this would affect his 2-meter standings. The answer is no, we merely change the call. Fred says the new call will save a few precious milliseconds on m.s. Is that the real reason for the change, Fred? Or is it for the same reason that WB4HHP is now K4AYO?

Gary, W3ZGI, who was responsible for much of the fine DX work on 50 and 144 MHz. from club station W3KWH, has moved to Fullerton, California. Good luck, Gary!

K5YWL, Little Rock, Arkansas, wants schedules. Elmo says he can run a kw. and has 80 elements at 65 feet. WA5NOR also offers Arkansas 2-meter schedules. Both should be much in demand as Arkansas has joined the "rare" list in recent years.

There are a number of changes in the boxes this month. VE2BGJ has taken over the number one place for Quebec, VE3ASO moves into Ontario's number three slot and VE7BQH continues to better his grip on British Columbia honors. W8NOII jumped to the fourth position in the 8th call area.

K4GL keeps nightly schedules with W8NUB at 0300Z. The distance is 330 miles and they have a solid contact every night. K4GL's frequency is 144.057. W5NUB is on 144.061. K4GL also schedules K4INC each Sunday at 1400Z, 485 miles.

At Bowling Green, Mo., WA0CHK says he will be ready for schedules in late spring with a 4CN309A and 8/8 slot at 70 feet.

And with the E's season fast approaching, several

2-METER STANDINGS

W1JSM	.35	8	1400	W5HFV	.27	10	1285
K1HBR	.34	8	1400	W5MCC	.25	8	1430
W1AZK	.34	8	1412	K5PTK	.17	5	1330
K1WHT	.34	8	1300				
K1HTV	.30	8	1310	W6GDO	.17	4	1326
K1WHS	.29	8	1300	W6WSQ	.16	4	1390
K1UGQ	.29	8	1280	K6HAA	.13	4	1380
K1BKK	.29	8	1275	W6NLZ	.12	5	2540
W1HDQ	.24	7	1040	K61IMS	.11	4	1258
W1VTF	.22	8	1296	K6IYO	.11	4	1240
K1ATM	.20	7	1225				
K1JXJ	.18	6	800	W7JRG	.27	6	1320
K1RJH	.17	7	1450	K7NII	.24	5	1290
				K7ICW	.16	4	1246
W2NLY	.37	8	1390				
W2CXV	.37	8	1360	W8PT	.41	9	1260
W2ORL	.37	8	1320	W81PF	.31	8	1150
K2LVA	.36	8	1305	W8DJO	.27	8	1150
W2BLV	.36	8	1150	W8NOII	.26	8	1165
W2AZV	.36	8	1380	W8TTC	.24	8	1000
W2FVGK	.33	8	1340	K8ZBS	.22	8	875
K2RTH	.31	8	1215	W8XV1G	.13	6	465
W2CKS	.31	8	1270				
W2DWJ	.23	8	880	K9SGD	.42	9	1300
W2AEAB	.23	8	1335	W89DOT	.41	9	1303
K2DNR	.23	7	1200	K9ULP	.41	9	1150
K2YCO	.20	8	750	K9VAA	.40	9	1200
WB2PNB	.20	6	915	W9VAG	.37	9	1200
WA2PMW	.19	6	1000	W9YVF	.32	8	1050
WA2PMW	.19	7	1000	W9PBP	.32	8	820
W3RUE	.36	8	1100	W9TFA	.37	8	—
W3KWH	.35	8	1335				
W3GKP	.32	8	1108	W9BFB	.45	10	1380
K3GPV	.25	8	1200	K0MQS	.43	10	1590
W3BPD	.23	8	1100	W0NXP	.12	10	1326
K3OHU	.21	7	930	W0DQY	.41	9	1300
W3HBF	.20	8	1310	W0LPE	.38	9	1040
W3AHL	.19	6	700	W0LER	.36	9	1250
WA3GHI	.19	6	625	W0EYE	.35	9	1380
W3YPA	.17	7	1342	W0ENC	.33	9	1334
				W0DRL	.25	8	1295
				W0LCN	.27	8	1000
W4HJQ	.39	9	1150				
W4WNH	.38	9	1350				
W4HJK	.38	9	1280	FSDO	.1	1	5100
K4EQJ	.37	8	1125	KH6UK	.2	2	2540
K4INC	.35	8	1403	OH1NL	.1	1	5850
K4QIF	.35	8	1225				
W4CKB	.34	8	1325	V6IAUC	.7	2	500
W4FJ	.34	8	1150	VE2BGJ	.16	6	750
W4VIII	.33	8	1100	VE2HW	.11	5	800
K4GL	.31	8	1275	VE2DPO	.9	4	600
W4AWS	.29	8	1350	VE3EZZC	.33	8	1283
				VE3A1B	.29	8	1340
W5UGO	.12	10	1398	VE3ASO	.28	8	1285
W5RCI	.42	9	1289	VE3EVM	.25	8	1100
K5WZX	.36	10	1450	VE3BRQ	.25	7	1250
W5AJG	.33	9	1360	VE7BQH	.6	2	1248
W5UKQ	.29	8	1150				
W5LO	.28	7	1254	VK3ATN	.3	3	10417

The figures after each call refer to states, call areas and mileage of best DX. Revised May, 1968.

operators remind us of the 144.1 Es-watch frequency. W5LO will activate his 144.1 beacon on or about May 1st, transmitting the first 30 seconds of each minute. The transmissions will be beamed east northeast from central New Mexico.

220-MHz. activity was given a shot in the arm by the February 2nd aurora. K2DNR worked his eleventh state when he tuned the band early in the evening and heard Indiana's W9HLY calling CQ. Sam says W9HLY was readable 25 to 30 db. over the noise from 0015 to 0035Z. That is a 600-mile path. K2CBA also noted the band open for aurora. He worked WIMX in Massachusetts and was heard calling CQ by KSANU in Ohio. KSANU's reply, however, went unanswered.

W2SEU says he is putting his 500-watt amplifier back on 220 and will accept schedules. In Massachusetts, K9AQF/P has completed a 6360 mixer and is now building a 500-watt final. He will be wanting schedules later. And in South Carolina, K4GL is building an amplifier using a pair of 4CX250Bs. It will replace his present single-ended amplifier. Jack also will accept schedules, as will KHXC at Melbourne, Florida.

For those looking for 220-MHz. transmitter designs, a beautiful 500-watt f.m. and c.w. rig by W1QWJ will shortly be appearing in *QST*.

432-MHz. aurora was also worked during the February 2nd opening. KSREG Ohio heard the aurora on 144 MHz. and decided to give 432 a try. His CQ was answered by WA2EMB in New Jersey at 2354Z. WA2EMB's signal peaked some 10 to 15 db. over the noise with a very pronounced hiss. K4QIF, Virginia, heard KSREG working New Jersey, but was unable to work either station. Rusty said the 432 aurora signals sounded identical to signals on 144 MHz. at the same time. The 425-mile path from KSREG to WA2EMB represents a new 432 aurora DX record. That we have not done better is likely due to the lack of stations in the right place and the right time. At 0048Z, KSREG heard W8HVX, in Michigan, on aurora and called him. When W8HVX answered, his signal no longer had auroral characteristics. The note was clear, but the beam headings were still north!

KSREG observes that aurora signals on 144 MHz. must be about 25 db. above the noise before 432 aurora can be worked. There appears to be that amount of attenuation difference between the two bands. Beam headings are the same for both bands. KSREG says a narrow bandpass, he prefers 1.2 kHz., aids in recovery of the badly demodulated 432 aurora signal. In a wider bandpass, the signal tends to blend into the noise.

W4FJ, Virginia, heard the KSREG auroral signals, some 25 to 30 db. out of the noise. But like K4QIF, Ted was unable to make contact with the Ohio station. His transmitter was off, and the signals quickly disappeared. Ted agrees that the 432 aurora signals sounded much like those of 144 MHz.

VE3EZC worked W8HVX for what is the first reported 432 aurora contact between the U.S. and Canada. K8DEO reports hearing WA2EMB, W4FJ and VE3EZC on the aurora.

There was also some good mid-winter tropo. In Ohio, K8DEO worked 20-watt K0DOK in Missouri on January 19th. Signals were very strong both ways. K4EJU, in Tennessee, heard 8s and 9s, but "nothing new." On January 26, K2UYII worked W8DES in Ohio. Al said conditions were near-normal, however, and that W8DES can copy him almost any night on troposcatter. Al has a new 96-element array (sixteen 6-element Yagis) designed by K2CBA. Al says he wants schedules.

220- and 420-MHz. STANDINGS

	220 MHz.		420 MHz.
W1HDQ	13	5	450
KLJX	12	4	600
KIBFA	8	3	225
K2CBA	17	5	1090
W2DWJ	15	5	740
W2SEU	12	5	325
K2DNR	11	4	600
K2RTU	11	3	300
W2CRS	3	3	200
W3UJG	14	5	460
W3RUE	10	5	480
K3UV	10	4	310
KHXC	3	2	1090
W5RCL	10	5	910
W5AJG	3	2	1050
W5LO	2	2	660
K7ICW	2	2	945
W7JRG	2	2	250
W6WRSQ	4	4	945
K7ICW	4	2	959
W7JRG	2	2	660
W8PT	11	6	959
W6EYE	S	1	910
VE3A1B	7	4	150
KIBFA	10	4	170
W1QVF	10	5	100
KLJX	10	4	160
W1HDQ	10	3	250
K2UYII	14	6	718
K2ACQ	13	8	880
W2BLV	13	5	500
K2CBA	12	6	2670
WA2EMB	12	6	720
W2CLL	12	6	693
W2DWJ	11	4	330
K2YCO	9	6	325
W4DQL	4	360
W5ORH	11	700
W5AJG	7	1010
W5UKQ	6	590
W5WK	3	222
K7ICW	4	325
W7JRG	2	420
W8PT	13	715
W8WINT	13	600
KSREG	13	625
K8DEO	12	450
W8HVX	11	195
W5RQL	10	425
W8PWE	7	150
WASVHG	6	290
K2UYII	16	780
W9AG	12	600
K9AAJ	12	125
W8NKT	9	400
W9JY	8	500
W0DRL	17	1065
W6EYE	6	425
WOLCN	5	425
VE2HW	3	750
VE3EZC	7	510
VE3A1B	5	450

The East Coast V.h.f. Society will send a 432 station to Vermont June 21 and 22. The station will have high power, a good receiver and large antenna, exclusively on 432 to provide Vermont contacts for those needing the state. That should include just about everyone! For schedules write East Coast VHF Society, P.O. Box 1263, Paterson, N. J. 07509.

On February 4th and 6th, K8DEO heard strong radar from the east, but no amateur signals except a few f.m. stations and some poorly modulated a.m. carriers. Don bemoans the lack of attention by some operators, saying many openings go unused because people aren't tuning and calling CQ. It is an old story, Don, but one which doesn't seem to have a final chapter. Don wonders if a listing of radars exists that could be used for detecting and plotting band openings.

WA2EMB has completed 200 contacts with W4FJ in the past year. WA2EMB has a 7203 final delivering 260 watts, stacked Tilton Yagis, and a solid-state converter feeding a 75A4. W4FJ says K4CLE will soon be active from Lynchburg, Virginia running 500 watts and a large collinear array. K4CLE is in the mountains of western Virginia and offers a good possibility for stations which haven't been successful with Virginia's other two 432 outlets, W4FJ and K4QIF.

1296-MHz. is suffering from the winter lull, but K4QIF has been working on a parametric amplifier design and promises a *QST* article on the subject. I'm getting requests for 1296 transmitting information, triplers, antennas and so forth. We could use some column material on these topics. In Florida, K4NTD is working on a 2C39 tripler, as are K4HNC and WA4GIK. This is the first 1296 work in Florida in nearly two years. And in Oklahoma, W5ORII has a klystron peaking into a 7-foot dish. Jay is at work on receiving equipment and a larger dish. That is quite a frequency jump for a 10 meter DX man!

QST

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

W3CUL—YL with a "Million"

If we amateurs were to apply a very old bit of doggerel verse to our operating we might say:

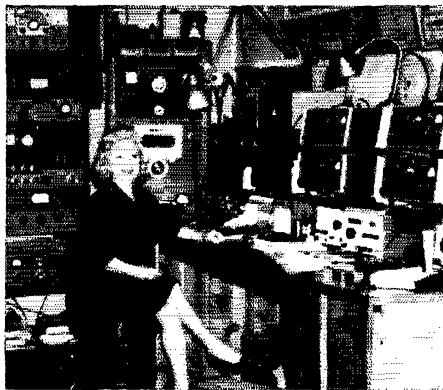
"Radio [sic] is a funny thing,
It's something like a lizard:
It wraps itself around your heart,
And nibbles at your gizzard."

And we might easily substitute our own particular interest in the wide range of amateur radio to that verse. If we live in RTTY, c.w., v.h.f., s.s.b., we know the top calls in our particular field, but seldom are familiar with those in any of the others. W3CUL is one call that is familiar to just about everybody in the amateur ranks, for her outstanding record has caught all our attention. The beginner who is just starting out as well as the veteran of the activity reads her thundering totals month after month and thinks "I don't see how she does it." Those of us who have worked Mae over the years, such as W6GYIH, who still maintains a 7-day-a-week schedule with her that began in 1948, know the answer: plain hard work.

Mae is celebrating her 20th year in traffic work with 240 BPL cards whose totals show that she has over a million messages to her credit!

Mae has been licensed since 1932, and even then her favorite form of emission was c.w. During the pre-traffic years she acquired A-1 Operator, WAS, WAC, CP-35, and was, in 1950,

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

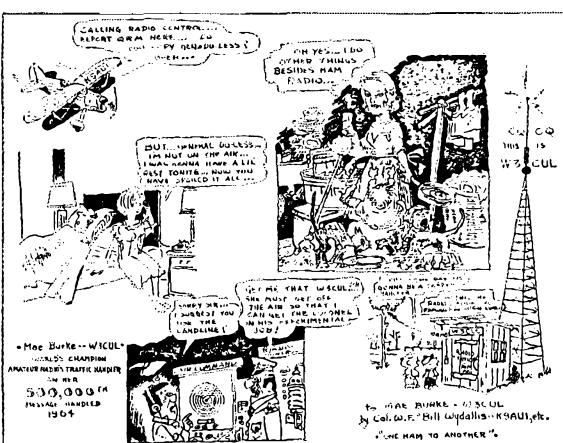


Mae Burke, W3CUL

Editor of YLRL *Harmonics*. Following World War II, Mae began to get interested in traffic, and in 1949, when the OM, Al, W3VR, became ill she covered his schedules as well as her own and received her first BPL. There hasn't been a month since that time that hasn't found W3CUL on that list of high total traffic operation.

How does she do it? It's hard work, true for it means seven-day-a-week operation with no vacation time, no days off for holidays, and for a long time it meant from 8 to 10 hours a day doing nothing but handling traffic! To most of us, particularly to those who haven't experienced traffic operation, the whole thing sounds like dull dusty drag. But to Mae it is the fascination that only a traffic man knows. To her those hours, and million messages represent the satisfaction of having been of assistance to someone. They mark all sorts of incidents from: the Korean war; the countless "arrived safely," from various military establishments; a whole section of them began at three o'clock in the morning with a telephone call from Red Barger, W3CVE saying "I am trying to work a KL7 and can only learn that there is something wrong up there, can you help?" This began a full week of almost round the clock work on the Alaska Earthquake.

A million is a nice round faceless amount, but Mae's million has all sorts of faces in those seven numbers. They represent what everyone who handles traffic knows and can never quite put into the proper words: people being themselves in their messages, and they also represent the activity of amateur radio's service to those people in times of disaster, in their fun time at a fair, in moments of anxiety about a loved one in



W3CUL cartoon by K9AUI

service, a happy mood of birthdays and anniversaries, or a "dearest Mudder" from Scout Camp.

Mae has many tangible rewards for her activity over the past twenty years. She has ARRL Public Service Awards, Navy MARS, many citations from all three of the armed services, and of course, the prized Edison Award.

What does it take to make a total of a million? Anyone who works W3CUL knows the answer. Dependability, and accuracy. Mae has her own answer: a list of truly dedicated traffic people such as W2EC, W2BO, W4PJ, W6CE, W6GYH, W7BA, W0QXO, and W0TQD, probably the greatest teachers any gal could have, who worked with her in the beginning. And of course, W3VR, who encouraged her activity.

That BPL means exactly what it says for until recently Mae has worked all c.w. However, she and Al now have added s.s.b., and this past year, RTTY to handle the bulk loads that make up many of her schedules.

The story of W3CUL is really the story of everyone in the Amateur Radio Public Service Corps for it is really the amateur radio operator who, while enjoying the privileges granted him, has placed the Amateur and his equipment at the service of the public when they need the particular skills the amateur is able to lend.

CQ YL pages available

Louisa Sando, W5RZJ, author of *CQ YL*, announces that the new supplements requested at the International YLRL Convention in Denver last June are now ready. These supplemental pages are: 36-G and H bringing current information through 1969 on officers of YLRL, and Chapter Six-C, a full report on the Denver Convention.

The YLs attending the convention donated enough money to pay for these pages so they are free for the asking to anyone who has a copy of *CQ YL*. Please send a six cent postage stamp to Louisa Sando, W5RZJ, 4417 11th Street N.W., Albuquerque, New Mexico, Zip 87107. The pages



Janice Fontana, WB2JCE, 1969 YLRL Disbursing Treasurer. Licensed in 1963, Janice's first love is c.w. She enjoys YL contests and placed high score for the Second District in 1967 YL-OM. OM, K2RYH is a well known traffic operator. Jan's other hobbies are sewing and piano.



Harry Dannals, W2TUK, Hudson Division Director, Midge Rommel, K6BUS, John Griggs, W6KW, Southwestern Division Director, John Huntoon, W1LVQ, ARRL General Manager, and Roxie Griggs, K6ELO at the LA-YLRC, 17th Annual Valentine Banquet in Los Angeles.

will be mailed in a flat envelope and are perforated for easy insertion into the book's spiral binding at the proper places.

Note: All YLs who attended the Denver convention will receive the pages automatically—don't write unless you fail to receive them. Also bulk shipments will be sent to YL clubs so check first with your club president, you may be able to get it at the club meeting.

Trillium Memorial Week Contest Results

Following are the results of the annual Ontario Trillium Memorial Week contest held November 23-25, 1968.

Winner of the Jensen Memorial Trophy — Cliff Smythe, VE3EZC.

Runners up were Cliff Peterson, VE3AST, and Bill Hardie, VE3ICFX.

High scoring Trillium — Jean Evans, VE3DGS.

Runners up were Thelma Woodhouse, VE3CLT, and Margaret Harkness, VE3CFM.

Time's A-wastin' - YL Mid-West Convention

When? May 16, 17, 18, 1969.

Where? Canadian Motor Hotel, Scarborough (Toronto) Ontario.

Registration? Doree Butler, VE3EUV, Apt. 501, 38 Carluke Cr., Willowdale, Ontario.

Cost? Registration fee, \$2.00; Luncheon, \$3.00; Banquet, \$6.00.

There will be all sorts of activities such as Eyelash QSOs by the dozen, a special tour, Pajama Party, luncheon, and a banquet. Also a special program has been planned for the OMIs who will be accompanying their ladies.

It isn't too late to plan to "cross the line in '69," so if you are tempted to attend this first Mid-West YL affair that has been scheduled outside the United States, just yield to that temptation gals and share the Canadian YLs hospitality. See you there.

Meet the Club—BAYLARC

Draw a line on a map to combine San Francisco and San Pablo Bays, add an arm with the curve of the elbow just below Sausalito, California, and there is a mermaid with a pony tail. This is the symbol of the BAYLARCs who are members of the Bay Area YL Amateur Radio Club whose members (Mermaids all) are located in the bay area from

BAY LARC
(Boy Area Young Ladies' Amateur Radio Club)

ANGLER:

From the **BAY** without a net
U caught 6 mermaids yet
You've had a **LARC**
To reach our mark
More mermaids U can get.

Signature: **WA6MAO** — Mermaid Authorized Officer

Baylarc certificate.

San Jose north to Novato, and from the Pacific Ocean east to Stockton.

BAYLARC was first organized by W6QMO in 1954 as the YLRC of San Francisco. At that time the membership included two General Class, two Novice Class YLs, and eleven hopefuls. Four years later the name was changed to the present one to indicate the scope of the membership.

The only YL club in this area, BAYLARC has served as hostess club for all the ARRL conventions held within this region since their inception. Included are the ARRL National Conventions of 1956, and 1965, and the Pacific Division Conven-

tions in 1959, and 1960. It was this group of YLs who originated the well known SWOOP award for unlicensed wives of amateurs.

BAYLARC has participated in three Field Day events, and twice has held second place in contacts among YL clubs in the nation. Other activities include a Valentine "Sweetheart" Banquet honoring the OMIs, a summer family picnic, and a club Christmas Party.

Meetings are held on the 4th Friday of each month at 8 P.M. at the home of WA6LIZ, Dorothy Dimitre in Milbrae. Meetings are open to guests at any time, and visiting YLs are especially welcome.

Members need not be licensed since one of the objects of the club is to encourage non-licensed YLs to procure licenses. At this time however, only 3 of the 40 members are licensed.

The BAYLARC Mermaid Certificate was introduced in September 1960. It is awarded to anyone sending a copy of log entries of contacts with six different club members. Endorsements are given for each six additional members worked. The club station, WA6MAO, is considered a contact for this award. Custodian is Elaine Carter, K6SJT.

Feedback

W4TVT, Claire Bardot, announces the following corrections of the 1968 YL AP top scores.

C.W.

First place	PY2SO	2016 points
Second Place	WASUSU*	1997.50 "
Third Place	WA9HILW	1912.50 "

Phone

First Place	K5YIB*	8875 points
Second Place	K9LUI	6902 "
Third Place	K6DLL*	6875 "

PY2SO, Sonia, is the first DX YL to win the top e.w. AP award.

OST

Strays

Robert Hunimel, WN9ZTY, of Juneau, Wisconsin, is helping in the search for 15-year-old Elizabeth Lurene (Liz) Bernstein who vanished without a trace last spring from Redlands, California, while walking home from school. WN9ZTY plans to operate and monitor from 7:00 to 9:00 P.M. local time each weekday evening on 7.190 and 21.180 MHz. Anyone interested in the case or anyone who has information concerning the girl is requested to contact WN9ZTY.

OST Congratulates . . .

George C. Wetmore, W3SO, named manager of engineering for Post-Newsweek's WTOP-AM-FM-TV.

Peter J. Shenk, WA4GFY, elected chairman of the board of Advance Research Corp.

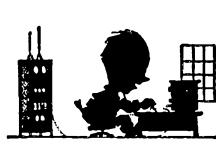
Philip E. Galasso, WN2HMH, on winning Full Membership in the New Jersey Junior Academy of Science for his research paper.

Irwin I. "Bud" Tryon, W3WFR, recently a Doctor of Jurisprudence from the University of Pittsburgh.

Lou Goldberg, WB2SSM, named chairman of the Amateur Radio Division of the National Rare Blood Club.

Douglas J. Seyler, WA9ZMR, finalist in the National Merit Scholarship Examinations.

BAYLARC Mermaids: First Row: WB6GID, Jessymae, WA6ALK, Estelle, WA6OGK, Dorothy, W6ALL, Wendy. Second row: WA6GQC, Elsie, W6PCN, Peggy (behind WA6GQC), WA6UAH, Vernice, WB6PJL, Jean, K6HIW, Kay, W6DXI, Gladys, WA6PKP, Vera, WA6LIZ, Dorothy, K6SJT, Elaine, W6BDE, Esther, K6USC, Arlene.



Operating News



GEORGE HART, WINJM, Communications Manager
ELLEN WHITE, WIYMM, Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZIE
Contests: ROBERT HILL, WIARR

DXCC: ROBERT L. WHITE, W1CW
Training Aids: GERALD PINARD

Specialization. It is perfectly natural for special interest groups to stick to and work with other people of their own special interests. This is an age of specialization. But specialization tends toward narrowness and narrowness toward limited vision and limited horizons.

For example, take the amateur who operates strictly by c.w. Nothing wrong at all about that; if he prefers c.w. and doesn't care for phone or other modes it is to be expected that he will operate on c.w. exclusively. It is his attitude that may go wrong. He works mostly with other operators who, like himself, use c.w. almost exclusively, and they start making phone operators the butt of jokes and first thing they know they are not only c.w. specialists but phone-haters; and they not only won't be but don't want to be persuaded that they could be wrong about phone as a mode of emission.

The same goes for the other side of the fence, of course — the phone operator who sees absolutely no sense iniddling a key when it is so much easier, faster and pleasanter to talk, and who looks on the c.w. hound as a queer kind of social misfit. Then there are the v.h.f.'ers, the DX specialists, the RTTY group, and many others, each of which attain a considerable degree

of cohesiveness and while willing to let someone in who shows the proper amount of enthusiasm, are not themselves willing to open their horizons to another specialty.

Throughout the years we have developed a kind of segregation and stand-offishness among the many specialty groups which could be inimical to our overall organization concept. The League tries to serve impartially all amateurs, including all specialty groups, but most of them are apt to feel that too much attention, money, time or space is devoted to others when it is obvious to anyone with half a brain that *theirs* is the most important. Added to this today we have a new kind of specialty which we can only call "modernism," consisting of those who seem to feel that age and experience and history and tradition all are marks of decadence and reaction and that anything not done with computers or computer-type attitudes belongs out to pasture. No longer are the "engineers with shaggy beards" the elderly and wise and sage, but the young and eager and progressive who will set the world afire.

Some of the specialties have specialist groups within them. Following through with our c.w.-specialist example above, we find them divided

OPERATING EVENTS (Dates in GMT)
ARRL-IARU-Affiliated Club-Operating Events

April	May	June
<p>Mar. 29-Apr. 13 IARC Propagation Research competition (p. 66, Feb. ONT).</p> <p>2 Qualifying Run, W6OWP</p> <p>5-6 SP DX Contest (p. 86, last issue).</p> <p>10 Qualifying Run, W1AW</p> <p>12-14 CD Party (c.w.)*</p> <p>19-20 FT-22 Contest (p. 92, this issue).</p> <p>19-21 CD Party (phone)*</p> <p>26-27 WAE RTTY Contest (p. 84, this issue).</p> <p>PACC Contest (p. 92, this issue).</p> <p>*League Officials and Communications Dept. appointees, only.</p>	<p>1 Qualifying Run, W6OWP</p> <p>3-4 Ohio Interstate QSO Party (p. 111, this issue).</p> <p>Nebraska QSO Party (p. 115, this issue).</p> <p>10 Frequency Measuring Test, ARRL Official Observers only.</p> <p>10-12 Georgia QSO Party (p. 130, this issue).</p> <p>16 Qualifying Run, W1AW</p> <p>17 Armed Forces Day</p>	<p>4 Qualifying Run, W6OWP</p> <p>14 Qualifying Run, W1AW</p> <p>14-15 VHF QSO Party</p> <p>28-29 Field Day</p>

NOTE: Possible W6OWP Qualifying Run "alternate" (same times and frequencies) is W6ZJR.

into self-exclusive groups of contestants, DXers, high-speed ragchewers and traffic-handlers. Then within these specialty specialties are still further divisions; for example, the contestants between the various types of contests offered, the traffickers between NTS and independent facilities.

Well, so what? Is all this bad? No, not necessarily; but it could be. For specialization within specialization could beget narrowness within narrowness. When you get away from the trunk and go into a limb into a twig into a sprig, sooner or later you will find yourself into such a narrow passageway that there can be no further progress forward and you have to go back; or jump off the tree altogether and start at the trunk again.

We can't eliminate these general tendencies entirely, but we ought to give more thought to minimizing them, or at least to preventing any deleterious effects. Versatility is the solution! Branch out, have a crack at some of the other aspects of amateur radio. Don't burn yourself out in one specialty.

Spring Is Here. If you'll forgive a personal note, one of our earliest memories of amateur radio is the front cover of the April '27 issue of *QST* in which spring is portrayed by Clyde Darr, W8ZZ, in the form of "listen to the birdies," some of which are "Xtal PDC," some characterized by severe chirps, and at least one of which is "Caw! Caw! Very raw!" We cannot help but shed a tear of sympathy for those of you who live

down in the southland to whom the coming of spring is nothing much than more of the same, only warmer, who do not annually witness the awakening of nature in all its glory to shroud the earth in a mantle of green.

Now that the DX Contest is over and all but forgotten until another year, we can all buckle down to those outdoor tasks which so many of us have had to postpone awaiting suitable weather — tightening those guy wires, taking up the slack in antenna spans, replacing rusted bolts and nuts on the beam, and putting up new and more efficient radiators. And next comes Field Day, rules for which will appear in the next (May) issue. We hope your plans are crystallizing for this gala annual event. Happy springtime, fellers and gals! — *WINNIN'*.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least one year immediately prior to nomination. Petitions must be received on or before 4:30 p.m. on the closing dates specified. In cases where no valid

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for January Traffic:

Call	Ortg.	Iccd	Rel.	Del.	Total	Call	Ortg.	Iccd	Rel.	Del.	Total
K5TEY	5	2808	2752	13	5578	WA6BYZ	34	241	132	109	516
W3COL	558	2300	2119	226	5203	W4RZL	64	344	88	19	515
W7BA	9	1648	1502	141	3298	W2RUF	69	265	99	78	511
WA2UWA	400	1140	1000	40	2540	WAIEYY	45	233	177	55	510
W3TR	192	1098	950	35	2149	W1BHG	32	257	212	3	504
K9QH	132	987	975	24	2118	WB4IIUS	22	247	233	—	502
K5BNH	8	1058	941	57	2061						
WA9CNV	2	988	982	4	1976						
W8IUP	17	903	797	101	1818						
K9PDX	7	827	811	16	1661						
WA9MHU	47	715	576	91	1429						
W9JYO	871	171	146	25	1213						
WA2BHN	50	523	503	9	1085						
WA7IHKR	6	460	558	20	1044						
WA7BZY	8	494	459	32	993						
WA61WE	20	440	440	87	987						
W5OBD	13	473	472	0	958						
W3EAL	84	491	358	3	936						
K9IVG	13	484	383	12	892						
WA9AKB	4	433	412	23	872						
K7RQZ	29	415	354	46	844						
W8GYH	51	395	384	8	838						
WA4DYL	6	40	373	5	824						
WA9OKJ	13	378	371	7	769						
WB1EW	21	366	253	98	738						
KOJMI	6	356	338	18	733						
K3NSN	158	359	364	6	725						
W7DZX	19	370	301	4	694						
WA48CK	24	347	318	3	692						
W9LCX	25	382	271	9	687						
W1EFW	45	366	268	6	685						
WB2RKK	25	330	309	10	671						
WA0PNB	10	323	311	13	657						
W1PEX	36	334	269	14	653						
W8IXJ	64	310	136	13	648						
K1ESG	45	273	276	17	611						
K8LNE	8	306	284	7	605						
W3MPX	97	307	179	11	594						
WA4UAZ	30	281	265	16	593						
K2KDO	118	243	193	30	581						
WB2ZP	36	236	0	247	555						
WA1HEW	31	284	233	25	553						
WA9IBB	118	216	216	0	550						
W9EON	10	192	340	5	547						
W4NLO	12	243	250	29	534						
K5MAB	12	276	205	9	534						
WA6ROW	44	230	191	22	527						
WB6UTC/4	84	255	252	1	522						
W0INH	14	250	223	19	519						
WA2GPT	27	250	223	19	519						

More-Than-One-Operator-Stations

K7NHL	15	268	233	26	542
W4DV	7	261	225	36	529

BPL for 100 or more originates-plus-delivers

WA9UHHL	1	212	WB4EPD	125	W6AAUD	105
WA5AQG	205		WB2PZH	122	W9HOT	105
K8ZU	180		WA3JWF	121	WA9HTN	105
WA9QHQ	174		WA9TUAL	121	W4RHA	104
WB2YKU	158		W9ESJ	116	VE2ADE	104
W6MIN	6	157	WAOLB	114	W4FPL	103
WA3ITV	154		WA2EDQ	112	VE3ERU	103
W2OE	139		WIDKJ	112	VE2ALE	102
WA8MLQ	136		WA1GGN	112	K9FHJ	101
W6KLF	133		K5QQ	112		
K9P	130		K7TH	111	Late Reports:	
WA1HO	129		WBTHQ	109	WA2MIGV	(Dec.) 113
KA1JW	129		WA1OVA	106	W2CLD	(Dec.) 109
WA9TOC	128		WA1KME	106	W2FCZ	(Dec.) 109
WB2SH	127		WB1UVB	105	WA1HT	(Dec.) 102
W3TN	125		WA5PH	105	WA3THV	(Dec.) 100

Late Reports:

WA1HO	129	WBTHQ	109	WA2MIGV	(Dec.) 113
WA1OVA	106	WA1OVA	106	W2CLD	(Dec.) 109
WA1KME	106	WA1KME	106	W2FCZ	(Dec.) 109
WA1HT	102	WA1HT	102	WA1HT	(Dec.) 102
WA5PH	105	WA5PH	105	WA3THV	(Dec.) 100

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 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

More-Than-One-Operator-Stations

K4KDJ	176	K2DEL	125	W1AW	120
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BPL Medallions (see July, 1968 *QST*, p. 99) have been awarded to the following amateurs since last month's listings: WA1HOL, WA2BHN, K2KDO, WA3INC, WA7DZL, WA8HD, WA9PPA, WA9QHQ, WA9HTN, WA3THV.

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 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

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 names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and *zip code*.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the ARRL Section of the Division, hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

— George Hart, W1NJM, Communications Manager

Section	Closing Date	SCM	Present	Term Ends
Maine	Apr. 10, 1969	Herbert A. Davis		June 9, 1969

Oregon	Apr. 10, 1969	Dale T. Justice	June 10, 1969
Tennessee	Apr. 10, 1969	Harry A. Phillips	June 14, 1969
Eastern Penn.	Apr. 10, 1969	G. S. Van Dyke, Jr.	June 15, 1969
South Dakota	Apr. 10, 1969	Seward P. Holt	July 3, 1969
Santa Barbara	May 1, 1969	Cecil D. Hinson	Aug. 10, 1969
West Indies	May 1, 1969	A. R. Crumley, Jr.	May 10, 1968
East Bay	May 1, 1969	Richard Wilson	Feb. 10, 1968
New Mexico	May 9, 1969	Kenneth D. Mills	Resigned
Western Mass.	June 10, 1969	Norman P. Forest	Aug. 11, 1969
Kansas	June 10, 1969	Robert M. Summers	Aug. 18, 1969
West Virginia	July 10, 1969	Donald B. Morris	Sept. 18, 1969

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

New Hampshire	Donald Morgan, K1QES	Jan. 2, 1969
Mississippi	Clifton C. Comfort, WA5KEY	Jan. 2, 1969
Alberta	Don A. Sutherland, VE6FK	Jan. 10, 1969
Eastern Florida	W. G. Blasingame, WA4NEV	Feb. 25, 1969
North Dakota	Harold L. Sheets, W0DM	Mar. 8, 1969
Michigan	Joseph L. Pontek, K8HMK	Apr. 26, 1969
British Columbia	Harold Ernest Savage, VE7FB	May 1, 1969

In the Colorado Section of the Rocky Mountain Division, Mr. Charles M. Cotterell, WB5IN, Mr. Gary P. Armour, W0UAT, Mr. Edward T. Pompea, K0ZPG, and Mr. Royal R. Maxwell, WA9QFY, were nominated. Mr. Cotterell received 205 votes, Mr. Armour received 108 votes, Mr. Pompea received 87 votes and Mr. Maxwell received 46 votes. Mr. Cotterell's term of office began Feb. 14, 1969.

DX CENTURY CLUB AWARDS

From January 1, through January 31, 1969, 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

H1AND	209	K4NTC/3	120	W2BIV	110	WB6QJD	104	WB6QJD	102	KIRBN	100
WA8QJK	196	OK3BU	119	W0NZY	109	W0EGC	104	WB6RAY	102	KX6SZ	100
NE2IH	184	WA9TBA	119	W4PLM	108	WB5KLD	103	DL8LJ	101	WA1LJ	100
VE3CBG	149	WA9NUU	119	K3GCT	106	WB5NM	103	DM14CBO	101	WB2WP	100
U9ANX	143	K3PUL	116	K0YVU	106	WB5NM	103	K7CZM	101	W7VBE	100
DA2KBX	138	WA4KJR	116	WA2EPU	106	WB7EXM	103	W3DMH	101	W8WPC	100
WA9HHX	125	WA1FHU	115	DJ6BN	105	WA9EPT	103	W4LBP	101	5V1KG	100
DL6HR	123	K3YUA	113	K4PTA	105	WA1LHZ	102	W8RSQ	101	WB8CD	100
WA9TQX	123	WA3PKC	113	W1ULH	104	W6DH	102	WA0OUU	101		

Radiotelephone

117SQ	231	K1RAW	137	VS6DR	122	W0NZY	105	W0EGC	103	WA4SLH	102
VE4SD	164	6Y5CB	132	JAI5YK	120	K2Y1O	104	W3HILB	103	W8LAX	101
KI1OV	155	CE6EQ	130	K4NTC/3	120	K5ZSC	104	YV4QQ	103	DL1GW	100
CF1RT	142	H1AND	130	VE7GMM	114	K3PUL	103	W1LJG	102	K7UBC	100
VE3CBG	140	U0ZKBD	128	PY1JZ	113	K91FPC	103	W4EJL	102	W8WEY	100
WA8QJK	138	K3YBN	124	K3PUL	112	W2WNN	103	WB2TPW	102	WA0HHLX	100

Endorsements

Endorsements issued for confirmations credited from January 1, 1969 through January 31, 1969 are listed below. Endorsement listings through the 300 level are given in increments of 20; above the 300 level they are given in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

325	305	260	K9CUY	HC2AW	W1DIT	W7GGO	W4WWG	K3FUI
K2UVU	W6KTE	DL9RK	PY4AJD	W2ABL	W1AOU	W9MJ1/1	WB4FJO	K9BJM
VE3BWY		K9JPL	U3AF	WA2CPG	W6HPS	W9YVM	WB4IJF	K9DYM
			W4UQ	W5TXN	W6JCR		W6OL	W1AGA
320	JABAD	W4NBV	WB2NYM	WA5AUZ	W9OPD	140	WB6PGK	WB2QJU
W6REII	PY2BKO	240	WB6PNB	WB6DAD/6	K3CUI	160	W7GYF	WA3ATX
		PT7YS	G2MI	W9EXE	WA8GPX	K4VZI	W7PJC	WA5PTG
315		K7CVL	YD2NEG	W9UTQ	HB9RB	K0AXU	W8GMX	W6GC
W8LY	280	W4HRE	8PBU	WB9VV	PY2BHO	W9DCW	W9DDL	W9WEN
WA6AUB	11ZPB	W0IDW	OK1MP	180	W3QZA	WB5FL	W9ELG	WBBA
ZS6LM		K1WLZ	W1RKC	U3AKBQ	W2DKM	W0CW8	WB0JAS	WA0BLWE
		K2QIL	K3HTZ	W1WL	W5TRG	WA2HIIU	120	WA0NBZ
310	PY2BGL	220	K1HTZ	W6ZC	W6UZ	WB2HNO	K1HKN	
OH2BH	W1AEW	K1HTZ	VE5CG	VE5QK	F2VX			
W6VUW								

Radiotelephone

315	W7KH	240	WB6UJO	W5WJQ	HB9RB	140	W9VNG	KZ5FN
ZS6LM		JABAD	PO8BS	W0DAD/6	K9CUY	DL6XV	6W8DY	V56DR
		W4NBV	HA1	W9EXE	WA1HEN	G5AFA		W2GA
310	W3FWD	220	U1WL	CR4AJ	X62IH	W4JVA	120	W3ZUH
VK2JZ	W4EEU	W1HOO	K6CQG	G2MI	YV4QG	WA7GHK	W5NOO	W4EAL
			W1HOO	WB2VEG	K1LHT	W8TWA	W6HPS	W5CIV
300	260	W4PRE	W6ZC	K1SLZ	VE5QK	XE1EII	W9DDL	K2BUL
SM5BCO	W5GXP	W9GYH	VE5QK	F2VX		W9PWQ	K3AHB	W9BA

Have you found a way to quickly determine if you've worked or confirmed a new one on any or all bands 160-10. Here's an easy system along that line, developed by W1YYM. The method uses 6 sheets. Each sheet has a "block" opposite a country/prefix for the six different bands. As you work a new country, you can either make a check mark in the box, or write the call in pencil. When (positive approach!) the confirmation comes through, you then make a second check in the box. Or, just erase the pencilled call and rewrite it in ink. Note that the bottom of each of the six sheets is notched in an inverted-L. This facilitates a quick flip to the desired section. Use a clasp to secure the sheets in a top-bound manila folder and you're set to go. Got a better idea? Why not share it with the rest of the 5BDXCC chasers via ARRL, 225 Main Street, Newington, Connecticut 06111.

