August 1967
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QST

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amateur radio

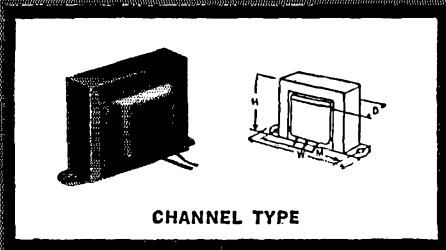
OFFICIAL JOURNAL OF THE ARRL

REPLACEMENT TYPE TRANSFORMERS & REACTORS

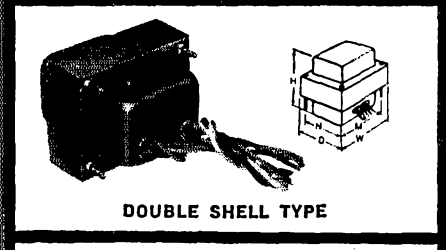
PIONEERS IN MINIATURIZATION

Forty years of pioneering by UTC's research, design and engineering skills assures you quality and reliability unexcelled in the industry. UTC's line of stock and special custom units meets every industry, every transformer and rite requirement to both military and commercial use.

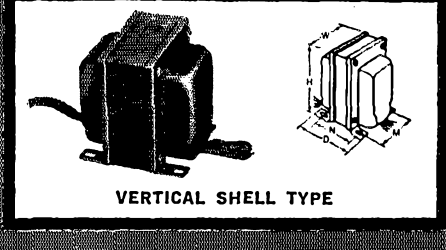
UTC replacement type transformers, hermetically sealed (Pri. 115 V 50/60 cycles) provide the highest reliability in this field. All units are low temperature rise. Vacuum sealed against humidity and special incorporating materials to prevent corrosion and electrolysis. Shells are finished in attractive high lustre black enamel.



CHANNEL TYPE



DOUBLE SHELL TYPE



VERTICAL SHELL TYPE

CHANNEL FRAME FILAMENT/TRANSISTOR TRANSFS.

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

Type No.	Secondary	W	D	H	M	Lbs.
FT-1	2.5 VCT-3A	2⅛	1½	1 1/16	2⅜	¾
FT-2	6.3 VCT-1.2A	2⅛	1½	1 1/16	2⅜	¾
FT-3	2.5 VCT-6A	3 3/16	1⅞	2	2 13/16	1
FT-4	6.3 VCT-3A	3 3/16	1⅞	2	2 13/16	1
FT-5	2.5 VCT-10A	3¼	2⅛	2⅝	3⅛	1⅛
FT-6	5 VCT-3A	3¼	2⅛	2⅝	3⅛	1½
FT-7	7.5 VCT-3A	3¼	2⅛	2⅝	3⅛	1½
FT-8	6.3 VCT-8A	4	2½	2¼	3 5/16	2¼
FT-10	24 VCT-2A or 12V-4A	4	2⅝	2⅝	3 5/16	2½
FT-11	24 VCT-1A or 12V-2A	3¼	2⅛	2⅝	3⅛	1½
FT-12	36 VCT-1.3A or 18V-2.6A	4	2⅜	2⅜	3 5/16	2¼

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

FT-13	26 VCT-.04A	2⅛	1⅛	1¼	1¾	¼
FT-14	26 VCT-.25A	2⅛	1⅛	1 1/16	2⅛	¾

DOUBLE SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-101	275-0-275	50	2A	2.7A	3	2½	3	2½	2	2½
R-102	350-0-350	70	3A	3A	3	2½	3⅜	2½	2	3½
R-103	350-0-350	90	3A	3.5A	3⅜	2⅞	3 5/16	2 13/16	2¼	4½
R-104	350-0-350	120	3A	5A	3¾	3⅛	3¾	3⅛	2½	5½
R-105	385-0-385	160	3A	5A	3¾	3⅛	4⅜	3⅛	2½	7

VERTICAL SHELL POWER TRANSFORMERS

Type No.	High V.	DC ma	5V. Fil.	6.3 VCT Fil.	W	D	H	M	N	Wt. Lbs.
R-110	300-0-300	50	2A	2.7A	2⅜	2 13/16	3¼	2	1¼	2½
R-111	350-0-350	70	3A	3A	2⅜	3⅛	3¼	2	2⅜	3½
R-112	350-0-350	120	3A	5A	3⅜	3 1/16	4	2½	2⅝	5½
R-113	400-0-400	200	3A	6A	3⅞	4⅜	4⅜	3	3⅛	8

CHANNEL FRAME FILTER REACTORS

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

Type No.	Induct. Hys.	Current	Resistance Ohms	W	Dimensions, in. D	H	M	Wt. Lbs.
R-55	6	40ma	300	2⅜	1⅜	1⅞	2	½
R-14	8	40ma	250	2⅞	1½	1 1/16	2⅜	¾
R-15	12	30ma	450	2⅞	1½	1 1/16	2⅜	¾
R-16	15	30ma	630	2⅞	1½	1 1/16	2⅜	¾
R-17	20	40ma	850	3 5/16	1⅝	2	2 13/16	1
R-18	8	80ma	250	3¼	1⅝	2	2 13/16	1
R-19	14	100ma	450	3¼	1⅞	2⅝	3⅛	1½
R-20	5	200ma	90	4⅛	2¼	2⅝	3 5/16	2½
R-21	15/3	200ma	90	4⅛	2¼	2⅝	3 5/16	2½
R-220	100/8 Mhy 25/2 Mhy	2.5A 5A	.6 .16	3¾	2	2 1/16	3⅛	1½

Write for latest catalog of over 1,300 stock items with UTC top quality

UNITED® TRANSFORMER CO.

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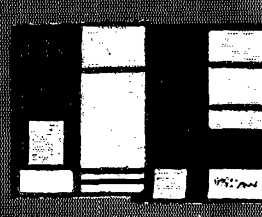
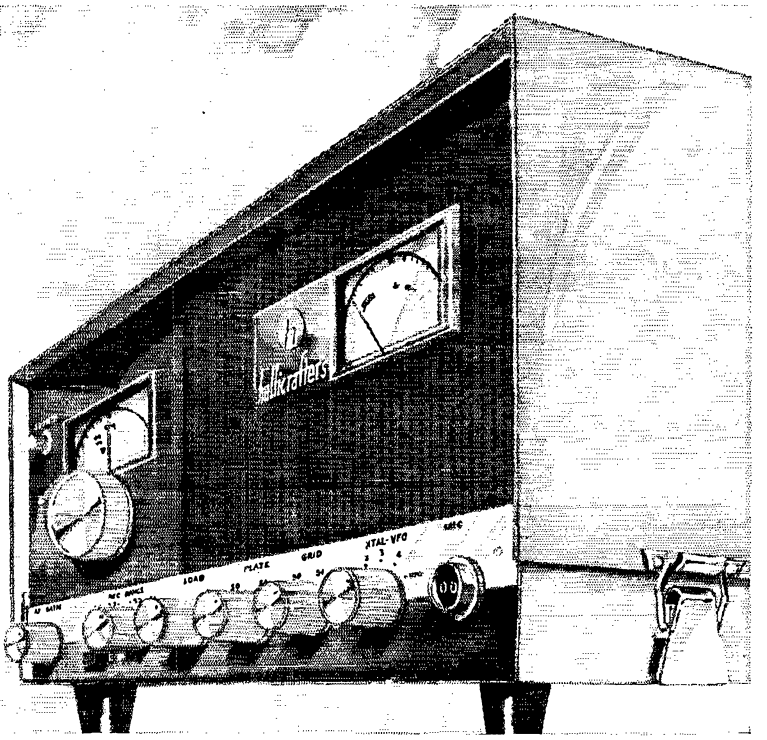


Two great new VHF transceivers



Efficient filters and selected injection frequencies make the new SR-46A and SR-42A virtually immune to FM and TV interference. Squelch, too!

Interference-free reception is only one of many advantages in the new SR-46. Complete six meter band coverage is another. Or full two meter coverage, if you prefer, in the companion SR-42 unit. Both give you double the usual bandspread, through use of dual tuning ranges. A neutralized nuvistor front end boosts sensitivity, and eleven tuned circuits increase selectivity while suppressing interference. Push to talk, of course.

Thorough field testing, before production, by hundreds of operators, assures you of years of trouble-free performance. It all adds up to your top VHF value. See the SR-46, or the SR-42, at your distributor today.

FEATURES

Frequency Coverage: 50 to 52 Mc and 52 to 54 Mc (144 to 146 Mc and 146 to 148 Mc in the SR-42). **Power Input:** 10-12 watts. **Power Supply:** 115 VAC and 12 VDC (vibrator and line cord optional extra). **Transmitter Crystals:** high frequency type; provision for four (one furnished), plus external VFO, switch-selected from front panel. **Tubes:** 10, plus zener diode oscillator control and four diodes (11 tubes, 2 zeners and four diodes in the SR-42). **"S" Meter** automatically switches to RFO. **Cabinet:** "snap-off" type for easy access. **Size:** 5½" high, 12⅛" wide, 8¼" deep. **Shipping Weight:** 17 lbs. **Amateur Net Price: $199.95**

New **SR-42A**
SR-46A

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Collector's Item

It's a mobile transceiver *and* a fixed station. It reaches out — SSB and CW — to collect QSL's. The KWM-2 lets you work all the 80- to 10-meter amateur bands. Like all Collins equipment, the KWM-2 is designed for system use. Put a 62S-1 VHF Converter on the table next to a KWM-2 and you are up on the 6- and 2-meter bands. Add a 30L-1 Linear Amplifier to the system for a full-powered fixed station. That's only part of the KWM-2 story. Ask your Collins distributor about the rest.

COLLINS

QST

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OUR COVER

What is it? It's a 75-meter mobile whip with remote tuning. See page 11 for the details.

—CONTENTS—

Outstanding Radiators

You may not fancy your Webster C-B antenna as the radiator ornament — an arrangement this lady is obviously considering! But she was strongly influenced by a quality conscious owner of a custom mobile KW station who spent hours convincing her that a **Webster** BIG-K isn't just **any** antenna. Indeed not! It's streamlined—attractive—actually adds a little verve and interest to any car. He pointed out the convenience of the high quality hinged column that can be tipped down for overhead clearance—strengthened his argument with sketches of the precision-machined hinge and the quick-thread-on collar that controls release and lockup. Just to cover all the bases he tossed in a quick description of the Webster Band-spanner, 6-band superstreamlined antenna.

Now isn't it just like a woman to protest **any** antenna on "her" car—and then when she's convinced that BIG-K is essential to the effective performance of the family mobile unit—intuitively to arrange the Webster antenna up front with the other excellent radiator?

Rolls Royce? V-W? Sceptical wife? Webster antennas are the answer.

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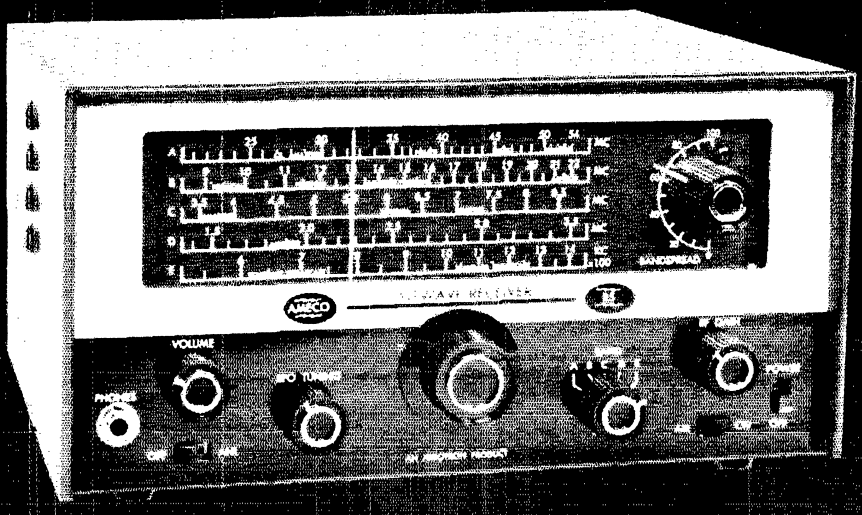

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- *Continuous coverage .54 to 54 Mc*
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- *Includes the 6 meter ham band*
- *And the 30 to 50 Mc police bands*
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*optional

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Section Communications Managers of the ARRL Communications Department

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

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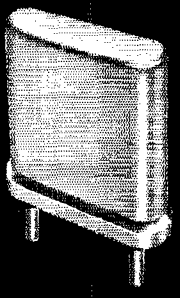

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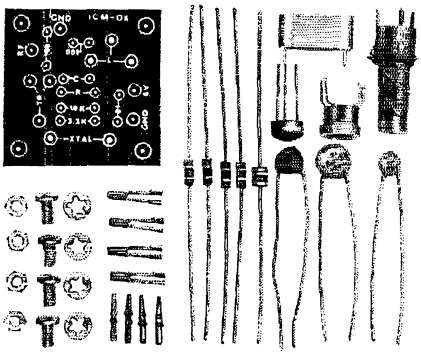

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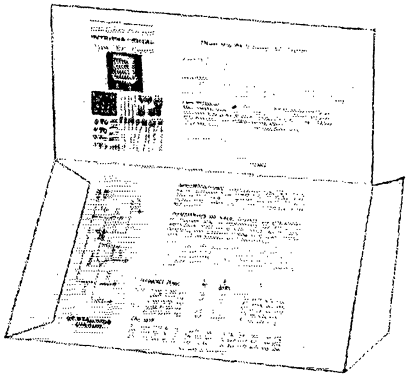

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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

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

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Central Division

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

Dakota Division

CHARLES G. COMPTON . . . . . WØBUO
1011 Fairmount Ave., St. Paul, Minn. 55105
Vice-Director:

Delta Division

PHILIP P. SPENCER W5LDH/W5LXX
29 Snipe St., Lake Vista, New Orleans, La. 70124
Vice-Director: Max Arnold W4WHN
612 Hogan Road, Nashville, Tenn. 37220

Great Lakes Division

DANA E. CARTWRIGHT W8UPB
2979 Observatory Ave., Cincinnati, Ohio 45208
Vice-Director: Charles C. Miller W8JSU
4872 Calvin Drive, Columbus, Ohio 43227

Hudson Division

HARRY J. DANNALS W2TUK
RFD 1, Arbor Lane, Dix Hills, Huntington, N. Y. 11743
Vice-Director: Stan Zak K2SJO
13 Jennifer Lane, Port Chester, New York 10573

Midwest Division

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

New England Division

ROBERT YORK CHAPMAN W1QV
28 South Road, Groton, Conn. 06340
Vice-Director: Bigelow Green W1EAE
11 Law's Brook Rd., South Acton, Mass. 01771

Northwestern Division

ROBERT B. THURSTON W7PGY
7700 31st Ave., N.E., Seattle, Wash. 98115
Vice-Director: R. Rex Roberts W7CPY
837 Park Hill Drive, Billings, Mont. 59102

Pacific Division

HARRY M. ENGWICHT W6HC
770 Chapman, San Jose, Calif. 95126
Vice-Director: Ronald G. Martin W6ZF
1573 Baywood Lane, Napa, Calif. 94558

Roanoke Division

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

Rocky Mountain Division

CARL L. SMITH . . . . . WØBWJ
1070 Locust St., Denver, Colo. 80220
Vice-Director: John H. Sampson, Jr. W7OCX
3618 Mount Ogden Drive, Ogden, Utah 84403

Southeastern Division

CHARLES J. BOLVIN W4LVV
2210 S.W. 27th Lane, Miami, Fla. 33133
Vice-Director: Albert L. Hamel K4SJH
220 N.E. 25th Street, Pompano Beach, Fla. 33064

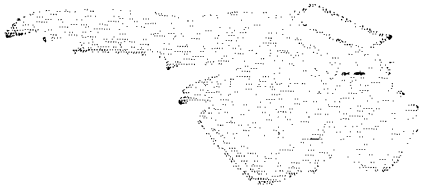
Southwestern Division

JOHN R. GRIGGS W6KW
11422 Zelzah Ave., Granada Hills, Calif. 91344
Vice-Director: Thomas J. Cunningham W6PIF
1105 East Acadia St., El Segundo, Calif. 90245

West Gulf Division

ROEMER O. REST W5QKF
P.O. Box 1656, Corpus Christi, Texas 78401
Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City, Okla. 73159

"It Seems to Us..."

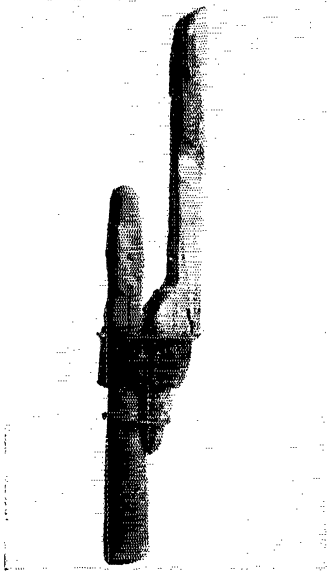


THE WOUFF HONG

In an institution as old as amateur radio, traditions and symbols of the art appear and become a part of it. Our traditions are many, among them our long record of self-policing, our dedication to public service in emergencies, our amazing versatility in experimentation, our instant response to the call of our country in time of war. But of the symbols, only one — aside from the ARRL diamond — has become a part and parcel of the framework of amateur radio, the symbol of its finest traditions, its long and glorious history.

That symbol is the Wouff Hong. Every ham should know its origin.

It seems to us that now is a good time to retell the story of this famous and beloved part of the very fabric of amateur radio. Visitors to Headquarters and to W1AW, seeing either the original or one of the many replicas in our buildings, ask what it means. New members of the Royal Order of the Wouff Hong, initiated during the midnight convocations of the Order at League Conventions, ask, "But where did it come from, in the beginning?"



It started back in 1917, in the very earliest days of ARRL and *QST*, when an anonymous amateur, writing under the title "The Old Man," created a wonderful series of humorous stories in the magazine. In a pithy, irascible style he assailed all that struck him as criticizable about ham radio operation of the period in his famous "Rotten Radio" series beloved to this day by all who read them. He pitilessly exposed the poor operating practices of the day, yet did it in a way which drew chuckles even from those recognizing themselves as the special targets of his ire.

In one of those stories, "Rotten QRM," he launched forth with examples of some of the poor sending cluttering up the band in a particular QSO to which he was listening. The gibberish included the words "wouff hong" which, apparently, was being used by someone on somebody else.

It turned out to be one of those priceless pieces of spontaneous word invention. Instantly, it caught on with the gang. Although T.O.M. himself admitted at the time he didn't know exactly what a wouff hong was, it quickly became something with which both to attack bad operating practices and to discipline their perpetrators. Within three months, the editor of *QST* found it necessary to write an editorial on the growing demand from the gang for wouff hongs. How rapidly this situation might have developed had not World War I intervened is a matter of speculation. But the tradition had been established, the Wouff Hong created in the minds of thousands of amateurs as some mythical instrument of torture to be used in enforcing good operating practice in amateur radio.

When *QST* resumed after the war, one of its first contributors was T.O.M. In an early 1919 issue he contributed an article "Rotten Starting" to work off steam on the slowness with which our government was getting around to let us operate again. At the conclusion of this article appeared the following: "In the meantime . . . I am sending you a specimen of a real live Wouff Hong which came to light out here when we started to get our junk out of cold storage. Keep it in the Editorial sanctum

(*Continued on page 136*)

League Lines . . .

Hear ye! Hear ye! Nominations for the offices of director and vice director are now open in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. See "Happenings of the Month" of this issue for full details.

Most ARRL-Affiliated clubs are still "on vacation," but now is a good time for the activities manager, officers or executive committee to study program schedules for the autumn and see where training aids from the League's library might be useful. If your Training Aids list is out-of-date or missing, another copy can be obtained from Headquarters.

Are you ready? Ready for any emergency? This year jet stream patterns have differed from those of recent years, and consequently the weather has been especially erratic. If happenstance brings a tornado or a hurricane to your area this fall, will you be able to provide an emergency radio service to your community?

Have you had to wait a long time for that new ticket or renewal? FCC's computer acted up for a while, and the agency is also having difficulty getting sufficient help at the Gettysburg office. The result was to slow down license processing for a while this summer -- in other automated-issuance services as well as amateur.

The industry group which was formed as an outgrowth of its meeting in Hartford to discuss amateur matters, has now decided to become affiliated with the Electronic Industries Association. This in effect revives the "amateur activities section" of EIA which has existed from time to time in the past. One area of early exploration is expected to be the long-debated question of standards -- measurements, etc.

Applications for ARRL Life Membership can be filed at any time, but this is last call for "Charter" Life Memberships which must be received by the Secretary on or before August 1.

Publicity is always a good topic for discussion among hams. Recently there's been plenty: on the bad side, the security breach by amateurs aboard ships near Vietnam ... mixed, (often depending on the skill of the local headline writer) as in the case of "the meanest ham" and Dear Abby ... emphatically good, as with Field Day and Amateur Radio Week. The first two kinds we amateurs have virtually no control over, but the latter is directly proportionate to club and individual amateur effort in each area. How about you? Headquarters will supply you with its "Publicity Kit" if you'll promise to put it to work.

The Connecticut Longhorn

The "Connecticut Longhorn" is a horizontal roof-top car antenna with a matching system at the base, remotely controlled for shifting frequency over a 200-kc. range on 75 meters. The station-wagon roof, along with the rest of the car body, is the counterpoise for the quarter-wave antenna.

Horizontal 75-Meter Mobile Whip with Remote Tuning

BY ANDREW PFEIFFER*, K1KLO

THE 75-meter transceiver that Santa Claus brought all the way from Michigan worked fine on the regular station antenna — but the idea was to go mobile! I backed the 1964 Ford Country Squire out of the garage — 209.9 inches of uncompromising antenna platform. Couldn't mount a vertical whip on the rear bumper because the rear deck wouldn't fold down; couldn't move it over in front of the taillight because the State Police take a dim view of such modifications to safety devices. Mounting the whip on the hump over and above the taillight would have started it some 30 inches above ground, making it a prime target for the garage opening, trees, low bridges, and low-flying UFOs.

I decided to take advantage of that aforementioned 209.9 inches and go horizontal. The antenna described and pictured is the fourth one built and tested in about as many months. It can be resonated over the 200-kc. transceiver range from the driver's seat, and can cover the low end of 80 merely by adjusting the setting of the capacitive hat near the end of the antenna. The best testimonial to its effectiveness as a radiator was the accusation: "You ain't mobile, ya clown; an' yer runnin' a kilowatt!"

*Box 385, RFD 4, Old Lyme, Conn. 06371

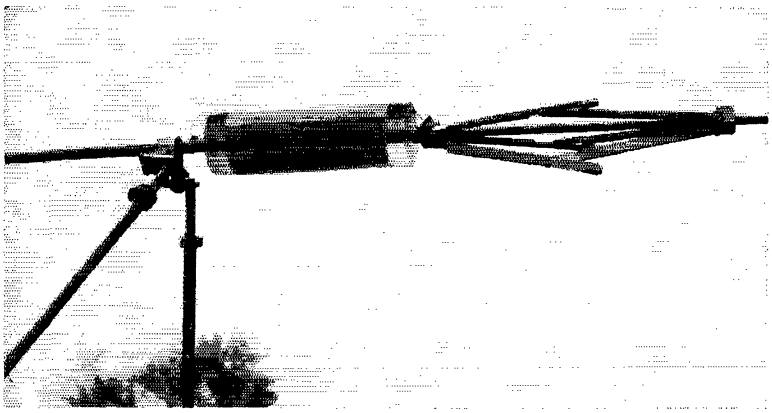
Some of today's station wagons offer a good-sized platform for an antenna, but how to take advantage of it without going to unrealistic heights? K1KLO solved the problem with a horizontal whip.

The secret of the wide frequency range is a remotely-tuned coil at the base of the antenna. Referring to Fig. 1, most 75-meter mobile antennas consist of a loading coil, L_3, a capacitive extension, l_1, and the support whip, l_2. The three combine to resonate the antenna to the desired frequency. It is generally considered section l_2 does the radiating; L_3 and l_1 are there to tune out the reactance, and contribute practically nothing to the outgoing signal. Obviously, the longer one can make l_2 the more effective the antenna.