	160 Meters	80 Meters	40 Meters	20 Meters	15 Meters	10 Meters
AC3.....Sikkim						
AC4.....Tibet						
AC.....Bhutan						
AP.....East Pakistan						
AP.....West Pakistan						
BV.....Formosa						
BY.....China						
EI.....Republic of Ireland						
EL.....Liberia						
EP.....Iran						
ER3.....Ethiopia						
F.....France						
	AC3-F	FB2D-KM6	KH4-TX	KA-VTR	VPO-ZK2	ZL-HY4

JANUARY CD PARTIES

Last year at this time we were all agog over such phone CD Party tidings as K2E1U/5 hitting 500 QSOs and three other Partyites breaking 100K. Hold on to your Funk & Wagmalls, gentlemen, 'cause Killer Keebler has done it again: 600 two-ways and 200K! And ten other mikesmen surpassed 100,000. What next? The mind reels, sort of.

C.W. conditions, on the other hand, were nothing to wax poetic about. EI1U had to strain for his 300 grand; K9ORK is a new face in the tip-top scorers; W1ET and W1ETU took turns hating each other.

There wasn't much feedback regarding earlier ending times and mandatory 15-minute time-outs, so we're gonna do it (or them). Effective with the April affairs, each Party will end at 0500Z Monday (instead of 0800Z) and all times out must be 15 minutes or more in order to count as off-time. (You may still take off 3 minutes, or 7, or 12 — but you can't subtract them from your 20-hour limit.)

The following are high *claimed* scores; read, from left to right: appointee, total score, number of QSOs, number of sections, number of hours of operation. Final adjusted scores will appear in the April CD Bulletin. — WIARR

C.W. SCORES

K2E1U/5	301,680-831-72-20	WA9SDC	132,940-385-68-6
W8SH (K1ZND, opr.)	288,720-795-72-19	W1BGD/2	132,240-400-64-9
	269,150-763-70-18	W8GAI	123,825-381-65-15
K9ORK	269,150-763-70-18	WA9QBM	122,200-371-65-9
W1ET (K1YKT, opr.)	260,820-750-69-18	W6JTI	119,925-364-65-16
WA9ITB/9	260,120-689-69-17	K2LWR	118,255-352-67-6
WA7IFD	237,700-655-69-17	K8EKG	116,550-370-63-11
W3IN	223,650-633-70-20	WA3RGE/8	116,180-359-64-11
W4UQ	207,800-587-70-18	W01YP	112,840-364-62-10
K9ZMS/6	205,800-581-70-14	K9CNC	112,545-363-61-7
K8AZJ	201,995-565-71-18	W5QGZ	112,450-350-65-18
WA9IYX	190,615-565-67-20	WA5KQN	109,430-347-62-16
W6GEN	189,060-511-69-18	W4GEQ	108,275-352-61-6
WB2HKK	183,940-534-68-18	WA2ABY	107,575-325-65-13
K4RJN/5	182,160-518-66-15	VE7AC	106,140-341-61-12
K9QPH/4	173,195-512-67-15	K9LBQ/7	104,960-321-64-4
K2KIR	171,185-504-67-9	W5EKF	103,800-316-60-17
WB4CT	170,515-502-67-15	W4KFC	103,635-322-63-4
WA9AUM/9	169,290-513-66-20	W8CKX	103,635-329-63-9
W1ETU	165,000-500-66-13	K3HNP	103,500-340-60-12
WA7ISP	162,840-467-69-19	W9JCK	101,430-315-63-6
W2SZ (WB2DRW, opr.)	156,750-469-66-11	W6BIP	101,260-325-61-10
	153,801-439-69-14	K8HLR	101,185-336-59-10
W9PJT	153,430-454-67-15	K7CTI	100,800-316-63-7
W2FR	151,640-439-69-16	W6RW (W6DXH DUXX)	364,680-1013-72-18
K4FU	150,080-441-67-12	W9YTF (WA9s A1B TPV)	125,095-394-63-8
WA3UV	141,705-418-67-19		
W8GN	137,610-410-66-9		
WA3HTQ	136,620-414-66-10	K2E1U/5	206,380-600-68-20
K8LBV	136,315-402-67-17	K9LBQ/7	174,915-500-69-16
W8PFB	134,970-403-66-18	W8SH (K1ZND, opr.)	
W4MXU/9	134,310-400-66-13		
K4PUZ	113,440-410-64-10	K4WGT	142,205-130-65-13
W1DAL	133,245-416-63-17	W6DGH	140,365-412-67-14

PHONE SCORES

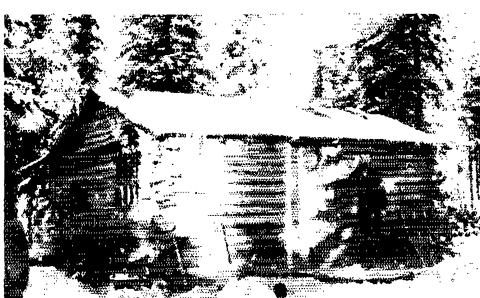
K2E1U/5	206,380-600-68-20
K9LBQ/7	174,915-500-69-16
W8SH (K1ZND, opr.)	

K6QPH/4	123,840-382-64-19	W8DQL	55,160-192-56-6
W1ET (K1YKT, opr.)	117,180-366-63-17	WA9SDC	53,560-200-52-2
	111,885-326-69-11	W4KFC	52,800-185-55-4
K4FU	110,400-339-61-15	W9GIL	50,445-171-57-9
W3IN	104,320-321-61-19	W3GN	48,960-185-51-6
WA9OTE	100,345-325-61-18	WA9MLE	48,880-184-52-6
WB2SIH	94,200-311-60-17	W4GEQ	46,640-173-53-6
K9UV	85,095-275-61-13	W2ZVV	45,500-175-50-6
K2QDT	75,810-262-57-20	K9PRZ/9	44,550-165-54-11
K3AKR	71,980-238-59-6	W1AX	44,255-160-53-2
K9CNC	71,250-250-57-12	W5JSM	42,930-159-53-11
WA1FZE	69,000-227-60-10	WA9OVW	44,250-170-50-6
W9PAN	61,560-216-57-10	W5PCX	41,830-173-47-5
K4TSJ	58,425-205-57-15	K9AJZ	41,520-169-48-10
WA4IWS	58,140-221-51-8	K9ZMS/6	40,750-156-50-4
W9JEX	56,140-202-54-10	W9HYP	40,710-177-46-5
W9ACU	55,350-198-54-8	W2SZ (WB2DRW FAJ)	
W6BIP			136,000-419-64-1

(Continued next page)

Strays

Anyone having knowledge of the whereabouts of Cornelius Bakker, who held the call W2HFN from 1930 to 1940 and was known to his friends as "Neil," please contact his sister, Mrs. Rose Smith at Box 97, RD 2, Ulster, Pa. Phone 717-351-4115. Neil's mother is in failing health and it is urgent that he be located.



Amateur radio has a unique value to KL7GLS, it is the only reliable form of communications! Above, Mike is shown at his homestead from which he operates on 20- and 40-meter c.w. Electricity is provided by a gasoline generator.

generator.

ARRL CODE PROFICIENCY PROGRAM

Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 w.p.m.) you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for W1AW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

W1AW will transmit a qualifying run on all listed c.w. frequencies at 0230 GMT April 10. (In converting, 0230 GMT April 10 becomes 2130 EST April 9.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz 0500 GMT April 2. (In converting, 0500 GMT April 2 becomes 2100 PST April 1.)

Code Practice

W1AW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each line may be reversed during the 5-13 w.p.m. transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10, 13, 15	7:30 P.M. EST daily 4:30 P.M. PST	0030 daily
5, 7½, 10, 13, 20, 25	9:30 P.M. EST { SnTTh 6:30 P.M. PST { Sat	0230 MWFSn
35, 30, 25, 20, 15	9:30 P.M. EST MWF 6:30 P.M. PST	0230 TThSat

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by send-

ing in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

Date Subject of practice text from February QST

Apr. 14: *It Seems to Us*, p. 9

Apr. 22: *A.F.S.K. for RTTY*, p. 11

Apr. 30: *Limited-Space Antennas and Methods of Coupling*, p. 24

May 8: *Hassles*, p. 56

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

May 9: *Transmission Lines*, p. 103

May 12: *Characteristic Resistance*, p. 104

Strays

HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30, on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-U.S. 5, the Wilbur Cross Highway. (For W1AW visiting hours, see the schedule below.)

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

W1AW SCHEDULE, APRIL** 1969

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.-3 A.M. EST, Saturday 7 P.M.-2:30 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your *original* operator's license with you. The station will be closed April 4, Good Friday.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000					RTTY OBS ³ , ⁷		
0030					C.W. OBS ¹		
0100							
0120-0130 ⁴			7.020	3.520	7.150 ⁶	3.700 ⁶	7.020
0130			7.080	3.555	7.150 ⁶	3.700 ⁶	7.080
0200					PHONE OBS ²		
0205-0230 ⁴			3.820	50.120	145.800	1.820	3.820
0230	←	CODE PRACTICE DAILY ¹	(35-15 w.p.m. TThSat), (5-25 w.p.m. MWFSn)				
0330-0400 ⁴			3.555		RTTY OBS ³		3.555
0400	RTTY OBS ³						
0410-0430 ⁴			3.825	14.095	7.095	14.095	3.825
0430	Phone OBS ²				PHONE OBS ²		
0435-0500 ⁴			7.220	3.820	7.220	3.820	7.220
0500	C.W. OBS ¹				C.W. OBS ¹		
0520-0530 ⁴			3.700 ⁶	7.150 ⁶	3.520	7.220	3.530
0530			3.700 ⁶	7.150 ⁶	3.555	7.255	3.555
0600-0700			7.080	3.945	14.100	3.555	7.080
0700-0800			14.280	7.255	3.945	14.100	14.280
2000-2100		14.280	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	21.16	21/28 ⁵	7.255	

¹ C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02 and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 29.015 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies; 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ W1AW will listen on the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1AIS QIS WPR. *Times-days in GMT. Operating frequencies are approximate.

** May QST will carry the W1AW Spring-Summer schedule, which will become effective April 27, 1969.

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, John L. Penrod, K3NYG—SEC/PAM: W3DKX. RM: W3EEB. Renewals and appointments: K3BBR as OBS. WA3DYG as EC, W3EJU as OO, WA3KFF as OBS. New club officers of the First State ARC are K3MYG, pres.; K3LCK, secy.-treas. Kent County ARC officers are W3CZS, pres.; W3MK, vice-pres.-treas.; K3LY, secy. Brandywine H.S. ARC officers are WA3EGX, WA3FCX, WN3KDR and Gary Summerville. The club call is WN3LQK. W3GUS is now active again on the ham bands. All ECs report a very successful SET this year. WA3KFF won the Del. QSO Contest for Kent County. WA3IID is doing some gear-swapping. WA3HWC was elected Kent ARC's outstanding amateur of the year. W3SNQ is the new Asst. RO for New Castle County. W3CGV is sporting a new s.s.b. rig on 2 meters. W3EKO is having crystal problems. Look up the band for him now. Jan. Net traffic: DTMN, QNI 43, QTC 17. Traffic: W3EEB 128, W3DKX 105, W3GSM 52, K3NYG 30, WA3HWC 17, W3TRC 15, WA3DYG 14, W3WR 11, WA3DUM 7, W3HKS 4, W3DEO 2.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke Jr., W3HK—SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX, K3SLG. PAMs: K3WAJ, K3MYS. V.H.F. PAM: W3FGQ. OBS reports were received from K3WEU and WA3AFI; OVS reports from WA3HDI, WA3IAZ, WA3ECC, WA3BJQ, WA3FCZ, K3VAX; OO reports from W3KEK, K3HNP, W3BFF, K3RTD, W3NNC, WA3IU.

Net	Freq.	Operates	QNI	QTC	RM/PAM	
EPA	3610	Daily	6:45 P.M.	478	W3MPX	
EPAPE&TN	3917	Daily	6:00 P.M.	587	W3KAJ	
PTTN	3610	Daily	6:00 P.M.	325	W3MPX	
PFN	3917	Mon.-Fri.	5:30 P.M.	470	K3SLG	
VHF(6)	50.64	Mon.-Fri.	7:00 P.M.	142	W3FGQ	
VHF(2)	145.35	Mon.-Fri.	8:00 P.M.	48	W3FGQ	
QTC	7240	Mon.-Fri.	2:00 P.M.	250	130	WA3AOJ

New officers of the Warminster ARC are WA3KSK, pres.; WN3JGX, vice-pres.; K3BXR, treas.; WA3HMW, secy. One of the WARC members is currently a radioman in the USN. The Penn Wireless and Naval Compound ARCs combined to handle 1167 holiday messages from the Neshaminy Mall. WN3JZB has a Novice net going daily on 7170. WA3BSC was nominated to the post of vice-chm. of IEEEET at Capitol Campus P.S.U. Note the V.H.F. 6-Meter Net has moved up to 50.64. The WHHS station now has quite a ham staff with WA3s ASO, FDB, HDI, IUV, JOB, WN3s, HSB, LIC. W3RV now is in a new QTH, WN3LQY, has started an ARC at Archbishop Ryan HS. W3ABT, at U. of P., still is waiting for a key piece of equipment. WA3ATQ is busy as chm. of the District YLRL. WA3JKB got his A ticket. WA3INC has 49 on WAS. WA3CKA is trying to get WAS on 40 QRP! W3BUR was at the Upper Bucks Tech HS open house and worked 177 stations including some 160-meter DX! W3EML states the SET was a success as far as NTS is concerned. K3MVO still is putting in a whopper of a traffic count for half a month. WA3CFU/3 has completed an all-transistor rig for 40 and 80. K3HNP hit the 300 mark for OO reports in Jan. WA3ECC is completing two Heath kits for the school club. K3WEU is busy

with ham tutoring. K3WEU, WA3ATQ and W3IVS accepted an award from the USO in Philadelphia for handling holiday traffic. Traffic: (Jan.) W3CUL 5203, W3VR 2149, W3EML 936, K3NSN 695, W3MPX 594, K3SLG 125, W3CID 401, WA3AOJ 377, WA3IUV 351, WA3EXW 228, K3PSO 225, WA3JWF 217, K3MVO 202, K3PIE 172, K3VBA 171, W3HK 182, WA3INC 161, WA3JKB 150, WA3GLI 148, W3FGQ 130, W3AIZ 126, WA3-CFU/3 125, WA3IHV 122, WA3AFI 119, W3NNL 116, WA3GU 105, WA3JWL 79, K3WAJ 78, WA3ATQ 74, K3RTX 67, WA3FCP 63, WA3ECC 54, WA3IOB 53, W3BUR 51, W3CBH 49, K3OIO 49, WA3CNM 44, WA3GLI 44, K3HNP 43, W3FFC 40, K3WEU 35, K3YVG 34, WN3JZB 33, W3NN 33, W3VAI 32, WA3HDI 30, W3AXA 28, W3HIN 24, K3KKO 22, W3OML 21, WA3-CND 19, WA3YC 16, W3VA 16, K3RUA 15, WA3FBP 14, K3KTH 13, WA3CKA 12, W3BNR 11, K3HKW 10, K3MDG 9, WA3CMD 8, W3ADE 7, WA3ECC/3 7, W3RV 6, WA3BSV 5, W3JKX 5, W3QY 5, W3AFP 4, WA3IAZ 3, WA3BJQ 2, W3KQE 2, K3RZE 2, W3ABT 1, WA3EMW 1, W3EU 1, W3FAD 1, WA3FCZ 1, K3FOB 1, W3ID 1, W3KEK 1, WN3LQY 1, K3VAX 1, W3YPF 1. (Dec.) WA3BSV 139. (Nov.) WA3BSV 9.

MARYLAND-DISTRICT OF COLUMBIA—SCM, John Munholland, K3LFD—SEC: W3LDD.

Net	Freq.	Time	Days	Sess.	QTC	QNI	Mgr.
MDD	3643	0000Z	Daily	29	351*	16.8	WA3HTQ/RM
MDDS	3643	0130Z	Daily	27	64	6.5	W3CBG/RM
MDCTN	3920	2300Z	STTS	23	332	21.1	K3GZK/PAM
MEPN	3920	2300Z	MWF	23	69	26.6	K3IAG
				1800Z	SS		

MTMTN 145.206 0200Z T-S 22 10** 8.9 W3IFW

*SET traffic not included

**In addition, this net helped AA County AREC handle about 250 messages during the SET.

New appointments: W3EWP/ORS, K3GJD/ORS, WA6ECF/3/ORS, WA3GAU/AEC. Endorsements: W3CBG/ORS/RM, K1PKQ/3/OPS, W3FA/RM/ORS. SET orientations were plentiful and enthusiasm was high. A dip of the ARPSC banner to W3LDD, WA3HTQ, K3GZK and K3IAG for magnificent SET preparations. W3ATQ is teaching evening electronic classes at junior college. K3GZK passed the Advanced Class exam. WA3HEN, W3MAH, W3LQY, K3JOM, WA1JHE/3 and a lot of termites had a ball on 2 meters in and around Anne Arundel County during the SET. W3NAE, K3UPU, WA3BNA and other members of the AARC pitched in with 6 mobiles and 3 base stations on RACES v.h.f. frequencies. K3EWU is the new Assistant State MARS (Army) Director for Maryland. W3FU is adding to his Intruder Data bank by leaping pounds and bounding ounces. WA3JBY says he might leave MDC this summer.

The major activity of W3ZSR in January was troubleshooting his rig. W3MSN (ex-W9JZZ, ex-W8HWR, ex-W8ZZCH (sic) and ex-W2NUC) got a Swan 250 and entered his first-ever contest on 6 meters. W3FA and fellow members of the Goddard ARC enjoyed an interesting talk by W4ZM. WA3GAU is building an SB-401. W3CDQ/OBS is keeping her rig on standby for the YL/OM, QCWA and CD Parties. WA3JPI is sending CQ CVTN at 145.82 on your v.h.f. dial. W3EOK has received his 25-year membership pin from ARRL and is celebrating his 44th year of operation. WA3EOP was in the SET and says WA3BMH hopes to develop MSTN (50.4 Mc.) as an AREC net. W4QLP/3, CHOP at W3ADO, says the station has good connections with hospital ships and overseas bases and will QNI to MDD more often since "chow time" has been changed for operators. Traffic: WA3JYS 70, W3TN 316, W3UCF/3 265, W3ATQ 214, W3LQY 203, K3GZK 168, WA3HTQ 168, W3CBG 163, WA3IRQ 144, K3QFQ 141, K3LFD 139, WA3IAQ 126, K3JOM 117, WA3HEN 101, K3JZY 94, WA3AJR 74, W3LBC 70, K3PEQ 68, W3ADO 63, WA3ERL 62, W3EOV 61, K3TBD 42, WA1JHE/3 32, WN3KAA 32, K3LFN 30, W3EWP 28, W3ZNW 27, W3ECP 23, WA3EOP 23, WA3GXN 21, WA3IJR 21, WA3HSU 20, W3FA 19, WA3JBY 18, W3MAH 15, W3ZSR 15, K3IYJ 14, WA3-

CEK 12, K30RW 12, W3GEB 5, W3CRE 3, W3PRC 3, K3QDC 3, WA3DWF 2.

SOUTHERN NEW JERSEY—SCM: Edward G. Raser, W2ZL—Asst. SCM: Charles E. Travers, W2YPZ. SEC: W2LVW. RMs: WA2BLV, WA2KIP. PAMs: WA2UVB, W2ZL. WA2BLV is high traffic man this month. The SET went over big again this year with all nets participating. W2IU made a nice score in the 9th Annual 160-Meter Contest. Congrats to W2POC, now among the Extra Class family. W2PEV has issued a very fine *NJEPTN Newsletter*. W2ZI has been awarded the 50-year ARRL lapel pin. He also was elected 1st vice-pres. of the Old Old Timers Club. We greatly need volunteers for the Intruder Watch. If interested, please write me. K3CPF was chairman of the V.H.F. Contest for club station, W2ZQ. He has been elected a director of the DVRA. SJRA officers for 1969 are W2SDB, pres.; W2EPA, vice-pres.; WA2EMB, treas.; W2BAY, corr. secy.; W2FYS, rec. secy. DVRA officers for 1969 are W2ZJZ, pres.; WN2KBF, vice-pres.; W2VE, secy.; K2-AAR, treas. W2YPZ recently returned from a vacation trip to Rome, Italy. WB2IJS and WA9PVE/2 recently joined the NJPEN. WN2IJQ and WN2YFQ passed the Novice Class test. The Princeton YMCA Radio Club has a new HA-10 linear and three-element Mosley beam on a 62-ft. tower. A new member is K3HOU. K2CPR was appointed to the new ARRL Contest Advisory Committee. WB2DRG has been in the hospital for two months. W2BAY has a new linear for his 160-meter rig. W2UP, formerly W4ER, is new G.E. Mobile representative for the Trenton area. New OPSS: W2BLM and W2DNF. NJPEN reports QNI 845 and traffic total 635. Traffic: (Jan.) WA2BLV 311, WB2VE 264, W2YPZ 228, W2QRS 224, WA2ABY 210, WB2UVB 147, W2DNF 94, W2PU 89, WA2KIP 62, W2ZI 62, WB2FJE 51, W2BLM 48, WA2ANL 43, K2SHE 19, WA2KAP 7, W2JI 6, K2-MBW 6, W2U 4. (Dec.) WB2UVB 1247, WA2MGV 178, WA2FCZ 165, WA2CLD 152, W2DNF 39.

WESTERN NEW YORK—SCM: Richard M. Pitzeuse, K2KTK—Asst. SCM: Rudy W. Ehrhard, W2PVI. SEC: W2RUF. PAM: WB2VSL. RMs: W2FB, W2MTA, W2RUF, K2KIR. NYS has added a late session at 2200 local time on 3675 in order to expedite traffic incoming to New York State. NYSPTEN reports handling 3754 messages of the formal variety and piles of informals in 1968. Honor station of the year on NYSPTEN is K2HOH with 328 check-ins for the year. NYS cleared 4623 messages in '68 with its most valuable member being W2FEB with 329 check-ins and 182 duty roster functions. A large number of test messages were received here during the SET indicating a good deal of activity. WN2GDQ and WN2GPO have a Novice net going on 7167 daily at 2200 local time. Congrats to WB2GZU on his new Advanced Class license. He also received his 50th QSL for WAS with 150 watts and a dipole. WA2-NDC renewed his EC appointment and tells of considerable activity in Navy MARS. WB2VSL, in between duties as PAM, plays in a jazz band and rides a motorcycle. Chemung County AREC had an interesting problem for the SET involving a mock collision of a private plane and a passenger airliner. The Broome Hamfest will be held Apr. 19. W2MTA can give more details. K2-LCT has the RTTY gear operating once more. W2-AFB spread the amateur radio word with a 20-minute talk to the Waverly Rotary on public service. K2DNN is QRX for a break in the wx so he can install his new rotor cables. Onondaga County EC WA2AWK reports he now has 36 members in the AREC. AREC nets are reported active in Erie, Chemung and Onondaga Counties. W2FCP is the Southern Tier representative to the NYSPTEN policy committee. Dave also is pub. dir. of ECARS. W2AFB received his 25-year gold lapel pin from ARRL. The Lake Chautauqua ARC held a reorganization dinner and meeting which was well attended. The Northern Chautauqua ARC is holding its annual banquet Apr. 19. Make inquiries of K2PCQ. New officers of the NCARC are WB2SNH, pres.; K2JQT, vice-pres.; WA2CZQ, secy.; WN2CTJ, treas.; WA2-UKE, K2LZV, WA2VSA, directors; W2SB, station trustee. Congrats to BPLers W2RUF and W2OEV. ESS certificates went to K2UIR and WA2PZD. Traffic: W2-RUF 511, W2FR 474, W2OE 391, WB2RHJ 379, WB2-OYE 351, W2MTA 338, WA2CAL 299, WB2GAL 248, WB2SMD 241, K2KQC 217, WA2BEX 165, K2RYH 161, WA2HSB 107, W2FEB 105, WB2VSL 101, W2HYH 99, K2DNN 72, K2JBX 63, WB2VND 62, WB2FHS 60, WB2HLL 49, W2RQF 49, WB2ZDK 49, K2QDT 47, WB2-YVP 32, K2OFV 30, WA2ALV 28, W2AFB 25, W2CFP 24, W2FCG 24, K2KTK 23, WB2IYB 19, WA2BVK 18, WB2RWR 16, W2PRY 12, K2VCZ 12, K2LM1 11, W2PVI 11, WB2YEE 11, WA2GLA 10, W2EMW 2.

WESTERN PENNSYLVANIA—SCM: John F. Wojciechowicz, W3GJY—SEC: W3KJP. PAM: W3WFR. RMs: WA3AKH, W3KUN, W3MFB, W3NEM. Traffic nets:

KSSN, 2330 GMT. WPA, 0000 GMT, 3585 kc. This column is saddened to record the passing of W3LN and W3RIS. The recent SET operation provided much enjoyment to the participants this year and was the best in many years. WN3JH joined the Etna Radio Club. K3KMO finds DX easy to contact on the low end of 80 with his Amateur Extra license and no QRM. W3UVF received a 25-year pin commendation for ARRL membership. K3CCB/WB4JAN, studying at the U. of Florida, received his Amateur Extra certification. W3TQN picked up his 2nd-class commercial phone license. K3ZVB and K3PGP share views on 400-Mc. TV. WA3JDT, Mercer County EC, encourages AREC participation in his county. For details drop him a line. 1969 officers of the Skyview Radio Society are K3SYW, pres.; K3VAS, vice-pres.; W3LWG, secy.; W3IHS, treas.; W3-LPQ, Radio Officer. K3SMB has been appointed RACES Radio Officer for Allegheny County. WA3LDZ is enjoying his new HQ-170 receiver. K3CKO has his SET activity interrupted by the arrival of a jr. operator. W3LNE is striving to rejuvenate the AREC in Clearfield County. The General Electric ARC in Erie was manned by K3QAY, WA3BBV, W3JTF, K3IOX, K3-IUK, K3VLQ and WA3GIV during the Simulated Test. W3ACD went mobile. WA3HDK, WA3GIV and K3-CKO try their hand at RTTY. K3AFO has been bitten by the DX bug. W3KPJ is chairman of certificates in the Erie area. WA3IYA has been appointed EC for Clarion County. ECs still are needed in Armstrong, Bedford, Clinton, Forest, Franklin, Fulton, Greene, Lawrence, Mifflin, Somerset and Warren Counties. New appointees: WA3IYA as EC; WA3AKB as ORS. Endorsements: W3KUN as RM; W3KUN, K3SJN, WA3-CPK, WA3HAL as ORSS; K3AKR as OVS. W3KUN is the winner of the 1968 William G. Walker, W3NUG Memorial Award. Honorable mention went to runner-up K3TFL. Traffic: (Jan.) WA3IPI 339, K3ZNP 323, W3-MFB 231, W3LOS 201, WA3AKH 177, W3NEM 172, K3-HKK 91, W3GJY 85, K3SM 73, WA3AKB 68, K3SOH 56, WA3GPK 42, K3HCT 37, W3SN 34, K3SJN 29, K3-ASI 24, WA3HSI 24, W3LOD 22, W3RUL 22, WA3BGE 15, WA3HAL 14, W3YA 8, K3TEZ/3 2. (Dec.) W3NEM 227, K3HKK 31, WA3AKB 8, WA3JDT 2, W3SN 2.

CENTRAL DIVISION

ILLINOIS—SCM: Edmond A. Metzger, W9PRN—SEC: W9RYU. PAMs: WA9CCP and WA9PDI (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	Tfc.
IEN	3940 kc.	1400Z	Sun.	42
	3760 kc.	0100Z	Daily	329
NCNP	3915 kc.	1300Z	Mon.-Sat.	
NCNP	3915 kc.	1800Z	Mon.-Sat.	1212
III. PON	3915 kc.	2245Z	Mon.-Fri.	
III. PON	3915 kc.	1430Z	Mon.-Fri.	601
III. PON	145.5 Mc.	0200Z	M.W.F.	230
TNT Net	145.35 Mc.	0300Z	Sun.-Fri.	491

W9NWK reports that the 75-Meter Interstate Single Sideband Net had a traffic count of 405 for Jan. W9NLF and W9YQT received their Extra Class licenses. The Motorola Amateur Radio Club (Chicago) is building and modifying receivers and transmitters to use in a 2-meter code practice net. K9VQY is now an Advanced Class licensee. WA9UHA has replaced his storm-damaged beam and is back on the ham bands. WA9UXF has been appointed EC of Grundy County. WA9TCW lost his 15-meter beam in the high winds. WA9ZPR has a new TH Mark III. A new Novice heard was W9NALS. The Ninth Regional Net passed 1018 pieces of traffic in Jan., according to W9OLV. W9GFF has a new call, W9FDY. New officers of the SRO are W9MRO, pres.; WA9CQN, vice-pres.; W9CDQ, secy.; W9GCI, treas.; WA9WHN, marshal; K9QJI, chaplain. Illinois was well represented at the Lake County Amateur Radio Club banquet at Schererville, Ind. New appointees this month include W9BVN as EC of Sangamon County and W9YH as ORS. K9PWO, K9YUS and W9FDY were elected the new officers of the Peoria Area Amateur Radio Club. The Chicago Suburban Radio Assn. will hold its annual banquet Apr. 19 at the Maywood American Legion Hall. The Wheaton Hamfest, held Feb. 16, was an FB affair and many an eyeball QSO was held. K9PEN, WA9QDN, WA9YMM, WA9VXH, WA9WPB, WA9WDT, WA9VEY and WA9ZNI passed the Advanced Class exam. They were students of the Advanced class sponsored by the CSRA, which now boast that more than 25% of its membership is of the higher class licenses. This column's sympathy is extended to the family and friends of W9PA, W9PGW and W9REA, who have joined the ranks of Silent Keys, and also to WA9-CLL, whose wife recently passed away. WA9CNV,

WA9MHU, WA9AKR and W9HOT are BPL certificate recipients for Jan. Traffic: (Jan.) WA9CNV 1976, WA9MHU 1429, WA9AKA 872, WA9TUM 406, K9AVQ 288, W9NXG 265, WA9TOC 256, W9HOT 254, W9KII 245, WA9OTD 210, WA9LDC 134, WA9ZUE 134, WA9PPA 128, WA9SFB 128, WA9BRQ 90, WA9QBM 81, WA9OBP 73, W9YH 66, W9DOQ 61, W9HPG 53, WA9UXF 33, W9LDU 29, K9RAS 29, K9DRS 16, K9HSK 15, K9DQW/KB9AIE 9, K9FRZ 8, W9LNQ 8, WA9YQT 8, WA9UHA 5, WA9QXT 1. (Dec.) WA9MHU 1098, WA9QXT 191, WA9TUM 189, WA9OBP 2.

INDIANA—SCM: William C. Johnson, W9BUQ—Asst. SCM: Mrs. M. Roberta Kroulik, K9IVG. SEC: W9BUQ.

Nets	Freq.	Time	Jan. T/c.	Mgr.
IFN	3910 1330Z	Daily 2300Z M-F	263	K9IVG
ISN	3910 0000Z	Daily 2130Z M-S	699	WA9CRS
		2300Z S-S		
QIN	3658 0100Z	Daily	124	W9HRY
Ind. PON	3910 1245 Sun.		36	K9EYF
Ind. PON V.H.F.	50.7 0200Z Mon.	Thurs.	116	WA9NLE

With deep regret I report WA9VBK of Michigan City, W9RE of South Bend and W9HAI of Brazil, Ind., as Silent Keys. W9PMT, mgr. of the Hoosier v.h.f. nets, reports Jan. traffic as 83. New officers of the Kokomo ARC are WA9QEY, pres.; WA9VZW, vice-pres.; W9KMY, secy.; WA9QWV, treas.; W9BFD, director. W9QLW has a new SB-200. WA9ALZ has a new Drake TR-6. WA9YXA's new call is W9FV; his XYL's call is WB9AMB. New officers of the Gibson ARC, Inc. are W9ZZR, pres.; W9URD, vice-pres.; W9AVVI, secy.-treas. New officers of the Indianapolis Red Cross are K9LNX, pres.; K9OXA, vice-pres.; W9POF, treas.; WA9BHF, secy.; W9FZV, chief op.; K9FSZ, trustee. WA9BWY's new rig consists of a TR-4 and an R-4. WA9SBR has an SB-401, SB-301 with Hygain 18 vertical. The Indiana Amateur TV & U.H.F. Club's Jan. meeting was very well attended. Speakers were K9PVW on APT Satellite, Gary Davis, of Columbus on Transistorized Camera and W9HWK on TV Converter for ATV. The SET was very successful. The Indianapolis Ham Association is having its first convention in Indianapolis, Ind., May 24, 1969. QIN Honor Roll: W9HDP 27, K9VHY 26, WA9DFQ 22, W9JBQ 22, K9DHQ 21, WA9KAG 17, WA9KOH 16, K9HYV 15, W9EPZ 15. *Amateur radio exists because of the service it renders.* BPL certificates went to K9FZX, W9JYQ, K9IVG, W9EQO and WA9QQ. Traffic: (Jan.) K9FZX 1661, W9JYQ 1213, K9IVG 892, W9EQO 550, WA9VZM 312, W9HRY 305, WA9QQ 196, K9HYV 192, K9CBY 156, K9QVT 132, WA9BWY 117, W9BUQ 110, WA9OLM 95, WA9PJM 88, WA9TJS 82, W9CMT 71, W9UEM 57, WA9BHG 51, K9CRS 48, W9FWH 44, WA9GNA 39, K9WGN 36, W9SNG 31, WA9AXF 30, W9GJZ 30, K9KTB 27, W9ENU 26, K9HSL 26, WA9OHX 23, K9ILK 22, K9JQY 22, K9FUJ 20, WA9LHG 19, W9AQEQ 18, K9VHY 17, K9RWQ 15, WA9CYG 14, W9DZC 14, W9RTH 14, WA9AUM 12, WA9YXA 12, WA9BVL 11, W9ALM 8, W9CUC 8, W9DOK 8, W9FJ 8, WA9QAD 7, K9EFY 5, WA9AMB 4, W9BDP 4. (Dec.) WA9PJD 245, W9OLW 115, W9RTH 37, WA9BWY 36, K9QVT 35, W9UEM 26, W9FJ 8, WA9YXA 7. (Nov.) WA9BWY 6, WA9YXA 4.

WISCONSIN—SCM: Kenneth A. Ebnetter, K9GSC—SEC: W2RUF. PAM: WB2VSL. RM: W2FR, W2MTA, W9NRP, WA9QNI, W9AYK. RMs: K9KSA, W9DND.

Net	Freq.	Time	Days	QNI	QTC	Mgr.
BWN	3985 kc.	1245Z	Mon.-Sat.	411	290	W9AYK
BEN	3985 kc.	1800Z	Daily	660	270	W9LVC
WSBN	3985 kc.	2300Z	Daily	1448	504	WA9QNI
WIN	3662 kc.	0115Z	Daily			W9DND
WSSN	3780 kc.	0030Z	Daily	174	42	K9KSA
WRN	3620 kc.	0130Z	Sun.	15	3	K9GSC
SW2RN	145.35 Mc.	0230Z	Daily	227	25	WA9IZK
SWRN	50.4 Mc.	0300Z	Mon.-Sat.			K9DBR

A net certificate went to WA9WOC for WSSN. New appointment: WA9TPV as ORS. Renewed appointments: K9GDF as OPS, W9MNG as EC, W9SIZ and K9DKU as ORSs. 1969 officers of the Manorad Club are W9KQB, pres.; K9RFZ, vice-pres.; WA9EZU, secy.-treas.; W9OMO, K9DIN, WA9PPN, directors. It is with deep regret that we record W9QHR and W9PYM as Silent Keys. They will be missed by all in the section. K9ZMS has a new Drake line and his Extra Class license. K9KSA has a new SB-401 and an SB-301. K9TBY is on 2-meter f.m. BPL certificates for Jan. traffic were issued to WA9QKP, K9FH1 and W9ESJ. Traffic: (Jan.) WA9QKP 769, W9CXY 457, W9DND 353, K9CPM 317, W9GJU 281, W9ESJ 230, WA9RAK 202, WA9QNI 135, K9FH1 111, K9TBY 81, W9IRZ 67, WA9HWF 66, W9KRO 61, K9KSA 58, W9DXV 53, WA9PKM 53, K9IPS 49, WA9TXN 43, WA9NBU 31, K9GSC 30, W9BCH 25, WA9UMT 24, W9NRP 19, WA9VCK 18, WA9LRW 16, WA9-

WOC 14, W9RTP 14, K9FYI 10, W9SQM 7, K9GDF 7, K9ZMS 5, WA9SAB 3. (Dec.) K9GDF 4.

DAKOTA DIVISION

MINNESOTA—SCM: Herman R. Kopischke, Jr., W9TCK—SEC: WA9MZM. RMs: WA9RRA, K9ORK. PAMs: WA9OEJ, WA9HRM. MSN meets daily on 3885 kc. at 0030Z and 0400Z. MJN meets Tue.-Sun. on 3885 kc. at 0100Z. Noon MSPN meets Mon.-Sat. at 1805Z on 3945 kc., Sun. and holidays at 1500Z. Evening MSPN meets daily on 3945 kc. at 2315Z. Minn. Sect. RTTY Net meets Sun. on 3620 kc. at 0200Z. With Daylight Saving Time all nets will meet one hour earlier by GMT, same local time, except Evening MSPN, which stays the same GMT but is one hour later local time. Congrats to new ORS WA9RRA. Appointments renewed: W9HEN as OO; WA9EZQ Carlton Co., WA9OVV Winona Co., K9VMW Stearns Co., WA9MMV Wadina Co., K9ICG Blue Earth Co., K9ZRD Washab Co., W9BUC Crow Wing Co., W9LW Wilkin Co. as ECs. W9ISI, K9UXQ, WA9EPX as ORSs. WA9JKT, WA9MMV, K9ICG, W9TCK, W9UMX, W9HEN, W9BUC, WA9OEJ, K9ZRD as OPSS. K9UXQ recently received his Extra Class license. WA9RKF now has an HW-32 to go along with his HW-12A. WN9WDX is looking for RCC members on 3705 kc. at 1600Z. Traffic: (Jan.) WA9IAW 399, WA9PFI 259, K9ZRD 179, WA9MMV 160, K9MVF 135, W9BE 93, W9PAN 93, WA9EPX 82, WA9RKV 79, W9BUC 72, W9KYG 66, WA9RKF 53, WA9QIT 49, WA9LAC 47, K9SRK 45, WA9ONS 42, W9TCK 40, K9FLT 39, W9RQJ 32, WA9RRA 29, W9ATO 28, W9EQQ 25, W9FHH 25, WA9ODB 25, WA9JPR 24, WA9UNS/Ø 23, W9YHE 20, WA9HRM 19, W9ARA 18, WA9JRA 17, W9KLG 16, K9IJU 15, WA9GMX 14, WA9VHU 14, K9WXH 13, K9ZBI 13, WA9EZQ 12, W9HEN 12, WA9THI 12, K9SXQ 11, WA9NQH 10, W9FHO 9, WA9GAZ 9, K9ICG 8, WA9OEJ 8, K9ZVG 5, WA9DFT 3, W9AAU 1. (Dec.) K9ORK 105, W9AZR 75, K9SN/9 65, K9CNC 41, W9BUC 31, W9AAU 22, K9UXQ 22, W9OMC 16, W9KNR 13, W9KLG 9, WA9JKT 1.

NORTH DAKOTA—SCM: Harold L. Sheets, W9DM—SEC: WA9AYL. OBS: K9SPH. PAM: W9CAQ. RM: WA9RSR. K9FUP has a new daughter. WA9TBR spent the snowbound days listening with one ear and wielding a soldering gun putting together a Heath hi-fi system. WA9MSJ is taking a West Coast vacation returning by way of Phoenix. K9QYD was host to a group of Fargo-Moorhead amateurs to discuss plans for reactivating the radio club in that area. WA9BIT has a new HW-100 in the making. WA9OVT got in the building mood and came up with a nice-sounding SB-101. On the morning of the trial run of SET a blizzard blocked the roads and WA9RWMS' son needed medication. With the help of several amateurs it was taken care of. With K9SPH, the State Radio Officer of RACES, and WA9AYL, the SEC in cooperation with the c.d. office in Bismarck where W9BF held forth, the trial run and the actual program on Sun. was quite successful. The organizers of this exercise and all taking part are to be congratulated on the splendid showing that was made. The C.W. Net, with WA9RSR as the RM, also worked in that category and has our congrats too. WN9WLP is a new call in Bismarck with a new SB101. WN9WIN and WN9WIS are also new ones there. WN9VFX and WA9VFY (technician) took the code test for Conditional. W9BF has been working with them. W9BF and W9EFJ are now retired. W9BF reports that the FS-1 Secondary Frequency Standard shown in Nov. QST page 34 was built and is a very nice piece of gear. WA9VMA went to St. Paul and came back with an Extra First license.

Net	Freq.	Time	Days	Check-		
				Sess.	ins	T/c.
ND YL WX NET	M-F	3994 kc.	23	535	30	WA9GRX, W9MND
N. RACES NET	M-F	3996.5 kc.	44	1152	265	K9SPH RO
	Sat.	3915 1730		CST		
ND PON NET	Sun.	3915 1730	11	226	46	WA9HUD
				CST		
				0900 CST		

ND CW Net Dec. 1968 report: 16 sessions 17 check-ins Organization WA9RSR RM.

Goose River 160m Net Sun. 0900 CST 4 sessions 62 check-ins. 1 traffic W9CDO. Traffic: WA9AYL 189, W9NMV 146, W9BF 134, WA9OVW 116, WA9QVW 60, K9SPH 51, W9GFE 33, W9WWL 23, W9DM 25, WA9IKS 22, WA9TBR 22, W9DXC 11, WA9MND 9, WA9JKT 4.

SOUTH DAKOTA—SCM: Seward P. Holt, K9TXW—SEC: WA9CPX. RM: W9IPF. PAM: WA9CWW.

Huron ARC election results: WAØTKX, pres.; WAØSKA, vice-pres.; WAØPNB, secy.-treas. Sioux Falls Auction will be held Mar. 31. Appointment in Jan.: KØKXR as OO. WAØRIQ received an ARRL Public Service award for aid in the Tracy, Minn., disaster. New calls are WAØWKZ and WNØWAS. KØIEI called on your SCM and relived old experiences. It is with pleasure we notice the older hams, such as WØDIY, WØNEO, WØDNV, WØDJO, WØCRF, WØVQC, WØZWL and WØDVB, participating in the traffic nets. Please note it is time to get petitions in for a new SCM. Net reports: WX Net, QNI 655, 306 QTC; NJC Net, QNI 558, QTC 179; Early Phone Net, QNI 358; QTC 20; Late Phone Net, QNI 1623, QTC 186. Congratulations to WØZWL and WAØPNB on making the BPL. Traffic: WAØPNB 657, WØZWL 555, WAØLLG 31, WAØBZD 21, WØDJO 17, WAØFUZ 16, WØDVB 15, WØHOJ 6, WAØRIQ 5.

DELTA DIVISION

ARKANSAS—SCM, Robert D. Shaefer, WA5II—SEC: W5PBZ. PAM: W5PPD. RM: W5NNND. RN and OZK had excellent participation and several local drills were held during the SET. Welcome to new Novice WN5WWA, in Arkadelphia. WN5SVS has been working good DX, including a CR5 on 15 meters. Top stations on OZK during Jan.: W5NND 29, WA5TLS 23, W5NOC 22, W5PBZ 19, W5MYZ 18. The teletype equipment at W5YM is being overhauled. Net reports for Jan.:

Net	Freq.	Time	Tfc.	Stations	Mins.	Mgr.
OZK	3790	0100Z	56	222	662	W5NNND
RN	3995	0030Z				W5PPD
APN	3937	1200Z	4	407	1386	W5VFW
PON	3925	2130Z	250	516	W5ELF	
Teenage	3995	2330Z	22	338	487	WA5QMQ

Traffic: W5OBD 958, W5NND 162, W5MYZ 118, W5PBZ 75, WA5II 47, WA5TJB 33, WA5TLS 13.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: K5ANS/5. V.H.F. PAMs: WA5DXA, W5UQR.

Net	Freq.	Days	Times/GMT	Net Mgr.
LAN	3615	Daily	0030/0400	W5MBC
DELTA 75	3905	Sun.	1330	WA5EVU
LaPON	3915	Sun.	1300	W5KC
LaRTTY	3612.5	Sat.	0100	W5GHP
CenGCHN	3935	Daily	0015	WA5NRG

WN5WRF is a new one at Pilottown. The Fifth Annual Hamfest sponsored by the Baton Rouge ARC will be held May 3 and 4 with headquarters at the Bellemont Motor Hotel. W5JOF is chairman of this popular event. The Loyola ARC is back on the air with W5AKQN and W5LJY carrying the big load. W5ERR says most of his 2-meter activity is local with occasional shots as far as BR. Some of Jan. activity came from training ship *State of Maine*, which visited NOLA for quite a spell. W5EA still continues to spend most of his time with Army MARS. W5JYA is on his way to Jamaica for a visit. W5CEZ handled over 139 messages in the SET. K5ANS/5 says that WA5VGD, WA5VMO and W5EKF are new to LAN and that K5UAR/5 has earned the coveted Section Net certificate. W5HGT now has RTTY and spends most of his time on 20 meters. W5KRX is now Extra with new call W5MI. WA5OJG is leaving Bastrop. WA5JVL and K5JXH are now Advanced Class. WA3HDM/5, with the USCG, is now located at Chalmette after operating KG6IF for a couple of years. Congratulations to W5NQR and W5NQQ on the arrival of harmonic Jane Anne. We regret to report the passing of WA5NDW, of Lafayette. WA5BDO, formerly of Lafayette, is operating KG6AA. W5NOR says the La. QSO Party was a huge success. K5ARH will announce the winner shortly. Newly-elected officers of the Ozone Radio Club down Slidell way are W5CKI, pres.; WA5CKI, vice-pres.; WA5QXH, secy.-treas. WA5QXH says that more than 60 Louisiana Alligator certificates, sponsored by the OZARC, have been issued. The gang at the GNOARC heard a talk recently by K5GLA on "Organization of Emergency Communications for the State of Louisiana." New 1969 officers of the CLARC are W5BBV, pres.; Sandy Sandefur, vice-pres.; Mac McKee, secy.-treas. Traffic: W5CEZ 214, K5ANS/5 183, W5KRX 159, W5MXQ 111, WA5KQN 92, WA5WBZ 65, W5MBC 35, W5HGT 28, W5EA 12, W5LJY 9, W5JYA 6.

MISSISSIPPI—SCM, Clifton C. Comfort, WA5KEY—Thanks to those responsible for my election as SCM. Much credit is to be given to those who worked on the tornado and explosion disasters. I must say "thanks"

to all the 9s, 8s, 9s and 4s who rode shotgun for us while we worked on the real thing right in the middle of SET. 3387 kc. seemed to be the only clear frequency on 75 meters. WA5WJP and WA5LXC are working on solid state TV cameras and digital counters. W5SBW has completed radiological monitor and shelter manager courses with the State Civil Defense. W5PBB is recovering from a heart attack and his daughter has had open heart surgery. K4RIN/5 and WA5SEG slipped across the Mississippi River and took part in the Louisiana QSO Party. We welcome K5BIO from Louisiana to Mississippi. K5ZSV has returned from the Arctic Circle. K5ZFM has his tower up and is now working on his quad. WA5TUD has his 4-1000 back on the air with no TIV. WA5FII gets his 2nd BPL certificate. Nets—Miss. Side Band Net 3990 kc. at 0015Z daily. Gulf coast Side Band Net 3925 kc. at 2330Z daily. Traffic: WASFI 345, W5BW 120, W5JDF 101, K4RIN/5 100, WA5JWD 8.

TENNESSEE—SCM, Harry A. Phillips, K4RCT—SEC: W4WJH. PAMs: W4PFP, WA4YBT, WA4EEW, WA4CRU.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980	Tue.-Sun.	0030Z	30	1752	394	WA4YBT
TPN	3980	M-Sat.	1245	31	1225	108	W4PFP
			Sun.		1400		
ETPN	3980	M-F	1140	23	637	56	WA4EEW
TGN	3980	Thurs.	0200	4	41	0	W4TYV
TPO	3980	Mon.	0030	4	132	15	K4RTA
TN	3635	Daily	0100	31	296	330	WA4YEM
TTN	7290	Daily	2200	31	671	202	WA4CRU
ETVHF	50.4	Tue.-Th.-St.	0000	14	266	0	WA4TJJ
ETVHF	145.2	W&F	0000	10	67		WA4TJJ

The SET was successful in Tenn. with much more traffic this year. No doubt about it, the NTS was overloaded. TN needs more representation and more traffic on 3635 kc. WB4JFT's rig blew during the SET. Congratulations to the Bristol ARC and Oak Ridge Radio Ops. Club, Inc., for being on the list of 100% ARRL clubs in the U.S. and Canada. WB4DZG is due commendation for carrying on as NCS for the 2-meter ETVHF Net. East Tennessee stations are urged to check in. Turn your beam toward Knoxville. K4SX/DL4EG will be back home approximately July 10. If your club would like to receive the Tenn. Council bulletin, contact WA4NEC. Traffic: WA4UAZ 592, K4AT 381, W4QJE 269, WB4OGG 239, WA4BXI 229, W4KQL 175, WA4WJH 169, K4RCT 140, WA4GLS 99, WA4ZAL 99, WA4YFG 95, WB4ANX 85, WA4NEC 85, W4WBK 81, WA4YFG 81, WB4HY 79, WA4CRU 67, K4UWH 67, K4MQI 65, WB4EHK 62, W4DJP 43, WA4DBG 40, WA4WV 39, WB4HLH 31, WB4FEC 27, WB4JFT 24, WA4ZBC 24, WA4EWV 22, WA4ZXZ 18, W4PFP 17, K4LTA 16, WA4ITW 16, W4TYV 13, WA4CGK 12, W4IGW 12, K4UMW 8, K4AMC 1, W4VJ 1, WA4YHO 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, George S. Wilson, III, W4OYI—SEC: W4VYS. Appointed: WB4HTN as EC and OPS; WA4WWA and K4MAN as OPSs. Endorsed: WA4FMY as EC; WA4GHQ and W4WNH as OVSS.

Net	Freq.	GMT	QNI	QTC	Mgr.
KRN	3960	1130	401	64	K4KIS
MKPN	3960	1330	518	121	K4RTA
KTN	3960	0000	1127	616	WA4AGH
KYN	3600	00+0300	533	977	W4BAZ
FCATN	50.7	0200	131	125	W4OTP

The 6-meter nets centered at Louisville and Lexington are providing needed coverage. More net representation is needed, particularly in the Bowling Green and the Covington precincts. Owensboro will be strained to provide full v.h.f. communications at the Unlimited Hydroplane Regatta on June 15. As it now looks, over 20 stations, mostly afloat, will be needed—many with multiple operators. Gear and volunteers may be needed. WA4MEX is a big sound with his new quad 811s. K4YCB is back after an 8-year layoff. There are probably well over a thousand hams in Kentucky. The bulk of public service work is being done by less than 100. In which category are you? Traffic: (Jan.) WA4DYL 100, WA4NLO 547, WB4HUS 502, WB4HQW 450, WA4GHQ 244, WB4BAZ 232, WA4AGH 229, WA4VUE 159, K4HY 134, WA4OYI 119, WA4NBZ 111, WA4BK 101, K4MAN 94, WA4UIH 91, W4OTP 88, W4VYS 77, WB4FDK 87, WA4VZZ 65, WB4EOR 59, K4UMN 42, W4CID 40, WA4UAZ 40, K4YZU 40, K4AMP 38, K4VDO 38, W4BTA 36, W4KJP 30, K4HOE 28, WB4FLA 26, WA4MEX 26, WB4EQY 21, WA4BZS 18, K4OKE 17, WB4IZX 16, W4Szb 16, W4CDA 10, WB4HTN 9, W4UK 9, W4MWX 6, K4YCB 6, WA4ZZE 4. (Dec.) K4FPW 15.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8MPD. RMs: W8FWQ, W8RTN, WA8OGR, K8KMQ, W8IJX. PAMs: K8GOU, K8JED, V.H.F. PAMS: W8-CVQ, W8YAN. Appointments: K8QKY, W8TBP, W8-UL, WA8ZPH as ORSS. WA8PPI, W8QPO, W8SWF, W8AVGQ as OPSs. W8SWF as OBS. W8JQT is now Genesee County EC and W8NIQN is Lenawee County EC. Net reports:

Net	Freq.	Time	Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	1185	743	111	W8FPW
WSSB	3935	0000	Dy	958	200	31	K8WRJ
PON-DAY	3935	1600	M-Sat	628	674	27	K8LNE
B/R-MEN	3930	2230	M-Fri	1012	243	27	K8LJS
GLETN	3932	0230	Dy	1073	113	31	WA8ONZ
M6MTN	50.7	0000	M-Sat	455	58	27	WA8WZP
PON-C.W.	3645	0000	M-Sat	86	48	27	VE3DPO
SW MICH 2	145.26	0100	Tue.	75	23	5	W8CVQ

New officers: Detroit ARA—W8BXO, pres.; W8AP, vice-pres.; K8LJX, secy.; K8YDI, treas. Grand Rapids ARA—W8ABT, pres.; WA8AAT, vice-pres.; WA8-NHL, secy.; WA8KEP, treas. Rosebud ARC—WA8-LKC, pres.; WA8CEN, vice-pres.; W8ZBT, secy.; W8-MMI, treas. Mason County RC—WA8WZF, pres.; W8-VTM, vice-pres.; WB8BJE, secy.; K8VXO, treas. Silent Key: K8YAV. RPLers: W8LJX, K8LNE, K8KMQ, K8-ZJU, WA8MCQ. The Semara Swap/Shop will be held at Cannon Memorial Apr. 13. The Michigan State ARRL Convention will be held May 9-10 in Grand Rapids. The Hazel Park ARC Swap/Shop will be held at Hazel Park High School, May 18. The Blossomland ARA is sponsoring an S.W. Mich. Area certificate Apr. 13 to Apr. 19, all operation in the phone bands. W8QOI was recently married in Maryland. The 2nd annual Michigan QSO Party, May 17-18, is sponsored by the Central Mich. ARC, Lansing. W8DSE and WA8WGM are happy with the new HW-100. W8ZBT has a new HW-17 on 2. WA8-ZHZ is ex-WA1DIM and W8IZ is ex-W8QQK. The QMN went all out for the SET. WA8ZPH lost his big antenna. WA8VAR is putting up a gutter pipe mast. WA8TDR made Extra. W8JXU now is on 160. Traffic: (Jan.) W8IJX 648, K8LNE 605, K8KMQ 427, K8ZJU 424, W8DET 318, W8GAI 238, WA8SQC 232, K8MXC 214, W8MO 164, W8RTN 160, WA8MCQ 157, W8JQT 138, K8JED 131, W8IZ 120, W8AWZF 111, WA8OGR 107, K8GOU 91, W8MPD 70, W8IJU 68, WB8BQG 58, WA8-MGN 53, W8EU 52, W8FX 47, W8WVL 46, W8HEZ 43, WA8ZPH 38, W8ZBT 37, W8YAN 34, W8IWF 27, W8-CVQ 24, W8ALR 24, WA8ONZ 22, K8QLB 21, W8DSE 17, W8NOH 14, W8SS 14, W8TBP 14, W8UFS 10, K8VDA 10, W8VJE 10, W8FWQ 8, WA8VGQ 7, W8A8QCW 6, W8BW 4, WA8LHZ 3, W8AAM 2, WA8VBL 2, WB8ANR 1, WA8WGM 1, (Dec.) WA8ZPH 84, K8QLL 13, W8BW 7, W8AVBL 5, WA8QCW 3.

OHIO—SCM, Richard A. Egbert, W8ETU—Asst. SCM: Roger Barnett, K8DDG. SEC: W8OUU, RM: W8IMI. PAM: K8UBK. V.H.F. PAM: WA8ADU. Jan. traffic net reports:

Net	QNI	QTC	Sess.	Freq.	Time	Mr.
OSSBN	2253	1404	64	3972.5	1530 & 2345Z	K8UBK
BN	743	590	81	3580	0000 & 0300Z	W8IMI
06MtrN	258	56	31	50.61	0000Z	WA8ADU
OSN	190	67	28	3580	2325Z	WA8VNU

This column was written by K8DDG while your SCM, W8ETU was in Southeast Asia on business. New appointments: K8WJG as OBS, WA8RUO as OO; WA8-JSW as OVS. 06MTRN certificates were issued to WB8AHY, WA8VVP, WA8ZUW, WA8WTK, WA8MTS, W8IMI, WA8CXV, WA8RLJ; BN certificates to WA8-GR, W8LT and W8FGD. Jan. was quite a busy month for the ARPSC. In addition to the SET, many amateurs were active in the Sandusky and Lima emergencies. Both OSSBN and BN were alerted for these emergencies. W8OUU observes that one major need is for more stations capable of operating at the same time on statewide and local nets. If you are not already affiliated with your local AREC, contact your EC or W8OUU for more information. New club officers: QCEN—WA8GRR, pres.; W8CHT, vice-pres.; WA8YRE, secy.; WA8STX, treas.; WA8COA, comm. ingr. Piqua ARC—W8AVM, pres.; W8ORK, vice-pres.; WN8YXQ, secy.; K8BLC, treas. Warren ARC—W8TQQ, pres.; W8HCL, vice-pres.; W8MKE, secy.; WA8PDG, treas.; W8KGD, trustee; K8JLK, editor. Miami Valley Contesters—W8-CEA, pres.; WA8MCR, secy.-treas.; W8ENH, act. mgr. W8OUU advises that there are plans for another ARPSC forum at this year's Dayton Hamvention Apr. 26. Governor Rhodes has proclaimed Apr. 20-26 as Amateur Radio Week in Ohio. W8ETU and K8DDG attended the Dayton ARA meeting in Jan., and Dick spoke on message-handling. Thanks to WA8IHC, K8-

WJG, W8DPW and W8UX for a very pleasant reception and tour of the DARA shack. According to Treaty City ARC Beam, WN8CHK worked Calif. on 80. K8YNH reports getting a couple of thank-you cards for his OO activity. W8IO has remodeled the shack and is back on the air. W8GDQ worked CE3CZ on 160. WA8ZZT got the BC-455 working. W8TV has put up the quad and rebuilt the exciter. The Greenville H.S. ARC has applied for a club call. Several stations, including W8UX, W8ERD and W8UMD, report their activity on MidCARS and EastCARS. The DARA reports 15 passed the Novice code test, according to K8SPC. WA8EBS is a new General, WA8GRG new Advanced and WA8-TKW new Extra. W8OUU received 177 participation reports from 17 counties during the SET. WA8GPX and W8QID are working on 432 f.m. WA8YHN is working on uvistor preamp. W8TYF says K8LUC has a new antenna system. W8ETU's "State of the Section" report was mailed to all appointees and affiliated clubs. If you would like to receive a copy, drop W8ETU a card or radiogram. Traffic: (Jan.) W8UPH 1818, W8IMI 232, W8RYP 279, W8ADU 259, W8QCU 247, W8OUU 225, WA8LAM 212, W8UDG 184, WA8ULF 174, W8SSN 160, W8VND 157, WA8VNU 156, WA8CXY 154, W8VND 147, K8PBE 136, W8CHT 119, WA8FSX 118, W8LT 113, W8ERD 105, WA8BZX 104, W8PMJ 104, WA8UTX 104, K8UBK 101, W8DWL 100, W8GOE 91, WA8OCG 81, K8QYR 80, W8FGD 75, K8VMI 75, WA8PBK 67, K8LGA 63, K8DDG 62, W8NAL 58, K8SUS 58, WA8ADU 56, WA8ETX 56, WA8SHP 56, WB8AKW 53, K8RONA 53, WA8MHO 51, W8VVL 51, WA8GRR 50, W8FRV 47, W8LRE 47, W8TV 46, W8GRT 43, WA8UPI 41, W8WEG 39, W8OE 36, W8GNL 35, K8BYR 34, W8DAE 26, W8-

1969 OHIO INTERSTATE QSO PARTY

May 3-4, 1969

All amateurs are invited to participate in the Ohio Interstate QSO Party, sponsored by the Buckeye Net and the Ohio SCM, W8ETU.

Rules: There are two 8-hour operating periods: 1900 GMT May 3 to 0300 GMT May 4, 1500 GMT May 4 to 2300 GMT May 4 with no restrictions on operating time, power, number of operators or transmitters. Each station can be worked twice on each band, once on phone and once on c.w. Ohio stations may contact any other station for credit. Non-Ohio stations may contact Ohio stations only for credit. To encourage emergency preparedness and provide contacts from rare Ohio counties, portable stations operating from any Ohio county (except Butler, Clark, Columbian, Cuyahoga, Franklin, Hamilton, Lorain, Lucas, Mahoning, Montgomery, Stark, Summit and Trumbull) may multiply their final score by 1.5. Portable operation is defined as operation outside the county in which you are licensed and signing your call as portable 8. Amateurs throughout Ohio and surrounding states are invited to test out their emergency and Field Day rigs by putting a rare Ohio county on the air. QSO points are 1 per completed exchange on 80 through 10 meters and 2 on 160 and all frequencies above 50 MHz. The final score for Ohio stations is the total number of QSO points multiplied by the number of ARRL sections worked, including Ohio. DX stations may be worked for QSO points but do not count as additional sections. For non-Ohio stations, the number of QSO points is multiplied by the number of Ohio counties worked. Portable stations changing counties during the contest may repeat contacts for QSO points. Stations outside Ohio may claim both QSO points and counties for such contacts. The exchange is QSO number, RST and ARRL section or county. Example: "Nr 204 579 Franklin" Suggested frequencies are 1805 3575 3875 7075 7275 14075 14275 21705 21375 28075 28575, 50.15 and 145.10. Try phone each even GMT hour and c.w. each odd GMT hour. Try 160 at 0200 GMT May 4. Logs showing date, time, stations contacted, QSO exchange, band, mode, location and score must be received by June 1, 1969 by Ohio QSO Party, c/o Robert S. Dixon, W8ERD, 311 East Kelso Road, Columbus, Ohio 43202. First, second and third place awards will be given to the highest scoring stations inside and outside Ohio and to the winners in each ARRL Section and Ohio county, provided at least 10 different stations were contacted. Separate awards will be given to stations using frequencies above 50 MHz exclusively.

JSW 28, K8MMZ 23, W8UX 23, W8WDU 22, WA8VVN 21, WA8YHN 21, WA8COA 19, K8LFI 19, W8ETU 18, K8DHJ 17, WA8KPN 17, K8EHE 18, W8ILC 18, W8WNK 15, W8GRG 14, W8QXQ 14, K8CKY 13, WA8BZR 12, K8DMZ 11, W8IO 11, W8ELE 10, W8HII 10, W8US 9, WA8WJR 9, W8AJW 8, WB8AZH 8, WA8AJZ 7, K8LRN 7, W8LZE 6, WA8RUO 6, K8WQJ 6, WA8CXV 4, W8EQ 4, WA8ETW 4, WA8JEH 4, WB8AHY 3, WB8AKU 3, W8LAG 3, WA8MCR 3, W8DYF 2, WA8WTK 1, (Dec.) WA8ULF 107, WA8FZS 31, K8LXA 22, K8DMZ 16, WA8CFJ 14, W8AJW 11, W8DYF 2, WA8WTK 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Graham G. Berry, K2SJN—Asst. SCM & RM: Ruth E. Rice, WA2VYS. SEC: W2KGC, PAM: WB2VJB. Section nets: NYS, 3765 kc. nightly at 2400Z; ESS, 3590 kc. nightly at 2300Z; NYSP&EN, 3925 kc. nightly at 2300Z; Westchester AREC, 3925 M-W-F after NYSP&EN and 146,178 kc. same days at 0030Z. Appointments and renewals: WA2WGS as EC for Orange and Ulster Counties; W2TV Schenectady County; WA2GQW as OPS; WA2BHN and WB2SIH as OBSs on split week out of Armonk; W2UC and WB2UHZ as ORSS; K2YCJ, with K2EBX trustee, as OVS; W2UC, WB2VJB and WA2WGS as OPSs. Jan. activities: WA2JWL has a swinging net going on 75 Westchester AREC/traffic. See above for dates/times/frequency and join in. It's open to all ENY not just County residents. WB2YQU worked VE3 and WA8 for the best v.h.f. DX plus 16 sections. WB2IYO is now Advanced Class. W2HZZ named WB2HXZ Asst. EC in Dutchess. The New Rochelle Club is starting its 10th series of theory classes with K2JQB "Dean of Faculty." All ENY stations should look into the job being done up in Albany County by the AREC—outstanding! ECs and Asst. ECs write WA2VQB for the latest bulletin. K2KTJ supervised the run of a 400-ft. a.c. line to the Albany f.m. repeater soon to go into action. There are two base stations and 28 mobiles in the net. WB2PNB needs more volunteer teachers for classes in the Albany area. WB2RBG found 4s, 8s and 9s during the Jan. openings on v.h.f. and worked everything but 6 and 7 in Dec. The NYSP&EN '68 report shows 18K check-ins, 3.7K traffic handled. Look for the late session of the NYS now at 0300Z daily on 3675 kc. At the Westchester Club, members heard W2AH on the electric power industry use of electronics. There are many check-ins on the WARA Tech. Net Wed. on 28.690 at 8 P.M. local with W2KFB in charge. WB2UEQ/3 is very active on 160 at Johns Hopkins in Baltimore. Traffic: WB2BHN 1085, WA2VYS 577, W2EAT 182, WB2SIH 166, W2ODC 141, WA2VYT 129, WA2CRW 122, WA2JWL 107, WB2RKG 96, WB2VJB 89, K2SJN 64, WA2VAN 30, WA2FDD 26, WB2RBG 22, WB2IYO 10, WA2QEG 10, WB2FOA 7, WB2NQK 6, WA2VQZ 6, WB2FOA 4, WB2FUV 4, WB2AFV 3, WA2GQW 3, K2HNW 3.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI*	3830 kc.	1915/2200 Nightly	K2UAT	RM
NLIVHF*	145.8 Mc.	1930 MTWTF	WB2RQF	PAM
NLIPhone*	3932 kc.	1600 Daily	WA2UWA	PAM
Clear Hse	3925 kc.	1100 Daily	WA2GPT	Mgr
Mic Farad	3925 kc.	1300 Ex. Sun.	K2UBG	Mgr
East US	3683 kc.	0001 Nightly	K2UBG	Mgr
All Svc	3925 kc.	1300 Sun.	K2AAS	Mgr
NYSP&EN	3925 kc.	1800 Daily	K2SPO	Mgr

*Section Nets. All times shown above are local.

WB2CHM, draft-age-type son of WB2RQF, sashayed off to active duty with the Navy last Jan. WB2MZB is asst. mgr. of the NLIVHF Net. Also, please note that K2UAT is the new RM for NLI whereas WA2UWA is now the PAM of the NLI Phone Net. WB2YRU allows that SET '69 was a big smash and prompted him to create more traffic in two days than he did all last year. By the way, WB2YQU heads for RPI up in Troy this coming fall. WA2RUI says the SET '69 worked out much better than SET '68. K2AAS reports he had a swinging time at the SAROC Convention out in Las Vegas and beat a couple games of chance. The C.W. Post College ARC has invited the student body and faculty to join the club and learn amateur radio. New members of the Queens 10-Meter Mobile Net are WA2CZO, WA2PMW and WB2VIV. The EC for that net, W2IAG, has issued a call for new members to augment the existing staff of 9 mobiles. Officers of the Levittown ARC are WB2WCS, pres.; WB2MNG, vice-pres.; K2UPA, treas.; WB2FDY, WB2YQT, seccys. RTTY members of the Tu-Boro ARC (WB2IPO, W2LXC, WA2MXB, WA2NDJ, WA2VYP and WA2ZCU) are hanging out on 145.62 every evening looking for those good old RTTY contacts. The fifth annual meet of the Amateur Radio Luncheon Club was scheduled for Mar. 25 at the Statler-Hilton during the S.S.B.

Show, according to W2PF. WA2JZX has moved into a new QTH out Copiague way and is busy stringing all those little wires that amateur-guys always string. WB2DXM ended up as Number One in his physics class at Albany and is operating portable with WB2SRN's rig—after all Number One is expected to do more! Oh, WB2SRN is running around with the Army. WA2QJU finished last term with all As and now has only one term to go. W2HLI has a good old rhombic just off the ocean out at Ammagansett. Officers of the Tu-Boro ARC are WB2IPO, pres.; W2YSM, vice-pres.; WA2UXK, treas.; W2LXC, secy. K2JJD passed the exam for Advanced Class, as did WA2KEC and WB2WLV. Officers of the Crossband Communication Club are WB2PZR, pres.; WA2IOT, vice-pres.; K2ZKE, treas.; WA2SFF, secy. Officers of the Staten Island ARA are K2USX, pres.; K2JFE, secy.; W2EYU, traffic. Traffic: WA2UWA 2580, WA2GPT 519, WB2YUKU 236, WB2RQF 194, WB2PJH 135, W2EPP 111, WB2QJL 90, WA2RUI 90, WA2HPB 45, W2JZT 40, WB2AEK 35, K2AAS 31, WA2GJZ 22, W2LAG 14, WB2WCS 13, WA2PMW 10, W2EC 6, W2PF 6, WA2EMF 4, WA2JZX 4, WB2DXM 3, WA2QJU 2, W2UL 2.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso W2ZZ—Asst. SCM: Edward F. Erickson, W2CVW. SEC: WA2ASM, RMS: WB2DDQ and WB2RRK. PAMs: W2PEV, K2KDQ, WA2KZF and WA2TBS.

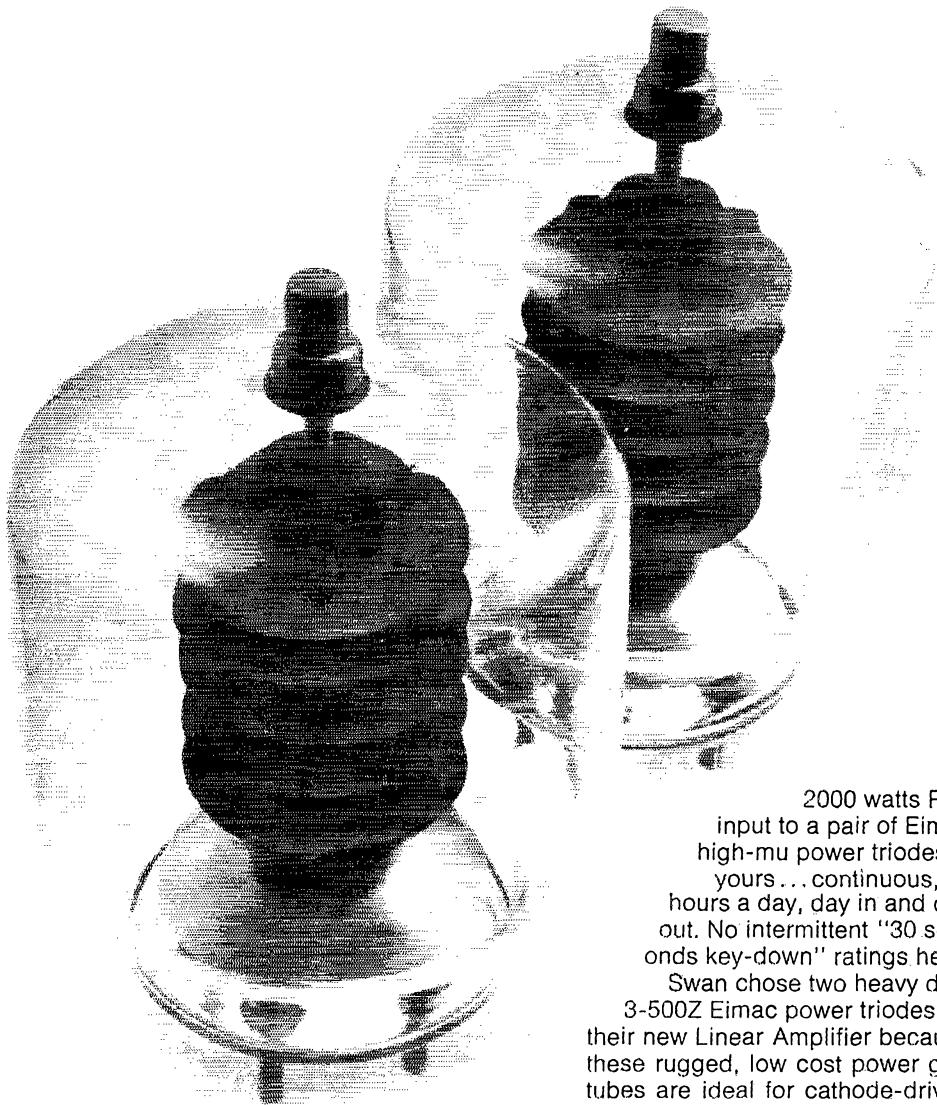
ARPSC Section Net Schedule

Net	Freq.	Time	Days	Sess.	QNI	Tfc.	Mgr.
NJN	3695 kc.	7:00 P.M.	Dy	70	829	472	WA2BLV
NJSN	3740 kc.	8:00 P.M.	Dy	21	64	29	WB2RKK
NJEPTN	3929 kc.	6:00 P.M.	M-Sat	40	845	635	W2PEV
NJAN	50,300 kc.	8:00 P.M.	M-F	25	361	136	WA2KZF
PVTEN	145,710 kc.	7:30 P.M.	Dy	31	418	490	K2KDQ
ECTN	146,700 kc.	9:00 P.M.	Dy	38	348	313	WA2TBS

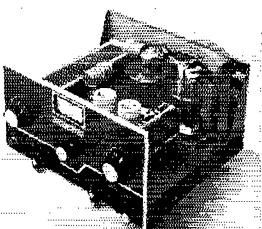
New appointment. WB2BXK as EC for Rumson and vicinity. (O) reports: W2TPJ 54. New officers of the Knight Raiders V.H.F. club are K2KDQ, pres.; WB2MCA, vice-pres.; WA2CRF, secy. The group at WB2WNZ has added the HW-100 to its station. WB2UIR reports that school work is forcing him to QRT until summer. WA2EUX has his rig in operation again. WA2KZF attended the Southeastern ARRL Division Convention. K2RPZ is mobile on 50 Mc. WN2IHW is a new Novice in Linden. WA2HSW received his General Class license. WA2CUR has a TA-32. WB2MDR is attending medical school in Iowa and will be operating as WA2V-VA. WA2TAZ is looking for 2-meter RTTY activity. WB2RKK was active both week ends of the CD Party. WB2DRJ received his WAS certificate. WB2AMV, WB2NIN, WB2RWV and WB2WID all passed the Advanced Class exam. WN2EPU passed the General Class exam. Congratulations to all and don't stop there. WB2FNG reports that his first eight months show 48 states and 45 countries worked. WN2GHM poured it on for the Novice Roundup. WB2ZEI has a new HW-17. WA2CCF added the 3223 and 30L1 to his shack. K2IEF reports his DX total is now at 122. W2PEV is using a new SB-200. Your SEC and SCM wish to thank everyone for their participation in the SET. Also, a special thank-you to the net mngs. and their NCSs for the smooth-running nets. It was a real pleasure to listen to them. Traffic: (Jan.) WB2RKK 671, K2KDQ 581, WA2ASM 254, K2DEL 223, WA2TBS 218, WB2NSV 207, WB2WID 185, W2ZZ 185, WB2ZSH 163, WA2BAN 146, WB2FEH 145, WB2BCS 137, WA2ACJ 134, WA2BXX 130, W2PEV 101, K2ZFI 89, WA2CRF 82, WA2TAF 82, WB2DDG 66, WA2NBG 61, WB2QMP 55, WA2CCF 53, WA2KZF 46, WA2DRH 45, WA2EUX 38, K2HHT 38, K2PBP 37, WB2WNZ 36, WA2BCT 30, WN2CWU 22, WA2ACP 20, WA2EVO 19, WB2YDL 19, WB2CGI 16, WB2ZKC 15, WA2CLO 15, WB2TFM 12, W2CU 11, WA2BAU 10, WA2GIE 10, K2MFX 10, W2EWZ 9, K2JSJ 9, W2ABL 5, K2RPZ 3, WB2DRJ 1. (Dec.) WA2EVO 8.

MIDWEST DIVISION

IOWA—SCM, Wayne L. Johnson, K0MHX—SEC: K0JVB. PAM: WOPZO, RM: W0LGC, OBSS: W0LCX, W0IAQ, W0CXN, W0AMIT. W0BEC has joined the Silent Keys. The Des Moines Hoover High has formed an amateur radio club with W0QUL as trustee. The club call is WA0VQN. Officers are: WA0RGV, pres.; WA0MTY, vice-pres.; WA0TBG, secy.; WA0FW, treas. WA0SEQ is the first club member to attain Advanced Class. WA0OTE attained his goal of 100K plus in the Jan. C.D. Party and heard K0YVU, K0AZJ, WA0SDC and W0NLF making good scores. K0AZJ is looking for NCS stations for the Tall Corn Net. WA0LGG and the Tenth Regional Net cleared 288 test messages during the two special sessions for the SET. Berther reports all sections were represented in both



Two will get you two thousand.



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Both tetrodes feature transconductance double anything even we've been able to offer. They have greatly reduced cathode lead inductance and a unique re-entrant anode, permitting a shorter stem and lower input capacitance. Feedback capacitance also is much lower, simplifying tube neutralization and eliminating

any need for a neutralization circuit. In both tubes the screen base is designed to serve as an electrostatic shield.

These tubes have 4 to 5 dB higher gain than comparable tetrodes, yet are very compact. The 4CW50,000E (50 kW model) weighs only 35 pounds. It has 310 pF input capacitance, 52 pF C_{out} and 0.6 pF feedback capacitance. The 4CW100,000E weighs 50 pounds, has 349 pF C_{in} , 60 pF C_{out} and 0.8 pF C_f . For data and application assistance contact your nearest Varian/Eimac distributor or ask Information Operator for Varian Electron Tube and Device Group.



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sessions. Wright County amateurs met with WØHWA to organize a county AREC. KØJMA is EC, with WØMOW, KØDXT and WØQQJ as assistants. WAØRXR is on 40 with milliwatts. WØPFP has his 432-Mc. converter working and heard WØPHT. WAØEOA is now s.s.b. with an SB-101. It's nice to hear KØAHP back handling traffic.