The writer's antenna is shunt fed, as also shown in Fig. 2. The value of this shunt, L_1, is very critical if a proper match is to be obtained between the output of the transceiver and the very low impedance offered by the radiator. A quarter of a turn, plus or minus, makes a considerable difference in match, as indicated by an s.w.r. bridge.[1] A small adjustable ferrite slug inside L_1 makes this critical adjustment a simple matter.

The Q of this antenna is high. An excursion of 10 kc. or less was all that was possible, while

[1] The installation includes an s.w.r. bridge which is in the line at all times, and is used to determine exact resonance and maximum output. Actual tests run at a distance of about two miles have indicated maximum power output when minimum reflected power showed on the s.w.r. bridge indicator.



The rear support for the antenna consists of two rods clamped to the roof-top carrier. Nylon inserts at the top insulate the rods from the antenna. Three hinged pairs of rods, operated umbrella-fashion, serve as a capacitive hat immediately next to the loading coil. At each end of the Lucite tube containing L_3 there is a 1-inch thick Lucite disk, threaded at the center. The coil is mounted on a mating threaded end on the antenna, and the extension rod, with hat, screws into the disk at the other end. Connections to the ends of the coil are brought through the disks.

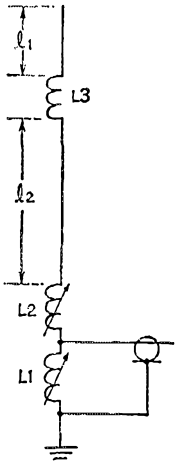


Fig. 1—The schematic of the conventional vertical whip antenna is the section above L_2 in this drawing. L_1 and L_2 are adjustable inductances used for shunt feed, L_2 for resonating and L_1 for matching.

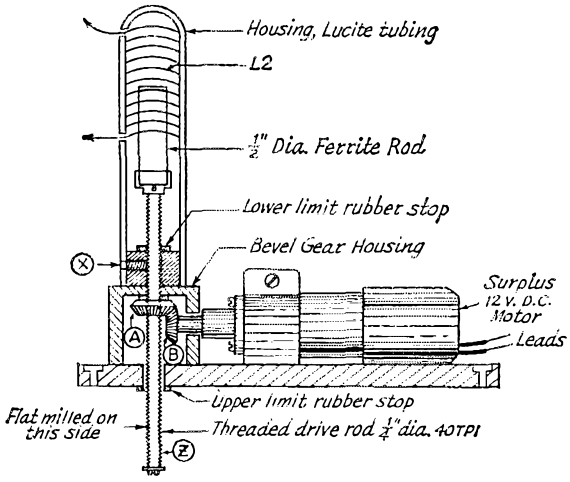


Fig. 3—The remote variable-inductor assembly. The threaded drive rod, Z, has a flat milled its full length and is prevented from rotating by means of a nylon set screw at X. The hole in bevel gear A is tapped for ¼-40 threads per inch and mates with the drive rod, Z. Energizing the motor drives bevel gear B, which in turn drives the "captured nut" bevel gear A, raising or lowering the ferrite rod inside L_2.

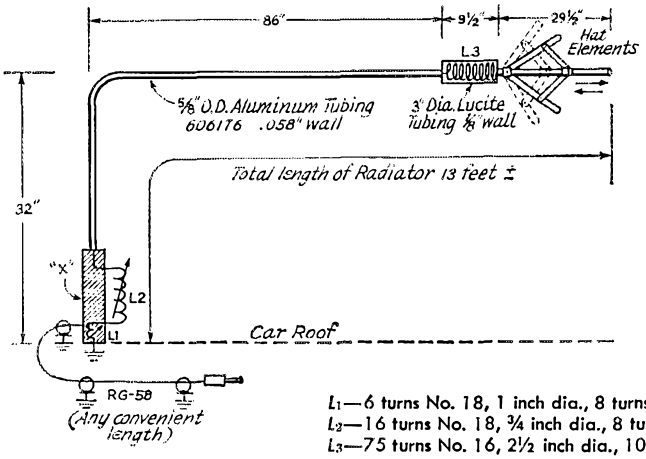
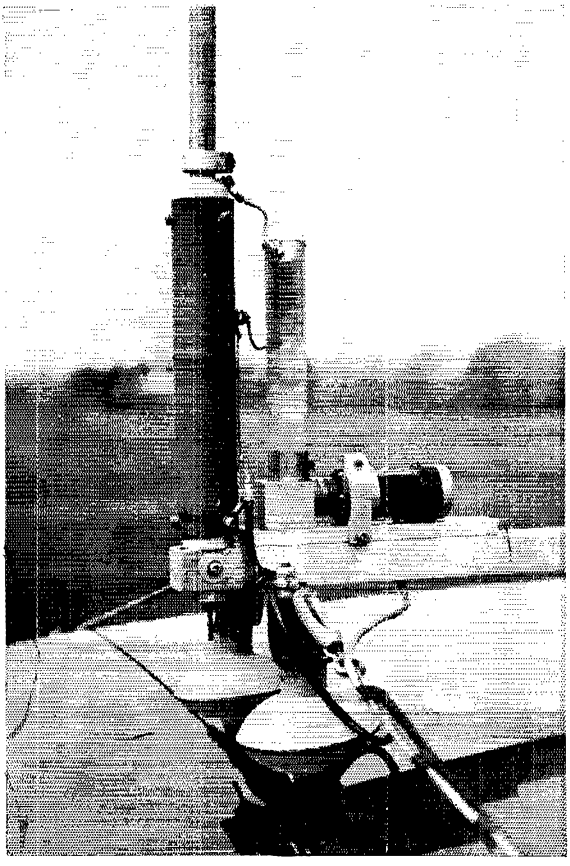


Fig. 2—Mechanical layout of the Connecticut Longhorn. "X" indicates an 8-inch length of 1½-inch diameter linen Micarta tubing. The "hat" elements, totalling six, are each 8 inches long, ½ by ¼ inch aluminum.

L_1—6 turns No. 18, 1 inch dia., 8 turns/in. (Polycoils 1746 or equivalent).
L_2—16 turns No. 18, ¾ inch dia., 8 turns/in. (Polycoils 1740 or equivalent).
L_3—75 turns No. 16, 2½ inch dia., 10 turns/in. (Polycoils 1776 or equivalent).



Close-up of the feed end, which is supported by suction cups on the car roof just back of the windshield. L_1 is inside the micarta tube at the left; the adjusting screw for the ferrite slug can be seen just above the far suction cup. The remote variable inductor and driving motor are to the right of the micarta tube. The horizontal support is a 1 × ½ inch aluminum bar which runs to the luggage carrier near the rear of the car.

still being able to tune the output pi network of the transceiver. The physical position of the capacitive hat made it impractical to make the necessary QSY adjustments at that point; aside from this, it is the mobileer's ideal to be able to work any segment of the band from the driver's seat. The remote variable-inductor unit, L_2 (see Fig. 3 and photograph), serves this purpose. Inside L_2 is a ½-inch diameter, 2-inch long ferrite rod that can be remotely moved in and out of L_2 by a small reversible 12-volt d.c. motor mounted on the car-top carrier assembly. The in-line s.w.r. bridge indicates the proper positioning of this ferrite slug, and minimal reflected power can be maintained from 3.8 to 4.0 Mc. In this connection, it is interesting to note that the setting of the ferrite rod in L_2 is greatly influenced by the road surface: for example, the settings will differ when the car is on a concrete highway reinforced with steel as compared with an oiled surface.

Is the thing directional? I have run a number of tests where I have been in a large parking lot and driven in a complete circle while transmitting, and the indications are that with the model in question the antenna does not seem to be directional. In some of these contacts, a large group was on at locations at all principal compass points. An early model, sloping from front to back at an angle of about 40 degrees, did have definite directional characteristics.

The Connecticut Longhorn antenna described and shown in the sketches and photographs is presented only as a guide to those who may wish to "go horizontal"! The overall height of the radiator above ground was determined only by the author's garage-door opening.

I wish to thank sincerely the many radio amateurs both in this country and in Canada whose patience, helpful comments, and suggestions during the early frustrating phases made possible the final development of this antenna system. QST

Strays

For Tesla fans, there is available literature from "The Tesla Society", Box 4058, Minneapolis, 14, Minnesota. Write for Tesla Bibliography and list of all new Tesla Books. We recommend *Prodigal Genius* by J. J. O'Neil, especially. Tesla was quite a guy.

—•••—

If you will send your QSL to VE3GG, 20 Byng Ave., Willowdale, Ont., Canada he will send you a copy of the poem, "Silent Keys."

—•••—

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.

Stolen Equipment

Recently the Stanford Radio Club station W6YX, was broken into and the following pieces of Collins Radio equipment were stolen:

Type	*Description*	*Serial No.*
32S-1	Transmitter	10790
75S-1	Receiver	3018
312B-4	Station Control	293
516F-2	Power Supply	3611
75A-4	Receiver	5091

The cabinets of the S-line equipment were sprayed with red and orange paint. The 75A-4 receiver had a home-built crystal filter in place of the mechanical filters.

Preventing Receiver Overload,

Cross Modulation,

and Spurious Generation

For the ordinary amateur, building filters such as the ones used by the author would be about as practical as making transistors or tubes. But although a good filter is a relatively expensive component, it can solve a problem no receiver by itself can handle — eliminating the receiver front-end susceptibility to the presence of a kilowatt next door.

Front-End Receiving Filters

BY E. H. CONKLIN,* K6KA

Six stations were operating simultaneously during the 100th anniversary celebration of I.T.U. at Geneva — sometimes with two or three in the 14-Mc. band, all kilowatt jobs in the same room, with antennas on the same roof. Without something new and unusual, this would have been impossible.

This paper reviews the author's experience with this relatively new development in reception — the front-end r.f. filter. It gives promise of ranking with the major advances in receiving equipment over the past fifty years.

Unwanted-signal Problems

As congestion in our bands has increased we have encountered more interference from strong nearby stations, and preselection and other aids that it was hoped would permit operation have been only partially successful. In the last few years, however, the development of crystal-lattice filters has progressed to the point where they can be placed between the antenna and the receiver without adding a tube, transistor, or any other device that might be subject to overloading or other undesirable effects.[1] Front-end overload in receivers may cause blocking or actually cause grid current in the early stages, thereby reducing the gain and resulting in temporary loss of sensitivity, as well as producing spurious responses. Our present multiple-conversion techniques pass very many off-channel signals, in a band several hundred kilocycles wide, through the tuned circuits in the early stages. These may be amplified, mixed, and sometimes even accidentally frequency-doubled before there is an opportunity to reject them in the later stages.

Front-End Filters

The new crystal-lattice filters are inserted in the antenna circuit and pass only a relatively small portion of an amateur band. They can, and do, attenuate off-frequency signals 100 db. or more before they reach the receiver. Furthermore, the attenuation is available to reduce the effect of nearby transmitters, provided the transmitters do not produce key clicks or s.s.b. "buckshot." But even when the transmitter is poorly adjusted it may be possible to listen through the interference, without reducing the receiver's sensitivity to a desired weak signal.

Each filter provides a small band of frequencies — 10 to 40 kc. wide depending on the design — in which a receiver acts as it normally does with an antenna connected. Outside this band the receiver sounds as though its antenna had been grounded. Just how quiet it is depends upon the r.f. leakage around the filter, into the coaxial line to the receiver, and into the circuitry in the receiver chassis. While such leakage, until eliminated, may reduce the attenuation to only 60 or 80 db., the results still are outstanding. No longer need one wonder whether the neighbor's key clicks and splatter are generated in the transmitter or in one's own receiver — the filter will disclose this by attenuating everything outside its passband.

Filter Characteristics

Those interested in early designs may refer to two papers particularly relating to s.s.b. filters[2] and to test methods.[3] Also, an excellent reference publication[4] discusses design, and another paper covers the half-lattice development[5] which with only two crystals provides balanced-to-unbalanced conversion from the basic balance of the 4-crystal lattice bridge.

The current designs are almost as small as a package of five sticks of chewing gum. Fig. 1

* Box 1, LaCanada, Calif. 91011

[1] Rockwell, "Station Design for DX," Part III, *QST*, November, 1966, p. 51.

[2] Taylor, "SSB crystal filters," *Electronics*, October, 1948. Abstracted by Zeluff and Markus in *Electronics Manual for Radio Engineers*, p. 306.

[3] Lowrie, "Lattice-type Crystal Filter," *Electronics*, April, 1951. Abstracted by Markus and Zeluff in *Electronics for Communication Engineers*.

[4] *Reference Data for Radio Engineers*, 4th edition (1956), 7th printing, July 1961. International Telegraph and Telephone Corp., 320 Park Avenue, New York, N. Y.

[5] Dishal, "Practical modern network theory design data for crystal filters," Institute of Radio Engineers' 1957 National Convention Record, Part 8.

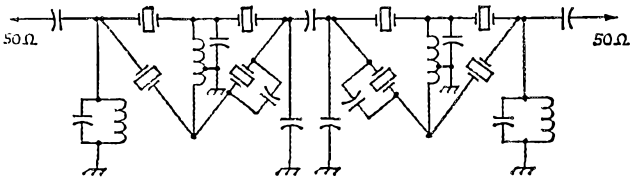


Fig. 1—Circuit of the front-end crystal filter for the 14-Mc. band produced by C-F Networks, Inc. It consists of four half-lattice filters in series, with 50-ohm unbalanced input and output.

shows the circuit of the four half-lattice filters, with eight crystals, which produce 8-pole, 4-zero elliptical characteristics. Approximate specifications [6] are as follows:

Shape factor — Under 1.8 for 60 db./6 db. bandwidth ratio; under 2.7 for 100 db./6 db.

Passband insertion loss — Less than one db.; typically, 0.25 db. The inband ripple is the same.

Stopband rejection — Greater than 100 db. beyond the initial 100 db. points. Spurious response attenuation is greater than 80 db.

The above are from laboratory-type measurements. In amateur practice, we are concerned with the performance of the entire receiving system. The best available rejection presumably would be with the filter mounted with r.f. gasketing on a "water-tight" box which would provide shielding of the input from the output and space for the connectors, as shown in Fig. 2. The unit available to the author, however, is a turret containing a 12-position coaxial switch, on which is mounted a set of eleven filters. Each of these is nominally 33 kc. wide at the 1-db.-down points, and the set is designed to cover the entire 14-Mc. band with a bit left over on the high end. BNC connectors were attached to two short cables into and out of the assembly.

S+N/N Ratio

A test was made with a setup consisting of a Measurements Model 80 signal generator, a 6-db. T-pad attenuator, a 20-db. T-pad attenuator, the filter turret with additional lengths of cable attached, a receiver, and an a.c. meter to indicate signal input necessary for doubling the receiver audio output voltage. The usual phono connector, which certainly is inferior to the BNC series, remained on the receiver. The major problem with this arrangement is that of setting the output noise accurately, inasmuch as the random nature of the noise causes the meter needle to jump a bit.[7] Nevertheless, there were no wild results; the minimum filter attenuation measured was exactly zero, and there never was an apparent gain.

The curves for a number of the filters were obtained with this setup in order to observe the performance within the passband, the rejection just outside of the passband, and the ultimate rejection. The filters in the phone section of the 14-Mc. band required as much as 8000 microvolts into the 20-db. T-pad attenuator and the filters, on the skirt frequencies, in order to double the receiver output. This compared with around 0.3 microvolt for the receiver with no filter, and for the filter pass-band frequencies. In the c.w. range the leakage around the filters appeared to be slightly greater in this particular setup. Fig. 3 shows one of the curves. The bottom line represents the measured receiver sensitivity (which must be corrected for the 20-db. pad attenuation). Sometimes as many as five consecutive points produced an identical sensitivity reading. Line-voltage changes probably were more likely to have been the cause of the slight variations than the fluctuations in random noise on the a.c. output meter, particularly since the sensitivity in the filter passband usually followed the same variations. Most of the data show a total loss of only one db. in the filter passband. The passband is reasonably flat, the corners sharp, and the skirts steep.

Receiving Performance

When this filter is used with an antenna, the coaxial line should not present sufficient reactance to degrade the filter performance. The cubical quad that was used certainly was not ideal. Nevertheless, no signal — however weak without the filter — sounded any different in the passband of the correct filter. Frequency doubling in the receiver's second mixer, which can bring s.s.b. signals into the c.w. band 228 kc. lower, disappeared. Several other types of spurious response also disappeared. Cross modulation and "monkey-chatter" (false signals formed by combination, such as FSK teletype mixed with a manually-keyed c.w. signal) usually disappeared. The latter improvement occurred when any *one* of the components was rejected by the filter,

[6] As given by the manufacturer. C-F Networks, Inc., 3102 North 29th Ave., Phoenix, Arizona 85017.

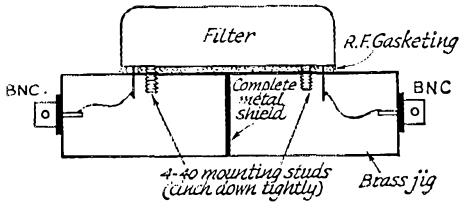


Fig. 2—Mounting for a single filter, using BNC connectors for the coax cables. At least one compartment should be soldered to make it "water tight."

[7] Also, a true-r.m.s.-reading a.f. voltmeter has to be used if the signal-to-noise ratio is to be measured accurately. However, only *relative* values with and without the filters were of importance in these tests. — *Editor.*

but did not when all components were within the passband.

On an s.s.b. signal from a station 100 yards away — literally "in the back yard" — nothing was heard when the receiver was tuned to the c.w. band with the filter for the s.s.b. frequency

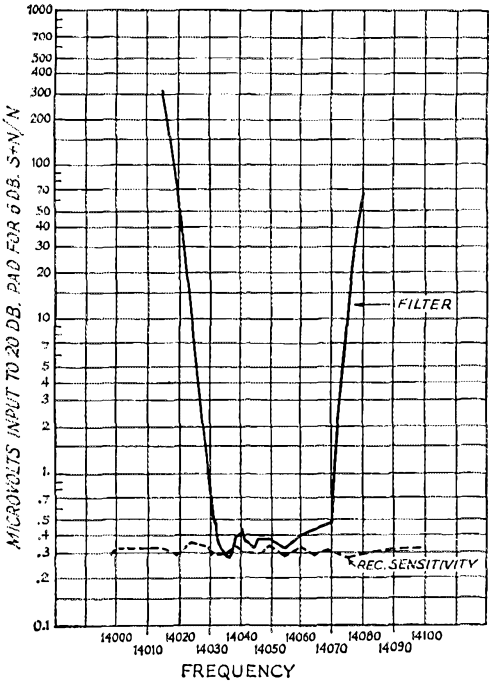


Fig. 3—Attenuation of a typical filter as measured with the setup described in the text. Signal-voltage readings are for constant signal-plus-noise-to-noise ratio.

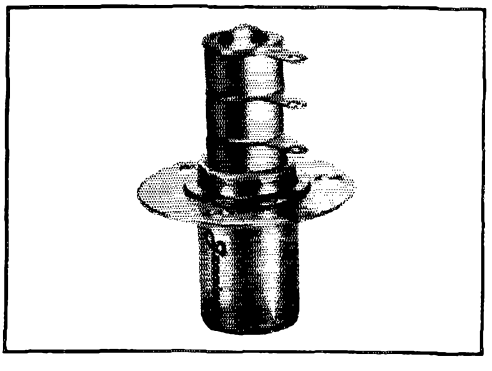
switched into the antenna circuit. When the filter for the c.w. frequency was used, there was some "buckshot" from s.s.b. splatter. However, the S-meter no longer moved a small amount while the desired weak signal disappeared; with the filter, the S-meter swung up farther on the "buckshot," but the desired weak signal remained undisturbed at its previous level and could be copied. Apparently, the receiver front end no longer was overloaded, and its sensitivity continued to be high. In short, the filter proved that the transmitter was actually radiating interference components on the c.w. frequency, and that the receiver was not generating spurious responses. Another s.s.b. station, farther away, previously had caused excessive interference throughout the band; with the filter it no longer was heard over most of the band, although there were a few frequencies on which there was spurious radiation.

No other receiver or device, in the author's experience, has so improved the ability to operate almost completely without spurious receiver responses in the presence of close-by amateur signals. It is hoped that a sufficient market will develop for the individual filters to reduce the price from the present $50 region; and for the full-band turrets in order to influence the manufacturer to produce them.

Ultimately, it may be possible to extend the design to include coverage of the 7-Mc. band, with a possibility of 21-Mc. and 3.5-Mc. coverage to follow. Consideration of the problems of crystals, inductances, capacitors, and shielding indicate that the complete filter network will cost less commercially in its completed form than would the construction of an equally efficient device by the amateur himself. QST

• New Apparatus

New Vacuum Relay

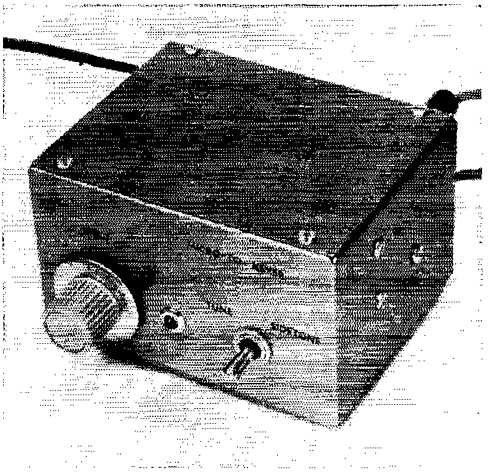


THE type RF1D vacuum relay, shown actual size in the accompanying photograph, is a new low-priced (in the $20–25 range) addition to the well-known Jennings line. It has an obvious application as an antenna changeover relay in amateur equipment. It is small — less than 1⅝ inches body length, with a mounting-flange diameter of 1⅛ inches — and weighs only ¾ ounce. The insulation is ceramic in the high-voltage section, with the actuating coil enclosed in a metal cylinder on the opposite side of the flange. The s.p.d.t. contacts are rated at 2000 volts and will carry 4 amperes continuously at 16 Mc. (6 amperes at 2.5 Mc.). The coil has a resistance of 1300 ohms and operates from 26.5 volts d.c. Nominal capacitance between contacts is 1.6 pf. and from contacts to ground is 2 pf. Maximum operate and release time is 10 milliseconds, according to ratings, but general experience with relays of this general type has been that the rated operating times are quite conservative. Contact resistance is 0.02 ohms maximum.

The RF1D is manufactured by ITT Jennings, 970 McLaughlin Ave., San Jose, California 95108.

— *W1DF*

The Micro-TO Keyer



An Electronic Keyer using Integrated Circuits

BY CHET OPAL,* K3CUW

Here is an inexpensive (under $25) electronic keyer in which no compromises have been made with performance. The circuit is functionally similar to the W9TO keyer, but for constructional simplicity the original vacuum tubes have been replaced by silicon integrated circuits and germanium diodes.

MORE than fifteen articles on electronic keyers have appeared since 1960 in *QST* alone. The designs range in complexity from the simplest relay-plus-capacitor analog keyers to keyboard-actuated digital computers which make entire letters automatically. Few hams have the resources to build one of the keyboard monsters, and the analog keyers, while simple, do not make perfect characters and are difficult to adjust and operate. The most practical keyer lies between the two extremes: it should be capable of generating perfect characters, yet it should be simple enough so that the average ham can build it. Probably the first satisfactory keyer of this kind was invented by W9TO.[1] A modern version of his design is presented in this article. First, however, some aspects of the TO design and its variations will be discussed.

TO Keyer Operation

All keyers of this general type employ some kind of dot generator. Dashes are made by filling in the space between two dots with digital circuitry, and latching circuits are used to insure that a dot or dash will be completed once it has been started. Dot and dash memories may be added,[2] although their usefulness is debatable. The various designs differ primarily in the method of generating dots.

An astable multivibrator is often used for this purpose because it is relatively simple. The keying speed is varied by changing both time constants in the astable multivibrator together, while the weight, or dot-to-space ratio, is adjusted by changing one of the time constants independently. The weight control makes it possible to compensate for nonuniform tracking of the time constants, asymmetry in the transmitter shaping, and relay closure delays; however, the control must be readjusted whenever the keying speed is changed appreciably.