Net	Freq.	Day	GMT	QNI	QTC	Mgr.
Iowa 75	3970	M-Sat.	1830	1576	214	WØPZO
Iowa SSB	3970	M-Sat.	2359			WØYLS
Iowa 160	1815	Daily	0100	835	8	KØTDO
TLCN	3580	Daily	0030	213	144	KØAZJ
PON	3915	W & F	0030	97	12	WAØDYV
PON-CW	3697	Tue. & Sat.	0030	38	5	WAØDYV

Traffic: (Jan.) WØLWX 687, KØAZJ 323, KØGJI 129, WØLGG 119, WØLUWA 109, WØPZO 103, WAØUAW 68, WØCZ 56, WAØQZL 40, WØJPJ 29, WAØDYV 28, KØKAQ 22, WAØBSF 20, KØEVEC 20, WAØGMZ 19, WAØROM 18, KØTFT 14, KØTDO 10, WAØPPW 9, WAØAIW 8, WØREM 7, WAØTIR 6, KØVDY 2. (Dec.) WAØSDC 82, WAØQZL 30, WAØAUX 5.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RMs: KØMR, WAØJFV. V.H.F. PAMS: WAØCCW, WAØLSH. An ice storm broke KØGSP's 40-ft. pole into 12 feet above ground. WAØQEH is back on the air after being hospitalized. The Wichita ARC elected WAØPGI, pres.; KØLFG, vice-pres.; KØFII, secy.; WAØSFJ, treas.; WAØPYP, pub. WØHF and WØEWE received special awards at the WARC Annual Banquet in Jan. for their outstanding contributions to the club in 1968. The Air Capitol Radio Club's officers for 1969 are WAØCCX, pres.; KØDYH, WØSPF, KØJOC, WØHYR, WØCRN, KØKCS, directors. AREC standnings as of Jan. 1969 are 484 members, 25 emergency net members.

Net	QNI	QTC	Sess.	Mgr.
KSBN	807	267	25	KØJMF
KPN	278	24	19	KØJMF
KPON	1037	1406		WØLXA
KWX Net	910	83	34	WAØLLC
KEC	44	2	4	WAØCCW
QKS	344	195	66	KØMR
HBN	641	98	20	KØICB

V.H.F. Net activities,—not including SET activity

PINet NCK Section	37	10	4
SCKs Sect.	27	69	3
AREC 7 Other			
Zone 1 2 Meters	61	4	4
7 2 Meters	43	29	3
15 6 Meters	17	42	5
ACARC 2 Meters	37	0	4
Coffeyville 2 Meters	32	0	3
NCK 2 Meters	23	0	13
AREC Nets LO-Band			
Zone 1	32	6	
Zone 7	31	3	4
Zone 15	67	10	

Traffic: (Jan.) WØINH 522, WØTHQ 379, KØBXF 358, WØLXA 295, KØJMF 276, KØJMF 249, WØPSN 198, WAØLLC 183, KØMR 151, WØHJ 139, WAØLBB 133, KØEMB 127, WAØMLE 117, KØUVH 106, WAØOZP 104, WØSPF 99, WAØNFP 96, WAØKPE 95, WAØJOG 81, KØFPC 80, WAØSWC 77, WØCGZ 72, WØFII 70, WAØSHG 62, WAØUTT 56, WAØDWH 50, KØLPE 47, WØBGX 46, KØGII 39, WAØKDE 38, KØJID 32, WAØCCW 30, WØQQQ 17, KØEQH 15, WNØTAS 14, KØGIG 8, WØGCJ 7, WØFDJ 4, KØGZP 3, WØLYC 2. (Dec.) WØFII 12.

MISSOURI—SCM, Alfred E. Schwanke, WØGS—SEC WØBUL wishes to thank all who helped to make this year's SET the best ever for Mo. A special thanks goes to ECs and to the NCs and net members who helped with extra net sessions. WØBUL received appointment as Asst. Director for the Midwest Division. The EC appointments for WØWKC and WAØIIK were renewed. New Novice Class licensees in the Ruskin H.S. ARC (WAØTKV) are WNØWKB and WNØWLS. The club also has obtained a 40-year run of back issues of *QST* for reference. The PHD ARC's (WAØUGU) radio classes have 35 registered for the Novice course with 26 average attendance and 9 in the General class. WAØYTU and WØGSM have started teaching a class in amateur radio, sponsored by their church for underprivileged boys. KØGJD, formerly of St. Louis, is now stationed at Whiteman AFB after 4½ years in California. New officers of the HARC (K.C.) are KØGTJ, pres.; WAØABO, vice-pres.; WAØPBQ, secy.; WAØPFS, treas.; WØCTQ, sgt. at arms; WAØOPF, editor of

HARK. The Zero Beaters ARC (WAØFYA) started Novice classes Jan. 22. KØONK was appointed director of women's activities for the blind in chapter 4 of the YL Div. of the CHC. WNØVBG passed the General Class exam. A new call in Kirksville is WNØWOW. WAØQXG received a MON certificate. Net reports for Jan.:

Net	Freq.	Time	Days	Sess.	QNS	Tfc.	Mgr.
MEN	3885	2330Z	M-W-F	14	169	41	WØBUL
MøSSB	3963	2400Z	M-Sat.	28	1093	283	WØRTO
MON	3585	0100Z	Daily	35	169	176	KØAEM
MNN	7063	1900Z	M-Sat.	26	91	40	WØOUD
SMN	3585	2200Z	Sun.	3	4	2	WØQUD
MoPON	3930	2100Z	M-F	27	168	234	WØHVJ
PHD	5045	0130Z	Tue. (GMT)	5	103	71	WAØKUH

Traffic: (Jan.) KØONK 2118, KØAEM 313, WAØHTN 267, WØBUL 241, WAØKUH 96, WAØFMD 81, WØBV 75, WAØUGU 62, WAØKBE 53, KØJPS 38, WØRTO 32, KØVHN 15, KØORB 14, WØJKF 7. (Dec.) WAØKBE 15, KØJPS 23. (Nov.) KØJPS 23.

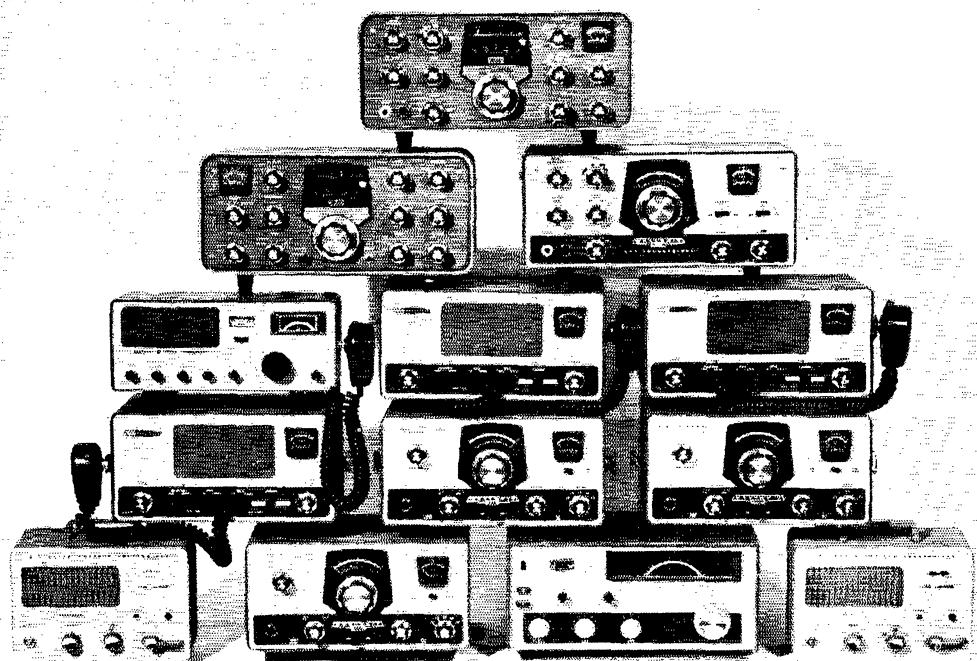
NEBRASKA—SCM, V. A. Cashon, KØOAL—SEC: KØOEMB. Monthly net reports for Jan.: Nebr. Storm Net, WAØLOY, 0030Z session, QNI 1438, QTC 122; (130Z session, QNI 1094, QTC 68. Nebr. Emergency Phone Net, WAØGHZ, QNI 1333, QTC 504. Nebr. Morning Phone Net, WAØJUF, QNI 1156, QTC 52. West Nebr. Phone Net, WØNJK, QNI 653, QTC 35. WREC Phone Net, WØIRZ, QNI 173, QTC 5. Nebr. C.W. Net (NEB), WAØHWR, 0100Z session, QNI 127, QTC 36; 0400Z session, QNI 83, QTC 17. 160-Meter Phone Net, WAØCBJ, QNI 920, QTC 18. Dec. net report: Dead End Net, WØFBY, QNI 466, QTC 66. The Hastings ARC held its Annual Valentine Sweetheart Party for the N.Y.L. Feb. 17. WAØJH and WØFQB are operating GT-550 transmitters. The Ak-Bar-Ben ARC's officers are WAØKIL, pres.; WØEGP, vice-pres. The Lincoln ARC is sponsoring the Nebraska QSO Party, to be held May 3-4, 1968. Individual operators reporting, 51, QTC 18,814. Traffic: (Jan.) WØIBB 552, WAØGHZ 385, WØLOD 349, KØODF 88, WAØHWR 72, KØJTF 60, WAØCBJ 51, WØBFV 46, KØOAL 33, WØFQB 32, WØHTA 32, KØLDP 31, WAØLOY 31, KØAIE 26, WAØGVJ 21, WAØOVL 21, WAØEEI 20, WAØJKN 18, WØNJK 18, WAØLVM 16, WAØSES 16, WAØTET 16, WØYFR 16, WAØFGV/Ø 15, WAØJTU/Ø 15, WØVEA 15, WAØIXD 14, WAØJH 13, KØJFT 12, KØHTN 12, WAØJUF 12, WAØOQX 12, WAØIBL 11, WAØPSN 11, WØBFN 10, KØJPP 10, WAØOLE 10, KØECH 9, WØMAO 9, WAØMHW 8, WØPQF 8, WØRJA 8, KØUDW 8, KØDGW 6, WØEWZ 6, WØFH 6, WØHOP 6, WØJAV 5, WAØPIF 5, KØFRU 4, WAØQEX 4, WAØJAV 3, WØATU 2, WAØLWK 2, WØPHA 2, WAØRFZ 2, WØSWG 2, WØLSI 1, WAØNYM 1. (Dec.) WAØHWR 94, WØBFV 18, WAØPIF 12, WØSWG 3.

NEBRASKA QSO PARTY

May 3-4, 1969

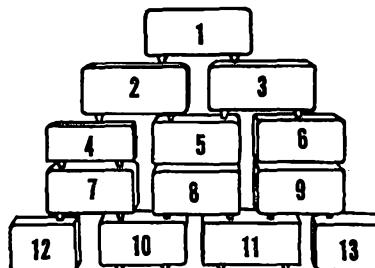
Rules: Starts 1600 GMT May 3 and ends 2200 GMT May 4, 1969. Use all bands, c.w. and phone; a.m. and s.s.b. classified as phone. The same station can be worked and counted for QSO points on each band and mode. Single operator stations only. Out of station stations send QSO number, RS(T) and ARRL section. Nebraska stations send QSO number, RS(T) and county. Out of state stations count 3 points per QSO. Nebraska stations count one point per QSO. Nebraska stations can work other Nebraska stations for points only. Out of state stations multiply the number of Nebraska contacts X 3 points X counties; Nebraska stations multiply ARRL sections worked (plus a maximum of ten foreign countries) by the total number of QSOs. Suggested frequencies: 1815 3600 3982 7100 7260 14,100 14,300 21,070 21,325 28,050 and 28,600 kHz. Be alert for Nebraska mobiles changing counties which may be worked again on the same frequency. Top station in each Nebraska county will receive an award. The top scorer for each ARRL section and foreign country also receives award. (The Awards Committee will issue additional certificates where deemed appropriate.) Logs must show date, time in GMT, exchanges, band, mode, points, a summary sheet with scoring and name and address in block letter. All logs must be received by June 9. Send to: The Lincoln Amateur Radio Club, c/o Michael E. Nickolaus, WAØKGD, 4921 Tipperary Trail, Lincoln, Nebraska 68512. Please include a large s.a.s.e. for results.

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Kit SB-101, 23 lbs.....\$370.00
- 2. The SB-110A** — the "no compromise" 6 meter rig. 180 watts PEP USB/LSB input, 150 watts CW input. 1 kHz dial calibration. Famous Heath LMO. PTT or VOX control. Same crystal lattice filter as SB-101. Built-in 100 kHz calibrator. Switch select either crystal controlled transceiver or crystal controlled transmit with variable tuning receive-CW or cross-mode. Go six meters for less, and still get the best — go Heathkit SB-110A.
Kit SB-110A, 23 lbs.....\$289.00
- 3. The HW-100** — Heathkit's newest 5 band transceiver and second only to the SB-101 in performance and value. Work 80 thru 10 meters; 180 watts input PEP SSB, 170 watts input CW. High quality crystal lattice filter. Built-in 100 kHz calibrator. Patented Harmonic Drive™ dial mechanism. Solid-state (FET) VFO. PTT or VOX. Triple Action Level Control. Make friends & influence people — buy the HW-100.
Kit HW-100, 22 lbs.....\$240.00
- 4. The HW-17** — the better way to go! All Solid-state 2 meter AM for less. Perfect for local rag chews, nets & DX, as well as CAP, MARS & CG Auxiliary. 25-30 watts input. Solid-state, dual-conversion receiver. Pre-built, pre-aligned FET tuner. Four crystal sockets plus provision for external VFO. Battery-saver switch & built-in speaker — well suited for rugged mobile work. Overwhelm your friends on 2 with the HW-17.
Kit HW-17, 17 lbs.....\$128.00
- 5. The HW-18-1** — the only way to go! This CAP SSB rig is inexpensive and effective. Covers 4450 to 4650 kHz and provides 200 watts PEP input on USB; 25 watts input with carrier for compatibility with AM stations. Crystal filter sideband generation. 1 uV sensitivity; 2.7 kHz selectivity. 2 crystal-controlled channels, switch selected. PTT mike and mobile mount included.
Kit HW-18-1, 15 lbs.....\$119.95; wired HWW-18-1, 15 lbs.....\$179.95
- 6. The HW-18-2** — A 4450 to 4650 kHz transceiver at a fraction of the cost you've had to pay before. 200 watts input on either USB or LSB (you specify); 25 watts input with carrier. Fixed tuned for simple PTT operation. Crystal filter IF for high selectivity. Switch select either of the two crystal controlled channels. ALC holds output constant under varying voice levels. Complete with PTT & mobile mount. Get fast, efficient MARS communication with the HW-18-2.
Kit HW-18-2, 15 lbs.....\$109.95
- 7. The HW-18-3** — Good news on 160 M rigs, OM!! 200 watts input on LSB; 25 watts input with carrier. Just select either of two crystal controlled channels and push-to-talk — what could be easier! One microvolt sensitivity and 2.1 kHz selectivity. Relayless transmit/receive switching. Automatic Level Control. Easy construction, fast alignment. See you on 160 with the HW-18-3.
Kit HW-18-3, 16 lbs.....\$109.95
- 8. The HW-22A** — the famous Heathkit 40 Meter Single Bander. 200 watts PEP input on either USB or LSB. Choice of power supplies for fixed or mobile operation. Front panel mike input, gain control & bias adjustment for easy change over. Slow AVC action for ideal SSB reception. 1 uV sensitivity, 2.7 kHz selectivity. Temperature compensated VFO. High quality crystal lattice filter.
Kit HW-22A, 15 lbs.....\$104.95
- 9. The HW-32A** — the world's best 20 Meter Single Bander. Operates either USB or LSB — 200 watts PEP input. ALC input for use with external linear. Run fixed or mobile, using either of the two accessory power supplies. Change over is easy, thanks to the front panel mounted mike input, bias adjustment & gain control. Built-in S-meter, PTT, VOX and ALC. Your best buy on 20.
Kit HW-32A, 15 lbs.....\$104.95
- 10. The HW-12A** — The popular Heathkit 80 Meter Single Bander. The world's best 80 meter value by far. 200 watts input on USB or LSB. Ten-tube superhet controlled with 1 uV sensitivity, 2.7 kHz selectivity and slow AVC action for superior sideband reception. Operates PTT or VOX. Built-in S-meter and ALC. Easy to change from fixed to mobile. Is there a better buy on 80? Not at this price.
Kit HW-12A, 15 lbs.....\$99.95
- 11. The HW-16** — A high performance CW rig for the newest novice or most experienced old brass pounder. Optimum CW operation on the first 250 kHz of the 80, 40 & 15 meter bands. Power input adjustable from 50 to 90 watts. True "break-in" operation — solid-state TR switching and receiver muting. Crystal lattice filter for extra sharp selectivity of 500 Hz. You're on top of the action when your rig is an HW-16.
Kit HW-16, 25 lbs.....\$99.95
- 12. The HW-29A** — One of the very popular "Benton Harbor Lunch Boxes" — this one for six meters. There's a lot of action in this little package. The crystal controlled AM transmitter has a husky 5 watt input — ideal for local nets, CAP or MARS operations. The tunable super-regenerative receiver with RF stage has 1 uV sensitivity. Get on 6 with the HW-29A.
Kit HW-29A, 9 lbs.....\$44.95
- 13. The HW-30** — The other "Benton Harbor Lunch Box", 2 meter transceiver. Interested in VHF? There's no better way to begin than with this one. Features 5 watt input to the AM transmitter and 1 uV receiver sensitivity. Comes complete with ceramic mike, meter jack and power cables for mobile operation. Can operate on USCG Auxiliary freq. of 143.28 MHz.
Kit HW-30, 9 lbs.....\$44.95



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NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: WA1HSN. PAM: WIYBH. V.H.F. PAM: KISXF. Net report for Jan.

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3840	Daily	1845	60	739	1032
GPN	3880	M-S	1800 Sun.	1000	32	564
VHF 2	145.98	M-S		2200	24	114
VHF 6	50.6	M-S		2100	26	223

High QNI: CN—WA1HSN, WA1HOL, WA9HHH/1, WA1HEW, WIYU, WI0BR, WA1HLP, WA1HGF and WA1FNJ. CPN—W1GVT, WIYBH 28; WA1HEW, WA1HOL, WIULU/WA1JYK 27; WA2HMX 28; WA1JMR 24, K1YGS 22. SEC W1PRT thanks all who held AREC drills during the SET. Reports are requested from all ECs. N.E. Director WIQV requests suggestions for presentation at the ARRL Annual Board Meeting May 1. Clubs are urged to strive for 100% ARRL membership. Highlights of the month: Conn. QSO Party and the SET. These can offer as much fun and competition as Field Day. Plan now to take full advantage of the Conn. QSO Party and the Simulated Emergency Test next year! New officers of Murphy's Marauders are K1JHX, pres.; WIETU, vice-pres.; K1GUD, secy.-treas. Contest and DX operators are welcome! Homebrew project engineers: WA1IQJ, six-element 2-meter Delta Loop beam; WA1GGN, keyer; WA1FNJ, transistorized 20- to 160-meter converter; WIAGJ, f.m. repeater equipment. Public service: East Coast ARS monitors 7255 kc. Contact W2CFP/WB2QCK for information. Congratulations to: WI1FW and WA1HEW for Jan. BPL the hard way! WA9HHH/1, WA1GNN and WA1HOL also Jan. RPL. Candlewood ARA for Conn. QSO Party, Murphy's Marauders for 100% ARRL membership, WI1DO for Antarctica Servicemen phone patches; K1EUV on his retirement. Traffic: (Jan.) W1EFW 685, WA1HEW 553, WA9HHH/1 434, WIYU 394, WA1HSN 391, WA1GNN 311, WA1HOL 277, WI4W 242, WA1FNJ 195, WA1IGF 180, K1SX 129, W1GVT 125, WA1GFV 115, WIARR 94, WI0BR 76, W1BDI 66, WA1JGA 49, K1TKS 42, WIADU 39, WIPT 39, WA1HLP 34, WA1JCX 33, WA1GIX 28, W1CTI 27, WA1JYU 23, WIYBH 22, WI1BNB 20, WIQV 19, WICHAR 18, W8CWE/1 18, WN1KMR 16, WA1FXS 13, K1YGS 11, WA1IQJ 8, WICUH 5, WA1DUV 5, WIYBI 5. (Dec.) WA1GFW 9.

EASTERN MASSACHUSETTS—SCM, Frank Baker, Jr., WI1ALP—Silent Keys; W1GCF, ex-ICSM. King Philip AR Soc. has the call W1BL. W1s AKY and AUG are in Florida for a stay. New officers of the Norwood ARC are K1HHN, pres.; WA1HQW, vice-pres.; WN1JZN, secy.; WA1DLU, treas. WI1ALP and fellows from each Raytheon plant have gotten out a list of calls of 435 hams. K1JGD, of National Radio Co., spoke at the South Shore Club on new sets. WIPEX has a kw. on the air. WA1KKU will be on 2 with a Twoer from Emerson College. WA3ITR/1 is working on WAC. WN1JKG is active on 15, 40, 80. WA1KOR/WA2KZV is at MIT and on 2. WA1FHU has DXCC. WA1EFR is on 40 c.w. 10 and 20. W1IAU is on 160. The Whitman ARC is building a club station. WIAKN is active on several nets. W1NJL is working hard at B.C. Law School. WA1JGO/LA will be home in Aug. WA1KNQ has a Ranger on all bands. K1OJQ lost his beams in high winds and is putting up a 68-ft. tower. WN1KLQ has an SX-111, WRL 90-A. The 6-Meter Cross Band Net had 20 sessions, QNI 82, traffic 1. Wellesley ARS had W1DTY as a speaker. WIQV is having very good luck on 15 with DX. W1CVO is on the air in Fairhaven. Keep in mind the 3rd Annual One-Land QSO Party Apr. 28 and 27, sponsored by New Eng. CHC Chap. 32. Write to K1VGM for information. K1QFC, the son of WIAX, is out of the Navy. The T9 Radio Club had a dinner meeting with the XYLs. The Capeway RC met at WIYTB's QTH and had a dinner meeting at the Alamo. WIPEX assisted the NYCL Phone Net during the SET. WA1ECN, pres., and WN1KBE gave talks at the Chelmsford ARA meeting. W1RM had a knee operation. W1DYS put modulation in the 221 frequency meter. W1ER has a TBS-50 for 160. K1EMU's beam is working well on 6. WIICFU is putting modern tubes in National receivers. WI0IW is busy flying. WA1FBH is taking a course in "Transistors." WIAYA has a "Transmatch" for each band. WI1LMU was in the 160-meter contest. K8NL is the new call of ex-W1BOD, Mass. Amateur Radio Week is June 15-21, says WA1DFL. The Central New Eng. Net reports: (Dec.) 1203 QNIs, traffic 61; (Jan.) 1194 QNIs, 56 traffic. WA1FNH has a new NCX-200. WA1s CRA and FXV has a new HA-460 on 6. The W1AAC Club had an auction. K1KIX worked England on 10 mobile. WA1FHU gave a great talk to the North Shore RC. WIWLZ gave a talk at the Massasoit ARA

on Shunt Feeding your Tower. W1GLF and son, WQ1XH/VE, have a sked each Sat. A.M. on 40. W1s EIF and MV are back on 10. W1AHSN retired and moved to Boynton Beach, Fla. K1s EUM and VAO are on the RTTY Net on 6. K9AQP/1 is active on 220 and 432 Mc. W1DWY was in the hospital. K1CLM is very active on the Intruder Watch. K7JRE/1 is fixing up his rigs. WA1JMR has a Tribander. The Quannapowit RA had W1OOP at a meeting. WA1GSV moved to Ormond Beach, Fla. W9GT/1 has a new Tri X tower. The Mass. Post Office Net, on 50,620 Mc. at 0100Z, Mon. through Sat. with WA1IBL as mgr., had 5 sessions 37 QNIs, traffic 52. The 6-Meter Cross Band Net had 18 sessions, 67 QNIs, 1 traffic. W1DAL has an SB-401. WA1HNS is on 6. KIETY is EC for Holliston. WA1DPX is a new OBS. Appointments endorsed: K1CLM, WIAX, WAIEXY, W1N1AS as OPSS; W1BHD, W1IAU as OBSS; W1BHD, K1OJQ, W1IAU as OVSS; W1s BHD, IAU, MOJ as ECs; W1s AX, PEX, NJL, K1OJQ as ORSS. Traffic: W1OJM 725, WIPEX 653, K1ESG 611, WA1EYY 510, WA1FAD 453, K1PR 238, WA1HBL 234, W1DAL 195, WIEMG 176, W1DKD 141, WA1HHK 67, W1CTP 57, W1JIL 35, WA1DEC 26, K1LCQ 21, W1NUP 21, WA1DED 20, WA1DFL 14, W1DXK 14, W1DQ 13, WA1JMR 10, WA1HNS 9, W1LE 2, W1BUF 1, K1OKE 1. (Dec.) W1DAL 42, WA1FHU 39, W1IAU 7, W1AKN 2. (Oct.) W1DAL 106.

MAINE—SCM, Herbert A. Davis, KIDYG—SEC: K1CLF. RM: W1BJG. PAM: WA1FLG. Traffic nets: Sea Gull Net meets Mon. through Sat. on 3940 kc. at 1700; Pine Tree Net meets daily on 3596 kc. c.w. at 1900. It is with deep regret that we pass on that W1FKH is a Silent Key. He was active in the nets and ragchews. He will be sadly missed by all who knew him along the way. The state was active in the SET with AI and the gang doing well. Traffic: W1BJG 504, K6CAG/1 358, WA1FCM 183.

NEW HAMPSHIRE—SCM, Donald W. Morgan, K1-QUEST—SEC: K1RSC. RM: K1BCS. PAM: K1APQ. Net reports: NHAREC 118/19; GSPN 1032/211. The changing of SCMs makes this short. Please send your reports by the 5th of the month. The SET was very successful. K1RSC is the new SEC. Give him your support. Traffic: WA1LIH 183, K1PQV 89, W1MHX 56, K1BCS 53, K1QES 10.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1LII. RM: W1BT. PAM: W1TXL, V.H.F. PAM: K1TPK. RISP report: 31 sessions, 432 QNI, 134 traffic. The Providence Radio Assn., W1OP, held its Annual Meeting recently with the following officers elected: W1EYH, pres.; WA1IQH, vice-pres.; K1HZN, secy.; WIKKE, treas. Elected to the board of directors were K1BKM, WA1DOG, George Jakobsche and elected officers. The club is back on the air with a one-half kw. on 6 meters. Bill Franklin, the club librarian, is looking for all back issues of QST. Stolen from the club was an NC-303 serial number 524-1673 and an HT-32 serial number 185981. WIPEO has a new NCX-5 transmitter and a new Clegg 22er. WAIHXX has a new Swan 500C. WN1JXD would like to make skeds on 40 meters. He has worked 19 states and 2 Canadian provinces. WAIJHW and WAIPII, two brothers, recently passed the Advanced Class Exams and are working 40 meters with an inverted "V". Their station includes a DX-60B, HQ-170 and an Apache with the SB-10 Adapter. Traffic: W1TXL 166, WIYKQ 146, WIYKQ 98, K1VYC 81, WAIEXP 68, K1QFD 59, WA1BLC 49, K1TPX 48, WA1CSO 36, K1VPK 33, WB2HPW/1 9.

VERMONT—SCM, E. Reginald Murray, K1MPN—

Net	Freq.	Time	Days	QNI	QTC	N. Mgr.
Gr. Mt.	3855	2230Z	M-S			W1VMC
Vt. Fone	3855	1430Z	Sun.	123	0	WA1EDI
VTNH	3885	2230Z	M-F			K1UZG
VTCD	3990½	1500Z	Sun.	45	15	W1AD
Carrier	3865	1400Z	M-F	319	29	W1KKD
VTSB	3909	2230Z	M-S	625	85	KL7OVP/1
		1330Z	Sun.			

We regret to learn that W1SAT, Noble Craft, and W1SEO, Joe Daly, are Silent Keys. We congratulate WA1KDJ, Jeffersonville, on passing the Conditional Class exam and new Novice WN1KSS, Waterbury. The Central Vt. area expects a whole new crop of Novices soon. 2-meter f.m. activity is growing fast and W1KOO is going to be busier. Your SCM wishes to thank all for the sincere wishes and cards received while he was confined to the hospital. Traffic: K1BQB 274, K1MPN 33, WA1GKS 17, W1MRW 1.

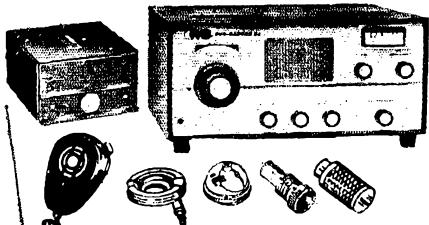
WESTERN MASSACHUSETTS—SCM, Norman P. Forest, W1STR—RM W1DVW reports attendance was

Duo-Bander 84

80-40 Meter
SSB Transceiver

HAM NET... \$159⁹⁵
WRL CHARG-A-PLAN \$8 Monthly

A Complete 80-40 Meter MOBILE PACKAGE!



Includes: 1 ea.: Duo-Bander 84, DC384 Power Supply, one Band-spanner Antenna, BDYF Mount, 350C mic, Mic. Plug, PL 259 Plug, UG176/U Reducer and 25' RG58/U coax Cable. All supply cables are included.

ORDER: ZZMA103 package.
\$288.33 (\$14 monthly)

OR...

A Complete 80-40 Meter FIXED STATION PACKAGE!

Includes 1 ea.: Duo-Bander 84, AC48 250 watt supply, 80/40 Duo-Doublent Antenna kit, 350C mic, Mic. Plug, PL259 Plug, UG-176/U Reducer and 100 ft. RG58/U coax cable.

ORDER: ZZMA104 Package.
\$213.23 (\$10 monthly)

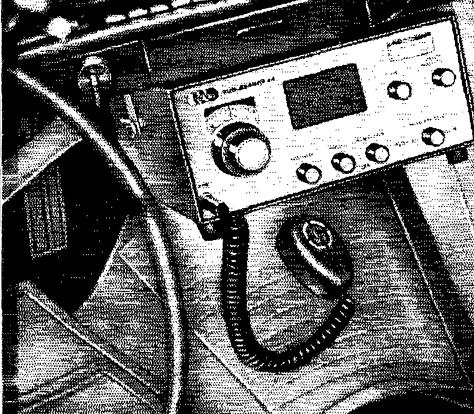
ORDER: ZZMA105 Package.
\$243.23 (Same as above with
400 watt AC supply)
(\$12 monthly)

Use this
Handy-Quick
Mail-Order
Coupon

You can buy your Duo-Bander 84
on WRL's easy payment plan.

NOW 400 WATTS the HOT one!

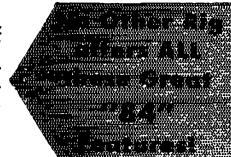
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A Real POWERHOUSE at a Real WRL Bargain Price!

A GREAT RIG...Now even Better than Before! Designed for the Amateur whose interest is 80 and 40 meter SSB. Here's Power (now 400 watts!) to make good contacts...a Selective Receiver...Stability...Compactness (only 5x11½x10"). It was a great value at the old price. Now you get 100 watts more power and can buy either of these two great packages at \$20.00 less! Buy now on our easy monthly terms!

- 400 watts PEP-SSB • Rugged—Reliable Printed Circuitry • 2-kHz Dial Calibration • Dual-Speed Vernier VFO tuning • E-Z One-Knob Tune-Up—"Just Peak Output" • Built-in Speaker • Mobile Bracket supplied • Combination "S" and Output meter • Crystal Lattice Filter.



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QST- g40

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- Duo-Bander MOBILE Package ZZMA103 @ \$288.33*
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- Your FREE 1968 HAM Catalog
- My Check or Money Order for \$_____ is attached.
- Charge it to my WRL charge acct. #_____

*Sorry—these reduced prices are without trade. Write us for trade-prices

Name _____

Address _____

City _____ State _____ Zip _____

down slightly but traffic was significantly up. W1BVR and K1WZY, in the Berkshires, W1IHI and W1HRC, Worcester and W1ZPB and W1DVW, central, manned the pumps quite regularly. There is a need to generate some activity in the Leominster-Kitchburg area. Coverage of that area would complete coverage of the whole section. Western Mass. was represented on all 1-hour sessions of IRN during the 1989 SET. Stations in the order of activity for Jan. were W1DVW 28, W1BVR 26, K1WZY 25, W1ZPB 23, K1IJV 18, W1STR 15, W1IHI 12, W1HRC 12, WIKK 11, with others calling in less than 10 times. HCRAI reports the Mon. night V.H.F. Net (145.35 Mc.) and the Wed. night 10-Meter Net (28.990 Mc.) are having good attendance. WIKK is feeding his 20-meter beam with open wire. W1NY helped out with the SET and handled messages from the Great Lakes to local Navy families. The HCRAI group scored approximately 65,000 points in the Jan. V.H.F. Contest. W1DXW has a new fold-over tower. WAIFKE recently attended a convention of the Missionary Radio Assn. and helped with antenna erection. Traffic: W1ZPB 202, W1DVW 104, W1BVR 96, W1IHI 80, K1WZY 68, W1EOB 59, W1STR 56, K1IJV 38, WAIBTU 28, WIIC 25, W1HRC 13.

NORTHWESTERN DIVISION

ALASKA—SCM, Albert F. Weber, KL7AEQ—KL7-BJD/KL7CAH, Mary and Sandy, have just completed 14 years as net control for the Sourdough Net. KL7FON reports that too many Novice classes cut his operating time to practically nil. The new classes sponsored by the NARC, both for Novice and General Class, started early in Feb. KL7FKO reports that he ran 112 phone patches from the bush to Anchorage in Jan. Of these, three were urgent medical and two were funeral arrangements. Since he works on a very time-consuming job, we wonder how he did it. For the first-time in its history, the Arctic Club of Fairbanks called off a meeting because of cold wx. KL7EKZ reports that they had snow and clear wx for six weeks, and if it didn't rain would run out of water. He is in Ketchikan, isn't he? Traffic: KL7CAH 219, KL7FKO 49, KL7FLS 16, KL7EKZ 10.

IDAHO—SCM, Donald A. Crisp, W7ZNN—SEC: K7-THX. The FARM Net convenes week days at 0200 GMT on 3935 kc; the Idaho C.D. Net week days on 3991 kc. at 1515 GMT. K7UEA reports that a repeater station is being installed on Mt. Harrison using t.m. on 146.34 in and 146.940 Mc. out. SEC: K7THX reports very good participation in the SET. The FARM Net and the C.D. Net held special sessions during the SET to handle the extra traffic and an EC net was activated on 40 meters during the day. W7IY lost his antennas in wind storm. K7KRO is in the hospital. WATETO and WATFFZ built fine-sounding keyers. W7FIS moved to Hayden Lake from Missoula, Mont. WATCOD is doing well after a back operation. K7YPC passed away. W7AKR and WN7NPY are new hams in Fremont County. WA7BDD had the highest score in the 7th District YL Anniversary Party C.W. Contest. FARM Net report: 24 sessions, 963 check-ins, 540 traffic handled. Traffic: WA7ETO 202, WA7BDD 198, W7GHT 142, W7ZNN 129, WA7GJE 14, W7AXL 10, K7CSL 7, W7FIS 5.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. PAM: W5ROE. RAI: WATDMA.

Section Nets **Freq.** **Time** **Days** **QNI** **QTC** **Mar.**
 Montana Traffic Net 3910 kc. 0100 M-F 731 152 W7ROE
 Montana Post Office 3950 kc. 0300 D 448 224 K7PWY
 Montana Section Net 3950 kc. 1700 Sun. W7TYN

Endorsements: W7LBK as OO and ORS. The Billings Club has formed the Billings Repeater Assn. to help coordinate the v.h.f. repeater interests in the area. The Yellowstone Club has started a code and theory class with WA7FCG, WA7KKN and WN7KID in charge. It is with deep regret we report the Silent Keys of K7PWY and W7RL. K7EGJ has reactivated the Great Falls AREC Net on 3910 kc. Sun. W7IWW, in Billings, has his new antenna up at over 100 feet on the higher bands and reports it is working out very well. We still are having problems with a liaison station in to RN7. If any of our readers are interested in helping out with getting inbound traffic into the state, please write or contact your SCM and we have a job for you. Much of the traffic still is being mailed into the state. Traffic: K7-PWY 159, WA7HDD 68, W7LBK 27, W7FIS 2.

OREGON—SCM, Dale T. Justice, K7WWR/WA7KTV —R.M.: W7ZFH. PAM: K7RQZ. Net reports: W7ZFH reports for the OSN for Jan., sessions 24, check-ins 132, traffic 77. W7AHW reports for the AREC Net, sessions 31, check-ins 752, traffic 33, contacts 95. QSTs 1, maximum number of counties 19. K7IFG reports for the BSN, sessions 58, check-ins 1454, traffic 234, contacts 360.

W7VIF reports for the OEN, sessions 62, traffic 47, contacts 495, check-ins 4391. Oregon's SET turned into the real thing in some areas as the biggest snowstorm in some time hit the state. W7WHY complained that Murphy struck him during the SET as power went off twice and the antenna went down once. K7PHP reported the SET proceeded as planned in Portland despite heavy snow. W7DEM reported the same for Josephine County. W7MLJ reported little trouble in Lake County. WA7JAU provided communications during the storm in and out of Coquille. WA7KJV became General Class after 4 months as a Novice. W7GKB (ex-W6RTA) is on from Eugene after a long absence. WA7HAW passed the Advanced Class exam. W7NLKW is a new Novice in Eugene. WA7JMD sends in a nice report and has an SE-101 being readied for service. Traffic: K7RQZ 844, WATFIS 205, W7WHY 108, W7ZFH 65, K7WVH 63, WA7KIU 62, K7ADR 54, W7ZB 53, W7HVK 52, K7OUF 49, W7PJ 46, K7GGQ 43, K7QLZ 35, WA7JAU 30, WA7BYP 24, W7KTC 24, W7DEM 23, W7AHW 21, W7BNS 20, W7AHV 19, K7KPT 15, W7AEQE 14, W7-ICD 12, W7MLJ 11, W7VIF 11, K7TWD 10, W7GER 8, WA7GJZ 8, WA7ADW 6, W7EXH 6, W7FSU 6, K7HLL 6, W7LPF 6, W7AIXX 6, K7RFO 6, K7TWZ 6, K7LUC 5, K7CUO 4, K7DMH 4, W7EO 4, W7GMP 4, K7LCQ 4, K7WNX 4, K7VMU 3.

WASHINGTON—SCM, William R. Watson, W7BQ—SEC: W7UWT. R.M.: K7CTP.

AREC	3930 kc. Sun.	1800Z NCS SEC	W7UWT	Asst. K7WTG
WSN	3590 kc. Daily	0245Z QNI	507 QTC	493 Sess. 31
NTN	3970 kc. Daily	1930Z QNI	1130 QTC	861 Sess. 31
WAHTS	3970 kc. Daily	0200Z QNI	1167 QTC	199 Sess. 30
NSN	3700 kc. Daily	0300Z QNI	293 QTC	73 Sess. 31

The 1989 SET reports appears to show an increase over 1988. The State C.D. participated for the first time on a limited basis in cooperation with ARRL. A fine performance was given by all who participated. A return to the \$5.00 fee for license plates looks like a reality with the Senate having passed the bill through the Highways Committee. Our license plate committee members are W7BQ, W7GWJ, W7HJM, W7AZL and K7CLL. W7BUN retires from his PAM job with many other activities taking up his time. Septuagenarian K7CTP (RM) came through with an Extra Class license. W7ZIW took time off the nets to add a boy to the family. The N.W. Tech. Net will celebrate its 4th anniversary in early April with more activity than ever. The net meets Sun. at 3 P.M. PST on 3970 kc. K7WTG is coordinating the forming of a statewide v.h.f. net, using repeaters. New appointment: K7OXL as ORS. OVS W7SAB reports SSTV between Alaska, Idaho and California operating on 3845 nightly. K7YZH hosted two JA visitors with plans for SSTV into JA-Land in the near future. WSN Mgr W7PI is putting out an FB bulletin. The Apple City Radio Club put on Amateur Radio Promotion, with radiograms, booths, brochures and newspaper coverage. W7FQE reports aurora contact with W9-Land on 10 meters for 20 minutes. W7UU handled phone patches for the USS *Constellation*. W7GYH is relocating in Richland. K7RSM returned from the Pueblo after a long absence. W7BTB is vacationing from the shack and K7L traffic liaison. We regret the passing of K7YRZ, of Seattle. OVS K7MWC sends in another fine report from the Seattle v.h.f. gang. The Dial Twisters of Spokane is planning an assist to the National Scout Jamboree in Idaho, with RTTY. W7BQ was renominated as SCM. Pac N.W. Bell filed new tariffs with Washington State. They coincide with those filed with FCC. Traffic: W7B-A 3298, WATEKR 1044, W7BZY 993, W7DZX 694, W7PI 360, W7KZ 337, K7UDG 235, W7IEU 207, WATEQD 195, W7BQ 189, W7UWT 155, W7AXT 152, K7CTP 144, W7PUL 127, W7IYZ 116, WAEYN 113, W7ACQ 107, W7GYF 97, W7JEY 79, W7MCW 78, W7RXH 84, K7JKO 62, W7GVC 56, W7ADZL 55, W7BUN 46, W7ZIW 44, W7FQE 42, W7BDB 39, W7GXH 38, K7LRD 37, K7NSG 36, W7BTB 35, K7EFB 35, W7WJW 28, W7GVB 24, W7JEB 22, W7APS 21, W7OEB 21, K7OXL 21, K7YFJ 21, K7MGA 19, W7HSJ 18, K7SUX 16, K7THG 15, W7WPR 10, W7AB 9, W7UU 8, W7HZ 7, K7MWC 6.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—Our new Asst. SCM, Paul Parker, WB6DH, 2236 Whyte Park Ave., Walnut Creek, will now handle monthly reports, certificates and other jazz like that. Please address all your correspondence to me. New appointees are W6JTI as OO IV; WB6YCA as OPS; W6IPW, W6UV, WB6-YBO, WA6EGL and W6OXN as ORSs. New hams are W6JTI, ex-KARAD; W6NQDE; W6PZC; W6LBT; W6NQCH; W6PNPO; W6PNPB; W6PMU; W6PM-6; WA6PZA; W8BPY, ex-K6TUP. New officers of the SARO are W6IDK, pres.; W6CH, vice-pres.; K6AWM, secy.; W6CMZ, treas. W6UZX is back from a 3-months

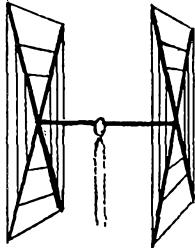
GOTHAM ANTENNAS ARE MUCH BETTER OF COURSE, YOU PAY MUCH LESS

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 16 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3—

CUBICAL QUAD ANTENNAS—these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional!) ALL METAL (except the insulators)—absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc., 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' × 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter. X Frameworks: Two 12' × 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices—note that they are much lower than even the bamboo-type:

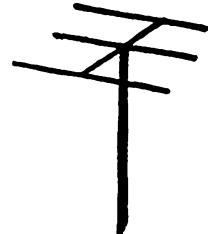
10-15-20 CUBICAL QUAD	\$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked VO4CT, 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; 7/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 E1 20	\$19	4 E1 10	\$18
3 E1 20	25*	7 E1 10	32*
4 E1 20	32*	4 E1 6	18
2 E1 15	15	8 E1 6	28*
3 E1 15	19	12 E1 2	25*
4 E1 15	25*		*20' boom
5 E1 15	28*		

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, WIWOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWF, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LC, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	\$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	\$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	\$18.95

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

tour of Europe, where he was on the air from PAO-Land and also from 41ITU. K6PMG says that there is no heater in his shack so he can not work his wireless. W6PYR has been busy installing a new mobile installation. W6CBF was the only one in the section in the CD Party this year. WB6YTX came up with 56,182 points in the SS. W6OJW is knocking on the DXCC door. K6PMG has been down with the flu. W6LGW is back home under tight security. He can receive phone calls and you might even hear him on the wireless if you're lucky. The CU brothers, W6CU, W3CU and W2CU, now offer a triple CU QSL. Work them all on 15 and get one card.

NCN	3630 kc.	0300Z	Daily
NCN2	3630 kc.	0430Z	Daily
Social Security	7265 kc.	1830Z	Mon.-Sat.
Burbon Net	3868.5 kc.	0130Z	Mon.-Fri.
Breakfast Club	3868.5 kc.	1730Z	Sunday
Fantastic	144.2-147.85Mc.	0400Z	Daily
Saturday	3791 kc.	1630Z	Saturday

Any club wishing the section officers to attend one of its club meetings is invited to contact either K6LRN or WB6DHH, who will try to set up a date with you. Traffic: (Jan.) W6IPW 733, (Dec.) W6LPW 666, W6UZX 77, WB6DHH 8, K6PMG 6, (Nov.) K6PMG 16, WB6DHH 11.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: KH-6GHZ. PAM: W4UAF/KH6. RM: KH6AD, V.H.F. PAM: KH6EEM. QSL Mgr: KH6DQ. RACES Nets (40, 10, 6 and 2 meters) (Coordinate with KH6AIN).:

Net	Freq. (Mc.)	Time (GMT)	Days
League Appointees	7.290	0700Z	Wed.
Friendly Net	7.290	2030Z	M-F
Pacific Interisland Net	14.320	0830Z	M-W-F
Boy Scout Ham Radio Net	21.360	1800Z	Sat.
S.E. Asia Net	14.320	1200Z	All
Marianas Islands Net	3.850	0830Z	2, 3, 4 Tue.
Gecko Net	14.315	0930Z	Tue. & Thurs.
Pacific DX Net	14.240	0700Z	Fri.
Marine Corps Net	21.380	1900Z	All

Two disasters hit recently and the fellows were prepared. The Keapuka Flood and the *USS Enterprise* disaster rallied many and the emergency measures learned in the recent SET came in handy. Alvin Rey, W6UK, and the King Family were here visiting and preparing for a forthcoming TV show filmed and taped aboard the *SS Lurline*. Alvin and his XYL had a nice visit with their son stationed here. KH6GQW and KR6NR recently passed the Advanced Class exam. WB6NMT was here on R & R from XV5-Land. KH6GKV reports his Model 321 quad is up and his 3-1000Z linear is almost completed. The Marianas ARC's new officers are KG6ARH, pres.; KG6AQY, vice-pres.; KG6AQQ, secy.-treas. W6JTD recently stopped by KG6GQA's QTH for an eyeball. KG6AQI reports he's got phased verticals on 80/40 meters and is set for 5BDXCC. Don't forget the Pacific Division Convention at the El Dorado Hotel, Sacramento, June 13-15. Send your reports to me—see page 6 of *QST*. Traffic: (Jan.) KH6BZF 43, W4UAF/KH6 8, KG6AQI 5, (Dec.) KH6GKV 12.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7ABEU. Hats off to the SNARC for an outstanding SAROC. A Nevada QSO Party is being planned for late fall. Watch for definite date and frequencies. Nevada QCWA Chapter's temporary officers: W7CSB, chairman; W7CMV, secy. K7ICW is busy with v.h.f./u.h.f. construction projects. W7CSB and W7DSF assisted in locating parts of K7GFN's beam that blew down in a 100-knot windstorm. K7NLLX is sporting a T-38 beam and Tri-Ex tower from the SAROC and is looking for some DX. K7RKH and K7ZOK have been running tests on 1296 Mc. Plan now for the Sierra Hamfest, Bowers Mansion, in Aug. It will be a picnic for you and the children. Monthly club meetings: SNARS, 1st Mon., NARA, 2nd Tue., LVRAC, 3rd Tue. and SNARC, last Mon. Vacationing in the Nevada, Reno and Las Vegas area, f.m. repeaters. 146.34 in, 146.94 out, plus WCARS. 7255, for Nevada travel information. W7ZT has a BTI linear.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, W6ATQJ. RM: W6LNZ. Don't forget to make your reservation for the Pacific Division Convention to be held at the Hotel El Dorado June 13 to 15. For information contact any of the following chairmen: W6DOR, WA6JDT, W6TEE, WA6CXB, K6QOO, WB6YCL, W8VDA/6, W6EDU, WB6TY, K6VT or K6DR. The XYL of W8VDA will be handling the YL program. Your SCM is now beginning a third term in office. W6NKR worked some 80-meter DX recently such as G3FXB and ISIIV.

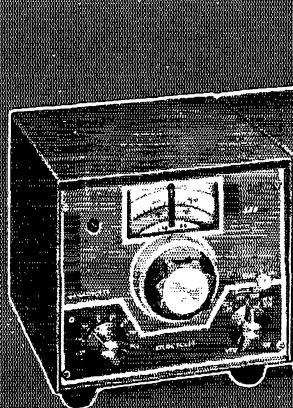
K6IKV reports that the SCEN averaged about 17 QNI per session during 1968. W6VUZ was almost flooded out for the CD Party because of the flood waters of the Sacramento River. The heavy rains put WA6JDJ temporarily off the air because of a wet floor in the ham shack. WB6VSC is about ready to go on RTTY. WB6WJO is now a regular NCS for the Mission Trail Net (3928 kc. at 0300Z). WA6CXB reports that local rag-chewing has disappeared from 145 Mc. With the Novices gone and with some of the Techs upgraded because of incentive licensing; the voice of the 2er is no longer heard in the land. WA6JDJ was in the V.H.F. SS Contest on 2 meters—first time in two years and with the h.i. tri-bander beam. The GEARS of Chico sports a roster of 57 members. Traffic: (Jan.) W8VDA/6 229, WB6YTX 48, WB6WJO 22, WB6EAG 10, W6VUZ 2. (Dec.) WB6HAW 44, K6IKV 15.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6WLW. The January SET found things a bit too realistic with the Red Cross Western Regional Hq. in San Francisco calling off any SET participation to handle emergency traffic. W6BIP, W6JWF and WA6DJJ were on duty and handled considerable traffic. The SEC reported much activity in the SET in Sonoma and Humboldt Counties. The Valley of the Moon Radio Club has been activated in the Sonoma area and meets the 1st Fri. of the month in the Community Center. K6SRM is the one to get in touch with concerning the club. WA4KCF/6 is conducting theory classes aimed at upgrading license class in the Marin Radio Club. Heard in the Jan. CD Party were W6BIP, W6HSA, WA6UV and W6EQ. WB6PSP, who attends Cal. Tech., has his Advanced and Commercial First Licenses. WB6IMO has produced another edition of the Marin Amateur Radio Directory listing close to 300 license holders in Marin County. W6PZE, the Petaluma Club station, handled 27 formal messages during the SET in Jan. W6PTS, WA6AUD and W6BUJO attended the Fresno DX meeting in Jan. W6CXU has been operating XEØ-mobile and has finally bought a hacienda near Guadalajara. W6BVW reports two flood stages on the Eel River in Jan. but no major flooding. W6BUY has returned to Marin and has a waterfront QTH on the Tiburon Peninsula. New officers of the Humboldt County Radio Group are WB6DGJ, pres.; WB6ZOM, vice-pres.; WB6RY, secy.-treas. WA6AUD was reelected secy.-treas. of the Northern California DX Club. Traffic: (Jan.) WA6BYZ 516, W6KVQ 351, W6WLW 284, WA6AUD 173, W6BVW 71, K6TJW 52, W6BAK 51, W6PZE 37, K6TZN 12, WB6IMO 8, W6CYO 2. (Dec.) W6KVQ 626, W6WLW 132, W6FAX 84.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W-JPU—The Joint Northern Calif. and Southern Calif. DX Convention was held in Fresno Jan. 25, 1969. W6KUT and W6HYG, former Fresnans, were present along with San Joaquin Valley hams K6NM, W6BVM, W6UZ, W6VO, K6JR, W6AXWP, W6KTW, W6QQW and W6JP. WB6RSS has 49 states confirmed and needs Vermont. He made 26,056 points in the SS Contest. W6IPC is active in Navy MARS. The Murray School Radio Club in China Lake is planning a seminar for May 3 from 8 a.m. to 3:30 p.m. All are invited. Would like to remind you that the Fresno Radio Amateur Radio Club is having its 26th Annual Hamfest in Fresno May 3-4-5, 1969. W6PUS participated in the SET. W6DKI, K6RBB, W6HCH and K6CPQ operated in San Joaquin County during the SET. W6COB, WA6ZHT and K6RBB operated on 2 meters during the SET. The Tuolumne County Radio Club had W6WGGR and WB6RZL participating. W6YPS reports that activity on 6 meters is slow. W6PRO and WN6AFI are new hams in Tuolumne County. WB6ZBX has an HT-32. W6NCG has moved to San Jose. W6OHT has a Collins S-Line. W6OZY, W6EYC and W6JPS are active on 6 meters. W6JUK is running a kw. on 6. Traffic: (Jan.) WB6HVA 281, WA6SCE 193, WB6WGR 156, K6KOL 97. (Dec.) W6IPC 451, WB6RSS 4.

SANTA CLARA VALLEY—SCM, Edward T. Turner, W6NVO—Sec: W6VZE. RM: W6LFA. This probably will be the last SCM report from W6NVO but because of confusion over who is SCM/SCV many reports seem to be missing at this station. They will be included next month. W6ASH continues limited activity on the CD, MARS and SPEC8 Nets. OO W6AUC keeps four skeds on Sun. and one daily. W6BP7 is working DX on 40 and traffic on 80. K6DYX, on the Slow-Scan TV Net with up to 8 stations checking in, sent and received pictures from Alaska, Idaho, Washington and California. The TV Net meets at 9 p.m. EST on 3845 kc. W6AFAC, QRL on traffic, sent a report via 80 meters. W6LFA handles much traffic by checking into four nets and working in the SET. W6MMG mostly ragchews on 10 meters. W6NXK is back on traffic after being QRT two years. W6RSY took part in the SET both days. WB6YAM, the new EC for Monterey and Seaside, took

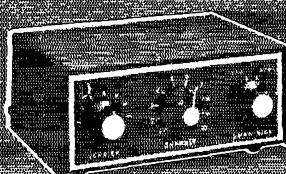
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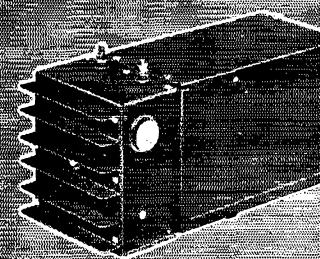
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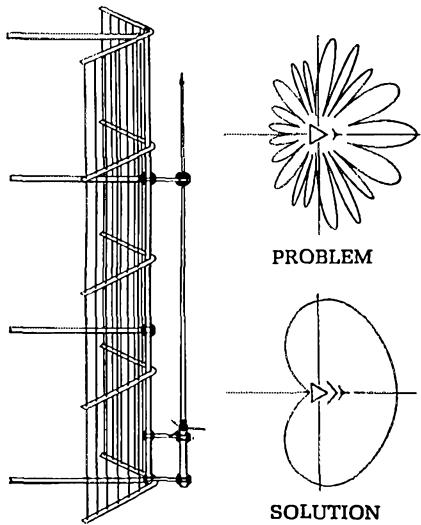
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part in the SET which, in his and the Salinas area, turned out to be a real emergency. His report to W6VZE is in the SEC report. W6YBV, on three traffic nets, reports 80 meters now have settled down and conditions are better. WB6ZSE likes traffic and ragchewing on c.w. and now is taking another electronics course. The WCA-ARS Net, on 7255, was very active and helpful in the SET, also the WCPS Net on 3952. W6VZT has been nominated as SCM. Traffic: W6RSY 738, WA6LFA 434, W6YBV 390, K6DYX 367, WB6NXK 170, WB6ZSE 50, W6AUC 23, WB6YAM 18, W6ASH 16, WA6FAC 12, W6BPT 10.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: James O. Pullman, W4VTR. SEC: WA4LWE, RM: W4IRE, PAM: W4AJT, V.H.F. PAM: W4HJZ, K4VLI, recently retired from the U.S. Weather Bureau, has put up a new beam and is now active on 20 meters. WB4BGL enjoyed c.w. netting and the SET during his "semester break," W4EVN, W4WJI and W4-JZA were active in the Robeson County AREC 2-Meter Net in the SET. Buncombe County ARC was active on 10-, 6- and 2-meter operation in the SET. W4IRE has accepted appointment as RM. WB4DPT says, "I report a small traffic total of 2, but a big son who weighed 12 pounds 2 ounces (born Jan. 30) for Jan." WA4KWC, newly-appointed EC for Buncombe County, is in the process of getting his ARPSC program underway. EC K4SNF and the Rowan County ARS had a successful SET exercise on 2 meters.

Net	freq.	Time	Days	QTC	Mgr.
THEN	3932 kc.	0030Z	Daily	172	W4ZC
NCN(E)	3573 kc.	2330Z	Daily	143	W4IRE
(Late Dec.)					
NCN(E)	3573 kc.	2330Z	Daily	170	W4IRE
NCN(L)	3573 kc.	0300Z	Daily	42	WA4CFN

Traffic: (Jan.) W4EVN 346, W4IRE 267, K4VBG 133, WB4BGL 99, W4FDV 95, WA4NV 70, WA4KWC 66, W4VTR 60, K4EO 48, WA4GMC 47, WA4UQC 36, K4-TTN 14, WA4ZLK 6, WB4HHI 5, WB4DPT 2. (Dec.) W4IRE 237, WB4DPT 4. (Nov.) W4IRE 223.

SOUTH CAROLINA—SCM, Charles N. Wright, W4-PED—SEC: WA4ECJ. RM: K6QPH/4. PAM: WB4BZA.

SCPNN	3930 kc.	0830	and	1530	EST Sun., 12 Noon Daily
SCN	3795 kc.	0000Z	and	0300Z	Daily Jan. Ttc: 29
SCSSBN	3915 kc.	0000Z			Daily Jan. Ttc: 73

WB4KPN is a new General in Spartanburg. W4NTO is working on a new frequency meter to keep up with the competition? WB4AMR has a new mobile SR-150. WA4-MWC is building an HW-100. 3875 is the local ragchew frequency for the Anderson gang from 0030Z to 0230Z. WA4OTC, W4ZHI, WA4MTO and WA4YAU are new Navy MARS members. KIIMP described his DXpeditions to the N. Augusta Club. Activity has been light and reports even lighter. Please send in your club news if you want to see it here! The Division League Officials meeting will be held in Greensboro, N.C., Apr. 12 and 13. Please let me know if you can attend. New officers of the Anderson Radio Club are WA4YAV, pres.; WB4-AMR, vice-pres.; WA4SK, secy.-treas.; WB4AQF, act. chmn. Traffic: (Jan.) K6QPH/4 152, W4PED 70, W4NTO 18, W4FVV 7, WA4HFA 4. (Dec.) W4FVV 14, WA4HFA 6.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. RMs: K4MLC, WA4EUL. PAM: W4OKN. As a result of the SET exercises this year, the VSBN manager reported a good traffic workout for the members while VN manager reported lack of sufficient stations to cover all functions. The Roanoke Division meetings will be held Apr. 12 and 13 in Greensboro, N.C. Va. Tech. Club station K4KDJ made the BPL on originates from students. Norfolk EC WA4BUE has been named RACES Officer for the city and conducted SET exercises from the Civil Defense Center this year. After many years of voiceless traffic-handling, W4NLC is now on sideband. WB4FDT has details on a Virginia PON which meets SUN. WA4HQW is back from a tour in the Navy and has resumed his traffic activity. Daylight Saving Time will be with us in several weeks. Don't forget the usual adjustment in net GMT meeting times. Traffic: (Jan.) W4QQ 455, K4KNP 356, WB4CVY 329, K4KDJ 253, WA4EUL 226, WB4JEZ 223, WB4FDT 215, W4TE 187, WB4GTS 185, K4JM 178, W4RHA 159, WB4-DRB 157, K4LMB 124, W4SHJ 107, K4FSS 105, W4NLC 103, W4GEQ 91, WA4JJF 90, WA4OHZ 85, WB4JFI 84, WB4PGH 81, K4MLC 74, WB4DOY 70, W4OKN 65, WA4HQW 63, W4YZC 53, WA4SJT 46, WB4GDO 39, W4THV 35, WB4HRA 31, K4VCY 31, W4HE 23, W4KX.

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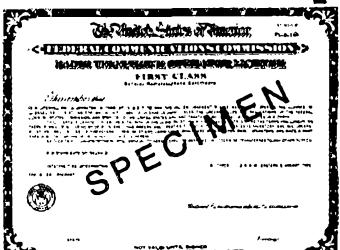
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20, K4GR 19, W4WG 18, WA4WQG 17, W4IA 10, W4JUJ 10, W4OP 9, W4KFC 7, W4MK 6, K4PSD 5, W4ZM 4, WA4YRH 2, (Dec.) W4NLC 345, WB4HRA 30, K4MLC 30, WB4AAV 16, K4LMB 9, WA4HQW 3.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8EV. RM: K8MYU, K8TPF. PAMs: K8CHW, W8IYD. Net Mgrs.: WA8YOF and K8MYU. I regret to report the passing of two active West Va. amateurs, W8ZHH, Wheeling, and WA8BVB, Sutton. New Mongolia Wireless Assn. officers are W8GUL, pres.; WA8YCC, vice-pres.; WA8YCD, secy.-treas. WA8HSZ and W8DUV are co-chairmen of the 69 Roanoke Division Convention, Huntington, Oct. 11 and 12. The March of Dimes Telethon, Huntington, included W8VA/8, WA8HSZ, WA8HVM, K8MHR, K8CAY, W8EII, WA8ODA, WA8KLE, WA8NJB, K8UHC, WA8HPA, WA8KCJ. WA8NDY reports excellent publicity from the local TV station on the ARC training classes. W8JM is on the planning committee for the LO meeting, Greensboro, Apr. 12 and 13. The Northern Panhandle ARC has W. Va. Amateur Radio Directories available. Contact W8IYD. W8HZA was active in OOTC and 160-Meter QSO parties. WVN C.W. Net reports 31 sessions, 213 stations, 161 messages; Phone Net, 33 sessions, 893 stations passing 248 messages. The State Radio Council and Convention groups held their Mar. meeting in Parkersburg. K8MYU, convention chairman reports, "Watch 3890 on Sun., 8 to 9 A.M. for news of the Convention, Jackson Mill, July 5 and 6." Traffic: WA8RQB 180, W8AHZ 162, WA8WIX 138, K8MYU 106, WB8BBG 102, W8HZA 61, WA8NDY 58, W8EV 45, WA8YOF 35, WA8WCK 33, WA8JM 30, WA8ZZI 23, WA8YSB 22, K8MYV 13, WA8ZNH 11, W8CKX 9, W8TCF 8, WA8LFW 7, WA8LAL 5, WA8LFZ 5, W8UDH 4, K8BOT 3, W8WEJ 3, W8AEN 2, WA8AGC 2, W8GUL 2, WA8IMH 2, W8VOI 2, K8WIJ 2, W8WVM 2, K8ZDY 2, W8ZQF 1, W8AY 1, K8CFT 1, W8DYB 1, W8FCF 1, W8IMX 1, W8QEC 1, K8QYG 1, WA8TOL 1, K8ZDV 1, WA8ZRV 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Kenneth D. Mills, W5WZK—SEC: W5PNY. K5MAT earned a BPL certificate in Jan. Congrats, Bill. WA5UJY was almost there. Several groups report AREC activities during the SET. W5WZK has resigned and W5NUI is Acting SCM until an election can be held. Give him the same fine support you gave me. Particular thanks goes to W5DMG and WA5FJK for their work on the two traffic nets, and also to W5PNY who has made AREC workable once again. Traffic: K5MAT 534, WA5UJY 122, W5TWA 31, W5DMG 25, WA7FBV/5 23, W5NUI 20, W5NON 14, WA4JNC 13, WA5MIY 8.

UTAH—SCM, Thomas H. Miller, W7QWH—SEC: W7WKF. RM: W7OCX. ORSs: W7OCX, K7HLR, K7RAJ, W7EM. OVS: W7RQT, WA7IAW. OO: K7ZJS, WA7KPN. EC: W7GPN. Nets:

BUN	1930 GMT Daily	7272 kc.
UARM	1530 GMT Sat.-Sun.	3987.5 kc.

Reports indicate that the SET was somewhat successful from the standpoint of the traffic nets but a total failure from the AREC/RACES standpoint. Let's try to do better next year. New officers of the Ogden ARC are WA7GTL, pres.; WA7LSJ, vice-pres.; WA7DRL, secy.-treas.; W7ZJI and WA7IAW, directors. The Ogden Club has issued a challenge to all comers for the annual Field Day Contest. Remember! The Rocky Mountain Division ARRL Convention, Salt Lake City, Utah, July 4, 5, 6. Traffic: K7HLR 278, WA7ICG 277, W7OCX 129, WA7BVE 61, K7SOT 58, W7JQ 40.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC K7NQX. RM: K7KSA. PAMs: W7TZK, K7SLM. OBSs: K7SLM, K7NQX, W7SDA, K7TAQ, WA7THA. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 0130 GMT on 3610; Jackalope, Mon. through Sat. at 1215 on 7260; W7 Net on Mon. through Sat. at 0630 on 3920. New appointment: WA7THA as OBS on c.w. Don't forget that when Daylight Saving Time gets here, all nets except the YO are on local time. WA7LOF was married in Casper in Jan. and is now in the service stationed in Virginia. WA7BSS will be taking a 15-nation tour of Europe this summer. So, we may hear John from some of those DX stations. The 1969 SET was a success here in the state with a lot of interest and more activity than we have had for some time. Another reminder of the 1969 Hamfest July 5-6 at Story. It should be a good one this year. Traffic: K7NQX 427, WA7CLF 384, K7ITH 285, K7KSA 103, W7TZK 101, K7TAQ 80, W7SDA 54, K7SLM 49, WA7GOV 46, WA7FKF 38, K7VWA 38, W7NKR 32, WA7GYQ 24, WA7DNZ 22, K7OAF 16, K7OVD 11, K7AHO 9, W7AEC 6, WA7BVF 4.

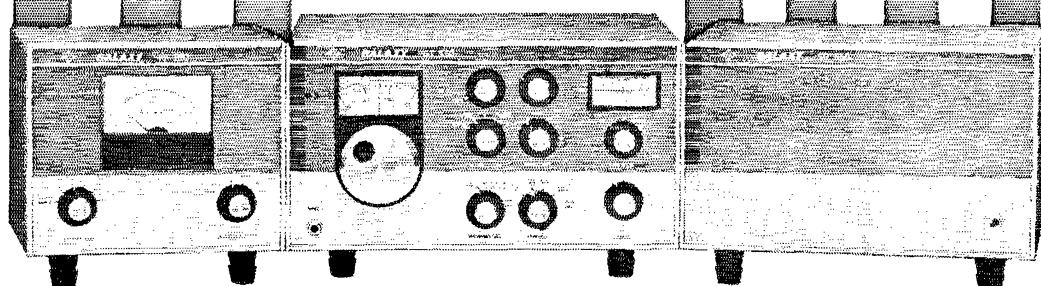
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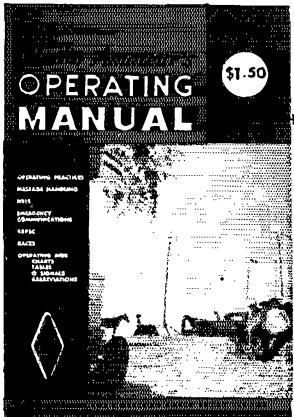
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SOUTHEASTERN DIVISION

ALABAMA—SCM, Donald W. Bonner, W4WLG—SEC: K4KJD. RM: K4BEC. PAM: WA4EBC. The Huntsville ARC has purchased 20 Novice crystals for 3725 kc, to support the slow-speed C.W. Training Net. W1UED visited the Montgomery ARC and the Birmingham ARC recently. The HARC General Class theory course has begun and is very successfully led by W4HFU. Many BPL certificates have been issued as the result of the SET. Your Field Day plans should be on the agenda now and maintenance on the old equipment also is order. The ARRL convention just held was very effective and educational and lots of action is being taken to maintain good hamming conditions. The Birmingham Hamfest is scheduled for May 4 and the North Alabama Hamfest for Aug. 17. Plan to attend for some good eyeball QSOs. The license for the 2-meter f.m. repeater in Huntsville has been received. See K4IQU or W4WGI for details. I would like to hear from all the clubs more often and also from hams. Traffic: W4FVY 207, K4BSK 185, K4KJD 142, WA4-VEK 139, WB4EKJ 138, W4MKU 114, W4WLG 104, WB4KDN 103, WA4ROP 102, K4WHEW 89, WA4AVM 76, WA4VUG 66, K4AOZ 60, WA4FYO 53, WA4DYD 52, WA4OCM 40, W4SVM 28, WA4AZC 25, WN4KSL 14, WB4DYY 12, K4UMD 10, WB4BLX 8, WB4IEY 8, WA4DBQ 6, W4DGH 6, WN4JMH 5, WA4NWI 5, W4WGI 5.

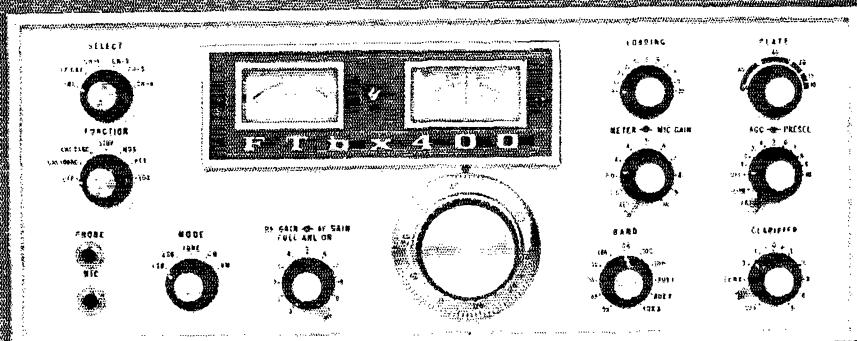
CANAL ZONE—SCM, Russell E. Oberholzer, KZ5-OB—The CARC recently held elections for new officers. Results are as follows: KZ5WR, pres.; KZ5LN, vice-pres.; KZ5SG, act. mgr.; KZ5FN, secy.-treas. KZ5AD lost his tower and antenna when a crank-up cable parted. The CARC's code classes are coming along real well with several "potential" hams.

EASTERN FLORIDA—SCM, W. G. Blasingame, WA4NEV—SEC: W4IYT. Asst. SEC: W4FP. RMs C.W.: W4ILE, K4EHY. RM RTTY: W4RWM. PAM 75M: W4OGX. PAM 40M: W4SDR, V.H.F. PAM: WA4BMC. Congratulations are in order to all those from Eastern Florida who participated in the SET. Everyone did a tremendous job. WB4FLW reports that he made 19,000 points in his first try at the C.W. CD Party. I think that's real good. Seems like we don't get too much participation from Eastern Florida. Ted also is helping a couple of his friends to get their Novice tickets. W7OX is operating portable from Maitland, Fla., and renewing many old friendships. W4LK is another newcomer to our area. Chick reports that his XYL is keeping him too busy getting the house straightened out to be able to do much hamming. I had a nice eyeball QSO with W4CKB at the Miami Hamboree. Bev tells me that he has worked and confirmed 34 states on 2 meters from Lake Placid, Fla. W4MVB was back home recently. Jess seems to be on the go all of the time. Sure is nice that he has a mobile rig so that we can keep up with his movements. News seems to be short for this time, but we hope to have more next month. Traffic: (Jan.) WA4CKB 692, WB4AIDH 480, K4EHY 471, W4ILE 458, WA4NEV 417, WB4EPD 349, W4FP 333, WA4IJH 277, WA4FGH 209, WB4FLW 168, WB4IER 158, W4EHW 134, K4LEC 134, WA4HED 130, WB4JW 130, W4OGX 128, W8BZY/4 126, WB4ADL 115, WA4TWD 112, WA4HDDH 109, W4LSR 103, W4IYT 100, W4KRC 91, W4PKK 90, K4DAX 82, W4SDR 66, WA4-TXV 65, WA4WZZ 60, K4EBE 54, W4SMK 49, K4UIZ 48, W4AKB 46, W4YPX 38, WA4CHQ 37, K4LPS 36, W4-TJM 36, WA4FJA 30, WB4DUN 29, W4IAD 27, W4ZAK 27, WA4NBE 24, W4NGH 23, WB4GUH 19, W4DFU 17, W4NYL 17, W4BGW 16, K4JHJ 16, W4HFR 13, WA4-EYU 14, W4GDE 12, WB4DSP 11, W4VPQ 11, WN4IVI 10, W4SCY 9, W4SOM 6, WB4CEX 5, WA4OHO 4, W7OX/4 1, (Dec.) K4EHY 164, W4EHW 98, WB4DSP 45, WA4EYU 10, WA4JYB 9.

GEORGIA—SCM, Howard L. Schonher, W4RZL—SEC: WA4WQU. RM: W4FDN. PAMs: K4HQI, W4-YDN. K4HQI reports 50-Mc. activity was extremely light with little DX. Two-meter activity proved to be better than 6. WA4VVW filed an enthusiastic report on the activity of the Atlanta Area Emergency Net during the SET. The Augusta Area AREC and RACES Net had 35 stations participating. GSN called all 62 scheduled sessions for a total of 456 messages and in the SET 154 QNI for 198 messages. The Georgia Single Sideband Net did an outstanding job during the SET although results were not reported. WB4FFE has a Drake TR-8, WB4BMF with a 70-ft. tower rushed TA-33 erection for the DX Contest. WA4BVD is back with GSN. How about a little traffic for Cochran? WA4BVD and WA4EPM received A-1 Operators Club certificates. WA4ARS has an SB-110 on 6 s.s.b. W4BGK now is Advanced Class. K4RZB QRD Florida. WB4EIR passed

TOP OF THE YAESU

F LINE



THE FT DX 400 TRANSCEIVER

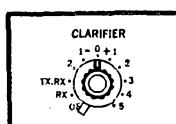
Conservatively rated at 500 watts PEP on all bands 80 through 10 the FT dx 400 combines high power with the hottest receiving section of any transceiver available today. In a few short months the Yaesu FT dx 400 has become the pace setter in the amateur field.

FEATURES: Built-in power supply • Built-in VOX • Built-in dual calibrators (25 and 100 KHz) • Built-in Clarifier (off-set tuning) • All crystals furnished 80 through the complete 10 meter band • Provision for 4 crystal-controlled channels within the amateur bands • Provision for 3 additional receive bands • Break-in CW with sidetone • Automatic dual acting noise limiter • and a sharp 2.3 KHz Crystal lattice filter with an optimum SSB shape factor of 1.66 to 1.

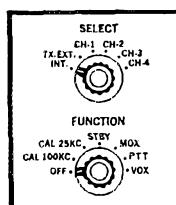
Design features include double conversion system for both transmit and receive functions resulting in, drift free operation, high sensitivity and image rejection • Switch selected metering • The FT dx 400 utilizes 18 tubes and 42 silicon semi-conductors in hybrid circuits designed to optimize the natural advantages of both tubes and transistors • Planetary gear tuning dial cover 500 KHz in 1 KHz increments • Glass-epoxy circuit boards • Final amplifier uses the popular 6KD6 tubes.

This imported desk top transceiver is beautifully styled with non-specular chrome front panel, back lighted dials, and heavy steel cabinet finished in functional blue-gray. The low cost, matching SP-400 Speaker is all that is needed to complete that professional station look.

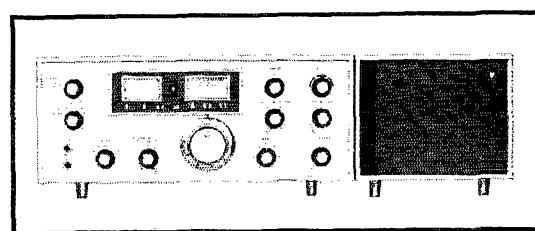
SPECIFICATIONS: Maximum input: 500 W PEP SSB, 440 W CW, 125 W AM. Sensitivity: 0.5 uv, S/N 20 db. Selectivity: 2.3 KHz (6 db down), 3.7 KHz (55 db down). Carrier suppression: more than 40 db down. Sideband suppression: more than 50 db down at 1 KHz. Frequency range: 3.5 to 4, 7 to 7.5, 14 to 14.5, 21 to 21.5, 28 to 30 (megahertz). Frequency stability: Less than 100 Hz drift in any 30 minute period after warm up.



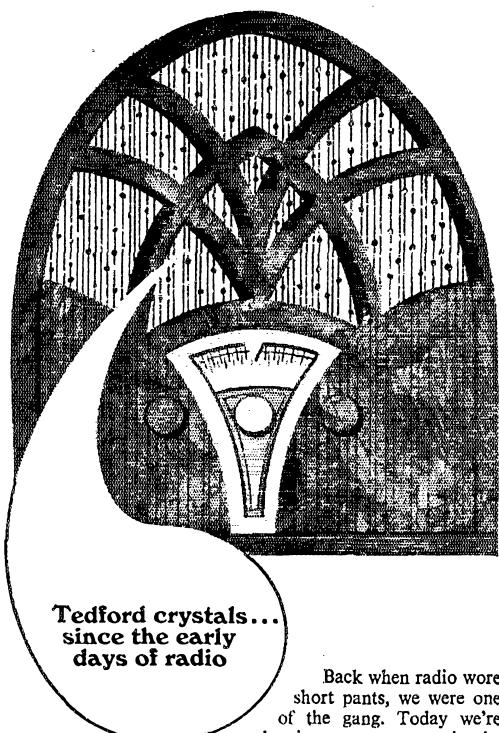
CLARIFIER CONTROL—Does the work of an external VFO—allows operator to vary receive frequency 10KHZ from transmit frequency, or may be used as an extra VFO combining transmit and receive functions.



SELECT CONTROL—Offers option of internal or outboard VFO and crystal positions for convenient preset channel operation.



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FREQUENCY CONTROL DEVICES

the Advanced Class exam. W4CZN is a new OO. The Cornelia Radio Club has been organized with W4TYE, WB4EBS, WA4EFY, W4GGZ and W4RTY as members. WB4EBS was elected pres.; W4TYE, vice-pres. and act. mgr.; WA4EFY, secy. W4YDN and WB4FCE are taking flying lessons. W4LUA has a new Braille machine from the Augusta Radio Club with help from W4WKP. Traffic: W4DV 529, WB6UTC/4 527, W4RZL 515, W4FDN 239, W4CZN 236, W4TYE 222, WA4WQU 178, W4PIM 116, WA4RAV 112, W4NSO 49, W4YDN 14, K4PIA 40, K4UUM 38, W4REI 35, WA4LLI 19, K4FLR 14, WB4EZK 13, W4PGU 12, K4PIK 8, WB4HHB 6.

GEORGIA QSO PARTY

May 10-12

The eighth annual Georgia QSO Party is sponsored by the Columbus Amateur Radio Club, Inc. and starts 2100 GMT Saturday May 10 and ends at 0300 GMT Monday May 12, 1969.

There are no time or power restrictions and contacts may be made once on phone and once on c.w. on each band with the same station. Exchange: QSO number, RS(T) and QTH; county for Georgia stations; state, province or country for others. (Georgia to Georgia contacts are permitted.) Scoring: Each complete contact counts 2 points. Georgia stations multiply their total QSO points by the number of different states and Canadian provinces worked. DX stations may be worked for QSO points but do not count as multipliers. Out of state stations will use the number of Georgia counties worked for their multiplier (a possible total of 159). Awards: Certificates to the highest scoring station in each state, province, county, and Georgia county. Second and third place awards will be made in sections where additional recognition is deemed to be warranted. A plaque will be presented to the Georgia station submitting the highest Georgia score. Plaques will also be awarded to the highest scoring out of state entry, to the Georgia club with the largest aggregate score and to the highest scoring Georgia portable station operating within the state outside his home county. Frequencies: c.w., 1810 3590 7060 14060 21060 28060; s.s.b., 3975 7230 14290 21410 28600; Novices: 3275 7175 21110.