Alternatively, a pulse generator may be used to toggle a flip-flop. The keying speed is then determined by changing the pulse repetition rate. Dots formed by this method are perfectly symmetrical and consequently there is no provision for adjusting the dot-to-space ratio (with proper shaping and fast relays or electronic switching there is no need for a weight control anyway). Perfect words, as well as perfect characters, can be made if the dot generator is left on all the time and is allowed to key the transmitter only when the keyer paddle is pushed, but this can be a nuisance with a memoryless keyer, since it is all too easy to leave out a dot at low keying speeds. In any case, if a keyed dot generator is used it is a simple matter to provide for the free-running mode. Since it is harder to design a good keyed astable multivibrator than a good keyed pulse generator,[3] the latter is used in the Micro-TO keyer.

* 42 W. Biddle St., Baltimore, Md. 21201

[1] Ricks never published his design, although copies of the original schematic have been circulating since the early 1950's and a commercial version has been marketed. The first *QST* reference to the TO keyer is by Old, "Transistorized Electronic Key and Keyer" (*QST*, May, 1959).

[2] A rather elaborate keyer using relays to perform logic and memory functions was described almost 15 years ago by Kaye, "Ultimatic — Key with a Memory" (*QST*, February, 1953).

[3] It is virtually impossible to key an astable multivibrator without making an extra-long first dot: the first 50-w.p.m. dot from silicon transistor astable multivibrators can be as long as a dash!

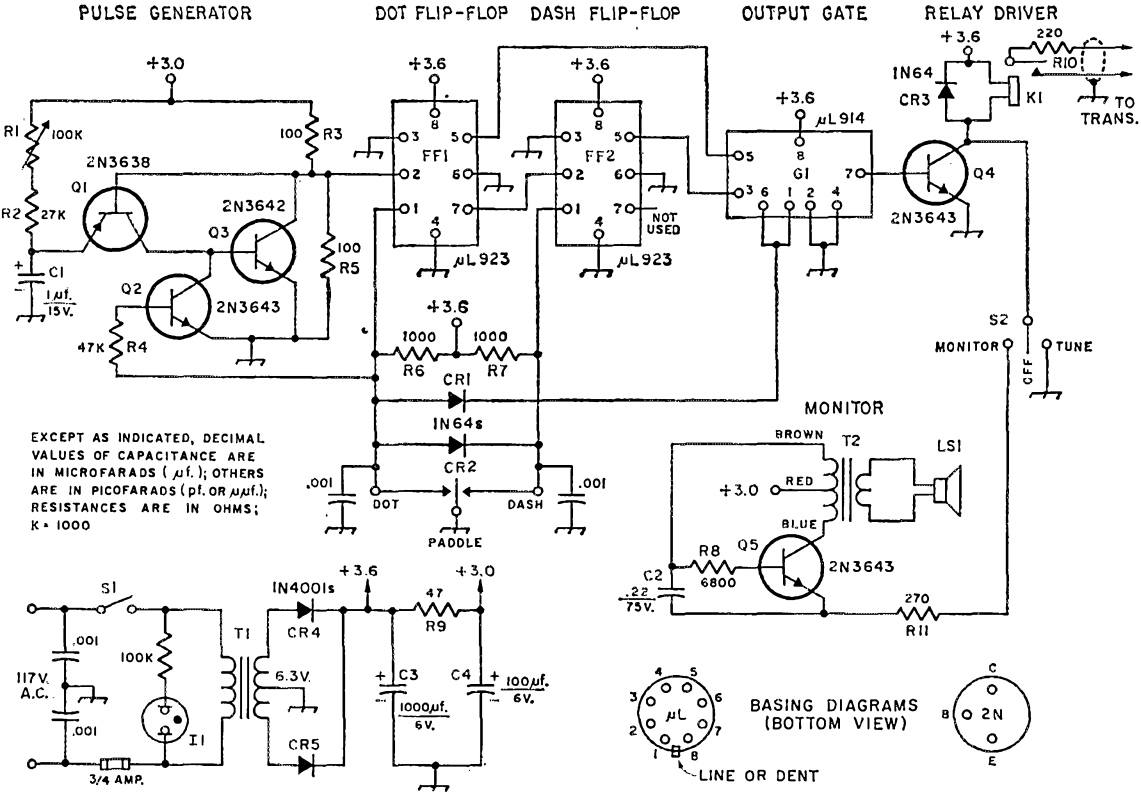


Fig. 1—Schematic of the Micro-TO keyer. Capacitances are in μf., polarity indicates electrolytic, others are ceramic. Resistances are in ohms (K = 1000); resistors are ½-watt. Component designations not listed below are for identification in board layout, Fig. 2.

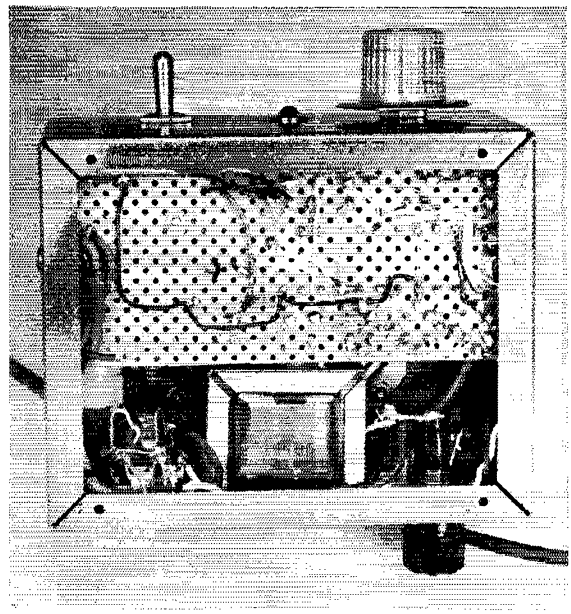
CR_1, CR_2—Must be germanium diodes.
FF_1, FF_2—J-K flip-flop (Fairchild μL923).
G_1—Dual-input gate (Fairchild μL914).
I_1—Neon glow pilot lamp.
K_1—S.p.s.t. reed relay (Magnecraft W102X1).
LS_1—3-inch 10-ohm speaker (Philmore).
Q_1–Q_5, incl.—Must be silicon transistors.
R_1—100,000-ohm control, linear taper, 2 watts, composition.
S_1—S.p.s.t. switch on R_1.
S_2—S.p.d.t. center-off toggle switch.
T_1—6.3-volt 0.6-amp. filament transformer (Stancor P-6465 or equivalent).
T_2—Transistor output transformer, 500 ohms c.t. to 16 ohms (Lafayette Argonne AR-118).

The Circuit

The logic functions in the Micro-TO keyer (Fig. 1) are performed by silicon integrated circuits. The boxes labeled FF_1 and FF_2 (μL923) are called J-K flip-flops, and contain some 15 transistors and 17 resistors; the details of the inner workings need not concern us. For our purposes, the flip-flops behave in the following way: Whenever the trigger input (Pin 2) is brought from positive (more than 0.7 volt) to ground (less than 0.2 volt) the flip-flop can go into a new state. If both the inputs (Pins 1 and 3) are held at ground during the negative-going trigger pulse, the outputs (Pins 5 and 7) will complement (assume opposite states), while if Pin 3 is grounded and Pin 1 is held positive the flip-flop will go into the state in which Pin 5 is grounded no matter what the initial state. Whenever the dot lever is closed and Pin 1 of the dot flip-flop FF_1 thereby grounded, the pulse generator, which will be discussed in greater detail below, begins to deliver a string of pulses into the dot flip-flop trigger input. Grounding the dash contact also grounds the dot contact through CR_2. A series of dots will appear at the dot flip-flop outputs as long as one of the levers is closed. The output of the dot flip-flop feeds through some gates in G_1, μL914 (which consists of two pairs of paralleled transistors) to key the relay. When the dash lever is closed, Pin 1 on the dash flip-flop FF_2 is also grounded and this flip-flop is ready to change state whenever Pin 7 of the dot flip-flop goes to ground. Thus, when the dash lever is closed, the dot flip-flop changes state with the first trigger pulse and this in turn triggers the dash flip-flop. At the end of the first dot, the dash flip-flop is still set and holds the relay in via the output gate. CR_1 keeps the dot generator going even if the dash lever is released, and the keyer goes on to make a second dot. This time

when Pin 7 goes to ground it resets the dash flip-flop and, finally, after the end of the second dot the relay opens and the keyer is ready to generate the next character. A little thought will reveal that once a character has started it is impossible to alter it with the keyer paddle. Also, there is no space in the middle of a dash, as is found in some keyers, so dashes are self-completing without a need for filters on the paddle leads (except, of course, for some 0.001's to keep r.f. out of the keyer).

The pulse generator is somewhat novel. Ignoring Q_2 for the moment, the combination of Q_1 and Q_3 resembles a unijunction transistor. Both Q_1 and Q_3 are normally off, and the base of Q_1 sits at 1.5 volts as determined by the 100-ohm divider resistors. C_1 charges through R_1 until the Q_1 emitter reaches about 2.1 volts (1.5 volts plus the base-emitter voltage drop), at which point Q_1 begins to turn on. Current begins to flow into the base of Q_3 and it also begins to turn on. This lowers the base voltage on Q_1, making it come on a little more; Q_1 then feeds more current to Q_3, making it come on harder, and so on: a cataclysmic collapse occurs which discharges C_1 and generates the negative pulse required by the dot flip-flop. When there is not enough charge on C_1 to keep things going, Q_1 and Q_3 turn off, the base of Q_1 goes back to 1.5 volts, and the whole process repeats. Now putting Q_2 back into the circuit, we see that with the key levers open it is normally conducting and, since the collector-emitter voltage on a saturated silicon transistor is less than the base-emitter drop required to turn it on, it diverts any current that otherwise would go into the base of Q_3. The collapsing process cannot begin, and C_1 is clamped at 2.1 volts by the base-emitter diode of Q_1. The instant the dot or dash lever is closed, however, Q_2 is turned off and the collapse takes place immediately. The circuit is insensitive to dirty paddle contacts, and once the clock has started the interval between pulses is always the same. If a free-running pulse generator is desired, a switch can be installed to open the base lead of Q_2. A speed range of 10 to 50 w.p.m. is obtained with the constants shown.



Wiring of the board is visible in this view inside the top of the box. Flea clips serve as tie points in the punched board.

An inexpensive reed relay is used to key the transmitter. It has operate and release times of less than 1 millisecond, including contact bounce, causing negligible keying delays at speeds below 100 w.p.m. The relay contacts occasionally stick together if the relay is used with transmitter keying lines having large bypass capacitors. A 220-ohm resistor has been added in series with one of the leads to eliminate the surge that causes the sticking. This small resistance has a negligible effect on the usual high-impedance grid-block keying line. The relay is not recom-

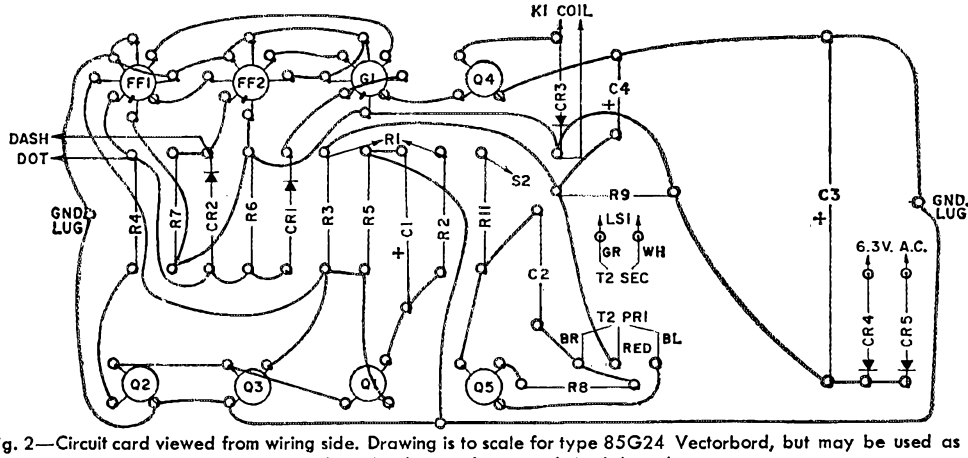
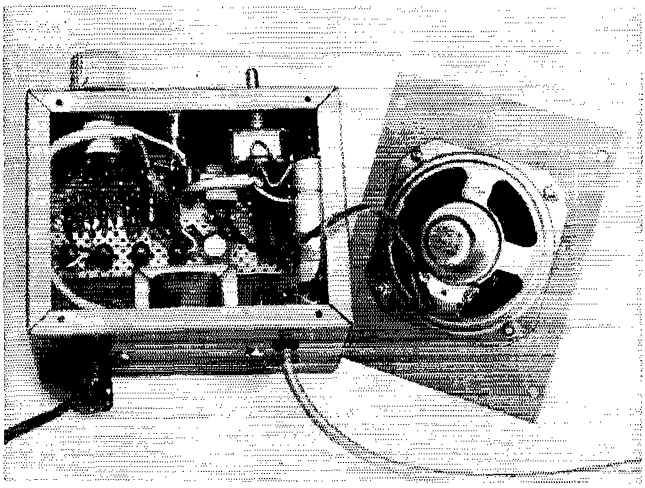


Fig. 2—Circuit card viewed from wiring side. Drawing is to scale for type 85G24 Vectorbord, but may be used as a guide in the design of a printed circuit board.



A look into the bottom of the enclosure shows the speed control (upper left), tone-sidetone switch (upper right) and the power supply, as well as the component side of the circuit board. The transistors and integrated circuits are along the edges of the board at the left.

mended for use with cathode-keyed transmitters running much more than 30 watts.

The monitor is a makeshift affair depending on speaker resonance and transformer inductance to generate an audio tone. The values indicated work for the particular speaker-transformer combination indicated; if other parts are used the values of the 6800-ohm resistor and 0.22-μf. capacitor will probably need to be changed. The waveform is a series of pulses which are damped out by the speaker resonance, and the resulting tone, while rough, is not annoying. The waveform can be made sinusoidal, but the keying then becomes clicky. The volume is determined by the value of resistor R_{11} in the Q_5 emitter lead.

Construction

The keyer is housed in a $3 \times 4 \times 5$-inch aluminum utility cabinet. The small components are mounted on a $2\frac{3}{8} \times 4\frac{13}{16}$-inch piece of Vectorbord. A suitable layout for the card is shown in Fig. 2 (since none of the wires cross, the diagram may also be used for the design of a printed-circuit card). The speaker is bolted to the bottom of the box, in which a few holes are drilled, and the box is mounted on rubber feet so the sound can get out. The controls are mounted along the lower part of the box, and the wiring board is fastened with small brackets near the top so it will clear the controls and speaker. The relay is held to the side of the cabinet with a pair of cable clamps. Another version of the keyer, which did not include a monitor, was housed in a $2 \times 4 \times 4$-inch utility cabinet with room to spare.

The Fairchild economy epoxy-cased integrated circuits used may be hard to find. The name of the nearest distributor can be obtained from Fairchild Semiconductor, Marketing Services Dept., P.O. Box 1058, Mountain View, California. The Motorola HEP integrated circuit line, which is available at many electronics stores, could probably be used if the power supply and relay voltages were changed. Other silicon transistor types could be substituted. The total cost of the keyer, including the monitor, is under $25.00.

Conclusions

Three Micro-TO keyers have been built, and all have performed well. One unit has been used for several months by operators of various levels of experience at a club station (WA3EPT, the Johns Hopkins University Radio Club), and the members seem to have no difficulty in getting used to the "feel" of the keyer.

The author would like to thank K2KFF for his assistance in designing the pulse generator circuitry and for his helpful criticism. QST

Strays

Recent articles in *QST* on antenna rotators mentioned "Azimuthal Maps." The U.S. Naval Oceanographic Office currently offers fifteen azimuthal charts at $1.20 each, some of which are listed below by order number and center point.

6700 Fairbanks, Alaska
6701 Seattle, Washington
6702 Honolulu, Oahu, T.H.
6704 San Francisco, California
6705 Washington, D.C.
6711 San Diego, California
6714 Cutler, Maine

All these charts are large, in the 30- to 40-inch category. If you are ordering from the Pacific areas or west of the Mississippi (but not the Gulf of Mexico or Canal Zone) send your order to:

Officer in Charge
U.S. Naval Oceanographic Distribution Office
Clearfield, Utah 84015

All other orders should go to:
Oceanographic Officer
U.S. Naval Oceanographic Distribution Office
U.S. Naval Supply Depot
5801 Tabor Avenue
Philadelphia, Pa. 19111

An RTTY Bandpass Filter For 1275/2125 c.p.s.

BY EDWARD E. WETHERHOLD,* W3NQN

For RTTY reception of 850-cycle frequency-shift keying, the r.f. tuning and b.f.o. receiver controls are usually adjusted to give audio tones of 2125 and 2975 cycles per second. A bandpass filter[1] designed for these frequencies is connected to the receiver output to provide audio selectivity. Some of the newer receivers have a roll-off of the high-frequency audio response starting around 2500 cycles, thus not permitting optimum reception of the 2975-cycle tone. If the receiver controls are adjusted to give audio tones of 1275/2125 the RTTY signals will be easier to tune but a new bandpass filter with cutoff frequencies of about 1200/2200 cycles will be required.

An excellent filter with the desired response is commercially available from Electrocom Industries[2] and the response of this filter, type BPF 1550K, is shown by curve *A* in Fig. 1. This filter, designed for 600 ohms, is contained in a $2 \times 2 \times 3$-inch hermetically sealed can with octal header and sells for $45 net. The purchase of this filter is a quick and convenient way of obtaining the 1275/2125-cycle audio bandpass selectivity; however, an equally suitable filter may be constructed for less than $8. This article discusses the construction of such a filter.

* Honeywell Inc., Annapolis Operation, Test Instruments Division, P.O. Box 391, Annapolis, Maryland 21404

[1] Hoff, "Mainline TT/L FSK Demodulator," Fig. 2, *QST*, August, 1965.

[2] 1105 North Ironwood Drive, South Bend, Indiana 46615

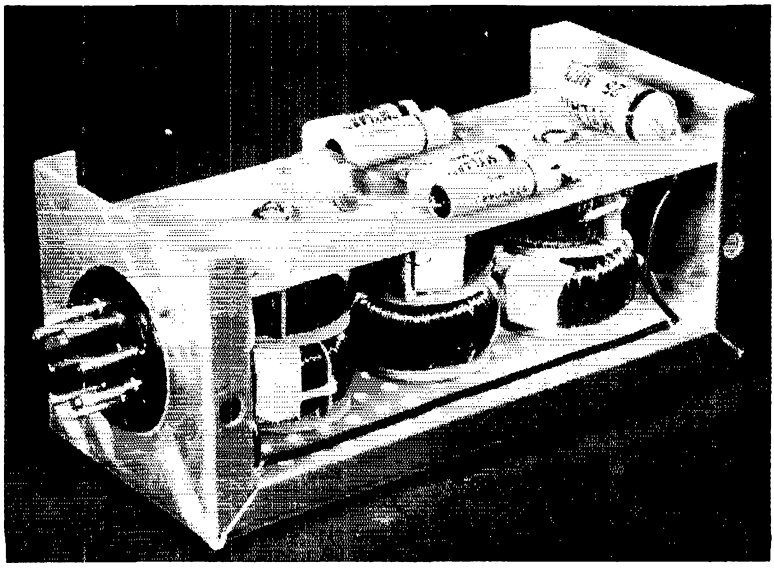
Filter Circuit Description and Design Parameters

The bandpass filter to be discussed results from the application of modern filter design techniques previously employed by the author[3]. The filter schematic, shown in Fig. 2, is obtained from the transformation of an elliptic-function low-pass filter prototype to a bandpass filter. The prototype design parameters are: f_{co} = 1090 c.p.s.; minimum stop-band attenuation (A_s) = 40 db.; maximum pass-band attenuation (A_p) = 0.5 db.; and source and load resistances (R_o) = 600 ohms. The low-pass prototype filter component values were calculated from data given in Table A4-2 of *Simplified Modern Filter Design*.[4] Space does not permit discussion of the low-pass prototype-to-bandpass transformation procedure; the reader is referred to Chapter 3 of Geffe's book for details.

The calculated parameters of the bandpass filter are: f_{co} = 1140 and 2230 c.p.s.; f_{mean} = 1594 c.p.s.; skirt frequencies at 40 db. attenuation = 697 and 3654 c.p.s.; and the frequencies of theoretically infinite attenuation = 632 and 4022 c.p.s. The bandpass filter values of A_s, A_p, and R_o are the same as for the prototype filter. Special efforts were made to obtain a bandpass design which would permit use of the currently available 44- and 88-mh. toroids.

[3] Wetherhold, "An Amateur Application of Modern Filter Design," *QST*, July, 1966.

[4] Geffe, "Simplified Modern Filter Design," John F. Rider Publisher, Inc., New York City, 1963.



Completed bandpass filter, less cover. The capacitor and toroid arrangement is shown in this view.

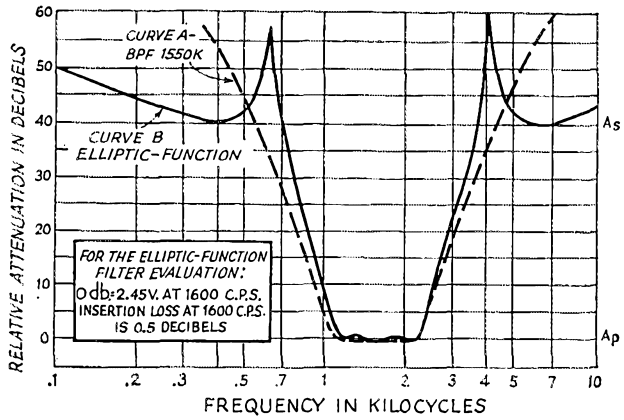


Fig. 1—Response curves of relative attenuation versus frequency for the Electrocom BPF 1550K (curve A) and the Elliptic-Function (curve B) band-pass filters.

Construction

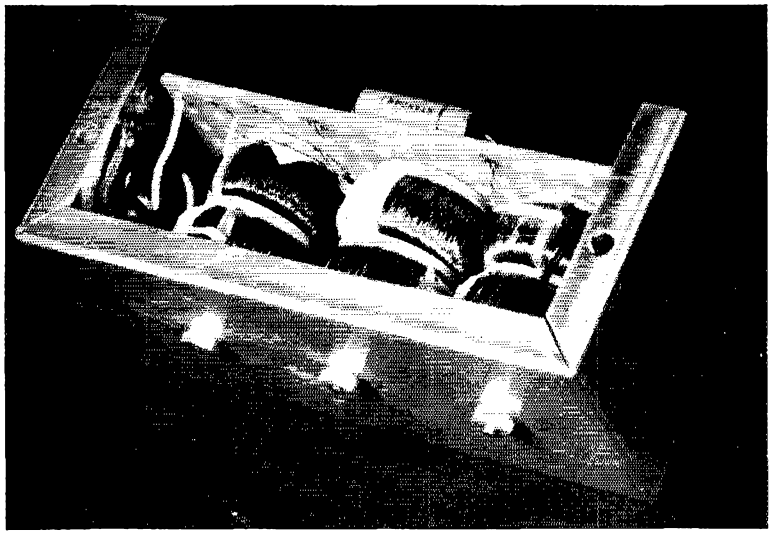
All the inductances specified in the schematic are obtained with the low-cost 44- and 88-millihenry toroids. It is suggested that five 44-mh. and five 88-mh. toroids be ordered from Buchanan[5] at a total cost of $3.50 postpaid. The toroids come unpotted, five of one value in a cylindrical metal case. After removing four of the 44-mh. toroids and two of the 88-mh. toroids from their cases, take one 88-mh. toroid, scrape the insulation from the four wires and connect the two windings on the toroid in series aiding. Repeat this procedure for the second 88-mh. toroid and also for two of the 44-mh. toroids. Information regarding this procedure is available in Lewis McCoy's article.[6] The two 132-mh. inductances required by the filter are obtained by connecting the 44- and 88-mh. toroids in series. To obtain the 40.3-mh. value, remove 10 turns from each of the two windings of a 44-mh. toroid and then connect the windings in series aiding. To obtain the 8.94-mh. value, remove 26 turns from each of the two windings of the fourth 44-mh. toroid and connect the windings in *parallel* aiding. This completes the modification of all the toroids.