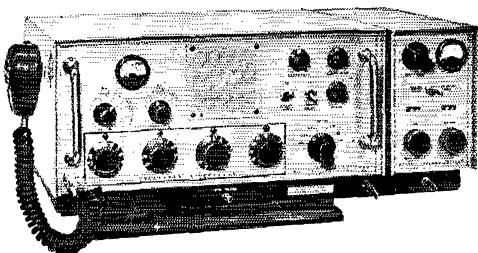
Your log should show date and time of contact in GMT, stations worked, exchanges, band, type of emission and multipliers claimed. Include a signed declaration that all contest rules and operating regulations have been observed and mail your entry no later than June 4 to: Columbus Amateur Radio Club, Inc., att: J. L. Laney, 3500 14th Ave., Columbus, Georgia 31904.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM V.H.F.: K4NMZ. RM: K4UBR. RM RTTY: W4WEB. Nets:

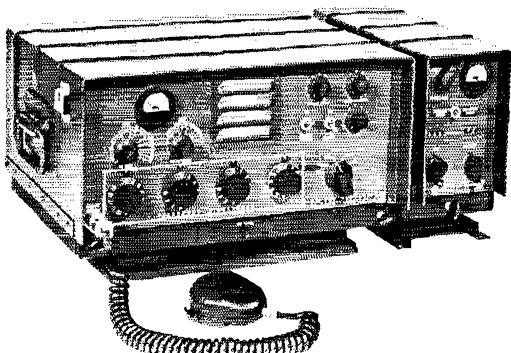
Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957 kc.	2300Z	Daily	31	—	—
QFN	3651 kc.	2330/0300Z	"	"	—	—

Pensacola: 8R1Y/W4 visited here during the SET. K4-LAN served as liaison between the WFPN, QFN and NTS during SET. WA4AYX implemented a new call-up procedure for WFPN. Fort Walton: WB4EER was guest speaker at the Annual EARS Club Dinner. The 2-meter f.m. repeater was moved to a 150-ft. water tower for better coverage. WB4CFQ built an all-solid state c.w. I.D. generator for the repeater. W4UXW got a second call for his store, WB4LYW. WA4PUC was transferred to Thailand, and received special permission to operate /HS1 on 20 meters. Crestview: W4OZX is back in the area and active on 75-meter s.s.b. Detuniak Springs: K4KHV is installing 2-meter vertical and beams on his new 120-ft. tower. Panama City: WN4LUW just received his ticket. Port St. Joe: W4WEB replaced K4-RZF as EC for Gulf County, but Bob continues as C.D. Director. Marianna: The MARC is looking for new meeting place. Tallahassee: An EC is needed for Leon and Jefferson Counties. WB4IXX reports a 6-meter net meeting each Wed. at 2000 EST on 50.25 and 50.4 Mc. Other members are WB4KAW, K4AQE, W4UAV, WA4WBS and WA4PIO. Traffic: (Jan.) W4IKB 252, K4-FVY/4 243, WA4AYX 198, K4LAN 179, WB4DVM 33, W4RKH 37, W4WEB 32, WB4IXX 23, W4KCA 17, W8-RIY/W4 7. (Dec.) W4IKB 29.

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NOMENCLATURED
AN/URC-58



RF-301A
NOMENCLATURED
AN/GRC-165

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"The two that are installed on the repair barge are being run continuously and the remaining eight are run in cycles of three days on and one day off. Of these ten units, there have been practically no failures to speak of in the past year-and-a-half that they have been installed."

"At one point on the obstacle course, the vehicle's wheels were bounced three feet off the ground. The beating the 301 got was incredible but it continued to work perfectly."

"We have tested four military type SSB equipment and the RF-301 is the best of the lot."

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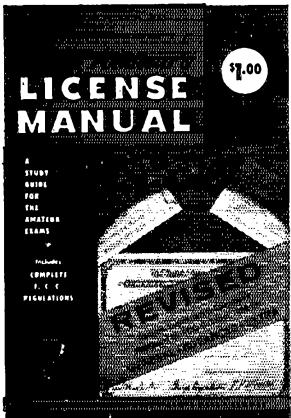
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ARIZONA—SCM, Gary M. Hamman, W7CAF—About 150 hams enjoyed the ARCA Winter Hamfest at Estrella Park, W4KFC, Roanoke Division Director, attended on Sat. Lots of bargains were available at the Swap Table. Transmitter hunts were held on 75 and 2 meters. Everybody participated in the potluck lunch on Sun. noon. The next state hamfest will be held at Ft. Tuthill, near Flagstaff, July 25, 26, 27. Congratulations to W7SBZ and WATEGZ, who are now married. W7CFJ was presented with his first son in Jan. The Pima County RACES/AREC group, under the direction of K7CET held two successful exercises during the SET week end. The State RACES Net and the Copperstate Net also were active during the SET to handle traffic. A new radio club has been formed, the Glendale High School Amateur Radio Club. Those operating nets and schedules are reminded to check for changes in operating time with the coming of nationwide Daylight Saving Time. The Copperstate Net will meet at 0200Z instead of 0230Z during the summer. K7NHL made the BPL with a 542 traffic count. The Copperstate Net handled 362 messages and the Arizona Post Office Net handled 19 messages. Traffic: (Jan.) K7NHL 542, W7GEP 278, WA7IIF 89, WATISP 73, W7OUE 49, W7CAF 42, W7UXZ 41, K7NOS 37, WA7IFD 31, WA7FEG 23, W7IO 22, W7LLO 22, W7WGW 14, WA7GDC 11, WA7GAE 10, K7UOY 10, WA7JHK 8, W7YXA 8, K7JFY 5, K7RBH 4, WA7UHU 3, W7KYM 2, W7CAL 1. (Dec.) W7GEP 222, W7WGW 17, W7CEN 11.

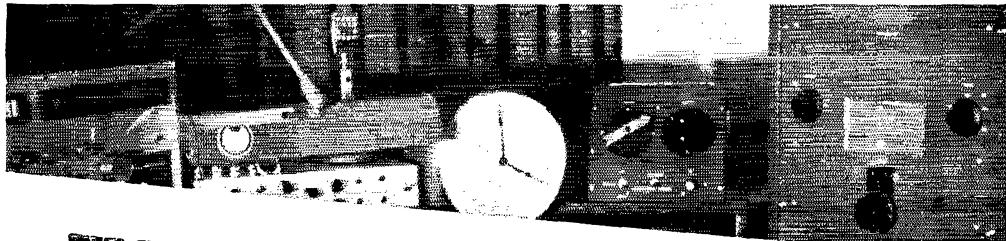
LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—Traffic: (Jan.) WA6LWE 987, W4GYH 838, WB6-BBO 391, W6MLX 305, WB6TQS 233, W6MIN 6184, WB6-PKA 118, W6QAE 112, W6HUJ 86, WB6WDS 65, WB6-SXY 52, W6JPW 47, K6UMV 45, WB6USZ 45, WB6ZVC 42, WB6OUD 38, W6BHG 33, K6CDW 23, WB6UHF 26, W6DGH 18, W6DQX 17, W6OEQ 18, WA6KZI 15, K6CL 13, W6USY 10, WB6KCK 8, K6ASK 8, WN6HRA 6, W6FD 5, W6TN 5, K9ZMS/6 5, W6EL 3, W6AM 2. (Dec.) WB6PKA 118, WB6MXA 42.

ORANGE—SCM, Roy R. Maxson, W6DEY—W1LG, ex-6HVZ, W6FKD, W6CLG, is now Extra Class. QO WA6ZZ scored 7.7 p.p.m. in the Nov. FMT. ORS W6-EIY reports having trouble with long skip and wonders if 160 is ever considered for sectional service under these conditions. EC WA6TAG advises that the SET was held with some real situations. W6BUK has resigned as OO because of lack of time to do the job right. My thanks to President WB6IQX and the other officers and members of the Anaheim ARA who presented me with the beautiful framed certificate investing me with life membership. The turnout for the SET this year transcends all others that I can remember. My thanks go to SEC WB6RVM and all the ECs and members of the ARPSC who participated, some in actual emergency situations to the extent that the second day's activity had to be partially cancelled because of conflicting situations. Traffic totals should be up all over the country from what was observed of section activity. RM W6BNX is trying out an FTDX400 and reports it is working FB. Traffic: WA6ROF 534, W6BNX 293, W8SELW/6 205, W6WRJ 36, W6EIY 30, WA6TAG 28, W6DEY 14, W6BUK 2.

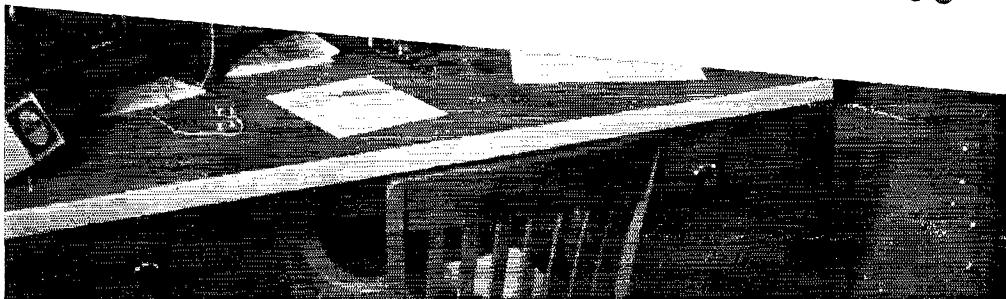
SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN—SEC: K6GV. RM: W6UJ. Section plans for the SET were largely interrupted by Mother Nature in the form of a flood. Several areas near the ocean (Santa Barbara, Lompoc, etc.) were hard hit and the WCARS frequency of 7255 was much used. Several cities deployed their units on local 75-meter frequencies. Several areas, and some amateurs, were cut off and choppers were used to fly in food and supplies. W6UJ was active during the flood as Radio Officer for Lompoc C.D. New officers of the Santa Barbara ARC are K6EAQ, pres.; W6JPP, vice-pres.; WZ6LWJ, secy.; WA6FGV, treas. Those wishing to contact the Santa Barbara Radio Club should write to P.O. Box 273, Santa Barbara. WA6DEI is going to school in San Luis Obispo but manages to check into the traffic nets. W6ORW, Simi Valley EC, checks in on the Mission Trail Net (7 P.M. on 3928). Our active EC in Santa Maria, WB6BWZ, has been inactive with the flu. I have received reports from the ECs that the recent floods have inspired new interest in emergency communications and the ARPSC. Traffic: WA6DEI 93, W6ORW 7.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. E. Harrison, W5LR—Asst. SCM: E. C. Pool, W5INFO. Asst. EC: W5JSW. PAM: W5BOO. RM: W5QGZ. Jim our new RM, is a 40-w.p.m. man on c.w. The SET is now history. Our



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SEC resigned at a very crucial moment. However, the Arlington RC came through with a grand performance and made our score better than anticipated. Several Texas nets, including TEX C.W., ITN, 7290, North East Texas Emergency, loaded the traffic circuits to the breaking point. W5JSM, Asst. EC for West Texas, reported 31,725 points, 47 sections in 14 hours operating during the CD contest on A3. There will be no Dallas Hambores this year. WA5PGC/5's certificate arrived. The Abilene Club reported but has no firm date on the hamfest at Fair Park. W5HVF is a new OPS. W5IQ sends greetings to all. Once again let me say this "Phone Directory" business is "Cutta this world for traffic people." It costs 8 cents. Irving News is read in Florida. K5MCH, of Garland, has some very strong ideas regarding W1AW's frequency business (see page 77 Jan. '69 QST, W8BW's article) and has even gone so far as to express his feelings in writing to our Director. W5EYB, K5BNH was issued an OPS appointment. W5NVDY requests association with the AREC, as does W5RDZ. The Director's letter has been sent to each Director, Asst. Director, Affiliated Club and others with the hope that he would receive a reply from you before the May meeting in New Orleans. The Dallas ARC Newsletter hereafter will contain a special box for League affairs and activities. W5QJA issued the best SET OPLAN I have ever reviewed. League membership for West Gulf was up 0.5% in 1968. W5TJA, Garland ARC, was selected "Operator of the Year," likewise W5VSH was selected "Ham of the Year" by the Irving Club. The KC Club of Ft. Worth presented OT's night at its Jan. meeting. W5QGZ has been appointed as RM for No. Texas. W5QGZ broke 100K points in the Jan. CD Party. WA5AQG reports that Amarillo will have a 2-meter repeater soon. The Midland Swapfest is scheduled for Sat. and Sun., Mar. 22-23. Traffic: (Jan.) K5BNH 2064, W5RHF 233, WA5AQG 226, K5LZA 133, W5QGZ 88, W5HVF 79, W5FCX 75, W5PBN 63, W5NSJ 41, W5JSM 34, WA5CTJ/5 31, W5LR 24, WA5QQ 24, WA5QWA 9, WA5QQE 6. (Dec.) W5FCX 62, K5LZA 61.

OKLAHOMA—SCM, Cecil C. Cash, W5PML—SEC: W5AOB, RM: W5QMJ. PAMs: W5MFX, K5TEY, WA5JGU, K5ZCJ. The SET operation went off in this section without catch or breakdown even though the circuits were well loaded with traffic. Late Jan. proves to be much the best time of year to hold a scheduled SET drill. If it is nice weather we can go through normal C.D. and Red Cross contacts operation but if the weather is bad with snow, sleet or ice then we can operate under real emergency test conditions. Thanks to the members of this division, both old and new for your loyalty. West Gulf Division membership was up 5%. Congratulations to new General Class licensee WA5EYZ and to new Advanced Class licensees K5AWD, WA5FSN, WA5HUN, WA5NRJ, WA5TSJ, also WA2-BDJ/5. If you are in the vicinity of Oklahoma City and are interested in upgrading your license you should contact the ACARC, which runs classes for Novice through Extra Class at least twice a year just before the examiner makes his quarterly visit to Oklahoma City. Net reports:

Phone Net	Sess.	QNI	QTC	C.W. Net	Sess.	QNI	QTC
OPEN	4	160	12	OLZ	20	68	37
OPON	22	388	78	SSZ	13	54	82
STN	26	833	398				

Traffic: K5TEY 5578, W5AOB 248, WA5RRH 121, WA5KFT 52, WA5IMC 45, WA5LWD 45, K5OOV 37, WA5LKS 35, W5PML 35, W5MFX 33, W5PWG 33, WA5FSN 31, WA5DZP 22, W5FKL 19, W5IQ 19, WA5SEC 16, K5WPP 12, WA5KZA 3.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. Thanks, fellows, for your part in the recent SET. EC W5TFW has a new trap dipole that works fine. W5ABQ reports the San Antonio Chapter of the QCWA elected W5EJT, chairman; W5KJ, vice-chairman; W5LPO, secy.-treas. PAM W5KLV advises that the '69 South Texas Emergency Net Convention will be held June 6, 7 and 8 in Austin, Tex. See you all there. K2-EIU/5 says he left the USAF in Feb. Best of luck in your new undertaking. EC K5HZR reports new assistants are W5ETG for v.h.f. and WA5RNV for h.f.

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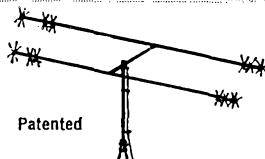


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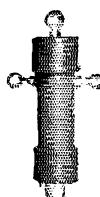
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operations. EC W5ICL activated his 6-meter net during the SET from club station W5ND and had a good workout in Orange County. EC W5KRR's Off Resonance reported wedding bells for WA5GZI on St. Valentine's Day. It is reported that the Laredo gang is considering a change in the Laredo Hamfest date so it will not conflict with the West Gulf Convention in Aug. The El Paso W5ES Bulletin, edited by OO W5NGW, says the El Paso ARC has a new directory out. Congrats to K5DT, WA5RVX, W5OPH and OM/XYL teams, WA5-RGR-WA5LQP, W5OVS-K5UYH and WA5RJF-K5-TML for a real service to the amateurs. It's a lot of work to set up a directory. WA5AUB reports a bang-up Old Timers Nite for the Corpus Christi ARC Jan. 9. Our new Director, W5EYB, was guest speaker. Vice-Pres. W5QFK also was present. W5VA demonstrated some antique equipment for a full evening of good fellowship. The Houston ARC Old Timers Night was held Feb. 21. Traffic: WA5FJN 308, W5QJA 252, WA5AUZ 201, K5-QQG 192, K5EZB 188, K2EIJU/5 158, WA5WFV 113, WA5TXI 109, WA5TOW 102, W5KWW 100, W5EZY 97, WA5CIV 94, WA5QKE 73, W5KLV 72, K5PRG 68, W5AC 61, W5TFW 53, W5AIR 48, W5ABQ 43, K5HXR 38, WA5RXO 34, K5WYN 16, K5VXP 10.

CANADIAN DIVISION

ALBERTA—SCM, Don Sutherland, VE6FK—SEC: VE6FK, ECs: VE6AWM, VE6AFQ, VE6SS, VE6XC, PAM: VE6ADS, OO: VE6HMI, VE6TY, ORSS: VE6-ATG, VE6ATH, OPSs: VE6ATG, VE6ATH, VE6TG, VE6S, VE6AQ, VE6AWM, Calgary EC, did a fine organizational job on the SET. VE6ATH handled our NTS liaison work by herself. VE6SB did a nice job picking up control when the power failed. VERTG put in many hours on the APSN to keep Lethbridge connected with the SET. VE6AJA, the Vulcan Club, was well represented. The APSN handled a large volume of traffic, less than 1% of the total could not be moved. VE6BH is using a 7-watt transistorized c.w. rig. He plans to extend this to a complete 24-volt transistorized portable station. VE6ADS and VE6EL, of the SAIT staff, are building a satellite tracking station at the Tech. VE6NT is a technical advisor. The CARA issues a personal challenge to the NARC in any Field Day category. Traffic: VE6FK 132, VE6ATH 107, VEGADS 97, VE6SB 24, VE6XC 18, VE6SS 11, VE6TG 11, VE6-ATG 10, VE6AWN 9, VE6HN 7, VE6AJA 5, VE6AUT 5, VE6AWF 5, VE6VB 5, VE6AKZ 4, VE6HF 3, VE6YE 3, VE6AGZ 2, VE6ARL 2, VE6ARU 2, VE6ASZ 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—The Aurora Trans-Canada Net is on 7200 kc. at 0200 GMT, moving to 7185 kc. at 0330 GMT. Acting Net Mgr. VE7IQ reports this net meets daily and has greatly increased in check-ins across Canada. The B.C. Amateur Radio Public Service Corps Net meets on 3755 kc. Mon. through Sat. at 0200 GMT and is calling for volunteers as Net Mgr. The earth-shaking happening is that VE7FB did it—s.s.b. no less. Also there is a Santa Claus. He walked into VE7BLO, removed his a.m. transmitter, receiver, etc., from the table and in its place left an s.s.b. transmitter, receiver, mike, the whole works, all brand new. All of us would like to say thanks to the CPA and Burnaby Clubs. VE7BJT is active now with an HW-100. Our ill members, VE7WP and VE7AKB, are home. VE7BQA is recovering from surgery. A new EC is VE7BGX for Prince George. The Parksville repeater, VETAFR, has an input of 441.99 Mc. and output of 147.33 Mc. VE7AFJ is the operator. The East Kootenay ARC reports increased 2-meter activity. The Eager Beavers little monthly paper produces some mighty fine "ham tips." Traffic: (Jan.) VE7BLO 26, VE7AC 25, VE7BJT 20, VE7AMW 10. (Dec.) VE7SE 9, VE7BQA 3.

MANITOBA—SCM, John Thomas Stacey, VE4JT—I regret to report the passing of VE4AN of Portage La Prairie. George was one of the stalwarts of the 75-Meter Phone Net. The current issue of *The Manitoba Amateur* appears to reflect most accurately the apathy which has struck this section and it appears to be doomed to extinction if one of its 106 members does not undertake the job as editor, which has been in the capable hands of VE4IA as an interim arrangement. As this column is

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being put together I am faced with the same old problem, no news to report as no activity reports have been received except for the old faithful traffic-handlers. It is my intention to at least list the net activity each month so that their activities will not go unnoticed. MTN was active in the SET. VEAFQ had a swing through the Eastern U.S. at Christmas time and operated as W2 for a short while. Net reports: Phone sessions 30, QNI 778, QTC 9. MTN: Sessions 31, QNI 129, QTC 58. Traffic: VE4EYI 71, VE4FQ 47, VE4NE 21, VE4EF 13, VE4-XN 10, VE4QJ 9, VE4JA 8, VE4QK 8, VE4RO 8, VE4-HS 7, VE4YC 7, VE4LQ 6, VE4CR 3, VE4DQ 2, VE4-HS 2, VE4RB 2.

MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. Condolences to the family of VE1ASS, who has joined Silent Keys. The recent SET generated considerable traffic and much interest. VE1s 1F, AFB and ZZ are active on 432 Mc. VE1YQ is moving to VE2-Land. We wish a speedy recovery to VE1YO in the hospital at Halifax. VO2AP and VO2BE have new jr. operators. St. Johns, Newfoundland, reports 70 mobiles now equipped to work through the 2-meter repeater. Further news on the license fee is expected before the end of March. Net report: APN 122, QNS 566, session 83, SET 25. Traffic: VE1AUD 128, VE1AMR 124, VE1RO 73.

ONTARIO—SCM, Roy A. White, VE3BUX—The SET in Jan. was very successful and congrats to all those who put so much time and effort into the exercise. Our SEC, who used to be VE3OE, is now VE3LJ. The SET exercise pointed up the need for more regular liaison between the various nets in Ontario, so, if you can help, let me know and I'll route the information to the proper quarter. We were sorry to hear that VE3FKH passed away in Jan. A fellow minister, VE3FIG, gave the eulogy at the funeral. Our sincere sympathy goes to VE3CY, whose XYL died in Jan. Dec. 9, '68 marked the 22nd anniversary of the Ontario Phone Net. I hear that VE3AMT has officially joined the Professional Loafers Club. Ottawa ARC is sponsoring its own convention in Ottawa June 6 and 7, and the Chicken Junction Net is putting on a luncheon and dinner at the Town and Country in Toronto Apr. 19. VE3EQM has tickets for the latter affair. VE3ETM has a linear on his Drake T-4X now. Congrats to VE3ERU, who made BPL for the second month. Don't forget to send in your appointment certificates to your SCM for endorsement, please. Have CD Parties outlived their usefulness? One would think so judging by the lack of Canadian amateurs taking part recently. Ontario-Quebec and Ontario Phone Nets are not listed in the '69 Directory. Managers of nets are required to advise ARRL before July 1 each year to insure listing. It was only on Feb. 5, when I got my copy of the Ontario Amateur, that I learned of the loss suffered by VE3CKU in December when his XYL, Jean, passed away. VE3MS, of King City, has returned to the ranks of amateur radio. Traffic: VE3ERU 274, VE3RZB 239, VE3GI 179, VE3DPO 148, VE3DV 144, VE3BUX 127, VE3DBG 103.

QUEBEC—SCM, J. W. Ibey, VE2QJ—SEC: VE2ALE. RM: VE2DR. The following have been presented with Section Net certificates for Trans-Canada Net participation: VE2BWU, VE2BKA, VE2BPU, VE2YX, VE2QE, VE2CF. Endorsements: VE2DK, VE2AKI and VE2BCB as ECs. VE2NV, VE2WA, VE2DCW, VE2BV, VE2YU, VE2DCX, VE2WY, VE2AJ and VE2BGJ can be proud

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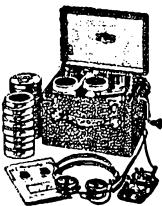
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of their first year's operation as a club in the DX Test. VE2WM still is hard at work in amateur circles in the Gaspé area and is arranging a VE2 Party. We would appreciate an occasional report from the Lake Saint John area. Our section is proud to have a top DX operator, VE2NV, selected to the advisory committee. VE2ADE has changed QTH causing slowdown in his activity. VE2DKJ presides over the Wagar High School Club. Le réseau du Québec VE2AQC devient de plus en plus populaire; les stations-contrôle font un bon travail: VE2BPT, VE2ASU, VE2ADR, VE2AU, VE2LD, VE2AA, VE2AFK et quelques autres. Constatez par vous-même! VE2BVY demeure toujours le champion télégraphiste du Québec. Bravo, Richard! Traffic: (Jan.) VE2ALE 150, VE2ADE 146, VE2OJ 112, VE2DR 100, VE2BVY 94, VE2BRD 84, VE2AJD 78, VE2EC 40, VE2WM 36, VE2CP 21, VE2DKJ 4. (Dec.) VE2ADE 43.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—We in Saskatchewan are fortunate in having a real gang of contributors to this column, and we wish to express our appreciation to Saskatchewan hams. We also wish to ask for more timely news items. The Jan. 26, SET exercise was marked by exceptional c.w. activity and by even greater than usual cooperation between the members of the 5 provincial divisions. SEC VE5CU received 62 and sent 12 messages. The SARL Contest held the week ends of Jan. 12 and 19 was quite successful and was enjoyed by many Saskatchewan hams, especially those on c.w. Building programs are being undertaken by VE5WG (transceiver), VE5CX (transceiver), VE5PZ (linear), VE5BV (slow-scan TV). Our friends in Manitoba, (VE4CN, VE4FO and VE4EF) are almost ready to throw their pictures on the air. VE5BP and family are Hawaii-bound. VE5FX and family have just returned from there. VE5FX is leaving for a warmer climate in Haiti and the Dominican Republic. We welcome interested VE5s to contact the SCM concerning ARRL appointments. The weather during Jan. was excellent for short and long skip. Much DX was heard on 75 meters. The Saskatchewan Phone Net continues to be very active and extremely successful on 3785 kc. at 0100Z. The Saskatchewan C.W. Net is very active and is to be commended for its part in the SET on 3690 kc. at 0230Z. The 40-Meter Net, covering all the provinces, meets on 7.188 at approximately 0145Z. Traffic: VE5GL 131, VE5PX 36, VE5LQ 30, VE5SSC 12, VE5XL 12, VE5UT 7, VE5LH 6, VE5PX 5, VE5QS 3, VE5GW 4, VE5KI 3, VE5AG 2, VE5HX 2, VE5YR 2, VE5OO 1, VE5TS 1.

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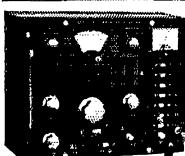
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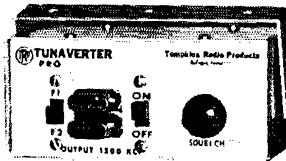
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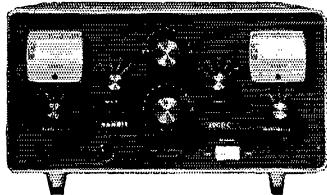
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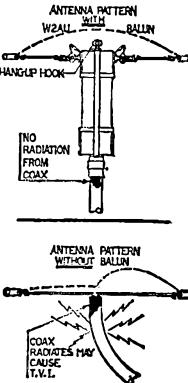
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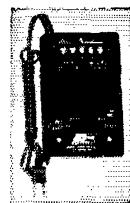
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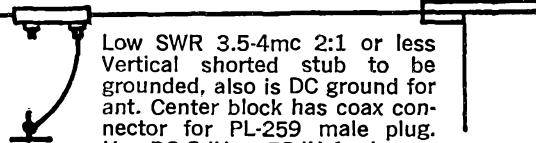
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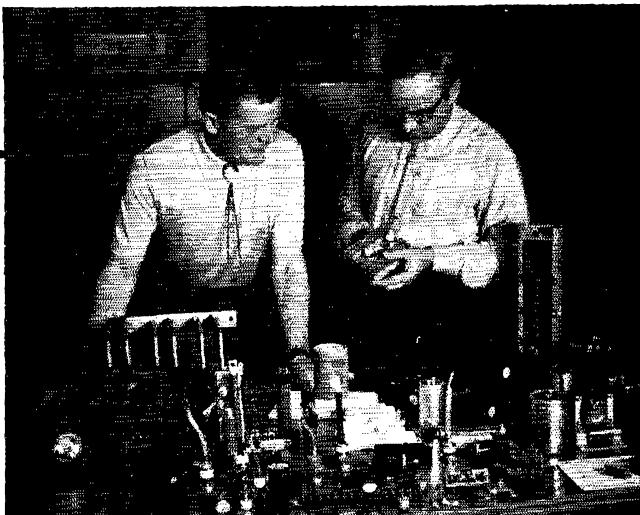
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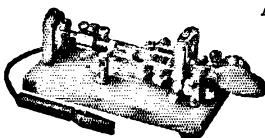


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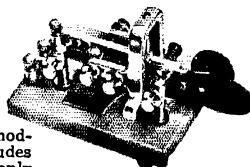


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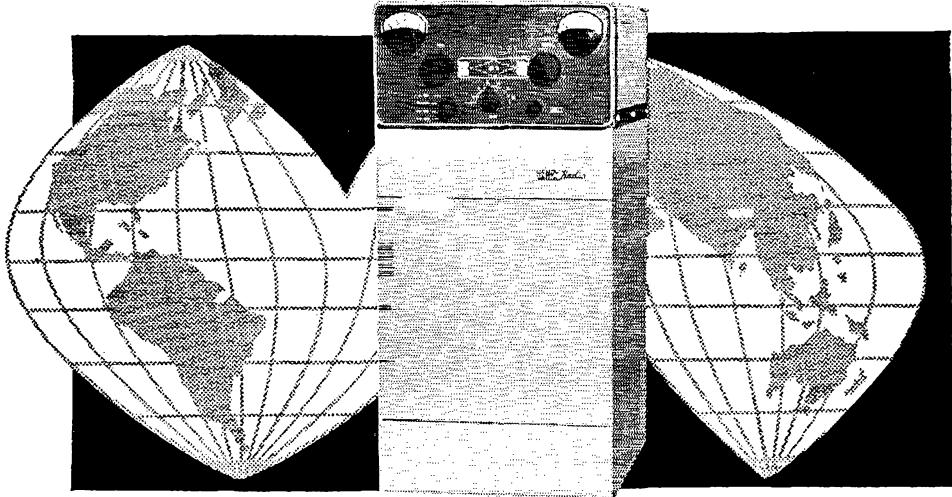
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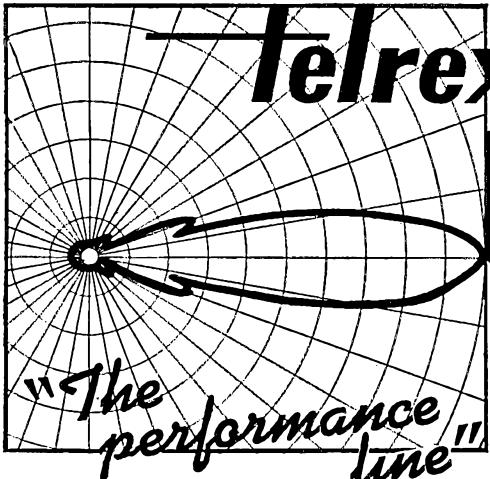
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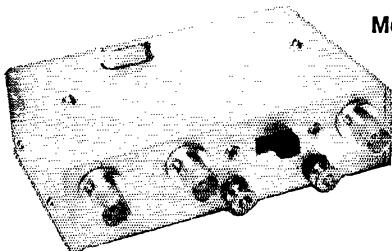
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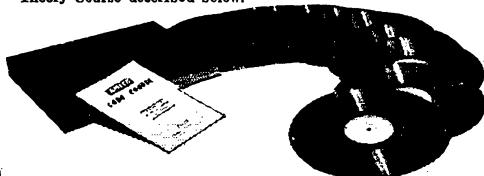
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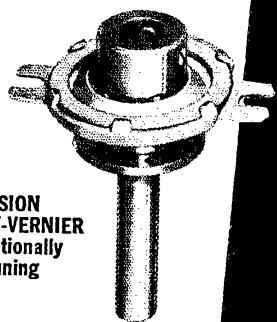
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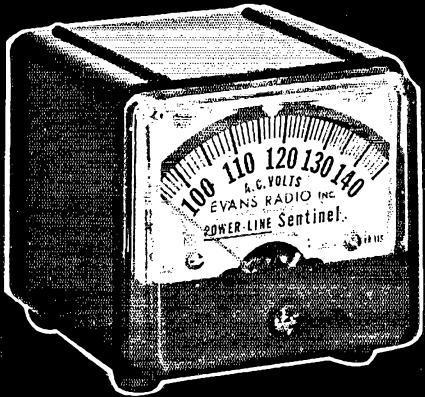
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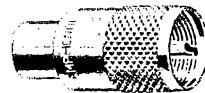
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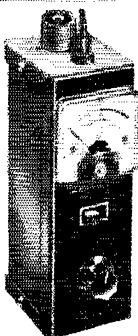
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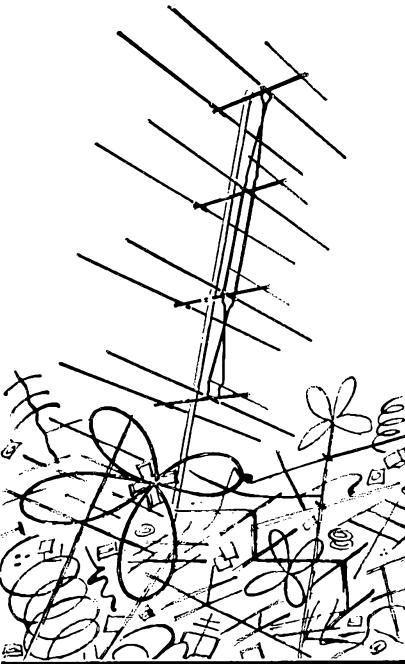


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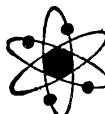
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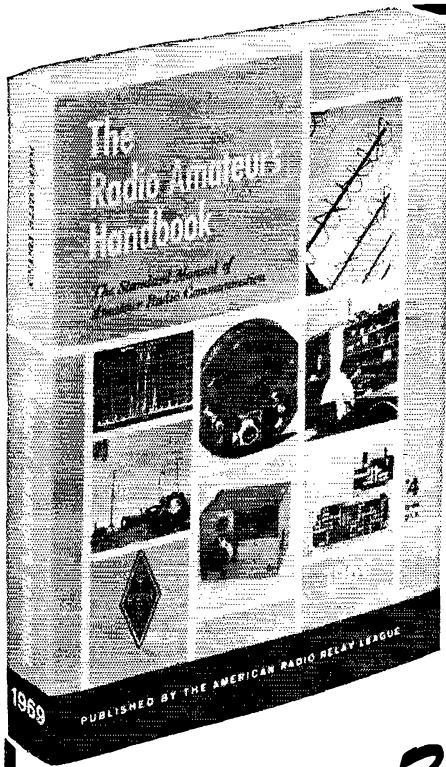
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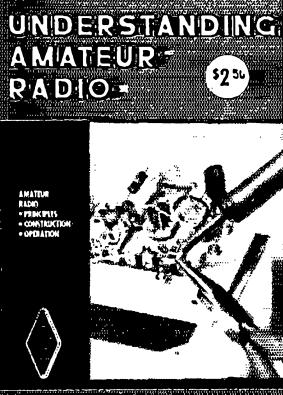
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HAM-ADS

(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 of your letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

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(5) Closing date for Ham-ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except that is charge for 7 words, which is essential you furnish. An attempt to depict 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.

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(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 enterprise or for the grade or character of the products or services advertised.

A.W.A. National Amateur Radio Historical Conference, Oct. 3, 4, and 5th, East Greenwich, Rhode Island. A weekend of nostalgic memories: Spark transmitters, Crystal sets, Hartley oscillators, and Regenerative receivers. Everyone welcome! Write W2OY.

ROCHESTER, N.Y. is again Hamfest, VHF meet and Flea market headquarters for one of the largest events in the East, May 9, 10 and 11th. Write WNY Hamfest, P.O. Box 1388, Rochester, N.Y. 14603, for program and information.

"SEE your picture and a thumbnail sketch of your life in wireless along with many of your old buddies in Spark Gap Times magazine published by the Old Old Timers Club. Charter membership is offered to all pre-World War I operators, regular membership to any operator licensed 40 years or more ago. Be a recognized pioneer, join the Old Old Timers by writing the Secretary WSZC, Bert E. Gamble, 402 Beck Building, Shreveport, Louisiana 71101."

INVITATION: New York Radio Club invites New York Area hams and SWLs to its regular monthly meetings, the second Monday of each month at the Hotel George Washington, Lexington Ave., and 23rd St. at 8 PM. W2ATT, New York Radio Club. Our April, May, and June meetings will be held on the 2nd Monday of the month. Our Annual Auction will be held on March 14, 1969 at the George Washington. (All our meetings are held there.)

HAMFEST: June 8th. Save this date for Annual Starved Rock Radio Club Hamfest at Ottawa, Illinois. Write: George E. Keith, W9QIZ, RFD #1, Box 171, Ogleby, Illinois 61348, or see Hamfest Calendar in May QST.

QCWA—Quarter Century Wireless Association in a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information, A. J. Gironda, W2JE, 1417 Stonybrook Ave., Mamaroneck, N.Y. 10543.

INDIANAPOLIS DXX: Association will provide a Hospitality Suite for DXers on Friday night, May 23rd. Write Joe Poston, 309 Benton Dr., Ind., Ind. 46227.

INDIANAPOLIS Ham Convention (Sat.) May 24 (9 to 5) at beautiful Lafayette Square Mall. Indoor manufacturers displays for sale or auction. Free outside flea market. 80+ shops, cinema, for XYL and kids, inside airconditioned Mall. Airports and Interstate $\frac{1}{2}$ mile. Write: Indianapolis Ham Association, 309 Benton Dr., Indianapolis, Ind. 46227.

CHRISTIAN Ham fellowship is now organized for Christian fellowship and witness for licensed amateurs. Free gospel witness tract samples and details on organization on request. Christian Ham Calbook for \$1 donation. Write Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

HAMFEST sponsored by Lancaster and Fairfield County ARC at Derby Downs one mile south of Lancaster, Ohio, on BIS Road, Rte. 793, June 8th. Gigantic Swap Shop! \$1.00 Registration. Good food at reasonable prices. W. C. Beach, 268 Peters Ave., Lancaster, Ohio 43130.

WELCOME To Maritime Mobile service net. 14313 KHz, daily 2130Z. Amateur Radio's service to the Fleet. Vic Barry, RDC USS Corry, DD817 FPO, N.Y., N.Y. 0950.

QSL Cards?? America's Finest!!! Personalized made-to-order!!! Sample 35¢. Deluxe 50¢. Religious 25¢. (refunded). Sakkers, W8DED, Box 218, Holland, Michigan 49423.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252.

QSLS "Brownie" W3CJH, 3111 Lehigh, Allentown, Penna. 18103. Samples 10¢. Catalog 25¢.

QSLs, stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md. 21733.

QSLS—SMS. Samples 25¢. Maigo Press, Box 375, M. O. Toledo, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

10¢ Brings free samples, Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSLs, SWLs: Rubber stamps, address labels, and envelopes. Quality with service. Samples 25¢ (refundable), R. A. Larsen Press, Box 45, Fairport, N.Y. 14450.

QSLs. Free samples, attractive designs. Fast return, W7IIZ Press, Box 2378, Eugene, Oregon 97402.

QSL, SWL cards that are different. Quality Card stock, Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

CREATIVE QSL Cards. Personal attention. Imaginative new designs. Send 25¢. Receive catalog, samples, and 30¢ refund coupon. Wilkins Printing, Box 787-1, Atascadero, Calif. 93422.

QSLs by Jansen, K2HVN. Samples 25¢. 860 Atlantic St., Lindenhurst, N.Y. 11757.

QSLs SWLs Hundred \$2.00, samples dime. Garra, 414 Mahoning St., Lehighton, Penna. 18235.

QSLs 300 for \$4.35, samples 10¢. W9SKR, George Vesely, Rte #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLs. Gorgeous rainbows, cartoons, etc. Top quality! Low prices! Samples 10¢ refundable. Joe Harms, W4AFJE/W3COP, 905 Fernald, Edgewater, Fla. 32032.

RUBBER Stamps. Return mail delivery, postpaid. Basic price, \$1.00 first line 60¢ each additional line. Request type style chart. Fulton Rubber Stamps, Route 216-A, Fulton, Maryland 20759.

QSLs. Neat, quick, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 45353.

QSLs Kromkote glossy 2 & 3 colors, attractive, distinctive. Choice of colors, 100—\$3.00 up. Samples 15¢. Agent for Call-D-Cals, K2VOB Press, 457 Chancellor Ave., Newark, N.J. 07112.

QSLs, finest YLRLs, OMs samples 10¢. W2DJH Pres. Warrensburg, N.Y. 12885.

RUBBER Stamps \$1.15 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QSL cards. Finest quality. Economical prices. Fast service. Free samples. Little Print Shop, Drawer 9848, Austin, Texas 78757.