The required capacitances are made up of either mylar or polystyrene capacitors connected in parallel, where necessary, to get the design values within a few percent.

Two phenolic boards, $1\frac{15}{16} \times 4\frac{1}{2}$, were cut from a sheet of type 32AA18 Vectorbord. The six toroids were sandwiched between the boards and the whole assembly held together by three 2-inch long 6-32 machine screws and nuts. The toroids comprising the 132-mh. inductances were placed near the octal plug. The 8.94-mh. toroid was placed between the 0.247-μf. capacitor and the 40.3-mh. toroid. The capacitors were mounted on top of the toroid sandwich and the filter component leads wired together in accordance with the filter schematic. After installing an octal plug in the $2\frac{1}{4} \times 2\frac{1}{4} \times 5$-inch Minibox, the filter assembly was bolted inside the box and connections made to the octal plug as specified

[5] Buchanan and Associates, 1067 Mandana Blvd., Oakland, California 94610

[6] McCoy, "The Selectoroid," Figure 3, page 20, *QST*, December, 1966.



Underside view of filter showing how the toroid mounting screws are also used to bolt the filter assembly inside the Minibox case.

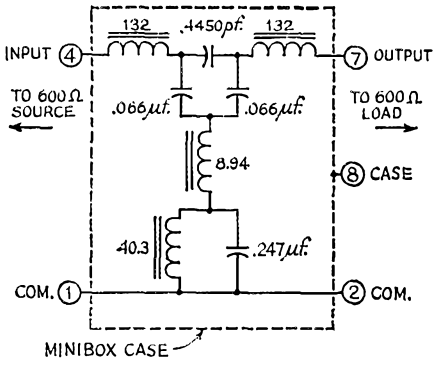


Fig. 2—Circuit diagram of the bandpass filter. Inductances are in millihenrys and capacitances are as indicated. Encircled numbers indicate octal-plug pin connections.

in Fig. 2. The nuts which hold the toroid sandwich together also act as spacers to keep the wiring tie-points on the bottom phenolic plate from shorting to the aluminum box.

Brass eyelets (⅛ inch long, stock no. 31F2221, $0.32/100, Newark Electronics Corp.) were used as wiring and component lead tie-points. Prior to assembly of the toroid sandwich, the eyelets were inserted at appropriate points and secured to the boards by flaring the eyelet with an awl and then peening with a ball peen hammer. The component leads and interconnecting wires were then inserted in the eyelets and soldered to make neat and compact tie-points. Flat rubber washers were used on each side of the toroids to provide cushioning and also to provide some degree of physical separation between the toroids to minimize coupling. Additional details may be obtained from the photographs.

Filter Performance and Application

The elliptic-function filter was evaluated in a 600-ohm system and the attenuation response versus frequency is shown by curve *B* of Fig. 1. The excellent agreement between the calculated and measured attenuation (typical of all filters designed in accordance with modern filter design techniques) is primarily due to the use of the high-*Q* toroids and the adjustment of component values to within a few percent of the design values.

Although the bandpass filter was not tested in an RTTY system under actual operating conditions, the filter response curve indicates that satisfactory performance should result if the source and load resistances are within 10 percent of 600 ohms. For this reason, a pad designed to provide the proper filter source resistance and having a loss of 6 to 10 db. is recommended for insertion between the RTTY receiver and the filter. Generally, the resistance seen looking into the average receiver's 600-ohm transformer winding is several times greater than 600 ohms, and the recommended pad should be designed to compensate for this. In addition to providing the proper source for the filter, the pad will tend to minimize reactive components of the receiver output transformer from affecting the filter operation and also will tend to isolate the receiver audio output amplifier from the widely-fluctuating input impedance of the filter.

Acknowledgments

The author wishes to thank John Brennan, Jr. for providing the photographs and Irvin Hoff, W6FFC, for his advice and encouragement.

QST

Strays

I would like to get in touch with . . .

. . . radio amateurs seriously interested in UFOs. WB6RPL.

. . . doctors or health personnel in remote areas who would like to have medical consultations with qualified medical specialists via ham radio. WB2NIN.

. . . anyone interested in playing chess on the air. K2DDK.

. . . amateurs who are members of the Rotary International. WAØGXY.

. . . YLs interested in the International Teenage Net. WA7FDF.

—•••—

***QST* congratulates . . .**

Jack B. Harvey, K2HNY, on his appointment as Senior Scientist for Communications Systems, Inc., Paramus, N. J.

Dr. George H. Reifenstein, W3CKN, on his promotion to the rank of Rear Admiral, USNR. He is Technical Director, Clinical Research and Medical Education, U.S. Naval Medical Center, Bethesda, Md.

Sheldon A. Glick, WB2OHH, on becoming instructor of radio-electronics and amateur radio at the Talcott Mountain Science Center, Avon, Connecticut.

Burt J. Bittner, KØWQN, who was elected President of the Board of Education, Air Academy School District, Colorado.

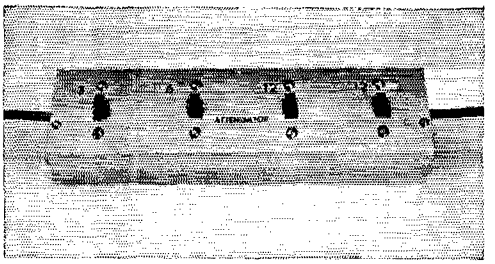
Gerald Wade, WB4CMK, for being the only U.S. winner in the Radio Canada QSL card design contest.

Arthur A. Collins, WØCXX, President of Collins Radio Co., who received a University of Iowa Distinguished Service Award.

Clayton Bane, W6WB, who was elected president of the Northern California Advertising Agencies Association.

A Simple Step Attenuator

BY BYRON GOODMAN,* W1DX



THE attenuator to be described is for use between antenna and receiver, to reduce overloading by extremely strong signals.[1,2,3] Attenuation between 3 and 33 db. can be obtained in 3-db. steps by closing one or more of four slide switches. A more elaborate design might include 1- or 2-db. intervals, but the sole intent here was to make the device simple and inexpensive. Common 10-per cent-tolerance composition resistors are used.

Referring to the circuit diagram in Fig. 1, when all of the switches are in the "up" position there is a direct connection between P_1 and P_2. Moving S_1 "down" introduces a 3-db. pi-section pad, moving S_2 introduces 6 db. attenuation, and S_3 and S_4 each add 12 db. attenuation. When two or more switches are "down" the attenuation is the total of the attenuations for the active sections. It should be noted that the design is based on the assumption that the receiver looks like 50 ohms; if it is higher, the lower values of attenuation will be less than stated above. But just because your receiver doesn't look like 50 ohms (or because you don't know what it looks like) doesn't mean the attenuator won't work; it will, but the attenuation values will be different. So what?

The use of the 12-db. maximum section is based on measurements made when the switches were first installed. They had been wired for the straight-through connections but no attenuating resistors had been installed; an "open circuit" position was available at each switch. Opening one switch, the attenuation was 39 db. (measurement at 28 Mc.). As the switches were progressively opened, the additional attenuation per switch decreased, and opening the last switch introduced only 12 db. additional attenuation over that obtained with three switches open. It is unlikely that the next step (24 db.) is practical with this simple construction, and that's why two 12-db. sections are included.

The unit was built on a piece of 5 × 8-inch sheet aluminum bent into a 1½-inch deep and 2-inch wide channel. The switches are mounted 2 inches apart. Coaxial line (RG-58/U) was secured at each end by small aluminum cable clamps bent from scrap aluminum. The ends of the coaxial lines were terminated in a BNC plug for the receiver and an SO-239 receptacle and UG-177/U hood for the antenna connection. Obviously these connections would vary with the station and application.

Using a signal generator and receiver for measurements at 28 Mc., no differences in attenuation could be detected with a bottom plate on or off.

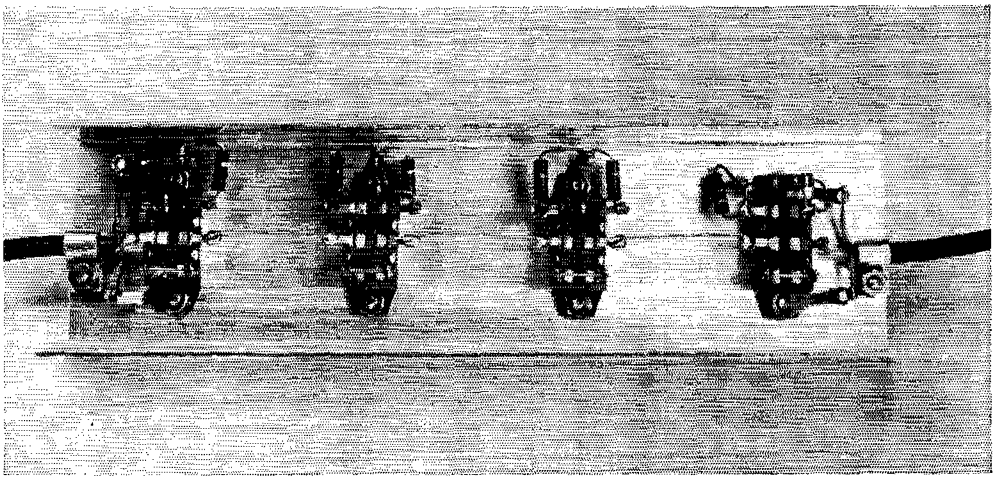
Anyone who wishes to confirm the attenuations of the various sections can use a signal

* 75 Holland Lane, East Hartford, Conn. 06118

[1] Andrade, "Recent Trends in Receiver Front-End Design," *QST*, June, 1962.

[2] Talley, "Receiver Front-End Attenuator," *QST*, January, 1964.

[3] "The ITT Mackay Marine 3010-B Receiver," *QST*, April, 1967.



Resistor networks for the attenuator are mounted on the switches and grounded to lugs held by the switches. Note that outer conductor of coaxial cable is fanned out and grounded either side of switch.

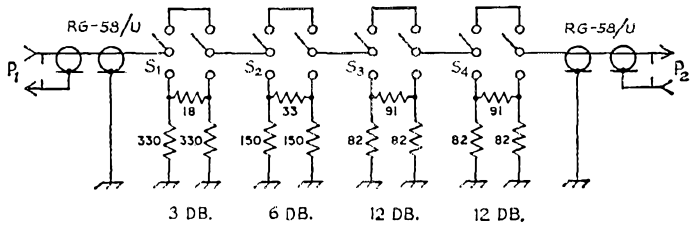


Fig. 1—Circuit diagram of the step attenuator. All resistors are ½-watt composition.
P_1, P_2—See text.
S_1–S_4—D.p.d.t. slide switch (Continental-Wirt or equiv.)

generator (it must have an accurate attenuator), an audio oscillator and oscilloscope, or a source of d.c. and a voltmeter. Connect a 50-ohm resistor or other termination across the output (receiver) plug. The voltage at this point, measured by receiver, oscilloscope or voltmeter) should be 0.71 times the input voltage for the 3-db. section, 0.50 times the input voltage for the 6-db. section, and 0.25 times the input voltage for the 12-db. section. But again, if it doesn't work out right on the button, so what? It will still work and it will help you on more than one occasion when the QRM gets heavy.

(Anyone interested in a more precise step attenuator — and who has the facilities for measuring r.f. resistance values — can design his attenuator sections from the following:

$$R_{series} = \frac{A^2 - 1}{2A} R_o$$

$$R_{shunt} = \frac{A + 1}{A - 1} R_o$$

where R_o = characteristic resistance, e.g., 50 ohms

A = reciprocal of output/input voltage ratio; e.g., 1.414 for 3 db., 2.0 for 6 db., 4.0 for 12 db., and so on.)

NEW BOOKS

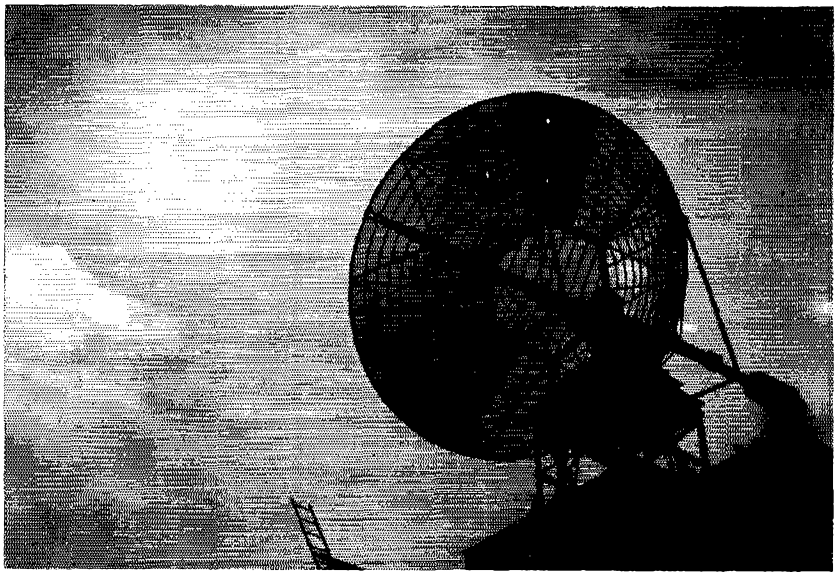
RCA Linear Integrated Circuit Fundamentals, by staff at Commercial Engineering, RCA Electronic Components and Devices, Harrison, New Jersey 07029. Technical Series IC-40. 5⅜ by 8⅜ inches, 240 pages including index, white paper cover. Price, $2.00.

An integrated circuit is a collection of components fabricated as a complete entity to perform some electronic function. From which definition the layman might assume, with some reason, that what this amounts to is primarily a one-piece realization of an ordinary multi-component circuit — especially when such-and-such an "IC" contains 14 transistors, 21 diodes, 6 resistors, 9 capacitors, and heaven only knows what else No doubt about it, the IC is a miniaturized marvel However, there's a lot more to the story than getting a heaping handful of components for the price of one

The fact is that the IC calls an entirely new philosophy of design into being. Integrated construction has some very definite limitations as well as equally important advantages. The circuit designer must recognize one outstanding fact: in ICs it is far less costly to make multiple transistors than it is to make any other kind of component. In fact, only two other kinds can be made, resistors and capacitors — resistors up to perhaps 20,000 ohms, and capacitors up to a few hundred. Furthermore, since the cost of any component on the semiconductor "chip" is proportional to its area, resistors and capacitors cost more than transistors because they take more space, especially in the higher values. The optimum integrated circuit, therefore, is one in which transistors (or diodes, since each transistor readily can be connected as a diode) are substituted for resistance and capacitance. This explains, partially, why an IC often has such an apparently excessive number of transistors in one small package.

The second reason has to do with the nature of semiconductor material. When all the fabrication is done with microscopic dimensions on one tiny piece of silicon, two side-by-side transistors will have almost identical characteristics, and so will other devices on the same chip. This is especially important when temperature effects are considered; excellent temperature characteristics can be obtained by suitable circuit design. "Suitable design" generally means that two or more transistors are used in balanced circuits to a job that would be done by only one transistor in conventional circuit layouts, but the extra complications are worth it because of the improved temperature stability. Thus most integrated amplifier circuits are "differential" amplifiers — out old friend push-pull in a new hat.

All this and much more is covered in "RCA Linear Integrated Circuit Fundamentals". Basic design considerations are discussed for the benefit of the circuit designer who must have a tailor-made IC, and in addition a little over half the book is spent on applications of a number of standardized ICs marketed by RCA. The book does not range the entire IC field, being limited to linear circuits — i.e., linear amplifiers — of monolithic construction, where the entire circuit is made by diffusion techniques on a silicon chip. Nonlinear circuits such as flip-flops are not covered, nor are circuits made by the thin-film and other methods. However, the monolithic linear circuit would appear to be enough for a first gulp. There is plenty of design information, liberally sprinkled with mathematics, as well as performance data on RCA linear integrated circuits. — *WIDF*



432-MC. SOLAR PATROL

A Study of Solar Noise in Relation to Radio Propagation

BY PAUL M. WILSON, W4HHK/A4HHK *

IN the spring of 1966, the "big dish" at W4HHK was comparatively idle. Oscar IV was silent, moonbounce activity on 432 Mc. was nil, and there were no tropo-scatter schedules in prospect. Then an item in *Sky and Telescope* caught my eye. It told how NASA planned to maintain a solar-flare patrol as part of the space program. Why not a solar patrol on 432 Mc.?

This seemed like a worthwhile effort. Though the flux density of radio noise from the sun is measured daily by observatories, their records are not immediately available to the amateur. Our project would be a means of keeping track of solar activity on a day-to-day basis. In addition, it would be a way to evaluate the antenna and receiving system, and periodically check it.

Until now only an occasional "look" at the sun had been made. Observation had been inconvenient because each session meant trips up and down the tower to release and stow the dish. By the middle of April, 1966, several events had made daily observations feasible. A stowing device was built that permitted operation from the ground. A commercial step attenuator was obtained for calibrating solar noise recordings accurately. Last but not least, a 432-Mc. preamplifier built with low-noise kMc. transistors made a noticeable improvement in 432-Mc. receiver performance.

* Box 430, Collierville, Tennessee 38017

Solar Signals

At this point it is desirable to examine the source of the noise to be observed and measured. The sun is some 92 million miles from earth, or 8.3 minutes of travel at the speed of light and radio emissions. It is not a true point source, but for most amateur purposes can be considered as one. According to Bray and Kirchner,[1] it can be represented as a ring of about one degree angular diameter on the outside, and about one-half degree on the inside. The sun is a source of noise on radio frequencies, caused by plasma oscillations and gyro-oscillations in the solar atmosphere, as well as noise originating in random collision of electrons. Noise from the quiet sun is of the latter type.[2] A solar noise recording made when the sun was relatively quiet is shown in Fig. 1.

Noise from a quiet sun appears to have random polarization, but bursts of high intensity at 432 Mc. are elliptically to linearly polarized.[3] Sunspot activity of the current 11-year cycle (Cycle 20) is expected to peak some time in 1968. The quiet

[1] Bray and Kirchner, "Antenna Patterns from the Sun," July, 1960, *QST*, p. 13.

[2] NBS Monograph 80, "Ionospheric Radio Propagation," April 1, 1965, p. 38. Price $2.75, from Supt. of Documents, Washington, D. C. 20402.

[3] M. H. Cohen, Cornell University, "Measurement of Solar Radiation at 430 Mc.," *Quarterly Status Report*, Feb. 1–July 31, 1965.

sun looks like an approximate 500,000-degree Kelvin source, rising to about 1,000,000 degrees K. when disturbed.[4] The amplitude of solar emission may remain relatively constant for long periods, and then will be greatly enhanced during a "noise storm." Such storms are often associated with solar flares and certain geophysical disturbances, and may last for hours or days.[5]

Solar flares are sometimes, but not always, followed by aurora some 20 to 40 hours later. The rotation period of the sun is about 27 days, and there is a tendency for aurora to recur at this rate. Some sunspots may survive several rotations before disappearing. In a 1951 *QST* article,[6] Moore pointed out that correlation between sunspot number and aurora is not as great as one might expect. But what about solar *noise* and aurora, or sporadic *E*, F_2 or transequatorial v.h.f. propagation? It was hoped that regular solar noise observation might serve as an indicator of propagation conditions, and possibly give advance warning of events such as major auroras.

Equipment Evaluation

Besides helping you to keep up to date on what the sun is doing, regular solar noise measurements are a means of evaluating system performance, from antenna to receiver output. For given antenna size, feed line loss and receiver temperature (or noise figure) a certain minimum amount of solar noise should always be obtainable. W1FZJ described how a 17-foot parabola and a receiver-feed line combination with a 751-degrees Kelvin temperature would observe a 3-db. increase in noise when aimed at the quiet sun.[7] Another reference gives the quiet-sun noise level at 432 Mc. as 21 db. below the receiver noise level when using a perfect receiver and a dipole antenna. An increase of 10 db. could be expected from an active sun.[8]

[4] "The World Above 50 Mc.," October, 1965, *QST*, p. 112.
[5] Reference 2, p. 43.
[6] Moore, "Aurora and Magnetic Storms," June, 1951, *QST*, p. 16.
[7] "The World Above 50 Mc.," October, 1965, *QST*, p. 112.
[8] "I T & T Reference Data for Radio Engineers," 4th Edition, p 764.

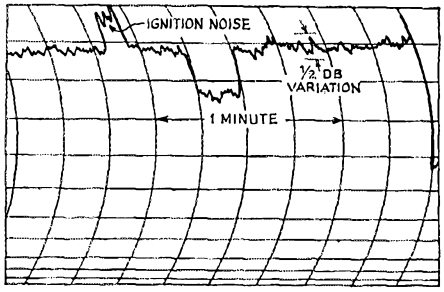


Fig. 1—Noise of the sun on a relatively-quiet day, Dec. 1, 1966. Noise was running between 3 and 3.5 db. American sunspot count was 32. A 1-db. calibration dip is seen near the center of the recording. A burst of ignition noise is seen at the left.

At the outset several questions were raised. Was the writer's dish performing up to specifications? What short-term variations would be observed? Could solar noise be used for reasonably accurate comparisons of equipment? Text books on hand didn't have all the answers. Thus one goal of the project was to resolve some of these questions.

The Noise-Observing Setup

The equipment used for solar noise measurement at W4HHK is shown in block-diagram form in Fig. 2. It doesn't have the simplicity of visual devices such as the Aurorascope[9] for checking sunspot activity, but it does work, rain or shine. The antenna is an 18-foot parabola, with a focal length of 90 inches, and a diameter-to-focal-length ratio of 2.45. The slide-rule specifications for 432 Mc. are 26 db. gain over isotropic, and a beamwidth of 9 degrees at the half-power points. It was made by the D. S. Kennedy Company, and obtained through the Army MARS program. The center is 35 feet above ground, at a 380-foot elevation. Geographic location is latitude 35 02 48 North and longitude 89 40 04 West. The dish is fully steerable in azimuth and elevation by an SCR-584 pedestal.

A modified FPS-3 radar platform supports the

[9] Tomcik, "The Aurorascope," July, 1964, *QST*, p 43.

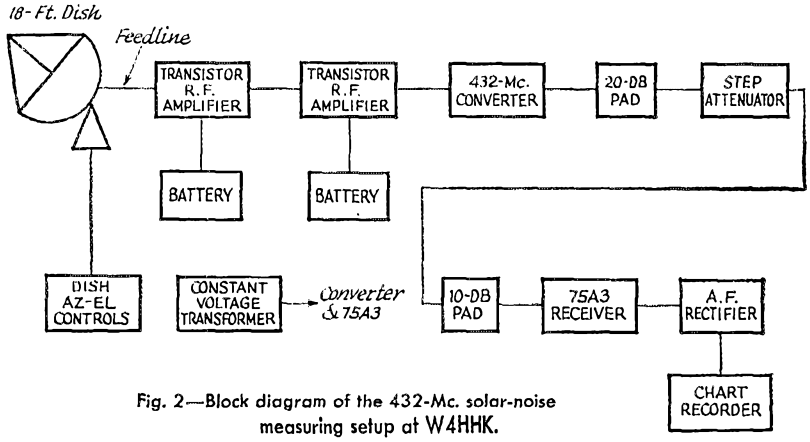


Fig. 2—Block diagram of the 432-Mc. solar-noise measuring setup at W4HHK.

pedestal and dish. Selsyn indicators at the control point show the azimuth and elevation in one-degree intervals. Steering is done by applying d.c. power to the ½-h.p. pedestal motors.

The feed for the dish is a horizontal folded dipole, with a plane reflector 16 inches in diameter. An air-dielectric balun mounted at the feed matches 50-ohm coax to the balanced 300-ohm dipole. A 38-foot length of foam RG-8 connects the balun to a 60-foot run of ⅞-inch Heliax, from the base of the pedestal to the shack. Overall line loss is about 2.25 db., according to published figures.

Since the antenna is also used for transmitting, a coaxial relay, not shown, is employed for transmit-receive switching. It is worth mentioning that after several months of operating a kilowatt transmitter alongside, no measurable change in receiver noise figure has been observed. The feed line is disconnected manually when the equipment is not in use, as a precaution against damage from lightning and heavy static.

Each r.f. stage is in a separate aluminum box, with power supplied by individual 9-volt batteries. The first r.f. amplifier uses a KMC n.p.n. experimental transistor, with a factory-measured noise figure of 2.8 db. (for the transistor). The second uses a TIXMO5 p.n.p. transistor. Gain per stage is about 9 db. Each has the common-emitter configuration, and is unneutralized. Both are stable, even in the absence of input load. Both have double-tuned input circuits, to minimize response to out-of-band signals. In-band signals are not a problem, as the nearest 432-Mc. station is 70 miles distant! The second r.f. stage feeds a 1N21F mixer, which works into a 50-Mc. converter at 49.5 Mc., converting again to 7 Mc., and followed by a 75A3 receiver and chart recorder. The converter and 75A3 are always kept on standby when not in use, to minimize trouble. The r.f. amplifiers and 432-Mc. converter were built by the writer.

A constant-voltage line transformer was found to be necessary to maintain reasonably good gain stability. Without it a recording of a constant-amplitude signal would vary considerably, especially during lengthy recordings. Apparently the main cause of this was heater-voltage change, as the converter plate voltages are all regulated. The converter seemed more sensitive to line-voltage change than did the 75A3. This and other problems were ironed out before regular observations began on June 1, 1966.

A 20-db. fixed pad is used at the converter output and a 10-db. fixed pad at the receiver input, with the step attenuator in the 50-ohm line between them. This was done to insure operation of the attenuator at its design impedance. The 75A3 mode switch was modified to permit reception with the b.f.o. and a.v.c. off. The receiver 500-ohm output is connected to a bridge rectifier, which drives the Esterline-Angus 1-ma. strip-chart recorder. Rectifier output is not linear, crowding at the low-signal end of the scale. Esterline-Angus chart paper, type 132020,

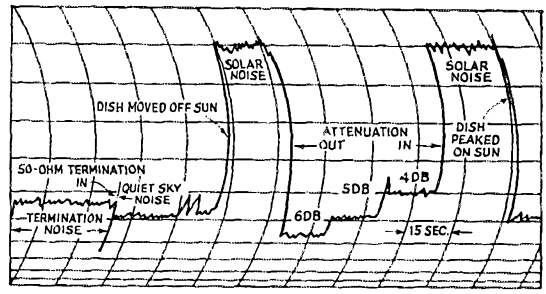


Fig. 3—Solar noise level of 5 db. recorded March 3, 1967. Read chart from right to left. A chart speed of 3 inches per hour was used at the start, as the dish was centered on the sun for the recording in the upper right corner of the chart, then changed to 3 inches per minute for the measurement. Next come three levels of attenuation, inserted for calibration, and another 15 seconds of solar noise. The dish is then turned away from the sun, and the quiet-sky noise is recorded. A 50-ohm termination is then substituted, giving about 0.5 db. more noise than the quiet sky.

that closely matches the rectifier response, was obtained surplus. A chart speed of 3 inches per minute has been found a good compromise between easily-read recordings and paper conservation. For long-duration recordings a speed of 3 inches per hour has been used.

Making Measurements

Radio observatories measure the flux density of solar radio emissions by using the unit of 10^{-22} watts per square meter per cycle per second. The method used by the writer measures the ratio of solar noise to quiet-sky (background) noise in decibels. The results of a typical measurement, made as described below, are shown in Fig. 3. The feed line is connected to the first r.f. amplifier and power is applied to both r.f. stages. Converter crystal mixer current is adjusted to read 0.5 ma. The 75A3 S-meter is observed to verify that two S-units of converter noise is read with the receiver in the a.m. mode. The 75A3 a.v.c. and b.f.o. are turned off, and the a.m. and c.w. limiters are disabled. Audio gain is advanced to 75 percent of full volume, and the "r.f." gain is reduced until the chart recorder reads about one-third scale, as seen at the right edge of the recording.

The dish is then steered toward the sun, and the azimuth and elevation controls are adjusted until maximum noise is indicated on the recorder. Audio gain is readjusted for a meter reading of about 0.9 ma. Chart speed is shifted from the 3 inches per hour, used while steering, to 3 inches per minute, and solar noise is recorded for about 30 seconds. This is the first 5-db. peak at the right. At this point several steps of attenuation are inserted to calibrate the chart, usually beginning with the 3-db. step. Normally the 3-, 4-, and 5-db. steps are each recorded for 15 to 30 seconds, depending on the undesired responses that may be present, such as from ignition or radar. In this instance steps of 4, 5 and 6 db. were used. The audio is monitored on a speaker,

and the chart trace is observed, to make certain that interference is not spoiling calibration and reception in general.

Following the last level of calibration the attenuator is switched out of the circuit, and full solar noise is again recorded on the chart. If nothing has changed (dish heading by wind gust, solar noise level, etc.) the reading will be about the same as at the start. Though the sun is not tracked during the measurement, the noise amplitude should remain constant, because of the antenna beamwidth and the shortness of the measurement period.

The dish is then steered away from the sun to a point in the northwest sky, the quietest heading for this location. Quiet-sky noise level is recorded for 30 seconds to a minute, again making certain that unwanted noise does not obscure the quiet-sky noise level. As each measurement is being made the GMT date-time, calibration steps, and other information are noted quickly on the moving chart. Three to six measurements are made each day in this manner, the entire operation taking 30 minutes or so. More measurements are made if conditions warrant. Recordings are examined at the end of the session, or later, and solar noise readings determined. Periodically the noise of a 50-ohm termination at the receiver input is recorded, in addition to quiet-sky noise, to confirm receiver performance. Termination noise is usually about 0.5 db. higher than quiet-sky noise, as seen at the left edge of Fig. 3.

All readings are entered in the solar noise log, and the section of chart with the highest reading is mounted and filed. The highest reading is of particular interest because it shows maximum solar activity during the observing period, and because it is usually the most accurate. Any errors caused by steering, noise, and equipment failure tend to degrade readings.

A solar noise recording made while the sun moved across the dish is shown in Fig. 4. This was obtained by pointing the dish at a point in the sky where the sun would be at a later time. The Greenwich hour angle and declination of the sun were determined from the *Nautical Almanac*.[10] This information was converted to azimuth and elevation by tables found in a Hydrographic Office publication.[11] Receiver gain was adjusted so that background noise deflected the recording pen about one-third scale, and the chart speed set for 3 inches per hour. Recording was started about an hour in advance of the time for which the dish was positioned. When the sun came into view the solar noise rose from the background level, peaked, and then slowly fell. Insertion of suitable levels of attenuation, in this instance 4 and 5 db., provide a check on the performance and establish the accuracy of the recording. Only the main lobe is seen at present levels of solar activity. Minor lobes of the antenna are too far down to show.

The sun's position can be used to "boresight" an amateur antenna. The dish is peaked carefully on the sun at a time and date listed in the *Nautical Almanac*, and the azimuth and elevation indicators are adjusted to read the azimuth and elevation given in the tables for that moment. This requires knowing the latitude and longitude of the antenna site precisely, and making the test at the correct time.

[10] "Nautical Almanac for 1967," Supt. of Documents, Washington, D. C. 20402. Price $3.50.

[11] "U. S. Navy Hydrographic Office Tables of Computed Altitude and Azimuth," Latitudes 30 to 39 degrees, inclusive. Pub. No. 214, Vol. IV. Order volume applicable to your latitude, from Supt. of Documents, Price $3.00.

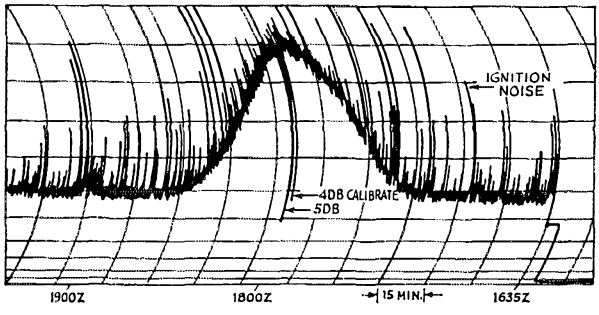


Fig. 4—Movement of the sun across the dish is shown in this 3-hour recording made with slow chart speed. The antenna was aimed at a point where the sun would be later, and left there to record the rise in noise level as the sun passes. Calibrations of 4 and 5 db. inserted at the noise peak show the strength of the solar noise. Numerous spikes are ignition and other noise.

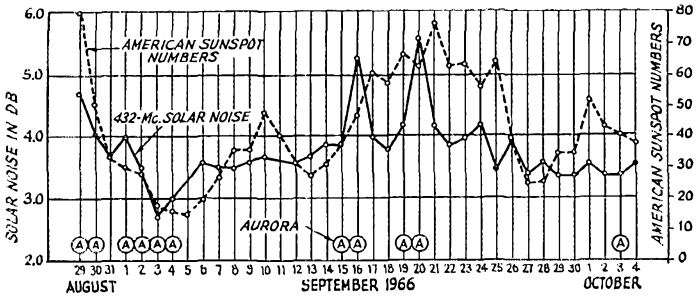


Fig. 5—Correlation between sunspot number and 432-Mc. solar noise is shown clearly by this graph. Dates when aurora was observed are indicated by the circled A.

A Quiet Summer Ends Dramatically

Noise varied monotonously between 3 and 4 db. through the summer of 1966. *QST* reported an aurora on July 7–8, and *Sky and Telescope* mentioned a big flare on July 11, but solar noise recordings on or about these dates gave no hint of anything out of the ordinary. Obviously measurements made during a brief period daily do not tell the whole story, and short-term events can be missed entirely. By late August the daily routine of shooting the sun had become just that: a routine. Interest was lagging.

Then on August 29 a reading of 4.7 db. was obtained. Sunspot records indicate that it was probably higher the previous day, when a Class 3 flare and associated sudden ionospheric disturbance (SID) occurred, but the 28th had been missed by this observer. Here was the big change sought all summer. Would there be an aurora? Indeed there was! *QST* reported auroral v.h.f. communication on Aug. 29, 30 and Sept. 1 through 4. The evening display of Sept. 3 was the best aurora in years, according to *Sky and Telescope*,[12] and amateur results on 6 and 2 bear this out. An inconvenient work schedule and too much reliance on "N7" transmissions by WWV caused the writer to miss the big event!

This called for careful monitoring of the sun for the remainder of the month, with results shown in Fig. 5. Solar noise is plotted by the solid line, and American sunspot numbers[13] by the broken line. Aurora dates are identified by the symbol, A. Note the high level of solar noise and sunspot number on Aug. 29, followed by a rapid drop to the low point Sept. 3, the period of auroral activity. Solar noise peaks were observed again on the 16th and 20th, and corresponding sunspot maxima occurred on the 17th, 19th and 21st. Both started dropping, and reached a low point on the 27th and 28th. No radio aurora was reported around the noise peaks of the 16th and 20th, but visual sightings were reported by *Sky and Telescope*. *QST* reported 50-Mc. DX Sept. 21.

The graph indicates that 432-Mc. solar noise and sunspot numbers are related, and vary in the same general way. One can see readily that there is also a correlation with aurora. It would also appear that during September the sunspot maxima and minima tended to trail solar noise highs and lows by a day or so. This is not always the case. Records for eight other months show noise peaks and sunspot maxima coinciding, and occasionally the sunspot count has peaked a day in advance of the noise.

Fall and Winter

During October solar noise was measured every day but three. Auroral propagation on 50 and 144 Mc. was reported by W1HDQ Oct. 3, but noise and sunspot figures for the period didn't

[12] "Auroral Activity Increases," Observer's Page, *Sky and Telescope*, December, 1966, p. 380.

[13] American sunspot numbers derived by the American Association of Variable Star Observers (AAVSO), solar division, reported monthly in *Sky and Telescope*.

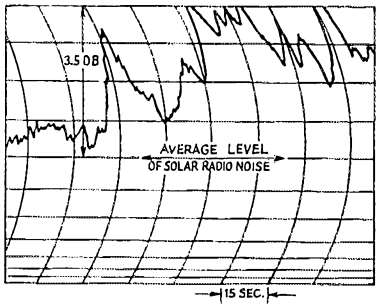


Fig. 6—90-second burst of solar noise recorded at 1613 GMT Feb. 23, 1967. Peaks were some 3.5 db. above the normal solar noise level.

indicate it. Presumably this was a 27-day recurrence of the disturbance of early September. There was a noise peak on the 20th that coincided with maximum sunspot number (82) for the month. The Ottawa Algonquin Radio Observatory report for October shows solar flux at 2800 Mc. also peaked this day, but there were no radio aurora reports. *Sky and Telescope* confirms that there was a small aurora on the 20th. Trans-equatorial propagation on 50 Mc. was observed by PY5GK on 14 days in October, including the 21st, but not the 20th.

Shortened daylight hours reduced our opportunities for daily observations in November and December. Solar noise high for November was only 4.1 db., but activity picked up in December. High noise reading for the last month of the year was 4.75 db. at 1900 GMT, Dec. 13. There were no reports of aurora. (Statistically, aurora is rare in this hemisphere in December — Editor). Sagamore Hill Observatory reported an outstanding solar radio emission on 2695 Mc. at this time, and American sunspot numbers were at their month high on the 13th. A week later noise readings reached a low point, and then began an upward climb toward the end of the month. A good indicator of general solar activity, for the writer, has been the number of days per month that solar noise reached 4 db. or higher. December had 13 such days, compared with only 5 in November, for almost the same number of observing days.

No observations were made the first few days of 1967, but when they were resumed Jan. 5 a whopping 5.1 db. was recorded, and it was up to 5.6 db. the following day. The alert was sounded, and participants in the V.h.f. Sweepstakes the weekend of Jan. 7–8 don't need to be told what happened. Working schedules the next few days prevented observations, but on Jan. 10 a high of 4.75 db. was recorded. Three days later, Jan. 13–14, another auroral session was reported. Like that of Jan. 7–8, it was violent and widespread, yet January is normally a relatively quiet month for aurora. Solar activity continued high, and every day when observations could be made found noise exceeding 4 db.

The first day of February a high noise reading of 4.6 db. was obtained, and on the 4th an all-

time high of 6 db. was logged! Three days later, on the 7th, another aurora was enjoyed by the v.h.f. gang. Activity continued high, with readings of 4.7 db. on the 7th and 4.5 db. on the 8th. Readings then settled down to about 4 db. There was no indication of aurora on Feb. 16, about the time that a recurring disturbance might have been expected. It would appear that some of the "repeaters" (auroras recurring on the 27-day solar rotation cycle) are not associated with solar noise readings, or the related noise peaks are of short duration and are easily missed.

Readings continued at 4 db. until Feb. 23, when a moderate rise to 4.5 db. was observed. Something new to the writer was recorded on this date: a noise burst some 3 db. above the average level, lasting about 90 seconds. See Fig. 6. On the 25th solar noise was peaking at 4.6 db. A minor aurora was reported on the 27th.

The Overall Picture

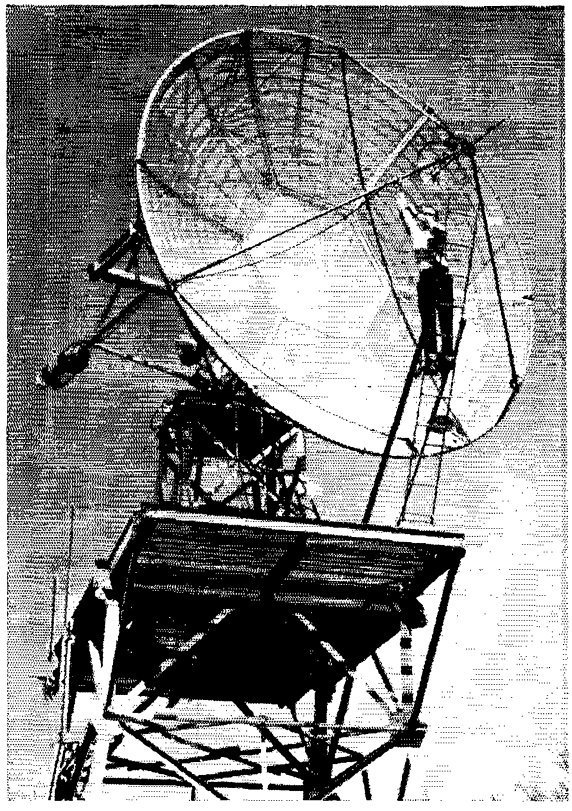
Highlights for the period June 1, 1966, to March 1, 1967, are shown in Table I. The monthly mean value for American sunspot numbers is included to show the relationship of sunspot count to solar noise. No doubt results might have been different if noise readings had been made every day, or for longer periods of time. Nevertheless, the figures do show that solar radio noise and solar activity have been increasing since June, 1966, and are still climbing. During the entire period there were no changes made in equipment or measuring procedure. Any known causes of error have been noted. Various r.f. amplifiers were tested and compared from time to time, but only the units described were used for the recorded data. Periodic checks of tubes and regular measurement of noise figure was done in an effort to obtain consistent results. The unchanging performance of the transistor r.f. stages contributed much to the system reliability.

Our 432-Mc. solar patrol has provided some answers to questions raised at the beginning, but more information is needed. The receiving system has performed about as expected, except

Table I — 432 Mc. Solar Noise
June, 1966–February, 1967

Month	No. Days Measurements were made	No. Days Solar Noise was 4 DB or Higher	Maximum Level Recorded	American Sunspot Numbers Mean Value (*)
June	25	2	4.0 DB	36.6
July	22	1	4.0	47.2
August	14	2	4.7	46.1
September	28	9	5.6	40.9
October	27	6	5.0	50.6
November	19	5	4.1	50.0
December	18	13	4.75	64.3
January	19	19	5.6	101.4
February	23	20	6.0	85.6

(*) From Sky & Telescope Magazine.



Paul Wilson, W4HHK, at work on the 18-foot dish used to make solar noise measurements on 432 Mc. The driven element and its circular plane reflector are just above the author's head.

that the azimuth beamwidth of the antenna is almost double what it should be, probably because an 18-foot dish is "small" in terms of wavelength at 432 Mc., and thus the dipole does not simulate a point source, as it must for optimum performance with a parabolic reflector. Vertical beamwidth is correct, about 9 degrees.

A minimum of about 3 db. of solar noise was always obtained, even during periods of little or no solar activity. When used with care, solar noise readings under quiet conditions can be used to evaluate systems, and make comparisons between antennas, r.f. amplifiers and so on. By comparing readings with other amateurs, a v.h.f. operator can determine if his system is "in the ball park," which can be very helpful in setting up for moonbounce work, for example. But beware! Solar noise measurements are subject to error and variations, just as noise figure measurements are.

Regular observations do give an indication of solar activity, but the solar noise level is not an exact indicator of sunspot number. For example, the AAVSO daily sunspot count has varied from 1 to 89 for noise readings of 3.5 to 3.6 db. Sunspot number is usually in the range of 1 to 50 for a

(Continued on page 140)

A New High-Power Keyed Antenna Relay

It was remarked in an earlier article[1] that the series-parallel operation of currently available reed switches was not the best solution to the high-power r.f. keying problem, and the hope was expressed that manufacturers might be able to make a more rugged reed switch. This hope does not seem to have been realized yet. However, high-voltage vacuum switches — not of the reed type — have been commercially available for many years, with voltage and current ratings fully adequate to handle the highest legal amateur power. At first glance, though, these vacuum switches appeared to have some potential drawbacks: first, the stated operating times seemed rather slow for high-speed break-in keying; next, the quoted lifetimes, while in the millions of operations, were nevertheless considerably shorter than those of the reed switches; and last, but certainly not least, their prices fall in the fifty-dollar range. Experimental tests have shown the first two fears to be groundless, but the last objection still remains, of course, and can only be overcome by a dedicated pocketbook!

Either the Kilovac (formerly HyVac) HC-1 or the similar Jennings RJ1A relay was found to work very well.[2] At 16 Mc. these relays have an advertised r.f. voltage breakdown of about 2 kv. and a current-carrying capacity of about 7 amperes. This represents a power capability of several kilowatts under "cold-switching" conditions. The relays are also rated at several hundred watts under "hot-switching" conditions where the power flow is actually interrupted by the relay. With a kilowatt input at 14 Mc. to the test amplifier it was not found possible to break down either relay, internally or externally, with the most violent load mismatches that could be dreamed up — open circuit, short circuit or highly reactive loads. This was indeed a pleasant change after the little reed switches, which worked fine at high powers provided everything was nicely matched but tended to disintegrate explosively if one did something stupid, such as connecting either the wrong antenna or no antenna.

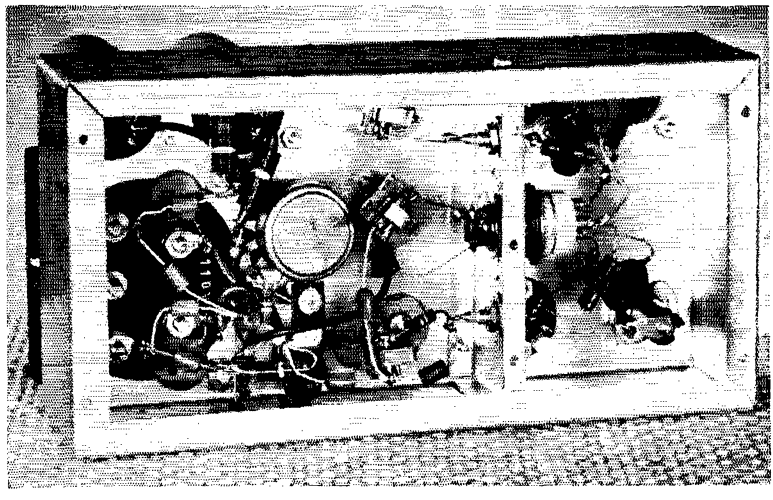
The advertised operating times of the relays are given as 6 to 8 milliseconds which, if true in practice, could reduce the length of a dot quite noticeably at 50 words per minute. However, when used in the keying circuits shown here (Fig. 1), or in the earlier articles[1,3], the actual measured closing times of the relays were found to lie between 1 and 2 milliseconds, which has a negligible effect at any speed up to 50 w.p.m.

The lifetime question can be answered satisfactorily only by controlled tests on a statistically significant number of samples, which is a program beyond the financial means of the average

[1] "A Keyed Antenna Relay," *QST*, p. 29, July, 1964.

[2] The ultimate in keying relays appears to be the Jennings RB1R. It is rated at 8 kv. and 6 amperes at 16 Mc.; expected lifetime is 10 million operations, and advertised operating time is 3 to 5 milliseconds. However, the price of the RB1R is around $120.

[3] "High Power Version of the Keyed Antenna Relay," *QST*, p. 20, December, 1964.



Latest version of VE3AU'S keyed antenna relay. The vacuum relay is mounted in the center of the partition extending between the sides of the chassis. The partition shields the r.f. section, right, from the d.c. wiring. In the r.f. compartment, J_1 and J_3 are at the top of the r.f. compartment in this view; J_2 is at the lower left, and the fuse is in the lower-right corner. Arrangement of the d.c. circuits, left, is not critical.

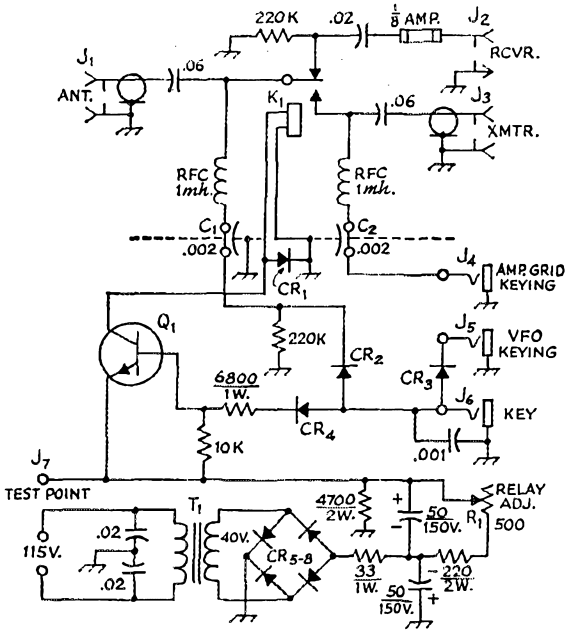


Fig. 1—Circuit of the high-power keyed antenna relay and power supply. Capacitances are in μf.; capacitors are 500-volt disk ceramic except for those with polarity indicated, which are electrolytic, and those listed below; 0.06-μf. capacitors are three 0.02-μf. disks in parallel. Resistances are in ohms (K = 1000); fixed resistors are ½ watt except as indicated.