QSLs, WSLs, XYLO-OMS (Sample assortment approximately 96) covering designing, planning, printing, arranging, mailing, eye-catching, sedate, fabulous, comic, DX-attractive, prototypal, snazzy unparagoned cards (Wow!). John Patterson carries on in the spirit of the late Warren Rogers, K0AAB, adding his own. Patterson Printing, 961 Arcade St., St. Paul, Minn. 55108.

QSLs. Radio Press, 15008 Orchid Ave., Poway, Calif. 92064.

3-D QSDS—The modern concept that makes all others old-fashioned. Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLs, SWLS, WPE. Samples 15¢ in adv. Nicholas & Son Printer, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLs, samples, 10¢. Fred Leven, WINZJ, 454 Proctor Ave., Revere, Massachusetts 02151.

RUBBER Stamps, 3-line address \$1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

QSLs 3-color glossy 100, \$4.50. Rutgers Varil-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J. 08848.

QSLs-100 3-color glossy \$3.50; silver globe on front; report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLs by KIFF: \$2.00 for 100. Others at reasonable prices. Samples 25¢ (deductible). K1FF QSLs, Box 33, Melrose Highlands, Mass. 02177.

PICTURE QSL cards of your shack, etc. from your photograph. \$200, \$12.00, \$1000 \$15.25. Also unusual non-picture designs. Generous sample pack, 20¢. Half pound of samples 50¢. KAUM's, 4154 Fifth St., Philadelphia, 19140.

ORIGINAL EZ-JN double holders display, 20 cards each in plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free samples to Dealers or Clubs. Teapaco, John, K4NMT, Box 1981, Gallatin, Tenn. 37066.

QSLs by Jansen, K2HVN, custom made, rainbows, pictures, maps, large variety backgrounds. Special offer, 300 glossy, \$5.00. Samples 25¢. 860 Atlantic St., Lindenhurst, N.Y. 11757.

3 Line engraved badges, any color, \$1.25. Special rates to clubs. Fallert's Engraving, 121 N.C. St., Hamilton, Ohio 45013.

NAMEPLATES: Call, full name, \$1.10. Adhesive or pin back. Many styles, colors. Quantity discounts. Catalog for stamp. Zach Engraving, Pike Place, RFD 4 Mahopac, New York 10541.

PICTURE of yourself, rig, etc. on QSLs made from your photograph. 250—\$7.50; 1000—\$14.00 postpaid. Samples free. Picture Cards, 129 Copeland, LaCrosse, Wis. 54601.

QSLs: 100, \$1.25 and up, postpaid. Samples, dime. Holland R3, Box 649, Duluth, Minn. 55803.

QSLs. Neat, professional, 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 45353.

MINI QSLs. Eye-Ball cards. Free information. A. A. 2833 Irving Ave., South Minneapolis, Minn. 55403.

QSLs. With all this competition, you've gotta have something different. Try us. Samples 104. Alkanprint, Box 5494, Minneapolis, Minn. 55408.

CANADIANS! The best selection of new and used gear in stock at all times. Drake, Swan, Yaesu, Hy-Gain and others. It will pay you to check our deals. The Ham Shack, 1566A Avenue Road, Toronto 12, Ontario (Tel: 416-789-1239).

INVITATION To form a Town Hall group for open discussion, debate and dissent on amateur radio matters. Write WASTSN, 4023 Mackland Ave., Albuquerque, N.M. 87110.

INVITATION. Voudrais vous un group les français aider dans l'études pour reseau des émetteurs français. Ecrir WA5TSN, 4023 Mackland Ave., Albuquerque, N.M. 87110.

DAYTON Hamvention April 26, 1968: Wampler Arena Center, Dayton, Ohio. Sponsored by Dayton Amateur Radio Association, Informative sessions, exhibits, hidden transmitter hunt, and ladies program for the XYL. Watch the Ham Ads for information, or write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

FANTASTIC—1969 New England ARRL Convention, May 24 & 25, Swampscott, Massachusetts. Save money! Early bird registration \$10.50 including Saturday dinner, dance and night club entertainment. Be a winner! Every major manufacturer will exhibit top speakers from science & industry. Tickets: \$10. WIKCO, John McCormick, Berkeley Street, Taunton, Massachusetts.

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.

PROP Pitch rotor, WW2, small, excellent, \$45.00. Link, 1081 Aron St., Cocoa, Fla. 32922.

WANTED: 2 to 12 304TL Tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Illinois.

SELL: New Yaesu FT-DX-400 Transceiver. W8AO, 2912 Riverview Blvd., Silver Lake, Ohio 44224.

OFFER \$10 for May 1913 Elec. Experimenter, \$3, Oct. 1914; \$2 May 1919; \$5 1919 issues Radio Amtr. News: \$10 any 1908 Modern Electrics; \$10 gov't. amtr. Callbooks, 1922-26. Less for later dates, or poor condition. For historical library, none sold. Wayne Nelson, W4AA, Concord, North Carolina 28025.

NORTHERN California hams: best deals, new and reconditioned equipment. Write, call or stop for free estimate. The Wireless Shop, 1303 Tennessee, Vallejo, Calif. 94590. Tel: 707-643-2797.

SELL: Microwave test set "X" band frequency meter, Signal Generator, power meter, TS-147A with manual, \$85.00. RTTY page-printer paper, 3" x 10", \$7.50/case. WBZPLY, Box 207, Princeton Jct., N.J. 08550. Tel: (609) 452-9038.

HAM Transformers rewound, Jess, W4CLJ, 411 Gunby Ave., Orlando, Florida, 32801.

ATTENTION Southwestern Hams! Congratulations! You now have your own volume discount hamstore. Never before heard-of cash savings on new, Drake, Swan, Hallicrafters, Galaxy, National and BTI equipment. Also save on Tri-Ex, Mosley, Hy-Gain. Get our quote before you buy. Write or phone today. Valley Discount Ham Shack, 4109 N. 39th Street, Phoenix, Arizona, 85018. Tel: (602) 955-4850.

SELL swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Lansdowne, Penna.

DUMMY Loads, 1 KW, all-band, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J. 07016.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test-sets, especially Collins Airborne. We pay cash and freight. Rito Electronics, Box 156-Q567, Annandale, Va. Phone: 703-560-5480 collect.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

MANUALS for surplus electronics. List 15¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

HAM'S Spanish-English manual \$3.00 Ppd. Gabriel, K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

WANTED: For personal collection; Learning the Radiotelegraph Code, Edition 4; How to Become a Radio Amateur, Edition 9; The Radio Amateurs License Manual, Editions, 11, 12. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

TOROIDES, .88 mb uncased, \$5/\$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

1916 QSTS needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey.

FOR Sale: SB-101 and SB-200. Wanted, kits to wire. Heath preferred, 12% of cost, some in stock. Professionally wired. Ian Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna. 17112.

WE buy all types of tubes for cash, especially Elmac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. 11551.

CASH Paid for your unused Tubes and good Ham and Commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, N.Y., N.Y. 10012. Tel: (212) 925-7000.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 6181 or S. R388, GRC, Any 51 series Collins units. Test equipment, everything. URM, ARM, GRM, etc. Rest offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07023.

INTERESTING Sample copy free. Write: "The Ham Trader." Sycamore, Illinois 60178.

RTTY gear for sale. List issued monthly, 88 or 44 Mhz to rods, five for \$2.00 postpaid. Elliott Buchanan & Assoc., Inc. Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

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: AF-68 w/p.s., NC-125 w/speaker, Dow coax relay; Heath RF signal generator, 2-400s and air socket and other items SASE. W8FPQ, 938 Bennett, Jackson, Michigan 49202.

MOVING Out of state: Drake TR3 with remote VFO and AC/DC power supply, \$450.00; 4-1000A amplifier 10-80 meters, spare tube, power supply \$500.00; \$250; 70 ft. tower 4-element 20-meter beam, prop pitch motor, \$600, or someone looking for house with water location on Great South Bay. Package deal \$43,000. For information, Chuck Daidone, 95 Anchorage Drive, West Islip, N.Y. 11795. Phone 587-7837.

HEALTH reasons: Must sell. Florida home built by me with hamshack in mind. Three bedrooms central heat and air-conditioning, including basement playroom, hamshack with workshop overlooking lovely lake; hardwood floors, three baths. Hamshack can be used as extra bedroom. Prefer to sell to retiring ham. Fifteen miles gulf thirty miles Silver Springs, Bargain! A. T. Tidwell, W4ASM (the original Route A-2, Box 165, Dunnellon, Florida 32630).

1000 PIV @ 1.5 amp, epoxy diodes includes disc bypass caps and bridging resistors, 10 for \$3.75. Postpaid USA. With diode purchase, 125 MF, at 350 volt electrolytic capacitors, \$50 each. Postpaid USA, no limit, East Coast Electronics, 123 St. Boniface Rd., Cheektowaga, N.Y. 14225.

BRAND New factory-sealed cartons. Hallicrafters SR-160, \$250.00; P-150-DC, \$90.00; MR-160 Mobile Mount for SR-160, \$12.50. All above F.O.B. H.D.H. Sales Co., 170 Lockwood Avenue, Stamford, Conn. 06902.

WE'RE Trying to complete our collection for Callbooks at Headquarters. Anyone has extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington, Conn. 06111.

TUBES, test equipment, transmitters or receivers. Any and all types bought for cash or trade on new or used ham gear. Air Ground Electronics, 64 Grand Place, Kearny, New Jersey 07032.

SELL, trade or buy Call Books, handbooks, magazines, and old radio sets and parts. Erv Rasmussen, 164 Lowell, Redwood City, California 94062.

SAVE On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts 01959-2530 for the gear u want at the prices u want to pay.

ESTATE Liquidation, SSAE brings list quality equipment. Paradd Engineering, 284 Route 10, Dover, N.J. 07801.

3000 V @ 3mf brand new GE Pyranco oil capacitors, \$3.00 each. Mail 3-lbs. each shipping weight. FOB P. Wandelt, RD #1, Unadilla, New York 13849.

TELETYPE Wanted—M28 typing units, any condx, keyboard perforators—reporators, cast aluminum TD bases, all unused parts. Sell, too. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310.

WANTED: An opportunity to quote your ham needs. 30 years of a ham gear dealer, Collins, Drake, Swan and all others. Also \$20,000.00 inventory used gear! Chuck, W8UCG-Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TEST Equipment wanted: Any equipment made by Jewett-Packard, Tektronix, General Radio, Stoddart, Measurements, Boonton. Also Military types with URM(-), USM(-), TS(-), SG(-) and similar nomenclatures. Waveguide and coaxial components also needed. Please send accurate description to Tucker Electronics Company, Box 1050, Garland, Texas 75040.

WANTED: Early wireless receivers and transmitters prior to 1926 for private collection. Jack Swanson, W5PM, RFD 1, Box 399, Covington, Louisiana 70433.

SELL: Borg-Warner 8-track portable crt. player, 2 weeks old, inc. 2 cartridges, (trade?) \$32.00; Lafayette HA150, 1 watt, 2 channel, portable c.b. xcvr, perfect condx, inc. leather carrying case, \$35.00. Johnson KW Matchbox 250-30-3 with meter, directional coupler, manual; exclnt condx. \$100 or swap. Want: HT32, HT32A, 2B-2BQ. Must be reasonable. Joe Rotunno, WA2CKM, 1816 Park View Ave., Bronx, N.Y. 10461.

FOR Sale: Collins KWS-1, Serial 1144. Excellent condition. Solid State power supply, Spinner knob, Relay. FOB first certified check \$425.00. E. L. Brady, W4RPC, 6415 Friendly Road, Greensboro, N.C. 27410.

FOR Sale: T-150 \$85.00, Superpro commercial version, \$60; antique Breitling 1, \$70; antique jewel meters, \$10 each, 4-250. K. Olson, Star Rte 1, Box 398, Belfair, Washington 98528.

INTERCEPTOR "B" with all-band converter, perfect, \$325.00. On air. Will deliver NYC-NJ area. Want HT-32B, mint. WB2TUG, Box 3, Allamuchy, New Jersey 08720.

LONG Run of QSTS: 1919-1965 for sale. Excellent history of electronics and ham radio. A few missing issues. Send for list. Best offer over \$150 takes. F.O.B. W1PNH, Lord, 3 Chilcatibar Drive, Walpole, Mass. 02081.

POLICE-Fire radio dispatcher directories! Exclusive official directories; callsigns, frequencies of local, county, state agencies. National. For all VHF fans. CD, AREC, RACES, MARS. VFD's Catalog for stamp. Communications, Box 56-T, Commack, N.Y. 11725.

"HOSS TRADER Ed Moory" says if you don't buy your Ham gear from him you might pay too much. Shop around for your best price and then call the "HOSS" before you buy. New Equipment with factory warranty. Galaxie 8 MHz, \$129.00; New Early Model Swan 500C, \$399.00; SB-34, \$349.00; NCX-500, \$319.00; FTDX-400 Transceiver, \$469.00; New Rohr 50 Ft. Foldover Tower Prepaid, \$189.95; New Mosley TA-33 and Demo Ham-M, \$195.00; Used Equipment 75A-4, \$299.00; HO-170, \$139.00; Hallicrafters S-117 HT-44, & Supply, \$419.00; Mint TR-4, \$409.00; FA-XB, \$339.00; R4-B, \$329.00; Ham-M, \$79.00; NCX-3 and NCX-A, \$229.00; Ed Moory Wholesale Radio Co., Box 506, Dewitt, Arkansas 72042. Phone (501) 946-2820.

HAMMARLUND HQ-180 with matching speaker. Immaculate inside and outside. Will ship. Make an offer. G. Hedworth, WAQGYX, 4114 NE 4, Terr., Kansas City, Missouri 64117.
FOR Sale: Johnson Invader 2000 \$500 cash, No C.O.D. K4-AUN, Lance H. Strickland, 4916 Bromley La., Richmond, Va. 23226.

DAH-DITTER Keyer. Integrated circuit electronic keyer. Fully self-completed on both Dit and Dah with automatic spacing. Built-in AC pwr. supply, recd relay output, with side-tone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N.E. Atlanta, Georgia 30328.

WANTED: Electronics Instructor. General indispensable. Theory and workshops. Science Camp, Lake Placid, N.Y. Write Eppstein, Apt. 4B, 440 Westend Ave., N.Y. 10024.

SELL: NC-300, Johnson Ranger, Astatic mike, D-104, low-pass filter, SWR Bridge, bug. First offer over \$200 takes. K6SUQ, 5 Rydal Court, Orinda, Calif. 94563.

SACRIFICE: College-bound. Factory reconditioned NCX-3, NCX-A supply, XCU-27 calibrator, Electro-Voice 664 mike. All exclnt condx: \$260. WA3JYM, 92 Grandview Blvd., Reading, Penna. 19609.

HALLICRAFTERS SR-42, two-meter transceiver HA-26 VFO PTT mike, beam, \$125.00. Packard deal only! Lochner, 353 Marguerite St., Elgin, Ill. 60120.

SELL: Heathkit HR-10 receiver, minus crystal calibrator. In exclnt condx: \$50. F.o.b. or will trade for Heathkit 10-21 oscilloscope. WA9UEK, Art Pahr, Box One, Plymouth, Wisconsin 53073.

POWER Transformer-Thordarson T22R35, also Inca 5 volt filament transformers 10 or 20 ampere, swinging chokes, Thordarson T19C38, also Inca 12/60 henries 35/350 ma/dc. Make offer. Heckman, 92 Lagoon Blvd., Massapequa, L.I., N.Y. 11758.

SELL: DX-60 vy gud condx \$55; RME 4350A, gud condx, \$75; RME 4301 slicer, \$50; AR-57 mike, never used, \$2.50; QF-1 Q mult. gud condx, \$3.00. Nice rig. Bob DeLuca, WB8BMG, 14120 Ashton, Detroit, Michigan 48223.

DX AWARDS Log: This 150-page book just published giving number and type of contacts needed for over 100 major awards for hams and SWLs by clubs world-wide includes cost and how and where to apply. Individual logs provided for each award to keep complete record of contacts and configurations. Required over two years to prepare. Most complete and up-to-date source of DX awards available. \$3.95 postage paid (\$4.95 foreign). The McMahon Co. (W6IZE), 1055 So. Oak Knoll, Pasadena, Calif. 91106.

WANTED: Complete used Galaxy station. KP6AQ, 4305 Windsor-Garland, Texas 75040.

WRL's used gear has trial-terms-guarantee! KWM1-\$299.95; IR3-\$399.95; SB34-\$19.95; Galaxy V-\$229.95; Galaxy 300-\$139.95; SX20-\$149.95; Invader 200-\$269.95; T4X-\$19.95; SX-146-\$189.95; HR20-\$79.95; SB300-\$229.95; Galaxy 2000* & PS linear-\$329.95. Hundred more-free "blue-book" list. WRL Box 919, Council Bluffs, Iowa 51501.

ANTENNA—Tower security. Highly corrosion resistant, stainless, brass, threaded, washer, hardware. Antenna accessories. Quote your needs. Lists 201, 156 credited first order. Ham Hardware Headquarters. W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

L-177B Tube Tester MX-949 A/U Adapter \$20.00, Vibroplex Champion Key \$8.00. U pay postage. W2CTX, 2 Dix St. New Brunswick, N.J. 08901.

FOR Sale: Swan 350, XC117, Spotless condition w/E-V 729R mic \$350. 143 Thomas Penn, U. of Pa. Phila. Pa. 19104.

SACRIFICE Drake 2A Knight T/50 CE10A W/VFO 6-2 meter transvertors ur off pse. Carl, WA5QYI, Box 159, Austin, Texas 78767. 512-476-6144.

SERVICE Bound: Good condx: DX35 with spare 6146 manual, and matching VFO; National NC-109 with matching sdrk. \$75.00 cash-and-carry only. Bob, WA9VOY/MPY, 1251 Cora St. Joliet, Ill. 60435. Phone: 722-5444.

HT37/SSX-111 package only \$300 HW12A \$100. BC221-AK Frequency meter \$65. New Johnson 250-39 TR Switch \$15. K4ECF.

COLLINS Station in new condition for sale. 753C with 800 cycle, 2.1 K.C., 6 Q.C.C. filters, 3233 transmitter, 316P2 power supply, 312BA4 station control, 301A linear amplifier, 664 mike and THGDX beam. 30% off list price. pick up only. K8LDC, 738 Truesdale Rd., Youngstown, Ohio 44511.

WANTED: 4-1000A tubes, pay \$15 to \$50 each, depending on condition. Joe Johnson, 305 East John, Champaign, Illinois. Phone: 217-344-5424 weekday evenings.

SALE: Kay Megasweep. A universal Lab-type sweep generator for university or shop. Also, Kay Megaligner—Make offer. Hunter-252 Jefferson Hts-Catskill, N.Y. 12414.

HAMMARLUND HQ110A Mint condition, little use, with speaker. \$165.00. Heath DX-60, and HG10 VFO, good condition, factory checked, crystals. \$75.00. WB2ZIA, Box S1305 Stevens Institute Hoboken, N.J. 07030, or Callbook address.

LAFAYETTE HE45B Transceiver, HE61 VFO, thunderstick Antenna. All \$80.00. you pay shipping. J. P. Wood, WA6UKA, 14031 Peach Grove, Sherman Oaks, Calif. 91403.

GALAXY V xcvr with power supply. New condition-Mechanical and electrical. Will ship \$375. WB2NZV, 14 Gordon Place, Glen Rock, N.J. 07452.

WANT: Early issues Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord, N.C. 28025.

GROUNDED Grid filament chokes, .30 ampis. \$4.00; Plate chokes 800Ma \$2.00; PP USA 48 William Deane, 8831 Sovereign Rd., San Diego, Calif. 92123.

SELL: Hammarlund HQ170-C with matching speaker \$170.00: HQ140X with Xtal Cal. \$90.00. Heath HR-20 \$90.00: Heath Apache with SB-10 \$140.00: Heath HW-12 with mic and speaker \$89.00; D-104 mic \$15.00; Darrel Sanders, K9ERX, 229 N. Superior Ave., Tomah, Wisconsin 54660. 608-372-4492.

SPAUDLING X-44CB Tower \$35.00. Buyer pays shipping charges. Sections may be added for greater heights; Knight capacity checker \$5.00; Lafayette stereo amplifier KT 23-\$20.00. W2WVK, 210 Utica St., Tonawanda, N.Y. 14215. Tel: 716-692-5451.

KWM2, Mint condition. Recently back from Collins factory overhaul with latest modifications. Waters selection and Waters channelator. Heath HP23 AC supply, Collins S16E 12 VDC supply, Collins 351D Mobile mount, Hustler 10-15-20-40-80 Mobile antennas. New Manuals. Asking \$95.00 for package. W1BYU, Ed Safrine, 14 Parlee Road, Cheshire, Mass. 01824.

COLLINS: 75A2 receiver. Product detector, and selectable AVC. \$200. Hallicrafters HT37 transmitter. \$200. Both in top condition. R. R. Kirk, 106 Va. St. West, St. Albans, W. Va. 25177.

THOR VI complete \$130. Heath Hp13 DC supply \$45. SB10 \$50. Hallicrafters SR42A, 2 Meter \$135. Hallicrafters SX101A Mint \$175. Heath Warfor \$125. Wanted: Monitor scope, antenna tuner, coax relays, phone patch, W2FNT, 18 Hillcrest Terrace, Linden, N.J. 07036. 201-486-6917.

SELL: Drake R-4 \$240. Two er \$30. Tom McGuire, 54 Blair Ave., Redmond, Calif. 94611.

SWAP: PE-203A, PE-101C, small prop pitch rotor. Needs BC-221 with calibration chart. HG-10 or 10-B. A. Taddeo Box 126, North Pembroke, Mass. 02358.

NATIONAL HRO-60 seven coils, 190-960 kHz and 1.700-30.000 mHz. Excellent mechanical and electrical condition. \$370 cash or trade for Collins S1S1 or Hammarlund SP 600. Lewis Collins, 759 Tennessee Building, Houston, Texas 77002.

SALE: BC-348 w/p.s. book \$45.00. Dumont 208B 5" scope \$45.00. German WWII TX/RX w/p.s. cables, mike, schematics, many spare tubes \$99.00. C. Fuhrman, 4613 Haverford Pl. Apt. 12, Wilmington, Delaware 19808.

WANT: Alprodec aluminum TV tower-new or used. 6.1 long sections & cornered. 11 1/4" OD on each side. State price and how many sections, for sale. KIDVO.

WANTED: HT 33 A or B. State condition and price. Wil Willimse, WB2NDH, 66 Bay Avenue, Atlantic, Highlands New Jersey 07716.

FOR Sale, or trade: National SW3 receiver with 40, 10 meter coils and instruction book. WØPSE, 205 N. Central, Coffeyville, Kansas 67337.

GONSET: Communicator III 2 meter transceiver, VFO and linear \$225.00. W9SP, Hal Blough, 9959 Drury Lane, Westchester III. 60153. 312-345-2574.

75A3 with 3.1 MHz, 800 Hz filters, plus Heath Q-multiplier manual, recently aligned. \$250.00. Need 7445 filter. Harry Burhans, Wells Road, RD 1, Malvern, Pa. 19355 (827-7374).

VHF Fixed, or Mobile-SB-110, HP-23, HP-13, SBA-100-200. Mobile mount, 6 Element YAGI, 6 Meter Whip, \$300.00 plus shipping. Good working order. H. H. Burns, WB4DJF, P.O. Box 335, Middleburg, Fla. 32068.

SELL: or trade: Hewlett-Packard 560A digital printers, H/H-AC-6 indicating decades, and other components for home brew counters. Complete components for kilowatt linear PL-172 linear with spare tube. SASE brings list with more goodies. WA4RGL, 1507 White Oak Ct., Martinsville, Va. 24112.

COLLECTORS Item: IRE proceedings run 1950 thru 1954 broken 1945 thru 1948. SASE list, consider Kennedy J. J. trade, interested in SR2000. W5LR, 1314 Holly Glen Dallas, Texas 75232.

SALE: Apache X'mtr. w/D104 mike; HO170C receiver-bot mint condition. SASE for many other items. Mrs. Ruth Hornbeck, 3406 Rock Bluff, Dallas, Texas 75221.

SALE: War Surplus items; Command Sets. Send SASE for complete list. C. W. Roberson, W5MBP-Box 218, Terrell, Texas 75160.

FOR Sale: Exceptional Swan 500C in mint condition including AC Power supply, \$500. Swan VX-2 Adaptor, \$200. Hallicrafters HA-1 T.O. Electronic Keyer \$55. New-Trac Hattert 4-BTV Base Station trap vertical antenna \$200. Robert White, K9LWA, 2540 Birch Drive, Richmond, Indiana 47374.

SELL: Collins 75A-4 Receiver \$325.00. Signal Corp frequency meter BC221 A8, complete with calibration book, range 12.5-20.000 KC \$75.00. Leeds. Northrop impedance bridge type S test set. No. 5300 make offer. Linear Ammeter, Homebrew, expert workmanship, using pr. 811's \$50.00. David E. Young, 2317 9th St. No. St. Petersburg, Fla. 33704 Ph. 829-2041.

ATTENTION! Complete Heath line low band station for sale. Mint condition. Want to sell as a single package, no trades. Total price \$1000.00: SB-100 Sideband Transceiver, SB-200 Linear 120 watts PEP. SB-630 Console with phone switch, SB-610 Monitor scope, SB-600 Speaker & Enclosure, HP-23 Power Supply, 1K Drake Filter 1K Antenna (Dumont), 1A 23-2 Rotator, 200' feet RG8 Polyfoam, ARS WABO, Jack Lintz, 2826 Woodview Ct., Normandy, Missouri 63121. Phone: 312-429-6056.

GLOBE Scout 65B, \$25. Eric Auto FM Tuner, Superex stereo headphones, \$25. 9X19 Rack panel cabinet \$10. All prices include shipping. R. Wanat, 443 Atlas, Madison, Alabama 35758.

FICO: 720 transmitter. \$30. or trade for HP-23 P.S. WABULQ, Robert Wyatt, 3526 W. Hillcrest, Dayton, Ohio 45406.

TECHNICAL Writers and Editors wanted: Free lance, part time. Various electronic topics. Standard rates paid. Send resume. Electronic Publications Company, P.O. Box 504, New Hyde Park, N.Y. 11040

SELL: HW12A. Mobile supply, mike, calibrator, Exc. cond. less than 1 yr. old: \$150.00. WIMIJ, C. Geiter, 58 Felic Rd., Natick, Ma. 01760.

SELL: Hallicrafters 18AVO, in superb shape. Looks like new \$170.00. Will pay postage. WA2DXL, 514 North Washington St. Peter, Minn. 56082

MODEL 26 teletype complete with FSK AFSK converter in excellent condition \$80.00. Also Knight 100A Receiver, good \$55.00. Ben Baker, WAØBHM, Rt. 2, Trenton, Nebraska 69044.

DRAKE-2c ex. cond. \$180.00. Gary Kunz, 391 Pascack Rd. Westwood, N.J. 07675.

HEATH HW-22A 40 Meter transceiver. Extra pair finals. Lafayette mike, mobile mount, manual. Only 5 hrs. operating time, excellent condition \$80.00. Donald F. Miller, R.D. 1, Cresco, Pa. 18326. Phone: 595-7744.

T-150-A, Ameco LP Filter, \$55 FOB, or best offer. Excellent. A. Windsor, 23550 Whittaker, Farmington, Mich. 48024.

50MHz Handbook Kilowatt uses practically new 4-400A. \$30. Gonset 912A 12-volt power supply for 4-meter Side-winder used 3X-perfect, \$45. Drake TV-100-LP lowpass (never used) \$3. M. Alter, 67 Nobscot Rd., Sudsbury, Massachusetts 01776.

SELL: Will ship express collect. NC-183D and Viking Navigator with manuals. Both as package deal \$160.00. WA4VDN, 409 Court St., Edenton, N.C. 27932.

SELL: Heath HW22-A mini condition. Reasonable. WAIHRL, 57 Greenfield Drive, Windsor Locks, Conn. 06096.

DRAKE: 2-B with Q multiplier/Speaker. \$200.00. Excellent condition. Going transceiver. Will ship. W8ANF, Garth Gerber, 109 N. Lawn Ave., Bluffton, Ohio 45817.

HA-1 type mercury relays. \$5 pp; 2B printer best local offer. K3MNJ, 8361 Langdon, Phila., Penna. 19132.

DRAKE Sale: T-4XB, AC-4 Power Supply, and R-4B altogether: \$725. You pay freight. Mint condition WB6YVVW, P.O. Box 2873, Hollywood, Ca. 90028.

NCX-3, NCXA, Mike #225. Top shape. Will deliver to 100 miles. Stuart Gates (WB4CNE) 4309 Taylorsville Rd., Louisville, Ky. 40220 or call 502-267-1277.

SELL: or swap for best offer. OST solid run, June 1924 thru 1964. All inquiries answered. KJHZ.

FOR Sale: Hallicrafters SR-160 transceiver with PS 150-120/AC power supply, xtal calibrator, and mike. Also Heath SB-620 Spectrum Analyzer (aligned for SR-160). All in fabulous condx. for \$250. Call (301) 474-1874 or write: J. A. King, K8VTR-3, 8150 Lakecrest Dr., 705 Greenbelt, Md. 20770.

FOR Sale: KWM-2 No. 12739, 516F-2 \$800. Henry 2K-2, share 3-400-Z. \$575. 7SS3-C (late production) \$600. Telrex TM-30-D \$250. 312B-5 \$275. James Craig, 29 Sherburne Avenue, Portsmouth, N.H. 03801.

GLASS House Hams-Compiling a directory of hams employed in the glass container industry and allied fields. Send information to WB2AHF, 1197 West Woodcrest Drive, Vineyard, N.J. 08360.

COLLINS: KWM-2 Serial No. 11736 with Waters Q Multiplier \$16-F-2 Supply with built in speaker \$750.00. WA2UHV, Roslyn, L.I., N.Y. Days (516) IV19844. Evenings (516) MA12629.

OST: Wanted all 1920, except October, plus November and December 1921 plus January, March, October 1922, plus August 1958. Name your price. Rex Bassett W4QS.

CE-20A Exciter, 600L Linear, Matching VFO, \$260. WB6SHO, 9908 Nebula Way, Sacramento, California 95827. Tel: 916-363-5516.

HEATH: In mint condition. SB-401 w/crystal pack \$250.00. SB-301 w/CW filter and SB-600-\$250.00 or both for \$475.00. W4RNG/1 P.O. Box 161, Niantic, Conn. 06357. Tel: 739-6429.

SELL: HW-12A w/ps. \$100. HW-16, \$75. HG-10B VFO \$25. SB-10, \$45. VF-1 VFO \$10. All are in very gd condx. Selling for college expenses. W8SOJG, 2002 Evangeline, Bastrop, Louisiana 71220.

GALAXY V MK II and AC Power Supply. \$359.00, postpaid. John Schroeder, W6UFJ, 3625 Quinn Bell Gardens, Calif. 90201.

STUDENT: must sell entire station—college expenses. Swan 350, TH3ir, beam ant, Heath Keyer, etc. Pls send for list. Ken, W8GOIB, 1115 Andrews Dr., Long Beach, Cal. 90807.

WANTED: Heavy duty VARICAP variable voltage transformer-0-140 volts at 15 to 20 amperes. State manufacturer, model number, and price. W2CVY, 70 Beech Terrace, Wayne, N.J. 07470.

POLICE Auto Alarm-100% protection of your mobile rig and car. Simple installation. Send \$9.95 PPD to B. Schneider, Dept. O, 2662 Hewlett Lane, Belmont, N.Y. 11176.

SWAN 350 and 117XC power supply. Late model, like new. \$350 for both. J. A. Russell, 1170 Devonshire, Muskegon, Michigan 49441.

SALE: Swan 500 Transceiver with 14/117 AC/DC supply in Speaker Cabinet. Perfect condition, and like new. \$400.00 cash. P. Scheller, K3GCI, Brodheadsville, Pa. 18322. Call (717) 992-4272.

SELL: In Vietnam, EICO 753 with transistor VFO. EICO AC power supply-spkr combo. \$150. L. Hamilton, 19509 Flavian Ave., Torrance, Calif. 90503.

TRADE: Complete 2 meter station; Hammarlund SP 600 IX, Ameco CN-144, Homebrew 6360 Transmitter, all in excellent condition for Swan 250 (6 meter) and 117XC. Will deliver in north eastern U.S. Ivan Lawton, 7471 Thunderbird Road, Liverpool, New York 13088.

WANTED: .5 KC and 2.1 KC filters for 75A-4 will pay reasonable price. M. Welch, 941 First Avenue, Williamsport, Pennsylvania 17701.

TELETYPE Model 19 in excellent condition. Will sell or trade for SSB Transmitter. G. Fasse, 11320 Darla Court, Warren, Mich. 48089.

HEATH DX20 with low pass filter. Xtal 7.168, \$25; Johnson Matchbox (275) \$35; Realtone eleven band portable receiver, \$49. R. Turner, 41 W. James St., Falconer, N.Y. 14733.

GALAXY III Transceiver-A.C. Supply, mike-good condition. Will ship. \$300.00 Marty-WA3GKR-13621 Grenoble Dr., Rockville, Md. 20853.

COLLINS KWM-1 with 516E-1 12VPS, 351D-1 Mobile mount, 312B-1 Speaker, and Home AC PS. All extremely good. \$435. Bill Pfeiffer, 120 Post, Iowa City, Iowa 52240.

KWM-2, 312 B-5, MP-1, 136 B-2, 351 D-2, CC-1, PM-2 \$1200. Henry 2K \$500. W. H. Jay K4TKW, RFD 3, Box 261 A, Douklastile, Ga. 30134.

WANTED: W. E. 16 button Touchtone dials: No. 66A4B, 66A3A, or 1066D4B-61 for remote control. Richard M. Jacobs, WAØAIY; 4941 Tracy, Kansas City, Mo. 64110 Telephone (816) 444-1968.

NEW antenna changeover relay. \$7.50 postpaid. Write WB-6WDI 1105 Oxford Rd., Burlingame, California. 94010.

SELL: NYC Area, EIMAC A54H transmitter \$25.00. Model H Slicer \$15.00. Instructions Bob Feikenbaum, 5 Park Street, Spring Valley, N.Y. 10977.

HEATH: 401 ssb xmtr. \$215. Hallicrafter SX-96 receiver with xtal cal. \$100. Both excellent condition, with manuals. W2ZIF, 28 Haring Dr., Old Tappan, N.J. 07675.

WANTED to buy-Telrex 3 element optimum spaced 20 meter beam or equivalent, gama match preferred. Will pick up in N.Y. state or surrounding area. Write stating full particulars, and price. K2UNY, R. S. Mead, R.D. 1, Owego, N.Y. 13827.

COLLINS KWM2 \$695.00; HBAC \$50.00; 312B5 \$255.00; Waters Dummyload Wattmeter Model 334 \$95.00; Dumont 304 AR Scope \$65.00; 3-400Z \$18.00; TO Kever Vibroplex \$70.00; Wanted: Drake R-4B-MN2000. Also, consider Color TV in trade. WA4LXX, F. E. Coble, 251 Collier Ave., Nashville, Tenn. 37211.

SALE: HO145X with speaker \$200. HR10B with xtal calibrator, unused \$85, new 304T \$10, K4UWH, 106 W. Chestnut, Johnson City, Tenn. 37601.

EICO 753 Tri-band transceiver and 751 A.C. P/S. very good cond. with manuals. \$150.00 complete. Elzie Osborne, 136 Broadway, Clark, N.J. 07066. 201-382-4684.

SELL: HO129X Lafayette HA63A receivers; Knight T-60 xmtr; HG-10 VFO; Amico preselector; GD-125 Mult; 18V antenna; coax and many accessories. WA1JMO, 45-303 Success Park, Bridgeport, Conn. 06610.

HAMMARLUND HQ-170. Factory noise blunker, 24 hour clock, speaker. All re-aligned, calibrated. Excellent condition. \$170. Will Ship. W6NFW, P.O. Box 61, San Juan, Bantista, Calif. 95045.

SELL: Collins 75S-1 excellent condition, VCZ modifications. \$300. FOB K4THA, Roux, 3190 N. Atlantic, Cocoa Beach, Fla. 305-783-4154.

HEATH: SP-610, HW-30, HS-24 Mobile Speaker, Hallcrafters S-38E, Electro-Voice 727 and Turner 54C Ceramic Microphones, Knight Speech Compressor, SWR Bridge and Z-Bridge, two BC-645 UHF Transceivers, (unconverted) with AC P/S. All flawless. No reasonable offers refused. K1LEC, Box 73, North Springfield, Vermont 05150.

COLLINS: 51S-1 all-band receiver s/n 331. New \$1828. sell for \$1,000. W3PDK, 729 Outer Dr., State College, Pa. 16801.

WANTED: Good used tri-band beam or mono banders. Packed for shipping. State age, model, price, etc., K1UZX, Washington, W. Va. 26181.

SWAN: 350, with xtal calibrator. \$275; 117-XC supply \$60; Turner 333 mike \$10; vibroplex "bug" \$5. WA8OVC, 109 Vaughn Rd., Delaware, Ohio 43015. (614) 363-1819.

DRAKE: 2-c, 2-CQ \$215. EICO 720 w/relay, TVI filter, 9 novice xtal. \$80. Heath Tower \$37. All for \$100. You Pickup. WA2GLH, Tel. 212-275-1052 eves. Zip 11375.

JAGUAR XKE 1964. Swap for high quality SSB equipment, plus cash. NCX-3 transceiver NCX-A, NCX-D, Hustler Mobile Antenna for sale or swap. Rosner, K2KHR, 39 Cameron Court, Freehold, N.J. 07728. Phone 201-462-8975.

VIKING Ranger, good condition \$70. DB23 Preselector \$10. NC98 Receiver \$35. Manuals included. W4KAS, 250 West Lakeview, Pensacola, Florida (904) 432-3747.

APACHE TX1 and SB10. Worked 100 countries SSB. Mint condition with manuals. \$140 FOB Albert Foss, W4KRS, 1118 Fairway Drive, Waynesboro, Va. 22980.

FOR Sale: NC-300 \$140; DX-40 and VF-1 \$40; Vibroplex Deluxe Original \$20; and JT-30 Mike \$5. All for \$180. Will ship. Write: Thomas C. Younce, K4CDF, P.O. Box 8561, Pope, AFB, North Carolina 28308.

REPAIR and calibration service. Write before shipping. Pantronics Inc., 6608 Edsal Road, Alexandria, Virginia, 22312.

WANTED: P/S (AC) for Pierson KE 93, Hank, W9II/4, 1254 Seminole Dr., Indian Harbour Beach, Florida 32935.

OST's: Complete excellent 1956, 1957, 1958, 1959, 1961, CQ, 1950, 1951, 1962, 1963 \$3. Per Yr. Pyrrt, 192 Norman Way, Paramus, N.J. 07652.

COMPLETE Drake 4B-line station. Everything new. Emergency, must sell complete station. own 19 payments \$620 each. Would like package sale, but will sell separately. MS-1 \$39.00, R-4 \$37.00, CA-1 \$14.00, AC-1 \$18.00, MS-4 \$18.00, MN-2000 \$154.00, 1B \$60.00. All still in sealed cartons. SC-2 \$61.00, SC-6 \$57.00, CPS-1 \$6.00. Converter serial console assembled but never used. Complete package \$1829.70. You pay shipping. Bob, WITT, 1110 Anderson, Irving, Texas 75060.

COMPLETE 6-meter station, 829-B transmitter \$70.00; (No shipping). VFO \$20.00, S-10 Receiver \$70.00; Dow Antenna Relays \$10.00; Converter \$10.00; Preamp \$5.00; JT-30 mike \$7.00; Telrex Beam \$20.00. Instruction book with tapes \$25.00; AR-22 Router \$22.00, CPO \$5.00. K8YNO, 5632 Haughey S.W. Grand Rapids, Mich. 49508.

SALE: 75A-4, Serial 2862, 3.1 kc & 800 cycle filters, \$350. TR-3, AC Supply \$350. Want Motorola Motrac, Mocom or other transistor units for 33 MC FM. Stan Talazo, Rt 3, Bridgeport, W. Va. 26330.

NOVICES: Lafayette HA-350 rcrv, 80-10 mtrs, WWV on 15 Mc., 100kc, crystal calibrator, matching spkr; Eico 723, 60 watt, cw xmtr; Hammarlund HO-110 AC rcrv, 160-6 mtrs, spkr. All in excnt condx. Don Kuczynski, WA2BSG, 68 Prospect St., Fredonia, New York 14063.

COLLINS: KWM-2 with A.C. and D.C. supplies, and speaker, excellent condition; \$800. HT-41 linear, \$200.00; SX-71, \$75.00; Ranger, \$75.00. Want HT-32B in perfect condition. No shipping. K10JQ.

EICO, 753, xcvr, mint stable with solid-state AC supply, \$150.00. EICO 717 keyer mint, \$50.00. Herb Howe, K7CWO, 115 N. 52nd Ave., Yakima, Wash. 98902.

SELLS: Complete Heathkit station HX20, HR20, HP20 with manuals, \$170.00. Johnson Matchbox 250-23 for \$50.00. Transportation extra. WIDNM/1, Bernard J. Bechard, Box 103, St. Michaels College, Winooski, Vt. 05404.

HALLICRAFTERS, HT37, excellent condition, manual, \$200.00; Heathkit Twoer, unused, \$30. WOOLZ, 1032 Richview, St. Louis, Mo. 63127. Phone: 314-822-8265.

FOR SALE: Johnson Ranger \$99 and Courier amplifier \$120. Both excellent and with manuals. No shipping! Richard Schweizer, WB2PCF, 240-27-145 Ave., Rosedale, L.I., N.Y. 11422 (212) LA-6124.

TV Camera, used, for sale. Sacrifice \$125. K6CHS, 1431 West Ave., Fullerton, Cal. 92633.

JOHNSON Vallanc F/W \$125, Central Electronics C-10B \$40, Malcolm Wiseman, W3GVG, 215 Peabody St., N.E., Washington, D.C. 20011.

COLLINS PTO units wanted. 70H12 for R390A, 70E15 for R-388 and 70E24 for 75A4. State condition, unsealed, new or used. Also need all mechanical filters for 75A4. WA4YFI, Bill Smitherman, Rt. 2, East Bend, N.C. 27018.

HALLICRAFTERS SR-150 Mount, D.C. supply \$375.00, S.X. 117-Speaker \$225.00; SB 200 Linear \$195.00, TH6DX Tri-bander \$85.00; Tristao CZ-454-FS Tower expecting fixture \$280.00; Both like new. Ham "M" Rotator \$75.00. Tri-ex 60' crank-up tower \$125.00. W4MVC, 10 Carjen Ave., Asheville, N.C. 28804.

SELL: Ranger 1, \$90. HQ-170A, \$160. Both very xint condx. Kay Mega-Pulser pulse gen. \$75. Globe 680-A \$30. Both very good condx. Pick-up deal only please. WA5MUV, 1214 Patricia Lane, Garland, Texas. 75209.

SWAN: 350, 117XC; Heath HD-10, HD-20, HM-11, JT-30 mic. All positively mint condition. All connecting cables, manuals, included. First \$350 takes postage your OTH. WOBYW, 1610 S. Valentine Way, Denver, Colo. 80228.

WATERS Compreamp No. 359 compressor, \$19.00 p.p.; Vibroplex Presentation, case, \$13.00 p.p. Wheaton, W5PKK, Rt. 2, Box 324D, San Antonio, Texas 78228.

FOR SALE: Hammarlund HQ-110 receiver, Amateur bands only, 1.8 MC to 54 MC less than ten hours use, \$100.00. Robert W. Harris, 1229 Monroe N.E., Albuquerque, N.M. 87110.

SELL: Turner 454C microphone \$13; Drake TV-1000LP filter \$11. Brand new, instructions, cartons. WB2ZQE, 31 Eaton, Syosset, N.Y. 11791. (516-931-2966).

KWM-1 mobile mounts. One new, one used. Best offer. W9MTU, P.O. Box 2248, Anderson, Indiana 46011.

NCX-3 transceiver, NCXA, power supply-excellent condition. Best Offer. Ralph Hawkins, 313 Knollwood Drive, DeKalb, Illinois 60115. Ph. 815-758-0492.

VIKING II with VFO \$85.00; HQ129X with speaker \$80.00. Both in excellent condition. 2W2GKT, Robert Slutsky, 216 Dellwood Road, Metuchen, N.J. 08840.

WANTED: 30L1 or 3K2/3 linear amplifier, K4IE, 705 Lake Worth Towers, Lake Worth, Florida 33460.

HEATH HW-16 CW Transceiver in good condition, \$85.00. WA2ABB, 7 Circle Drive, Syosset, N.Y. 11791. Tel. 931-4539.

FOR SALE: HT37 transmitter, SX111 Receiver. Good condition. Best offers. 9W9KUA, W. Bennett, 4464 Glenway St., Milwaukee, Wisconsin, 53225.

DRAKE T4X, R4A, AC-3 speaker combination as package \$670.00. Unabused and in excellent condition. Harry Dagley, 722 Paradise, Libertyville, Illinois 60048.

SELL: HT32 and SX101 MK111 with 160M both for \$325.00. You pay shipping. W. R. Ellis, 5688 Oakhurst Drive, Largo, Florida 33540.

DX, 60, HR10, VF I, \$100.00 plus postage, K6RIN Pat Schultz, 1368 Yokayo Dr., Ukihi, California 95482.

IRE Proceedings: 1958-1967, QST 1951-1965, 42" rack cabinet, George B. Lagaly, W5NTL, Rt. 3, Box 79c, Okla. City, Okla. 73127.

WANTED: For HRO 60, Coil sets E & F, with scales. C. F. Bell, Box 576, Burlington, Iowa 52601.

WANTED: 200 & 500 cycle filters, for Collins 75S3B. Write or call and advise price. W3DPA, S. Matthews, 921 Stuart Road, Wilmington, Delaware. 302-658-3200.

SELL: NC303 Receiver \$200; National 6 and 2 VFO \$30; Heathkit DX-100 \$65, W2DJG, 15 Bolivar St., Staten Island, N.Y.

SELL: Venus, P.S. and Apollo Linear \$595. Bird Meter 25W, 500W Elements, \$90. No Personal checks. WA8AYM, M. Listiak, 717 S. Schenley Ave., Youngstown, Ohio 44509.

HALLICRAFTERS HA-6 Six meter transverter with P-26 Power Supply, and Heathkit SB-200 Linear Amplifier. Perfect condition. First reasonable offers. David Mastran, 933 Mackall Ave., McLean, Virginia 22101.

20A Central Electronics SSB Exciter factory wired with anti-trip and 500W PER Homebrew linear, \$150. Motorola 3V FM Transceiver with transistorized power supply, control head, cables, microphone, speaker, but defective receiver section. \$35. Buyer must pick-up WSGYB/6, Box 1410, Diaphnit, Biona Dr., Los Angeles, California 90066. 213-391-6864.

FOR SALE: Heath DX-60 transmitter w/relay \$60; Heath HG-10 VFO \$23; Hammarlund HQ-110 receiver with speaker \$125. KW using two 813's with pwr supply \$130; Johnson KW low pass filter \$6. Handbook keyer using two 12 AU7's \$11; all equipment in excellent condition. WA2YYJ, Larry, 700 West 178 Street, New York, N.Y. 10033. WA8R067.

SELL: Drake 2 NT \$100.00. Instructograph with 10 tapes \$40.00. Bill Harmon, W6A6AYY, 1753 W. 103rd St., Los Angeles, Calif. 90047.

MOTOROLA-Wide Band PermaKey filters K8436 \$4.50 each \$10; FMTRU-5V Transceiver \$25; Hartman 120 watt 1/2 wave Band Mobile Linear \$85; RCA CMV4 H-Band, 12 volt \$100; four units \$350; Pve Hi-Band Mobiles PTC-8200 \$65; DDMont 5814 \$65; Bendix Base & Mobile, both \$85; Low HF 14/ KW Amplifier \$35; Link 1938 Remote control \$25; Ley, 1196 Elberon Ave., Elberon, New Jersey 07740.

TWO Galaxy V Mark 2. One new, one slightly used, A/C Power Supply, D.C. Power Supply, Speaker, console and Novice Adaptor, will accept reasonable offer. Arlie E. Paig, 418 Antelope Trail, Parker, Colorado 80134.

SELL: D 104 mike with attached PTT switch \$10.00; VHFplex Presentation bug \$19.50; Hallicrafters HG-1 RF Signal Generator \$13.50; Knight xmr Compressor Preamp \$19.00; Lafayette KT-174 VTM \$15.00; Dow-Key Coax Relays \$15.00 AC \$9.00; Craftsman Saber Saw \$10.00; or make offer. All in excellent condition. Harold E. Brown, W1ONG, 6193-0501, 4 Ward St., Woburn, Mass. 01801.

100 Watts on 6 meters, and 20, 40, 75, 80 and 10 Gables G768 plus turner mike, and mobile power supply, and cable 40 hours used excellent cond. \$125.00. C. Guetter, 345 71 St. Bklyn., N.Y. 11228. Tel. Nr. 836-5945.

HRD-60 \$194.00, Collins 310B-1 CW Exciter \$75.00, V. Johnson, 137 W. Sycamore, Chillicothe, Illinois 61523.

GALAXY V and AC-35 power supply, both mint condition \$300.00. Robert Mauro, 150-30 18th Ave., Whitestone, N.Y. 11357.

AMECO TX-62 w/relay, Heath 6 and 2 meter converter twoer. All excellent. Will ship, best offer. WA7EEB, Robert Arnold, 2008 W. Roma, Phoenix, Arizona 85015.

DRAKE R-20, R4B, AC4, MS4, \$700; Swan 250C, 117X \$375. John O'Rourke, WA5WRC, Box 152, Welling, Oklahoma 74471.

NATIONAL NC-200 transceiver, AC-200 power supply (110-220v), with manuals and original cartons. Excellent condition \$295.00; Shure 444 controlled magnetic, PTT microphone, \$15.00. John Pitts, K1QMF/7, 307 W. Webb, Put-in-Bay, Wash. 99163. Tel: (509)-564-7052.

WANTED: Phone patch and/or Matchbox equipment. New or used in gud condx. WA2ETN, 69 Maria Lane, Yonkers, N.Y. 10710.

RTTY Gear: Reconditioned Teletype equipment: Model #14 typing reperfs \$40.00; Model #14 T.D.s, \$40.00; Model #14 paper-tape KSR, \$6.00; Model 19 page-printer with perforator keyboard, \$100.00; Model #20 tape perforator, \$45.00; Model DDX200 distortion test set, \$85.00. Write for complete details. C. H. Plummer, Cherrybrook Drive, RD #3, Princeton, N.J. 08540.

FOR SALE: NC-300, \$125.00; DX-100 modified to B, no tubes, \$60.00. Both are in gud condx. W8YMB, 3703 Brecksville, Ohio 44141.

SELL: Henry 2K-2 linear amplifier with Galaxy V Mark exciter, remote VFO, power supply, VOX, xtal calibrator and all inter-connecting cables. In mint condx, all original cartons and manuals. 5 hours total use—guaranteed perfect. Will ship F.o.b. for only \$1049.00. Write or phone W3NVA, 8258 Brittany Place, Pittsburgh, Penna. 15237.

DISCOUNTS! New displayed items: Galaxy GT550, \$38. TR4 \$499; T4X, \$399; T4B, \$385; L4B \$650; Swan 350C \$469; MK II, \$589; 500C (used) \$399; Hy-Gain TH6DX \$139; Ham-M, \$199; Tr44, \$59; AR22R, \$29; Prices F.o.b. L.A. Amateur Radio Supply, 2302-B Artesia Blvd., Redondo Beach, Calif. 90505. Midwest: Evansville Amateur Radio Supply, 1311 N. Fulton, Evansville, Indiana 47712. "See Dayton Hamfest."

RARE QST's for sale: 1917 through 1925. Send for list. George H. Rancourt, K1ANX, 78 Williston Ave., Easthampton, Mass. 01027.

GET Antenna-Tower security. Highly corrosion-resistant stainless steel, threaded, washer, hardware. Many antenna accessories. See our March 1969 QST ad page 140. Quo your needs. Lists 204-154 credited first order. Ham Hardware Headquarters, W8BLR, Straesser, 29716 Brainerd, Southfield, Michigan 48075.

WANTED: Collins KWM-2, 32S-1, 32S-3, 75S-3, 30L-1. Must be in first-class condition, with manuals. WA6JWK/4, 230 N. Florida St., Arlington, Virginia 22207.

WANTED Coils for NC-300—30-50 Mc. H. Griffin, 29 Chipley Rd., Stamford, Conn. 06902. Tel: 143-174 MC.

HEATH SB-400 SSB TX 80-10 M., Xcint condx, \$220. Wanted: ART-13 manual. Hank Perras, K1ZDQ/174 Andover Road, Billerica, Mass. 01821. Tel: 617-667-1639.

CRYSTALS Airmailed: MARSHALLS, Marine, SSB, Nets, Etc. Novates, 0.5% Crystals 1.50. Custom finished etch stabilized FT-243 .01%—any kilocycle for fraction, 3500 to 8600 \$1.95 (five or more this range only). \$1.75 each, nets (one or more) same frequency. \$1.45 to 700, to 3499 and \$800 to 20,000 \$2.95, overtones supplied by 10,000, 10,001 to 13,500, fundamentals \$2.95. Add 50¢ each for .005%. Add 2¢ each for HC-6/u metal miniatures above 2000. Crystal singles and groups for ARRL-QST Handbook. SSB Manual. Be specific. Write for order-bulletin. Crystals since 1933. Airmail 104/crystal, surface 64. C.W. Crystals, Marshfield, Missouri 65706.

SELL: HW-16 c.w. transceiver in exctn condx, \$90. Jim Nelson, Box 10, Rexford, Kans. 67753.

SELL: SX-99, \$75. with Heath Q-Multiplier and Preselect. \$85. J. Schrimsher, 7004 N.W. Hwy 9, Kansas City, Mo. 64152.

COLLINS 30-band 51J rcvr and KWS-1 xmtr, \$1000. Will ship. No trades, sry, except G-E or Motorola communication equipment. Will also pay cash. W9DSV, Box 87, Webster, Wis. 54893.

HD-10 owners. Add portability and protection to your key. Custom built cases. \$12.50 ppd. Free photo. Johnson Case Co., RR#192, Oakland, California 94604.

SELL: CE-100V, \$300; 75A4, \$430.00; GSB-101, \$140.00 4-tel. Quad, \$100; 88 ft. crank-up tower, \$195.00. J. Walker, 328 Carpio Drive, Diamond Bar, California 91766.

RCA ITV-5 TV camera, with 10" monitor, interlaced sync generator CH 2-6 xmtr, control unit, camera cable, lens. Working, less Vidicon. Make an offer. Barr, Watzman, 300 Man. dorm, Room 310B, R.P.I., Troy, N.Y. 12181.

SELL: CO, Oct. 1957 through December 1967; 12 earlier issues, 73 Oct. 1960 through Dec. 1961, except January 1961. Almost complete files of Popular Electronics, Electronics illustrated. Offers? You pay shipping. W6CZP, 850 Croft, Pomona, Calif. 91766.

COLLEGE Expenses: sell Gonet Communicator III, 6M xcvt with all cables, manual, new mike and five element noise blander beam, \$130; RT-279/APX 1296 Mc VFO, xcvt, 115V60 cycle, \$25; 80AM, ARC-5 with power supply, \$15.00. RAO-7 (National NC000XA) 80-10 M receiver, \$75.00. Make offer! WASWVK, Box 1808, College Station, Texas 77840.

75A4 ser. No. I-202, vernier dial, 3 filters, speaker, 136C-I noise blander, speaker, like-new condx, \$410; Heath Monitor 'scope, never used, \$45.00; Tunnel dipper, in exclnt condx, \$25.00; Telrex 2 kw, inverted V with balun, \$17.00; TA-33 Jr. Tribander, \$30.00; CushCraft 6-el. 6 meter beam, xcint condx, \$22.00. All items F.o.b. New Durham, N.H. 03855. Tel: (603)-859-4557. K1NXL.

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COLLINS 75A4 with vernier dial and #3.1 mech. filter, \$395.00; Collins 75A3 with 3.1 mech filter, \$245.00; Globe King 500 C (\$275.00); Johnson Viking II with Johnson VFO and low-pass filter, \$85.00; B&W 5 position coax switch, \$6.95; Simpson Elec. powerstat type 116U prim, 115-60 cyc, output 0-135V, @ 7/8 amp, in cabinet with 0/150V AC Trippel meter, \$35.00; Central Electronics MM2 RF analyzer, \$6.00; Johnson SWR bridge, No. 250-24, \$5.00; Advance 115 v.a.c. relays 3 @ \$5.00 ea. Plus shipping on all above items. Fred Liddle, W2TZN, P.O. Box 434, Old Forge, N.Y. 14920. Ph. 103.

WANTED: BC-610. Please state price and condition. K8-NVJ. Quentin C. Smith, 13045 Carter Road, Painesville, Ohio 44077.

WANTED: Coil set 3, type RAS/CNA-47165, 9-2.0 Mc; and coil set 7, type RAS/CNA-47169, 14-30.0 Mc, for National RAS/CNA-46081, 456 kc, I.F. receiver. Write: Jim McNally, 104 Tulip Drive, Gaithersburg, Md. 20760.

GETTING OUT: SB101, xcint, factory aligned w/HP-23, SB-600 unit, \$400; HD15-\$20; HM-15, \$12.00, k.w. ant. switch, \$7.00; mobile mic, \$5; Cantenna, \$7. All plus misc. items, \$435.00. Cables, manuals included. All used very little. First check takes any or all. Shipping charges collect. WA9SXW 208 S. 8th St., Goshen, Indiana 46526.

HEATH SB-100 w/c.w. filter and all SB-101 modifications, plus SB-600 spkr. and HP-23 P.S. Cost over \$450.00 in kit form. All are in A-1 condx for \$350.00. New pr. \$867 triodes, gud for 2 kw h.p.E.P. Same size and socket as 4-400s. \$18/pr. 2 mech. fltrs. 250 kc, kc wide for SSB, \$19 each. G.E. Krelkberg, Gerry, W6HFR/Ø, 8309 Dupont Ave., South Minneapolis, Minn. 55420.

"Don And Bob" specials: Galaxy GT-550, AC supply \$46.00; Uni-Ex W61 freestanding, crank-up, prepaid freight (reg. \$851.50), \$725.00; Galaxy R-532, \$625.50; Hammarlund HQ-124, \$475.00; TH6DXX beam (reg. \$115.00), \$135.95; Sony 250A station recorder, \$99.95; D-104C G-stand, \$29.95; Mosley Classic 36, \$144.95; used special 75A-4, KW-1, Collins combination \$1000 cash; new, guaranteed surplus 1000 KHz HCG/U crystal, \$3.95; Telex Hwy-2000 "stethoscope" headset, \$3.95; RG-22B coax for Polyson quad, 154/ft.; RG-6 RG-213, RG-63U, 154/ft.; RG-62, 64/ft. ANB-1 military headset with cord, plug, headband, \$8.95. Write for export quotes. Collins warranty repair, plus other major lines. (FCC finance. Prices F.o.b. Houston, Texas, Don KSAAD, Bob, WA5UUK, Madison Electronics, 1508 McKinney, Houston, Texas 77002. Tel: (713)-CA4-2668).

VIDICONs: RCA 7735A, \$20.00; RCA 7038, \$15.00; Toshiba 7038, \$10.00; Vidicon yoke and focus coll., \$35.00. WB2GKF, Stanley Nazimick, 506 Mount Prospect Ave., Clifton, N.J. 07012.

SELL: Lampkin 205-A, \$150.00; Measurements 80-C, \$140.00; Dumont frequency meter, Mark III \$180.00; B&K model 707 tube-tester, used 2 months, \$125.00; Health 610 Monitor 'scope, used 2 months, \$50.00. Power supply, 5000 volt at .5 amp., \$35.00. Ken Birman, KSYYC, Rte. 4, Box 820, Battle Creek, Michigan 49017.

SWAN 210, new 6-meter VFO w/guarantee card, \$90.00. WA3HYW, 33 Fort St., Forty Fort, Penna. 18704.

HT-37, exclnt condx, for quick sale. Only \$160.00. K2KGU, 420 Riverside Dr., New York, N.Y. 10025. Tel: (212)-666-8513.

SELL: SR-500, AC/DC p.s., mobile mount and cables, \$425.00. Richard Hayman, 11556 Lockwood Drive, Silver Spring, Maryland 20904.

75A4 w/Collins noise-blanker, \$425.00; Parks 432 Mc. converter, \$45.00; list of gear excess needs. Stamp. WA4API, Box 4095, Arlington, Va. 22204.

SELL: Heath KW linear, Drake 2-A receiver, Heath Monitor 'scope, Leon Steinberger, W2EVV/1, 301 Buckminster, Norwood, Mass. Phone 617-762-2352.

RANGER II, excellent condx, best offer over \$110. Leonard Maisel, W3WVC, 8102 La Salle Road, Towson, Maryland 21204.

HEATH HW-16, in exclnt condx, factory-aligned: \$100. WA2BQG, 893 Schenck Ave., Brooklyn, N.Y. 11207. Tel: (212)-649-6152.

FLORIDA acre homesite trade for new or like-new transceiver. Acre value twenty-one hundred. I need thousand plus your transceiver complete. A. T. Tidwell, Route A-2, Dunnellon, Fla. 32630.

SELL: Johnson Viking Valiant I, \$120.00; also B&W 51SR-B SSB receiver, \$50.00. Both or separate in working order. Dick Volk, WA2BUC, 538 Morris St., Albany, N.Y. 12208.

SELL: SBE-34, SBE mike, SB2-cW codapler, SB2-XC calibrator, brand new, \$279. Also Elmac AF-68, perfect, \$49.00.

SELL: LRN-1A frequency meter with book, manufactured by General Radio, \$95.00; Wanted: HRO-60 or HO-180. Prefer rack model but table model OK. Nagle, 12330 Lawyers Road, Herndon, Va. 22070.

HEATH HO-10 monitor 'scope, A-1 condx; \$40.00 cash and carry. Lefor, 39 Pond Road, Ridgefield, Conn. 06877. Tel: (203)-438-6241.

DRAKE TR-6, new in December about an hour's use. As advertised page 175 from November 1968 QST \$500.00 gets it if you pay shipping. E. W. Barton, W91OG, 1619 W. Kensington, Peoria, Illinois 61614.

COLLINS 75S-1, \$225.00; Collins 32S-1 and 516/F2, \$450.00; National HO-50T1 and 5 coils, \$175.00. Central Electronics Model A slicer and Q-multiplier, \$30.00. WA4CWO, 3249 Ridge Rd., Birmingham, Alabama 35243.

SWAN 350, 117 power supply, crystal calibrator, sidetone. In xcint condx, original cartons. Firm \$345. Steve Strutner, 1984 Marques Ave., San Jose, Calif. 95125. Tel: (415)-269-8660.

WANTED: Used 2-meter AM transceiver and linear K7-DGV, John Stiles, Box 114, Sweetgrass, Montana 59484.

LINEAR, new, pair of 4-1000A in Class B grounded grid, vacuum capacitor, adjustable filament and plate voltage. 10 thru 80 meters. Bill Brown, WØSYK, 28 Marine Lane, Hazelwood, Mo. 63042.

WANT: Alproducro Aluminum TV Tower. New or used, 6 feet long sections 2-cornered 11 1/4" o.d. on each side. State price and how many sections for sale. KIDVO, L. W. Thomsen, Thomsen's Audio, 513 Glenbrook Rd., Glenbrook, Conn. 06906.

DISCOUNT Prices: new equipment—full warranty—factory-sealed cartons. Write for lowest prices: Swan-500C (\$520 reg.) \$399; Galaxy V MK III (\$420 reg.) \$319; new CDR Ham-M with indicator, \$99.95. Big discounts on all brands. Send for quote on any type of equipment today. New Gonet GSB-291 2 KW P.E.P. linear, \$279; NCX-500, \$381; TR-Ex W-51 self-supporting tower (\$393 reg.) \$339; Mosley Class 33, \$112.00; Hy-Gain TH6DX, \$139. Hammarlund HQ-180A (\$480 reg.) \$431. Edwards Electronics has the test discount prices on ham equipment. Quick replies on all mail orders. Edwards Electronics, 1316-19th Street, Lubbock, Texas 79401. The Discount Ham Store.

BRAND New coaxial antenna switches. Ideal for SSB transceivers, \$3.95—\$25 pp. Made by Tektronix, with Amphenol Teflon PL-259 and 2-SO-239's. Ramco Electronics Corp., 3830 Cypress Ave., Brooklyn, N.Y. 11224.

TOROIDs 44 and 88 mhy, center-tapped, never potted, \$5.00 postpaid: teletype 32KSR page-printer, complete, working, \$300 or will trade for FM. Model 15, \$85.00. Model 28KSR, complete, \$400.00. Johnson KW Matchbox with SWR, \$120.00. Hallicrafters SX-101A receiver, \$160.00. Heath DX-60A transmitter, \$55.00. Gonet GC-103 2-meter communicator, \$85.00. B&W 5100B and 51SB transmitter (SSB), \$145.00. Page-printer paper, \$6.00/case/12. 11/16" paper tape, \$3.00 box/10. Wanted: Back RF covers for Measurements Model 80 signal generator. Hi-Band and UHF FM gear. Stamp for list, pls. Van, W2DLT, 302Z Passaic Ave., S. Cliffside, N.J. 07090.

SELL: Collins station, 75A-4 rcrv with 0.5, 3 and 6 kc filters. KWS-1 transmitter, recently factory-overhauled, SC101 station control with coax antenna relay. In exclnt condx. Sked anytime to hear or see this rig. Price: \$1,000. WA6FMR, Don Baake, tel: (213)-349-7835, 19429 Vintage St., Northridge, Calif. 91324.

SELL: Waters Channelator with xtals, for KWM-2, \$40.00. Ted Balan, K8JFX, 5577 Waterbury Ave., Maple Heights, Ohio 44137.

I have two fine transceivers; will sell only one. Mint condition NCX-5 with calibrator and NCX-A AC power, \$420.00. Also brand new Hallicrafters SR-400 with PS-500 AC power in factory-sealed carton, \$755, plus shipping. Merrill Edison, W5AMK, Temple, Texas 76501.

ENTIRE Station for sale: HW-12A, ACP/S, HD-19 patch, 24 hr. clock/spkr, HA-63, SWR bridge, Drake filter, bux, mike, Jones Station Guardian, 20-meter linear, Challenger Transmaster, scopes, VOMS, DX-20, audio filter. Wanted: Good RX, Eli, 106 Hillair Circle, White Plains, N.Y. 10605.

FOR Sale: Asahi transistorized TV camera, \$197.50. Fred Mertin, Route 2, Fayetteville, Arkansas 72701.

SELLING: DX-100, Best offer over \$50.00. Dow-Key relay, \$10.00. JT-30, \$10.00; Heathkit mobile microphone, \$5.00. Want: SB-200, SB-610. Dennis Quinn, 88 Woodrow Court, Sharon, Penna. 16146.

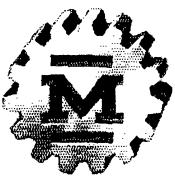
RECEIVER, Selling Heathkit GR-54, perfect condx, \$89.00. Also RME-6900, \$190.00, and Apache with SB-10, \$145.00, both are in FB condx. F.o.b. Unionville, Conn. 06085. Kruse, East Shore Drive, Unionville, Conn.

DRAKE 2-B, 2-BO, \$200. Hallicrafters S-108, \$75.00. Exclnt condx. WA5IIS, 409 West Cedar, Brinkley, Arkansas 72021.

KWM-2 and PM-2 power supply. Recent complete factory check-out. Like-new condition, \$695. Dan Hington, WØWIG, 272 Crandall Dr., N.E. Cedar Rapids, Iowa 52402.

BEST Offer: Collins 75S1, 32S-1, 516F-2, 312B4; Fischer X-101B stereo amplifier, FM-200B stereo receiver; FM-200B stereo receiver; Ampex stereo tape deck F-4450. All like-new. TA-36, 1000 foot copper clad steel wire, many transformers, chokes. Also old tube. Will accept 35MM SLR equipment in trade. W2LXD, 1381 Richmond Court, East Meadow, N.Y. 11554.

Designed for Application



The No. 90901 One Inch Instrumentation Oscilloscope

Miniaturized, packaged panel mounting cathode ray oscilloscope designed for use in instrumentation in place of the conventional "pointer type" moving coil meters uses the 1" 1CP1 tube. Panel bezel matches in size and type the standard 2" square meters. Magnitude, phase displacement, wave shape, etc. are constantly visible on scope screen.

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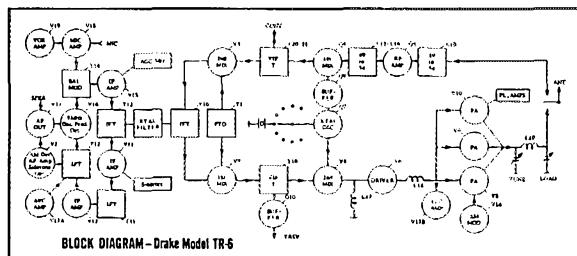
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GENERAL SPECIFICATIONS

SIZE: 5 $\frac{1}{4}$ " high, 10 $\frac{1}{4}$ " wide, 16 $\frac{1}{4}$ " deep (plus feet and knobs). **WEIGHT:** 15 $\frac{1}{2}$ lbs.

FREQUENCY COVERAGE: 49.4 to 54.0 MHz (crystals supplied for 49.9 to 51.1 only).

VFO DIAL CALIBRATION: 1 kHz divisions; dial accuracy is within ± 1 kHz.

CALIBRATOR: 100 kHz calibrator built in.

FREQUENCY STABILITY: Less than 100 Hz overall drift per hour after 15 minutes warm-up; less than 100 Hz for 10% supply voltage change.

SPLIT FREQUENCY OPERATION: Xmt and Rcv frequencies may be separated by up to 600 kHz by use of the RV-6 or FF-1 accessories.

MODES: SSB, AM, and CW.

POWER SUPPLIES: Drake AC-3, AC-4, DC-3, DC-4 or DC-24.

TUBES AND SEMICONDUCTORS: 19 tubes, 7 bipolar and 3 field effect transistors, 12 diodes.

RECEIVER SPECIFICATIONS

SENSITIVITY: Less than 1/10 microvolt for 10 dB S+N/R ratio at 2.4 kHz band width.

SELECTIVITY: 6 dB bandwidth 2.4 kHz with USB filter provided. Accessory filters available for LSB, AM (.6 kHz) and CW (.3 kHz).

AUDIO RESPONSE: 400 to 2800 Hz at 6 dB.

INPUT: 50 ohms unbalanced.

OUTPUT: 4 ohms to speaker or headphones.

AUDIO OUTPUT POWER: 2 watts at 10% HD.

AVC: Output variation less than 3 dB for 60 dB input change. Fast attack. Release time selectable.

MANUAL GAIN CONTROLS: RF gain control sets threshold for AVC, AF gain control.

DETECTORS: Switch on front panel. Product detector for SSB and CW Envelope detector for AM.

NOISE BLANKER: On-off switch for accessory noise blanker on front panel.

INPUT: 13.9 to 14.5 MHz receiving input/output jack for converters and/or outboard IF receivers.

TRANSMITTER SPECIFICATIONS

POWER INPUT: 300 W PEP on SSB, 300 W PEP on AM, 300 W CW (50% maximum duty cycle).

OUTPUT IMPEDANCE: 50 ohms nom. unbalanced, 2:1 max. SWR. Adjustable loading.

MODES: SSB (USB provided, LSB with accessory filter), AM (controlled carrier system), CW (semi-break in, Sidetone).

AMPLIFIED AGC: Prevents flat-topping.

CARRIER INSERTION AND SHIFT: Automatic on AM and CW, shifted carrier CW system.

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AUDIO RESPONSE: 400 to 2800 Hz at 6 dB.

40 dB SIDEBAND SUPPRESSION above 1 kHz, 50 dB carrier suppression.

DISTORTION PRODUCTS: Down 30 dB minimum from PEP level.

MONITORING AND METERING: Final plate current, AGC action, and relative output can be read on meters. Sidetone for keyed CW.

14 MHz OUTPUT: 13.9 to 14.5 MHz output for Drake TC-2 and other transverters.



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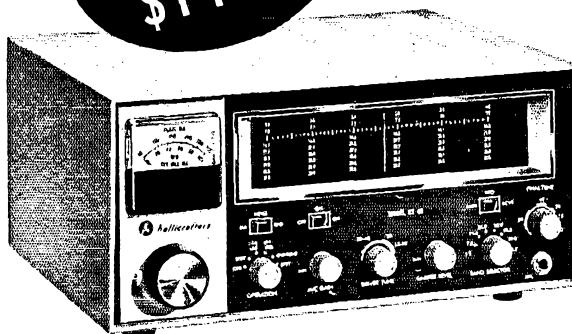
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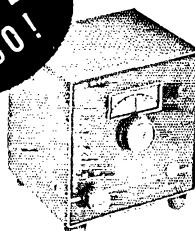
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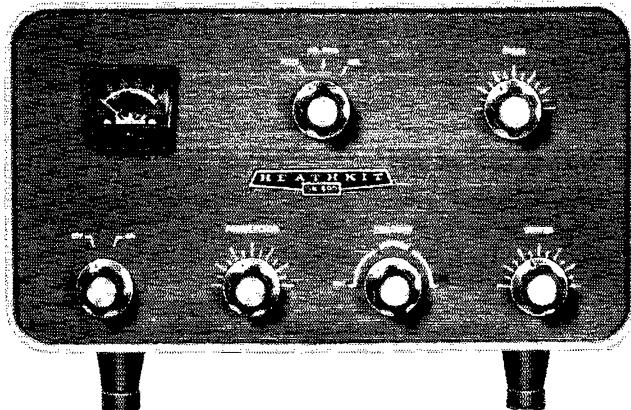
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- No cable switching • Handsome SB-Series styling

Now, in answer to many requests, Heath has a fast, low cost way to put you on two meters . . . without having to buy a whole new rig. If you own an SB-101, SB-110A, HW-100 or the SB-301/401 combo, you're almost there. Here are the details on how to get on "2" — the SB-500 way.

Here's How It Works. In the receive mode, the SB-500 takes an incoming 2-meter signal and heterodynes it to either 6 or 10 meters, where the low band gear handles it in the usual way. On transmit, a 28 or 50 MHz driver output is heterodyned to 2-meters, amplified and coupled to the output.

Here's What It Delivers. When used with any of the gear above, the SB-500 2-Meter Transverter gives you complete 2-meter SSB or CW transceive operation from 144 to 148 MHz. A pair of inexpensive 6146's in a push-pull AB1 circuit deliver a husky 50 watts output into a 50 ohm nonreactive load. Final plate voltages are derived from the driving unit, but all other operating voltages come from a built-in power supply — no extra supply to buy. Receiver sensitivity is 0.2 uV for a 10 dB S+N/N ratio . . . that means solid copy QSO's. A front panel on-off switch places the SB-500 into operation or allows the low band gear to operate straight through to an antenna or drive a linear . . . a combination of complete rear apron jacks and internal relay switching eliminates troublesome cable changing. Reliable relay-controlled T/R switching too. Tuning is fast and easy, and a built-in meter

monitors either final plate current or relative power. ALC voltage is supplied to the driver to aid in preventing over-driving and distorted signals. A built-in 1 MHz crystal calibrator is also included.

Solid, Stable Construction. The sensitive receiver and oscillator go together on well planned circuit boards. To insure stability and make adjustment more exact, the transmitter and power supply components are ruggedly chassis mounted. The SB-500 comes complete with all interconnecting cables too. Start enjoying the QRM-free world of 2-meters today . . . with the new Heathkit SB-500 . . . another hot one from the hams at Heath.

Kit SB-500, 19 lbs.....\$179.95*

SB-500 SPECIFICATIONS — RECEIVER: Sensitivity: 0.2 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. Spurious Response: All are below 0.1 microvolt equivalent signal input, except at 145.310 MHz (50 MHz IF only). Antenna Input Impedance: 50 ohm unbalanced. **TRANSMITTER:** DC Power Input: 130 watts PEP. Power Output: 50 watts (50% duty cycle). Output Impedance: 50 ohm with less than 2:1 SWR. **GENERAL:** Frequency Range: Any 2 MHz segment between 144 & 148 MHz into 50 MHz or 28 MHz tuned IF. Mode of Operation: SSB or CW only. Power Requirements: (1) 120/240 VAC, 50/60 Hz at 82 watts (internal). (2) 700 to 800 VDC at 200 mA (from driving unit). Fuse: 3/4 ampere slow-blow for 120 VAC (formerly 3AG); 1/2 ampere slow-blow for 240 VAC. **Front Panel Controls:** Meter-calibrate switch, final tuning, off-on (function) switch, preselector, final loading, driver tuning. **Chassis Controls:** Relative power adjust & bias adjust. **Rear Apron Connectors:** RF output, ALC, linear relay, relay, drive, power plug, low f receiver, low f antenna, fuseholder. **Tube Complement:** 6C86 transmitter mixer, 6C6B crystal calibrator, 6DS4 receiver RF amplifier, 6DS4 receiver mixer, 12GN7 transmitter RF amplifier, (2) 6146 final amplifiers, (types 6146A or 6146B may be directly substituted), 7059 heterodyne oscillator-amplifier, 8156 RF driver, 0A2 voltage regulator. **Diode Complement:** 5 silicon diodes, 750 mA, 500 PIV; 3 in power supply, 2 in ALC, 1 Germanium diode, IN191; REL PWR. **Cabinet Dimensions:** 12 $\frac{1}{4}$ " W x 7-15/16" H x 13" D. **Overall Dimensions:** 12 $\frac{1}{4}$ " W x 7-15/16" H x 14" D including knobs and feet. **Net Weight:** 14 $\frac{1}{2}$ lbs.

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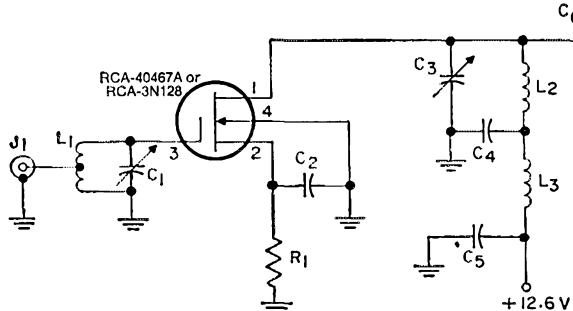
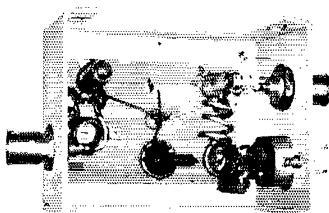
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Full details are available in the November and December 1968 "Ham Tips". Write RCA Electronic Components, Commercial Engineering Sect., D-37SD, Harrison, N.J. 07029 for copies.

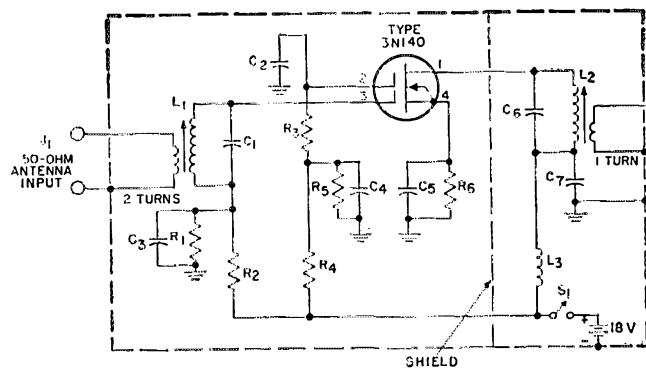
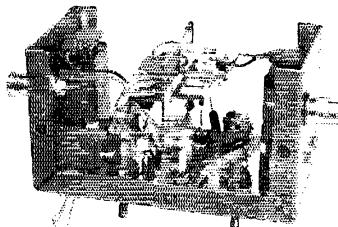
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