C_1, C_2—Feedthrough type; any value of the order of 0.002 μf. satisfactory.

CR_1-CR_8, inc.—Silicon, 600 volts p.i.v., 750 ma. (1N2071 or equivalent).

J_1, J_3—Chassis-mounting coax connector (SO-239).

J_2—Phono jack.

J_4, J_5, J_6—Phone jack, open-circuit.

J_7—Pin jack.

K_1—Vacuum relay; see text.

Q_1—Silicon n.p.n.; 5 watts, 60 volts (2N3053 or equivalent).

R_1—500-ohm variable, 2 watts.

T_1—40 volts, 12 va. (Hammond 56712 or equivalent).

experimenter! All that can be said here is that the first relay tried is still working perfectly after a year of service, representing considerably more than the million or so operations conservatively claimed by the manufacturer. Of course, the r.f. power is "cold-switched" and the relay is required to "hot-switch" only a few milliamperes of d.c. in the bias circuit, which is far below its rated hot-switching capacity, and this undoubtedly adds to its life.

In Fig. 1 the only essential change from the circuit diagrams of the earlier versions using reed relays is the inclusion of the transistor amplifier, Q_1. Both the HC-1 and the RJ1A relay have a standard coil resistance of 335 ohms and are intended to work from a nominal 26-volt d.c. supply. The circuit of Fig. 1 is designed to apply about −50 volts initially to the coil to speed up contact closing, and the resultant 100 to 150 ma. surge of coil current may be more than the average user would want to key directly. The simple d.c. amplifier reduces the keyed current to a few milliamperes.

The shaping of the rise and fall of the r.f. envelope to achieve clickless keying should be done as usual by means of one of the conventional differential keying systems. One then needs only to ensure that the antenna remains connected to the transmitter for a few milliseconds after the key is opened to allow the decaying waveform to drop to a negligible level. Suitable capacitance across the relay coil did the trick in the previous models. Here, the same effect is produced by diode CR_1, which (besides suppressing transients potentially harmful to the transistor) allows the stored energy in the coil to circulate through it and the coil, thus delaying the opening of the relay just like a capacitor.

One other minor innovation is the provision of J_5, to which the keyed oscillator may be connected instead of to J_4 in parallel with the amplifier. This gives the oscillator an extra 1 to 2 milliseconds head start on the amplifier while the relay is closing, which may be all that is needed to remove any residual chirp.

The photo shows the 2 × 4 × 8-inch chassis of the keying relay with an HC-1 relay mounted in place. All r.f. and d.c. jacks and connectors are on top of the chassis. QST

(Just recently the Jennings Division of ITT has announced a new moderately-priced relay which should be quite satisfactory in VE3AU's circuit. See description under "New Apparatus" elsewhere in this issue. —*Editor.*)

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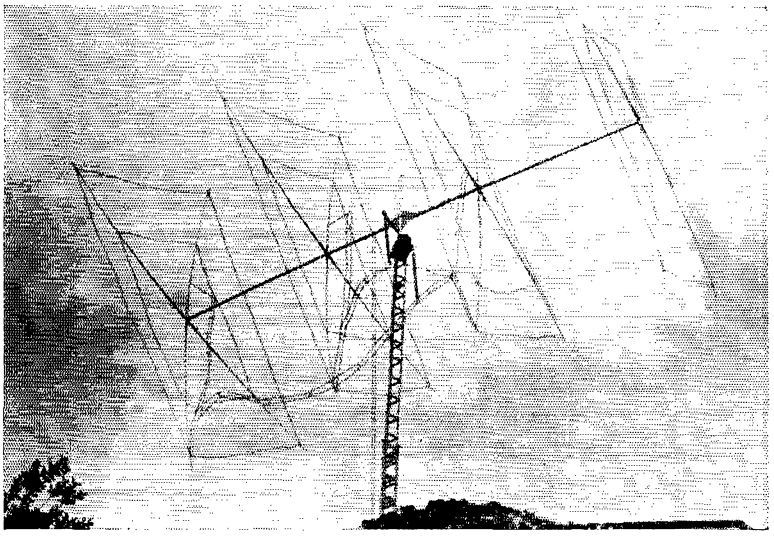
A Phased End-Fire 4-Element Quad for 14 Mc.



BY WALT KNOOP*, W2PXR

Here's a new twist on quad design — driven directors with a parasitic reflector. The antenna has given highly satisfactory results at W2PXR.

EXTENSIVE listening on 14 Mc. convinced us that the quad antenna seemed to offer a superior degree of performance, and might be a likely candidate to replace our ancient W3DZZ tribander. A review of the literature indicated conflicting reports with respect to the gain that could be achieved by adding parasitic directors to the widely-used two-element quad having a parasitic reflector. While WØAIW found adding parasitic directors a worthwhile proposition[1], W6SAI indicated that adding parasitic directors did not provide the increase in gain typical in a Yagi because of the low-*Q* nature of the quad and the resultant lesser induced currents in the parasitic elements[2]. This observation seemed to make intuitive sense to us, so we got to thinking about how to overcome the problem. Why not drive three elements with phased transmission lines and retain the parasitic reflector?

The *ARRL Antenna Book*,[3] in discussing end-fire arrays in general and unidirectional end-fire arrays in particular — which is basically what this configuration would be — states that the adjustment process is tedious and that the difficulty of feeding the elements resulted in no application of multielement driven end-fire arrays in amateur work. So, being on the stubborn and determined side, we decided we would put together a four-element quad, with three elements driven in the proper phase for unidirectivity and the currents in all loops made equal, a primary requirement for this configuration.

For the basic dimensions we used those developed by WØAIW for his driven element and parasitic reflector. Scuttlebutt at several hamfests had indicated that these dimensions were sound and could not be significantly improved upon. Also, his method of feeding at the bottom apex of the diamond would lend itself nicely to our proposed mechanical structure for the matching and phasing transmission lines.

Fig. 1 sketches a single loop assembly, and Fig. 2 shows the essential dimensions as seen in the plane of the boom.

* 11 East Greenbrook Road, North Caldwell, N. J. 07007

[1] Bergen, *The Multi-element Quad*, *QST*, May 1963.

[2] Orr, *All About Cubical Quad Antenna*, Radio Publications, Inc., Wilton, Conn.

[3] 1949 edition pp. 148-150.

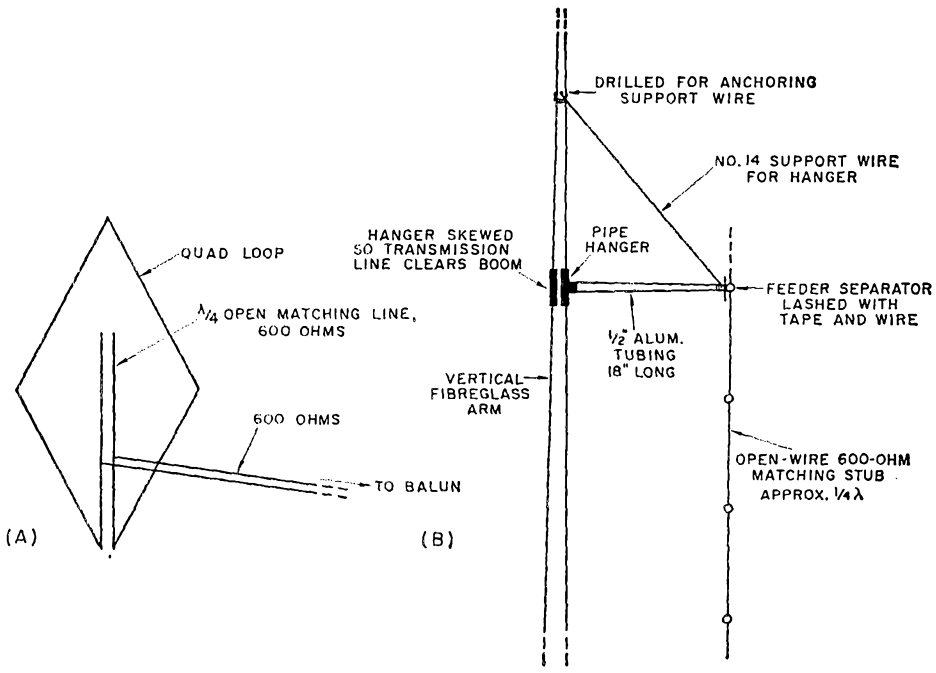


Fig. 1—(A) General arrangement of quad loop, matching stub and phasing line. (B) How the matching stub is supported from the fiberglass cross arm.

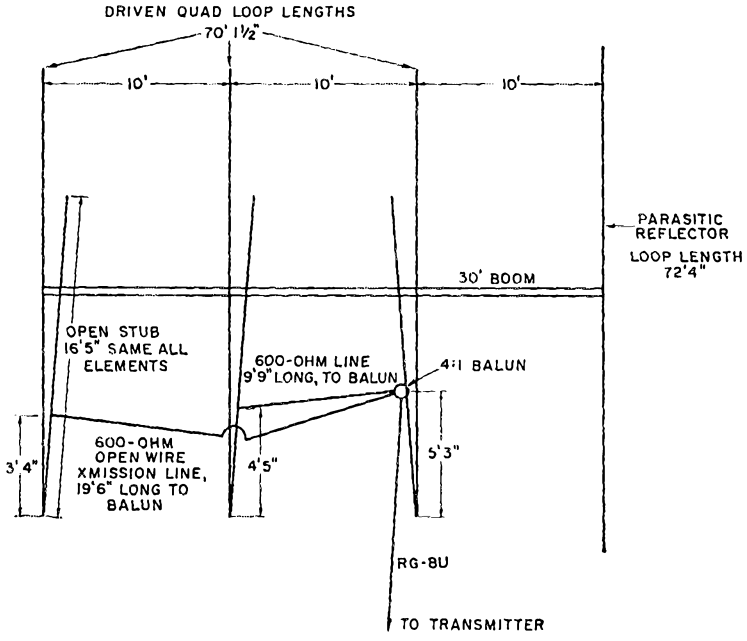


Fig. 2—Dimensions of the quad elements, matching stubs and phasing lines.

We constructed the quad loops and the transmission lines from aluminum clothesline which measures to be No. 9 AWG. The quarter-wave stubs were included, one continuous length of wire being used to form the loop and the stub, thus eliminating soldering and splicing where possible. The fiberglass crossarms and hubs were by U.S. Fiberglass Co. and the vertically-oriented matching stubs are supported at the top end by ½-inch aluminum tubing, 18 inches long, anchored with tube pipe hangers, American Tube No. 601, which just happened to have the right inside diameter to mate with or grasp the tapered fiberglass arm at the proper distance out from the hub.

The stubs are skewed somewhat in order to clear the boom. This gives the assembly an unsymmetrical appearance, although it doesn't seem to cause any noticeable electrical unbalances.

The inverted-U-shaped wood assembly visible in the photograph is fastened to the vertical mast to hold the phasing lines away from the tower, horizontally.

We decided to include a conventional 21-Mc. four-element parasitic quad as part of the structure since the supports were already there to be used.

Since the impedance at the junction of the sending ends of two phasing lines and the driving point on what would normally be considered the driven element is about 200 ohms, we placed a 4:1 Tenna Bal at this point and fed the balun with 50-ohm coax. This worked out nicely, as will be seen in v.s.w.r. measurements appearing further on.

Setting Up

As the *Antenna Book* predicted, adjustment was a tedious process.

We reasoned that the length of the phasing lines was inviolate, since it was calculated to provide a phase delay equal to the free-space distances between the two forward elements and the first element. Therefore we would not attempt to change this parameter.

In our first attempt to find the proper tap point on the open matching stub, flashlight-bulb current indicators were hung across 8 inches of the three driven loops as shown in Fig. 3. We arbitrarily connected the ends of each of the phasing lines to the matching stubs about 3 feet up from the bottom apex and applied transmitting power. Lo and behold, the bulbs lighted, but hardly with the required equal brilliance which would indicate equal currents. The three taps all interacted with each other, and no amount of fussing would bring them together.

Then we reasoned that if the system were in balance, the impedances at the tap points should be purely resistive and should look like 200 ohms, since in essence we were paralleling three 600-ohm loads and there should be no s.w.r. on the phasing lines. We converted our single ended "Antennascope" into a balanced bridge with a 1:1 balun and excited it with a grid-dip oscillator. Leaving all lines connected, and with a 50-ohm termination at the sending end of the coax feed line, we proceeded to search each stub for the 200-ohm point, connecting the phasing lines at these locations.

The second element kept showing reactance on the Antennascope so we blindly clipped off 10 inches from what had been 17 foot 2-inch open matching stubs on all three driven elements, on the premise that the stub length was not optimum for proper matching. As it turned out, we "cut the pants too short" and the natural resonant frequency of the array turned out to be 14.4 Mc. We were able to eliminate most of the reactance, however, and had reached the point where we said "this has gotta be it." Besides, trying to add length to the stub was an impossible mechanical proposition.

With lots of backing and filling we finally found the 200-ohm points on all three stubs and decided to run an air check with W2MJ, a mile away, to put the final touches on the tap points. We were able to get one S unit improvement with movements of the tap points in the order of 2 inches.

After final adjustment for maximum gain, the relative brightness of the three bulbs was observed to be almost equal, and certainly more uniform than had been the case in the earlier adjustment process.

The next measurement was to determine the v.s.w.r. on the coax feed at the sending end. This was calculated from measurements with a forward and reverse power meter, Sierra Model 164. The results were remarkable:

Frequency	*VSWR*
14.0	1.15
14.1	1.12
14.2	1.05
14.3	1.00
14.350	1.00

Pattern Checks

Since we never could buy the idea that relative S-meter measurements from a ground-based local receiver were significant in describing sky-wave directivity and front-to-back ratio, we decided to attempt an aerial survey utilizing our Piper Apache.

We calibrated a National NC-270 receiver with a strip chart recorder hung across the S meter, and installed it temporarily in the Apache with a single-wire antenna running from the cabin, up to the tail and out to one wing tip. A 2-meter transceiver was used for coordination between the plane and the transmitting station. Hours were spent in flying a circular orbit with a 2-mile radius, at various altitudes representing 5-degree vertical increments up to a 45-degree vertical angle.

It should be noted that W2PXR is located on a hillside, with the ridge above aligned northeast and southwest and a slope of about 10 percent for ¼ mile to the top. The horizontal pattern was run only with the antenna pointed north,

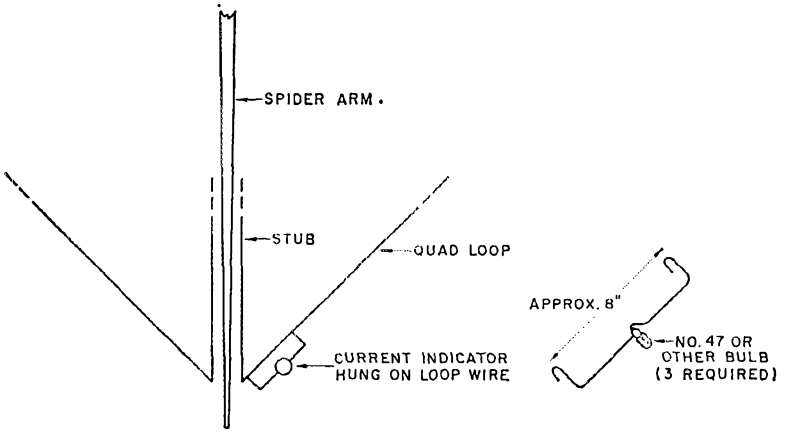


Fig. 3—Method of using flashlights as current indicators.

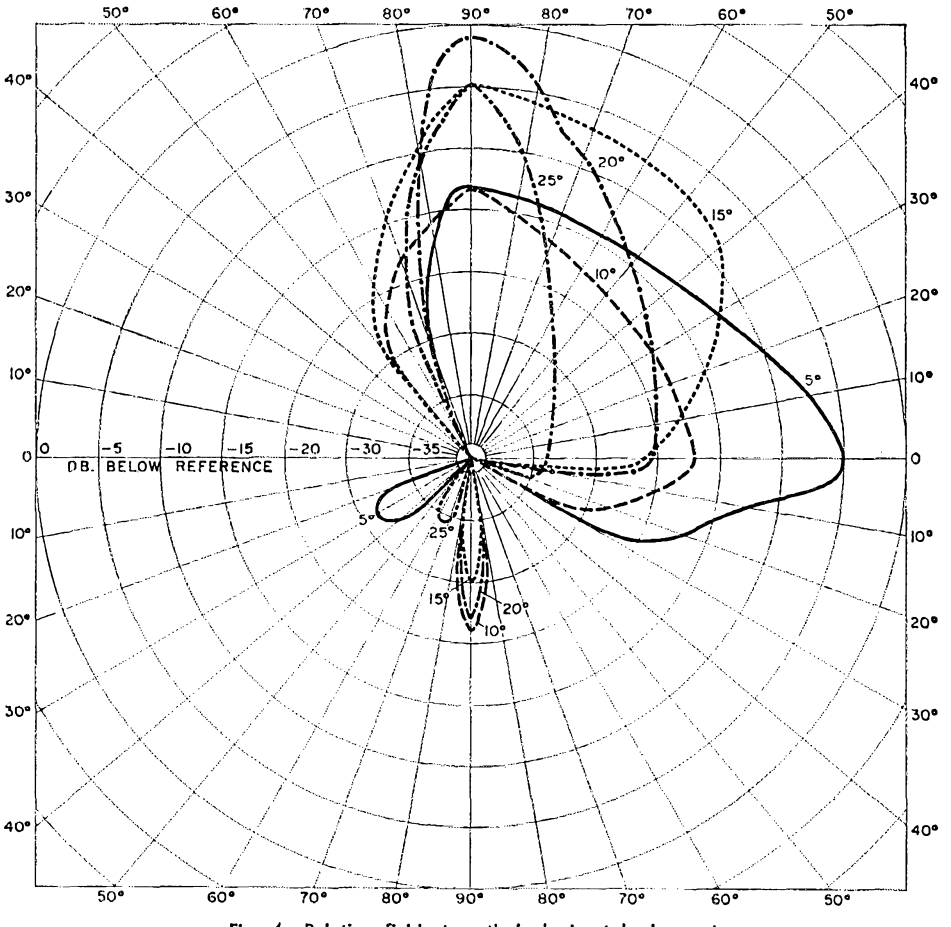


Fig. 4—Relative field strength in horizontal plane at various vertical angles, antenna pointed north into ridge running NE-SW about one-fourth mile away. Effect of ridge at low angles is clearly indicated.

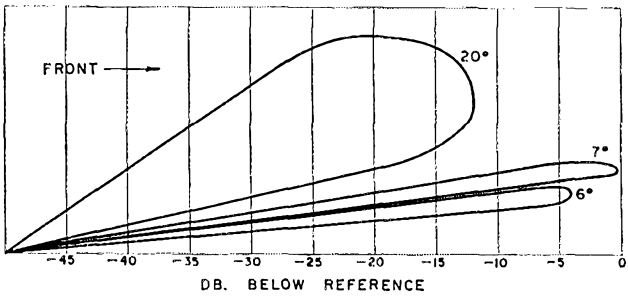


Fig. 5—Vertical profile of quad taken in front of the antenna. Beam pointed north into ridge for this measurement. Angles shown are those at which field strength is maximum in that lobe.

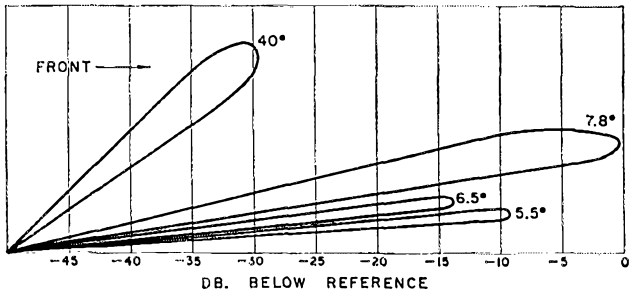


Fig. 6—Same as Fig. 5, but with antenna pointed south.

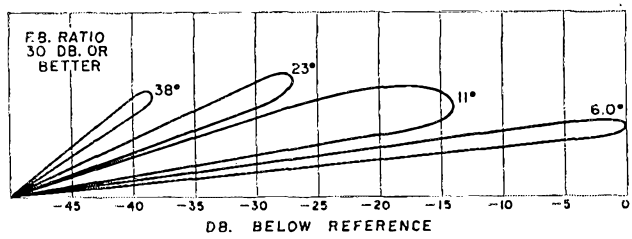


Fig. 7—Vertical profile of 4-element Yagi at W2MJ.

obliquely into the hill. The results of this survey are shown in Fig. 4. It is most unfortunate that the low-angle patterns fell into the vertical-angle nulls, which we didn't know about until later when we ran a vertical profile. I would be inclined to discount the practical validity of the 5-, 10- and 15-degree horizontal patterns. However, it seems clear that there is a decided bulge or "spillover" in the pattern in the general direction of the downhill slope, which in itself is interesting.

We then wanted some information on the vertical profile on our quad at 70-foot height compared with the 4-element Yagi of W2MJ at 90-foot elevation. Three runs were made at constant altitude along the course of the antenna's direction. Two of these were at W2PXR, looking into and out of our hill, and one at W2MJ since he has more level terrain. The result of this work is seen in Figs. 5, 6 and 7.

It is interesting to note that terrain has a decided effect on the vertical radiation pattern. Note that W2PXR when pointed into the hill has only two low-angle lobes and too much energy at a high (20-degree) angle. Pointed out of the hill, we lower the low-angle lobes and pick up an extra "fat" one at 7.8 degrees.

Note also that W2MJ's Yagi has but one low-angle lobe, and that the vertical directivity is almost classical, right out of the text books.

Results

In conclusion, I would say that the 4-element end-fire quad is roughly similar in actual performance to the 4-element wide-spaced Yagi. It is certainly a much broader-band affair, although a mechanical monstrosity. It's the best antenna I've ever used, and I can raise the rare ones in much less time than it used to take. It seems to compare reasonably well with the good signals produced by my friends of the North Jersey DX Association. I hear signals now that I couldn't hear previously, and my S meter has an added punch of about two S units that it didn't have before. No claims are made with respect to forward gain over a dipole, and the front-to-back ratio of about 19 db. depends on the vertical angles involved.

Listen for W2PXR and judge for yourself.

I would like to extend my thanks to Leo Cunniff, W2OEH, for his help in assembling the structure and for the photographs: to Wil Angermeier, W2MJ, for his patience in running the pattern measurements, and to my colleagues Orv Toler and Bob Mezger, W2BLL, for their encouragement as well as assistance with the measurements.

QST

Hints and Kinks For the Experimenter

ANOTHER ADAPTER FOR MIKES WITHOUT P.T.T. SWITCH

An adapter for microphones without push-to-talk control, described by W1DJV in the "Hints & Kinks" column of *QST* for October 1966, employed two toggle switches. As shown in Fig. 1, a single lever switch can be used instead. The desired mode of operation is achieved simply by switching S_1 to either VOX or P.T.T.

A small Minibox makes a suitable container for housing the adapter. The numbered terminals should go to a shielded cable that terminates in a microphone plug that mates with the microphone fitting on the equipment used. J_1 ought to match the existing plug on the user's mike. S_1 is a 2-pole, 3-position lever switch. — *J. A. Loy, VE2MH*

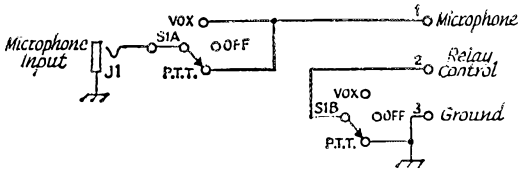


Fig. 1—VE2MH's microphone adapter.

COPYING C.W. AND S.S.B. WITH A V.H.F. RECEIVER LACKING A B.F.O.

Users of the many simple a.m. transceivers for 50 and 144 Mc. miss out on much of the v.h.f. fun because their equipment is unsuitable for copying c.w. and s.s.b. Manufacturers of those rigs have a point in their contention that enough stability to do a good receiving job on these modes is impractical in a moderately-priced unit. If you've tried putting a conventional b.f.o. into one of these units, you've already found this out, but there are ways to do the job.

One of the best methods is to inject a signal at the frequency of the c.w. or s.s.b. station. If you have a good v.f.o. with a spotting switch you have a usable system. If there is a "spotting level" control you really have it made, as optimum reception does require that the level of injection be set with some care, and the injection may need to be varied somewhat for different signal levels. It should be no great problem to rig up some method of controlling the injection level to the receiver.

The prime advantage of signal-frequency injection using a v.f.o. harmonic is that it eliminates the stability of the receiver as a factor in beat-note reception. If the signal is stable, and the v.f.o. has a good slow tuning rate, you can zero-beat the signal easily and get quite good sideband or c.w. reception, even with considerable oscillator instability in the receiver. Using a v.f.o. in this way may give you a better chance of working "cross-mode" with the s.s.b. fraternity on 6 or 2, but don't use it for voice transmission when the station you're listening to is below 50.1 Mc.! — *W1HDQ*

ANOTHER REMEDY FOR SLIDING KEYS

A key, bug or electronic keyer that won't stay put is most annoying. I found a solution to this problem in 3M "Scotch-Tred," a nonslip surfacing used primarily to insure surefootedness on boat decks, ladders and docks. It is available at most marine supply stores in 6-inch widths at $.50 a foot. A half-foot length is ideal for most keys. It has a pull-off backing, adheres to almost any surface, applies like tape and comes in an off-white color that can be repainted to match any table top. Try "Scotch-Tred"; you'll be pleased with the results. — *S. J. Knox, WB2MRA*

KEY BASE

Sick and tired of your key creeping all over the operating desk? One way to keep a key in one place is to mount it on a chunk of iron. And, an excellent base is the sole of an electric iron. The sole is made from cast iron, so it is easy to drill and machine.

In the unit shown in Fig. 2, a Brown Brothers paddle for an electronic bug is mounted at one end of the sole. At the other end are three E. F. Johnson insulated jack-top binding posts. Three rubber feet are mounted on the bottom. Depending on the size of the iron, almost any key or bug could be mounted on the sole. — *W1ICP*

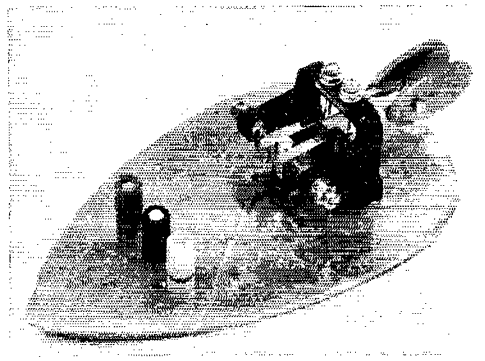


Fig. 2 — A key base that will stay put.

MAKESHIFT RUBBER FEET

TEMPORARY feet for a piece of home-built equipment can be made from Dr. Scholl's Adhesive Foam. This material is made of foam rubber with adhesive on one side and comes in 6 by 6-inch sheets. It is available from most drugstores and can be cut to any desired shape. I have used it on the underside of my transmitter chassis and on the bottom of my key-mounting board to keep it stationary during use. — *Jeff Bauman, WB2WRH*

MORE TIE TABS

IN reference to K1YSD's hint in *QST* for April 1967 on using tie tabs from bread wrappers, you'd have to eat an awful lot of bread to collect many of these ties. You can buy exactly similar stuff at any garden center. They're called "Tyems" and come in 6- to 12-inch lengths which can be cut up into shorter lengths with shears. They're used to tie plants to stakes and are very cheap. — *W1TS*

IMPROVED BREAK-IN MONITORING

FIG. 3A is an abbreviated version of the circuit for full break-in operation shown on page 239 of the 1967 *Handbook*. If you inspect this circuit carefully, you will see that any change in the setting of the receiver gain control will also affect the monitor gain when the key is down. This can be distracting. When a strong station is tuned in, the receiver gain control will normally be turned down, causing a loss in monitor gain. The opposite also holds true: when a weak signal is being copied, the receiver gain will be increased, causing an equivalent rise in the strength of the monitored signal. If the circuit is modified as shown in Fig. 3B, the gain of the monitor will remain the same under all settings of the receiver gain control, a condition conducive to much more pleasant operation. Note, however, that the wires going to the two outer terminals to the receiver gain control must be reversed or the control will work backward. — *K. J. Walton, W5MCI*

SB-200 TIP

MY Heathkit SB-200 linear amplifier worked fine except for one thing: the meter illumination lamp generated enough heat to melt the meter's case. I remedied this situation by removing the lamp and taping it to the filter capacitors directly behind the meter. Of course, the hole had to be plugged to keep dust out. — *Kenneth Ray Fleming, W10NLN*

NYLON-LINE INSULATORS

THERE have been several articles in *QST* on "invisible" antennas of small wire and various ingenious supporting insulators. For several months this writer has used an 80-meter antenna of No. 28 wire with three-foot lengths of nylon fish-line leader as end insulators. This nylon line is more "invisible" and stronger than the 28-gauge wire. A square knot ties the two together, and the wire will break or need to be replaced, due to stretching, long before an insulator gives up. — *Edgar L. Parkhurst, W6IY*

ANOTHER SIMPLE CB CONVERSION

THERE is no need to purchase transmitting crystals when converting the Lafayette HE-20C and HE-90 CB transceivers to 10 meters. In each case, the transceiver's receiver oscillator operates 1650 kc. above the channel frequency. For 10-meter operation, just replace the receiver crystals with the transmitter crystals and vice versa and adjust the appropriate stages. — *Donald E. Huber, WB2UKA*

BATTERY CONNECTORS

A READY supply of battery connectors for the rectangular 9-volt batteries in common use can be had by removing the terminal end of discarded batteries of this type and wiring the connectors appropriately. Don't forget that the formerly positive terminal now goes to the negative contact of the battery, and vice versa. — *J. Paul Alexander, K5LZT*

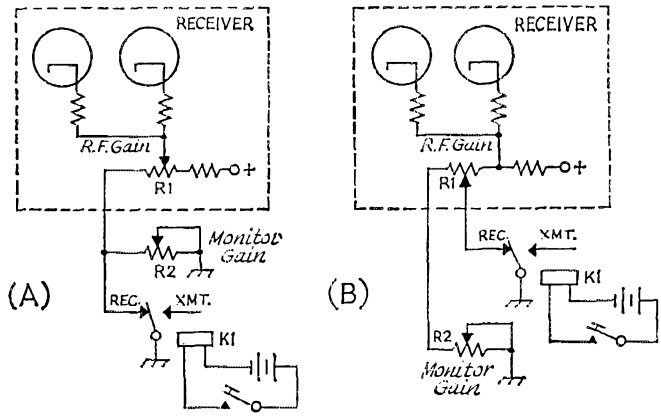


Fig. 3—Circuit for full break-in operation, before (A) and after (B) modification for improved monitoring. R_1 is the receiver manual gain control, and R_2 is a 5000- or 10,000-ohm wire-wound control. K_1 is a s.p.d.t. keying relay.

80-Meter Handicapper

BY LEWIS B. GILMER,* K2ETM

COMPUTER predictions for sky-wave communication give the odds for obtaining a desired signal-to-noise ratio over a point-to-point circuit at a given hour of the day during a month, on a specified frequency. They call it Circuit Reliability.

The computer programming developed by ITSA at Boulder, Colorado, has always been impressive. The agreement between predicted and measured results has been shown to be very good.[1] Wide use of the new predictions is made in engineering and scheduling traffic over administrative, public and press point-to-point radio systems.

If you have worked out a circuit prediction using manual methods you know how drawn-out and tedious the process is. You also know that in order to make a prediction, you had to base it on use of given power, use of specific antennas, man-made radio noise at the receiving site, and that you had to know the bandwidth of the receiver. This sort of information must be fed to the computer, and since it lacks imagination, it is a one-answer device.

The 80-meter prediction shown by Fig. 1 covers the Northeastern part of the United States. It is based upon data obtained from performance computed for five pilot circuits. Results obtained by use of this Zone prediction have been checked against sixteen point-to-point performance computations and the results agree sufficiently for many applications.

The pilot circuit computations were made on the basis of the following conditions:

1. The power delivered to the antenna terminals is 100 watts.
2. Transmitting and receiving antennas are horizontal half-wave dipoles, elevated 33 feet above ground.
3. The antennas are oriented in the on-axis direction.
4. The required predetection signal-to-noise ratio is 7 db.
5. The effective bandwidth of the receiver is 2 kc./s.
6. The man-made noise level at the receiving site is that found in a typical rural area.

In order to make Fig. 1 useful when conditions other than those given above exist, we have introduced a decibel scale along the left-hand margin of the chart which permits the effect of changes in system gain on transmission quality to be taken into account.

To use the chart, enter it at the bottom with the desired time. As a starter, use Eastern Standard Time. Move upward until you intercept the desired distance curve. Hold this point, and move to the left margin and note the transmission quality factor, Q_t. Return to the point on the distance curve and move to the right, into the noise reliability scales in the margin. Using the appropriate Day or Night scale, determine the number of days within the month on which the S/N ratio can be expected to be at least 7 db. This will be the answer when the conditions used in computing the data exist over your circuit.

The Non-Standard Case

When you operate under "non-standard" conditions for the chart, you will introduce gain and loss, or both into the communication system. If you increase the power, you will add "gain." If you decrease power, you will add "loss." It will simplify the use of the chart under non-standard conditions to keep in mind that the noise reliability scales which give the answer are related to the transmission quality factor, Q_t. When Q_t is increased, the noise reliability is increased, and vice versa.

The scale along the left margin is a circuit performance index which changes when conditions at the radio terminals are changed. We call it CPI and say

$$CPI = Q_{ts} + G - L \text{ db.} \quad (1)$$

where CPI = circuit performance index used to obtain noise reliability
Q_{ts} = transmission quality factor under "standard" conditions
G = total gain added to the standard system, db.
L = total loss applied to the standard system, db.

Assume that you wish to communicate at 3 P.M. EDST over a distance of 200 miles. You would enter the chart using EST or 14 hours. At 200 miles $Q_{ts} = 0$. Under standard conditions,

*% Communications Engineering, 17 Adams St., Garden City, N. Y. 11530.

[1] ESSA Technical Report ITSA—1.

For some time now, the ITSA (formerly CRPL) propagation predictions have been available in a form suitable for electronic computers. While the computer method is beyond the reach of most hams, it can lead to circuit evaluation of the type described in this article. If you haven't ever attempted to work out predictions for frequencies well below the maximum usable frequency, you'll get an introduction here to some of the many factors that must be included.

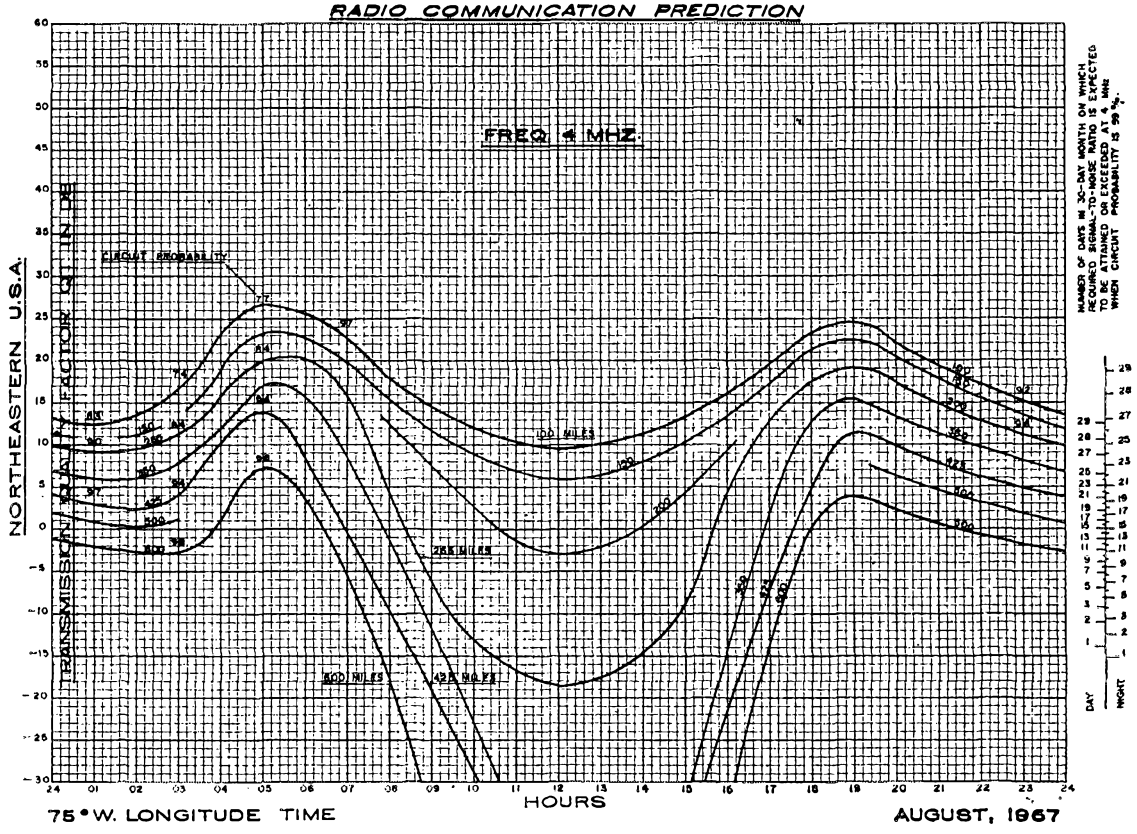


Fig. 1

the Day scale at the right shows that you might expect a 7-db. S/N ratio circuit (or better) on 15 days. If you increase power to 1000 watts at the antenna terminals, your CPI would be

$$CPI = Q_{ts} + G_p$$
$$= 0 + 10 \text{ db.}$$
$$CPI = 10 \text{ db.} \qquad (2)$$

From the reliability scale for daytime operation we see that the 7-db. S/N ratio minimum could be expected on 28 days when CPI = 10 db.

Logically, we would proceed in the same manner if we introduced a loss in the system. Suppose, for example, that in the above-mentioned case the antennas were standard but were orientated at right angles to each other. Using the *ARRL Handbook*, we find that the gain of each antenna can be expected to be down 6 or 7 db. off the ends. Since we must consider the response of both transmitting and receiving antennas, the combined loss due to the orientation might be taken to be, say, 13 db. Using G_p for power gain and L_a for the antenna loss,

$$CPI = Q_{ts} + G_p - L_a \text{ db.}$$
$$= 0 + 10 - 13$$
$$= -3 \text{ db.} \qquad (3)$$

The reliability for CPI = −3, during the daytime, is about 10 days.

The importance of man-made noise at the receiving site, during periods when it exceeds atmospheric noise, will be clearly evident when we increase the standard "rural" noise level to that found in a typical residential area. The effect is to add a loss of 12 db. When this is applied to the solution given by Eq. (3), CPI becomes −15 db. and the daytime reliability is decreased to less than one day.

Changes in the receiver bandwidth introduce relatively small errors. When the bandwidth is made less than 2 kc. a gain is taken. When the bandwidth is made greater than 2 kc. a loss should be applied. Halving the bandwidth gives a 3 db. gain. Doubling the bandwidth gives a 3 db. loss.

Corrections for changes in antenna height, or for use of antennas of other types, requires use of reference material which gives antenna gain characteristics. One of the more complex changes would be to substitute a mobile whip antenna for one of the standard half-wave dipoles. It is necessary to know not only the difference in the gain characteristics, but to know something about the losses in the mobile ground system, and in the loading element.

For example, the gain of the standard 4-Mc. half-wave dipole in the on-axis direction is about 1.1 db. referred to an isotropic antenna,

at a vertical radiation angle of 40°. The gain of a 6.5-foot vertical mobile antenna under the same conditions is about −18.1 db. Hence a loss of at least 19 db. would be introduced by substituting the mobile antenna for the half-wave. Assuming that no other losses were present except for those in the loading element, the overall loss at 4 Mc. would be approximately as given in Table I.

Table I

Loading Coil Q	*Antenna System Loss, db.*
35	25.4
50	24.2
100	21.9
150	20.8
200	20.1
250	19.7
300	19.3

The loss values shown in Table I are referred to the standard horizontal half-wave dipole. They may be taken as minimum values, since other losses in a mobile system may be expected.

When a mobile unit receives signals in an area where "industrial" grade noise is present, the loss correction to be applied is 24 db.

Errors in Zone Predictions

The principal errors which occur in zone predictions depend upon the geographical limits of the zone, and the geographical region in which the zone is located. In the case of the present prediction, it is recommended that when the chart is used for short-haul work in areas when Central Time is used, the time selected in entering the chart be Central Standard Time. The reason for this is that the short-distance pilot circuits are located nearer to the eastern end of the zone. In the morning, the effects of daytime absorption are experienced in this area before they are farther to the West. In the afternoon, the absorption decreases in the eastern end of the zone before it does in the western end.

There is some variation in the intensity of the median atmospheric noise within the zone which may at times affect the true CPI values by several decibels. Variations in m.u.f. within the zone can be expected to have occasional effect upon the accuracy of the prediction, but as shown by the circuit probability figures on the chart, this should only be evident on short-distance circuits during the early morning hours.

Some 196 comparison checks have been made between pilot and point-to-point circuit performance. The discrepancy did not exceed 2 CPI units during 80 percent of the time when no time correction was applied.

Distance Curve Characteristics

The distance curves in Fig. 1 will be seen to have two maxima, at about 0500 and 1900 hours. During these periods, near sunrise and sunset, absorption caused by radiation from the sun is low and nighttime atmospheric noise, which is most intense between 2000 and 0400, has not generally affected communication.

Absorption, which greatly attenuates signals in the daytime, is responsible for the marked decrease in CPI with distance at noon. QST

NEW BOOKS

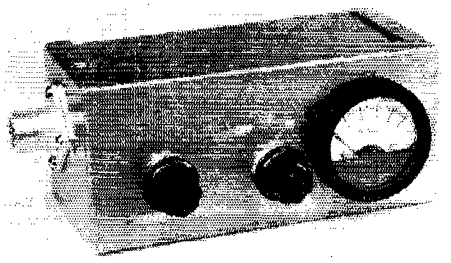
Transistors: Principles and Applications, by R. G. Hibberd. Published by Hart Publishing Company, Inc., 510 Sixth Ave., New York, N. Y. 10011. 304 pages, including index, photographs and drawings, 5⅝ by 8¼ inches, cloth edition, $6.95. Paperback, $2.95.

There seems no better language for a capsule description of this book than that quoted in the Preface as the objective set by the publishers: ". . . . intended mainly for students and technicians, the treatment should be kept free of mathematics and emphasis should be placed on practical considerations." The author, who is Manager of the Research and Development Department of Texas Instruments Ltd. (England), has succeeded in this remarkably well, in our opinion. The book can be heartily recommended to the amateur who really wants to learn something about transistors and how to use them in circuits. It fills a gaping hole in transistor literature — the area between the popularized hobbyist offerings and the abstruse technicalities of most serious texts.

Divided into eighteen chapters, the book opens with a brief historical review of semiconductors and quickly plunges into a discussion of basics, transistor characteristics and manufacturing technology, and semiconductor devices of associated nature. Then follows a discussion of equivalent circuits and parameters, d.c. operating conditions, low- and high-frequency amplifiers, oscillators, and the application of transistors in radio equipment. Transistor switching comes next, describing such things as flip-flops and their application in counting circuits, and there is then a chapter on power supplies of various types, including voltage regulators. The book concludes with a chapter on handling transistors, another highly-illuminating one on the basic considerations in integrated-circuit problems, and a final chapter on recent developments such as MOS and thin-film techniques. Throughout, numerous applications are described along with simplified design procedures; the reader is never left out on a limb with a tempting circuit and no information on what values to use in it.

To get the most out of a book of this sort it must be conscientiously studied. Mere reading is not enough; it rarely is when one wants to learn something. The point is that here no extensive technical background is needed, beyond what an ordinary amateur should be expected to have. A little familiarity with elementary chemistry would help — what "valence bonds" are, for instance — but lack of it is not fatal if the reader is willing to think. — *WIDF*

The Millimatch



This is the completed Millimatch. At the left is the sensitivity control, R_6. S_1 is in the center, and M_1 at the right.

A Sensitive Version of The Monimatch Mark II.

BY LEWIS G. McCOY,* W1ICP

In the last year or so the cost of transistors that can be used in transmitters has dropped to a point where more and more hams, both newcomers and old timers, are becoming interested in low-powered transistorized rigs. And by low power, we mean transmitters whose output is measured in terms of milliwatts, not watts.

Several very low power transmitters have recently been described in *QST*, and our mail bag attests to the popularity of these units. Such equipment is easily portable, and many hams, particularly v.h.f. operators, have discovered that extremely low power can be lots of fun.

One problem in using very low-powered transmitters is the difficulty in making antenna adjustments or checking output when tuning up. There "just ain't any" test equipment available to do the job. The regular garden variety of reflectometer, such as the Monimatch, isn't sensitive enough. The Millimatch, described in this article, provides adequate sensitivity — even for rigs with output levels as low as 10 milliwatts!

The Millimatch — What It Is

The Millimatch is similar to the Monimatch Mark II[1], except that a transistor current amplifier has been added. Fig. 1 is the circuit of the Millimatch. Of all the reflectometers that have been described since the original Monimatch, the Mark II is one of the best designs for accuracy of readings at v.h.f., up to and including the 144-Mc. band. For the benefit of the newcomer who is not familiar with reflectometers, a short description is in order.

When you attach a coaxial line of, say, 50-ohms characteristic impedance to an antenna and feed power through it to the antenna, a certain amount of power will be reflected back down the line toward the transmitter if the impedance of the antenna is anything other than 50 ohms. The larger the difference between the impedance of the line and the impedance of the antenna, the greater the ratio of reflected power to forward power. One method of checking this ratio is with a reflectometer which, when inserted in the coax line, in effect samples the forward and reflected voltages separately. From these relative voltage values the relative forward and reflected power, as well as the standing-wave ratio on the line, can be determined.

Referring to Fig. 1, the J_1 end of the Millimatch is connected to the transmitter and the J_2 end to the antenna. When the transmitter is turned on, r.f. current flowing along the conductor between the fittings induces voltages in L_1 and L_2. The voltage induced in L_1 is proportional to the forward line voltage, and the voltage induced in L_2 is proportional to the reflected line voltage. The L_1 voltage is rectified by CR_1, and the d.c. is applied to the base of Q_1. Q_1 amplifies this d.c., which is then read on M_1. When S_1 is switched to read reflected voltage, the voltage in L_2 is rectified by CR_2 and fed through the amplifier.

The standing-wave ratio on the coaxial line is found by first switching S_1 to read forward voltage and adjusting sensitivity control, R_6, so that M_1 reads exactly full scale; then S_1 is switched to reflected voltage and the meter reading noted. Let's assume the meter is calibrated from 0 to 10 in even divisions. The formula for determining the s.w.r. is quite simple:

$$S.W.R. = \frac{V_o + V_r}{V_o - V_r}$$

where V_o is the forward voltage and V_r is the

* Beginner & Novice Editor.

1 McCoy, "Monimatch Mark II," Feb. 1957, *QST*.

reflected voltage. For example, suppose that we set R_6 so that M_1 reads full scale, or 10, in the forward position, and when we switch to reflected we have a reading of 3. This would amount to

$$\frac{10+3}{10-3} = \frac{13}{7} = 1.8 \text{ to } 1.$$

However — and this is a point that some amateurs overlook — many reflectometers are not truly accurate instruments for measuring s.w.r. They are excellent for showing when a matched condition (an s.w.r. of 1 to 1) exists, but under any other condition the voltage readings are not dependable, because of poor linearity of the diode rectifiers used at CR_1 and CR_2. If the diodes were perfectly linear over the entire range of reflected and forward voltages being measured, the formula above would give accurate s.w.r. checks. If sufficient resistance is used in series with the diodes, their output tends to become more linear, but the sensitivity is reduced. We used R_4 and R_5 to improve the accuracy, and the loss in sensitivity is more than made up for by the amplifier, Q_1. In the Millimatch, another factor that gets into the act to upset the accuracy of s.w.r. readings is the linearity of the transistor used as an amplifier. However, regardless of the accuracy of s.w.r. readings, the bridge is excellent for showing when a match is achieved. Additionally, by setting S_1 in the forward position, the relative r.f. output of the transmitter can be observed on M_1. This is a valuable tool when tuning up a transmitter.

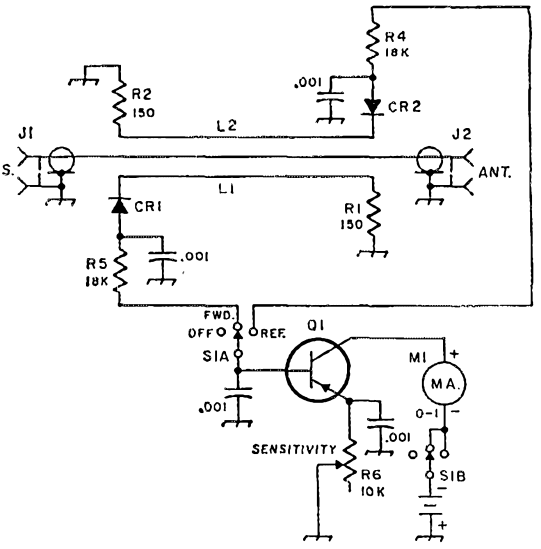


Fig. 1—Circuit diagram of the Millimatch. Resistances are in ohms (K = 1000). The 0.001-μf. capacitors are disk ceramic.

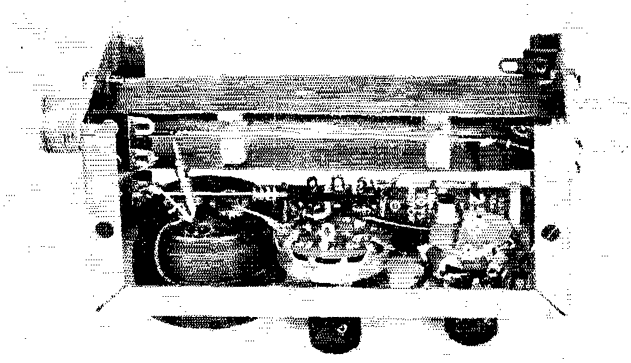
CR_1, CR_2—1N34A germanium diode.
J_1, J_2—Coax chassis receptacle, SO-239.
L_1, L_2—See text.
M_1—0–1 milliammeter. A more sensitive type can be used, but is not required.
R_1, R_2—150 ohms, ½ watt carbon or composition for 50-ohm bridge, 100 ohms for 75-ohm unit.
R_4, R_5—18,000 ohms, ½ watt.
R_6—10,000-ohm control, miniature type.
S_1—2-pole, 3-position switch (Mallory 3223J or similiar.)

Construction Information

The Millimatch is enclosed in a 2¼ × 2¼ × 5-inch Minibox. The transmission-line section consists of an inner conductor (a piece of ¼-inch o.d. copper tubing, 4⅝ inches long) and two pieces of copper flashing for the outer conductor. These two pieces measure 1 inch wide and 4⅞ inches long, plus a ¼-inch lip at each end for mounting under the screws that secure J_1 and J_2. Separation between the copper strips and inner conductor is maintained by two insulated spacers, Fig. 2. These spacers also serve to space the pickup wires L_1 and L_2 at the correct distance from the inner conductor. Any available insulating material of reasonably low loss, such as bakelite or polystyrene, can be used for the spacers.

Mounted on the front of the Minibox are M_1, S_1, and R_6. Almost any of miniature panel meters available from radio distributors can be used for M_1 as long as they don't protrude more than 1¼ inches behind the panel. We checked several types and found that most of them protruded 1 inch or less.

Mount J_1 and J_2 as close to the rear of the Minibox as possible, as shown in the photographs. Slide the spacers over the copper tubing and then tin the inside ends of the tubing with solder.



This shot shows the "innards" of the Millimatch. Pickup line L_1 is mounted in the grooves on the insulated spacers. CR_1 is at the left. At the right, just in front of the sensitivity control, is Q_1 in its socket. The 1½-volt Penlite cell is at the rear.

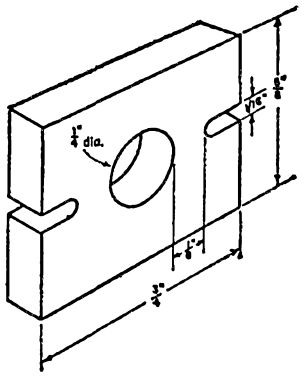


Fig. 2—Dimensions of the insulating spacers used to hold bridge wires and outer conductor strips in place.

Also tin the inner-conductor terminals of J_1 and J_2. Slide the ends of the tubing over the conductor terminals and solder. You can then mount the copper strips in place.

The pickup wires, L_1 and L_2, are 3⅜-inch lengths of No. 14 tinned wire. The wires are centered in the spacers as shown in the photograph and cemented in place with Duco cement. R_1 and R_2 are ½-watt resistors and must be carbon or composition, *not wire-wound*. For a 50-ohm bridge use 150-ohm resistors and for a 75-ohm unit, use 100-ohm resistors. (No, that last isn't a typographical error!) The ends of the resistors that are soldered to L_1 and L_2 are ⅛ inch long. Tin the ends of the pickup wires and the ends of the resistors with solder and solder the resistors in place. Don't overheat the resistor as too much heat can change the value. The remaining ends of the resistors are soldered to lugs mounted under screws that hold J_1 and J_2, keeping the leads as short as possible.

When connecting CR_1 and CR_2 to the pickup wires, use a heat sink on the lead between the body of the diode and the lead being soldered. Too much heat can easily ruin the diode.

We used a transistor socket for mounting Q_1, but it could be mounted by its own leads if desired. The 1½-volt battery was installed by soldering wires to both ends, no holder being used. Some penlite cells have a pressure-type contact at the base, or negative, end. This is a circular plate that must have pressure on it to make contact. If you get that type battery, take a knife and slice away the plate to get at the actual base of the battery.

Almost any p.n.p. type transistor will work for Q_1. We tried several types from the junk box — 2N114, 2N117, 2N705, and 4JD1A67 — and they all had more than adequate gain. As a matter of fact, we had removed about 50 different transistors from surplus computer boards, and every p.n.p. type had adequate gain for full-scale deflection of M_1 with 25 milliwatts input at 28 Mc.

Testing and Using The Millimatch

Connect the Millimatch to your transmitter, using 50- or 75-ohm coax as required. Leave the antenna end of the bridge unconnected. Turn on the rig, switch S_1 to forward and set the sensitivity for about half-scale reading. Next, switch to reflected. The readings for forward and reflected should be about the same. Next, if you want to check the accuracy of the bridge, connect a 1-watt carbon resistor of the appropriate value, 50 or 75 ohms, between the inner hole and outer shell of J_2. Switch S_1 to forward and adjust the sensitivity to full scale. Then switch to reflected and the reading should drop to zero.

You may find that when you first turn on the Millimatch, you will get a slight reading on the meter without the transmitter being on. This is the "no-signal current" in the transistor. Whatever the no-signal current reading is, and it will be very small, assume this value as "zero" when the transmitter is turned on and worked into a matched load.

You can check the accuracy of the s.w.r. readings with the formula previously mentioned by using dummy load resistances of various values. For example, a 150-ohm resistor will represent a 3 to 1 s.w.r. with a 50-ohm bridge.

As we stated earlier, the Millimatch will enable you to match your antenna system, and just as important, provide an excellent output indicator for that flea-power rig. QST

NEW BOOKS

RCA Silicon Power Circuits Manual, No. SP-50, published by Electronic Components and Devices, Radio Corporation of America, Harrison, New Jersey. 416 pages, including index, paper cover, 5⅜ inches. Price, $2.00.

This book is a real bargain for anyone interested in the applications of power transistors, rectifiers, and thyristors (the best-known type of which is the silicon controlled rectifier). It is full of useful design information on power conversion — a.c. to d.c., d.c. to a.c., d.c. to d.c. — and power-supply regulation, on power amplifiers for both audio and r.f., and on control amplifiers. In addition, a good deal of attention is paid to the basic characteristics and ratings of the semiconductor devices, by way of introduction to the design section. Of special interest to amateurs is the treatment of high-frequency power amplifiers, a chapter of almost 100 pages dealing with the use of transistors in transmitters.

It is unavoidable that in any book which takes up design on a serious basis there must be a good deal of emphasis on formulas and their application. However, the hobbyist for whom even the simplest mathematics offers an excuse for throwing a book away, after riffling the pages, has a good reason for taking a second look in this case. There is plenty of plain text that anyone with a very modest knowledge of electronics can understand. And it should remain useful for a long time — no space is spent on tabulating detailed characteristics of devices current at the time the book was written, but which in most cases, unfortunately, become obsolescent almost as soon as the publication is off the presses. — *WIDF*

A Microphone Preamp Using the FET

BY DOUGLAS A. BLAKESLEE,* WIKLK

Have a yen to try field-effect transistors? This little preamplifier will provide an evening's enjoyment experimenting with this new device, and the finished product will boost the output of low-level microphones.

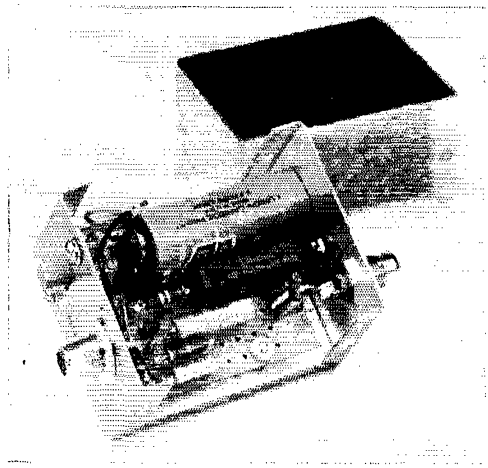
HIGH-QUALITY microphones almost invariably have low output, often 10 to 15 db. below the inexpensive crystal types. Many ham rigs, the author's Gonset Communicator II included, do not have enough audio gain to be usable with a "good" mike, unless you yell at the thing. A preamplifier is the obvious answer.

The relatively-new field-effect transistor is a natural for a preamp circuit because of its high input impedance, low internal noise, and low distortion. Until recently these new devices have had rather astronomical prices and little gain, but manufacturing techniques have now improved to the point where both gain and price tags look attractive. The Motorola MPF103 ($1 each) was used in our unit. Higher gains may be obtained, if required, by using the MPF104 or 105. The current drain of the FET circuit is so low that the battery will last almost its shelf life.

The circuit, shown in Fig. 1, has been designed to minimize hum problems. The use of a transistor, of course, eliminates heater-supply hum. The coupling and bypass capacitors have been chosen for a roll-off below 300 c.p.s. to get rid of power-line harmonics induced in the microphone itself and its connecting cable.

The bias value for maximum gain was found to be quite critical. Some experimentation with the value of R_1 may be necessary to get the most gain from individual FETs, because of the wide differences in forward transfer admittance (transconductance, to tube-thinkers). MPF103s vary between 1000 and 5000 μmhos, with typical transistors around 3000.

*114 Shelley Road, Meriden, Conn.



Construction

The FET preamplifier is built in a 2¾ × 2⅛ × 1⅝-inch Minibox; the small components are mounted on a 2¼ × 1-inch piece of Vectorbord. No suitable battery clip for vertical mounting was available, but it worked out (happily) that the battery made a good press fit behind the on-off switch. The output trimmer-

(*Continued on page 144*)

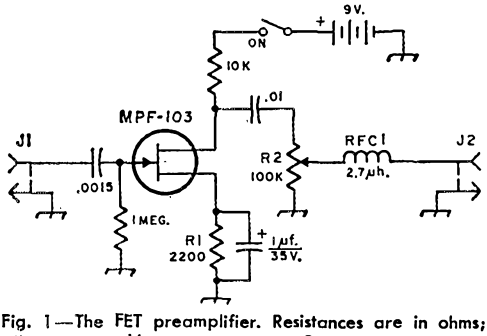
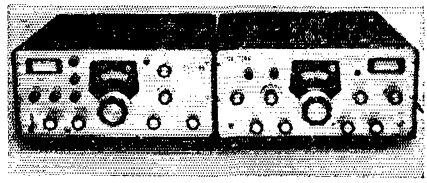


Fig. 1—The FET preamplifier. Resistances are in ohms; all resistors are ½-watt composition. Capacitors are paper, except the one marked with polarity, which is electrolytic; values are in microfarads. RFC1 is a Millen 34300-2.7, a 2.7 microhenry choke. See the text for a discussion of this choke, R_1 and R_2. J_1 and J_2 are phono jacks.

Recent Equipment

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

The Star SR-700E and ST-700E

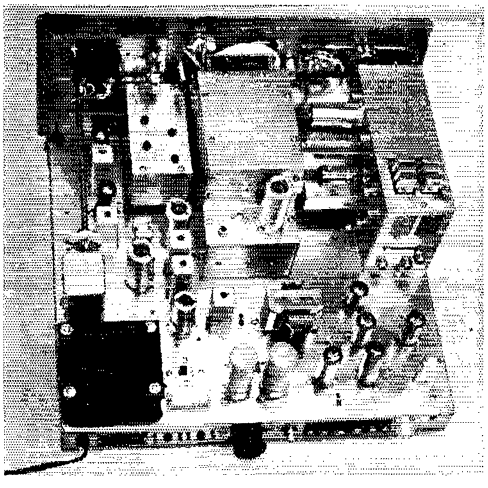


FAIRLY new to the American market is the Japanese-built SR-700E receiver and ST-700E transmitter combination. These pieces can be used together as a matched pair, or singly as independent units. Both are designed for use on a.m., c.w., and s.s.b.

Receiver Description

Although neat and functional in appearance, the SR-700E has that slightly "different" look that is common to most imported ham gear. That is to say, the knobs, meter face, main tuning dial, and style of lettering on the controls look just different enough from American equipment trimming to identify it as an "import." The interior of the receiver has a clean appearance because of the orderly way the circuit is laid out and wired. The chassis is rugged and well built. It is finished with gold-tinted zinc plating.

Most of the modern-day features found in American-built receivers have been included in the circuit. The SR-700E has variable-decay a.g.c., variable i.f. selectivity, variable b.f.o. tuning, T-notch filter, and a built-in 100-kc. calibrator. The main-tuning dial operates a rugged gear train which in turn controls the movement of the v.f.o. tuning capacitor.



A look at the top of the receiver chassis. The receiver's front-end circuit is housed in the subassembly at the upper right. Crystals for the conversion oscillator protrude from the top of the box. The v.f.o. is located just left of the front-end box (front-center of chassis). A box to the immediate left of the v.f.o. houses the variable-selectivity bandpass filter. The i.f. stages and the b.f.o. are located along the left side of the chassis, just ahead of the power transformer.

Fig. 1 shows the layout of the receiver in block form. The incoming signal from the antenna is amplified by V_1 and passed on to the mixer, V_{2A}. Output from the crystal-controlled oscillator, V_{2B}, is heterodyned with the incoming signal at V_{2A}, producing an i.f. whose range is from 3.4 to 4 Mc. The band switch selects the correct crystal at V_{2B} to beat with the 3.5- to 29.7-Mc. signal frequency to produce the 3.4- to 4-Mc. i.f. The main-tuning oscillator, V_{4A}, tunes from 5050 to 5650 kc. This v.f.o. output is routed through a cathode-follower, V_{4B}, offering a degree of v.f.o. isolation between V_{4A} and V_3, the second mixer. A second i.f., 1650 kc., is produced at V_3. This signal is fed to the third mixer, V_{5A}, where either a 1705- or 1595-kc. oscillator signal beats with it to give a third i.f. of 55 kc. Upper- or lower-sideband reception is established by selecting one or the other of the two oscillator frequencies at V_{5B}.

The remainder of the stages are more or less conventional. Output from the third mixer, V_{5A}, is routed through an LC bandpass filter whose switch positions provide 0.5, 1.2, 2.5, and 4-kc. selectivity. This filter does not have the sharp skirt selectivity that is possible with crystal-lattice or mechanical filters, but does offer a worthwhile degree of control over the width of the i.f. passband. After the signal leaves the filter, it is amplified by V_6 and V_7. During s.s.b. and c.w. reception, the 55-kc. i.f. signal is demodulated by the product detector, V_{8B}. V_{8A} serves as a variable b.f.o. at that time. During a.m. reception, a crystal diode performs as an envelope detector while the product detector and b.f.o. are switched off by removing their B-plus voltage. Output from whichever detector is being used is fed to V_9, the noise limiter. When V_9 is in use the clipping level can be controlled from the front panel of the receiver by means of a potentiometer. V_9 is a shunt-type audio limiter and both the positive- and negative-going pulses are clipped. Fig. 2 provides a closer look at the detector and noise-limiter circuits. Audio output from V_9 is amplified by V_{10} and is then brought up to loudspeaker or headset level by V_{11}.

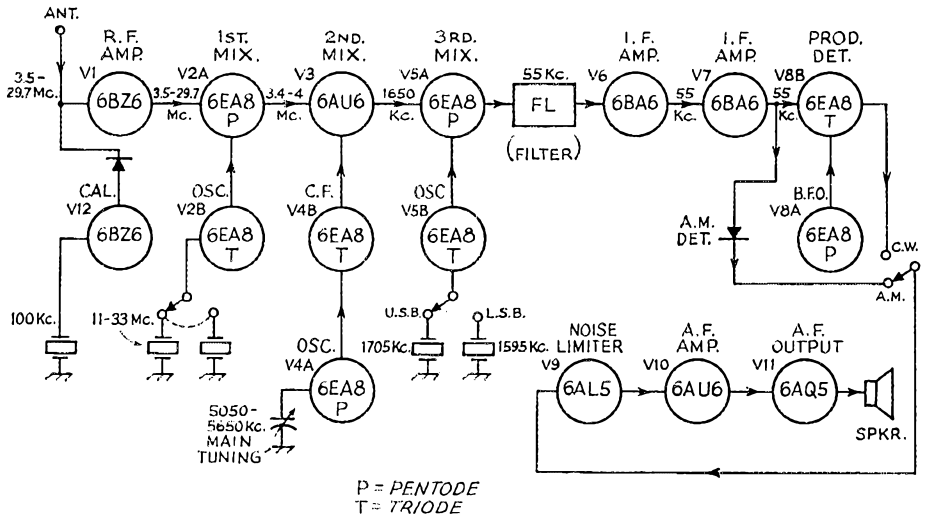


Fig. 1—Block diagram of the Star receiver. The arrows indicate the direction in which the signal travels.

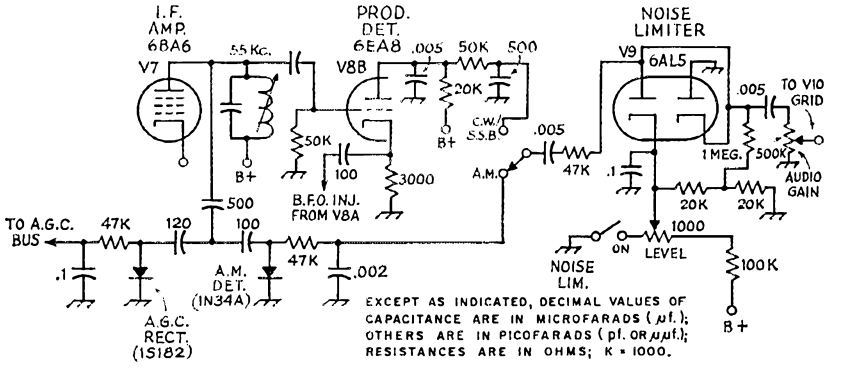
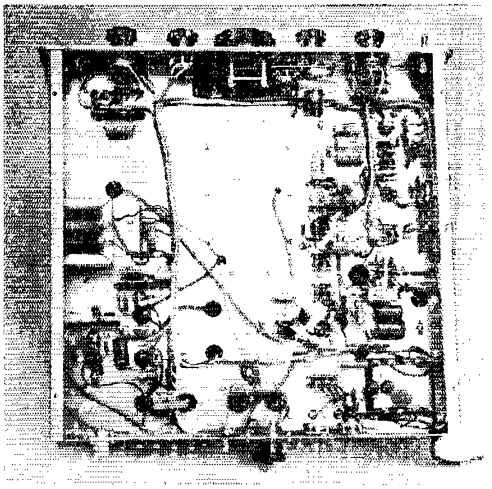


Fig. 2—Schematic diagram of the product detector, the a.m. detector, and the noise limiter.



A bottom view of the receiver. The i.f. section of the receiver is on the right of the chassis. Terminals and jacks along the rear apron are for antenna, speaker, and transmitter connection.

The crystal calibrator, V_{12}, supplies 100-kc. energy to the input circuit of r.f. amplifier V_1. Output from V_{12} is fed through a diode before it reaches V_1, enhancing the level of the calibrator's harmonics. This method helps to insure against insufficient 100-kc. marker amplitude in the higher frequency ranges of the receiver.

Control of the receiver r.f. gain is effected by a front-panel control that places a negative voltage in parallel with the a.g.c. bus. As the r.f. gain control is turned toward minimum, counter clockwise, the negative voltage on that part of the circuit is increased. This puts as much as −15 volts on the grids of V_6 and V_7, and up to −10 volts on the grid of the r.f. amplifier, V_1, at the minimum gain setting.

The front panel of the SR-700E has a satin-aluminum finish. The knobs and the lettering are in black, offering good contrast to the panel. The cabinet has a dark gray wrinkle finish.

Performance tests indicated good receiver sensitivity, good electrical and mechanical stability, and satisfactory immunity to front-end overload from strong signals. The dial calibration provides 1-kc.-per-division increments.

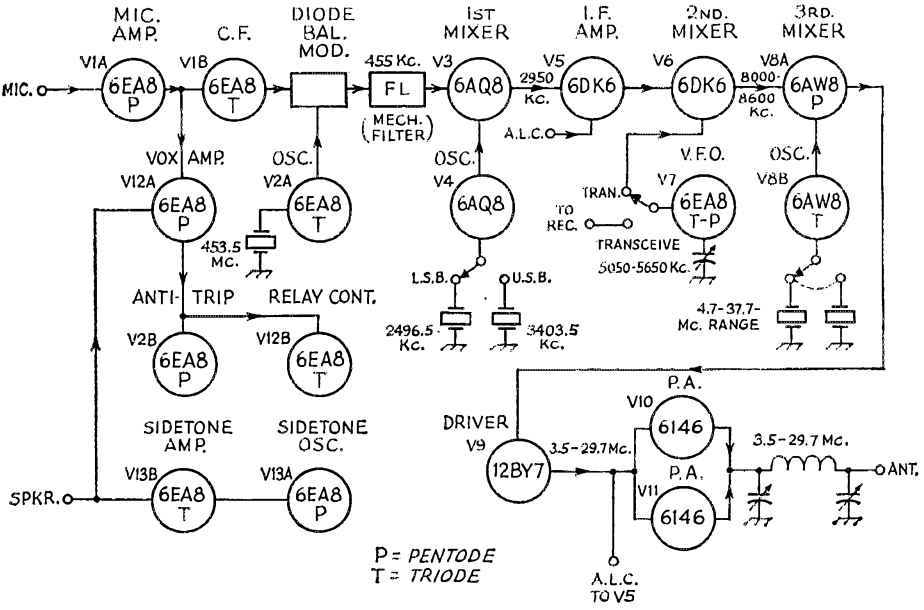


Fig. 3—Block diagram of the ST-700E transmitter. The signal path is indicated by the arrows.

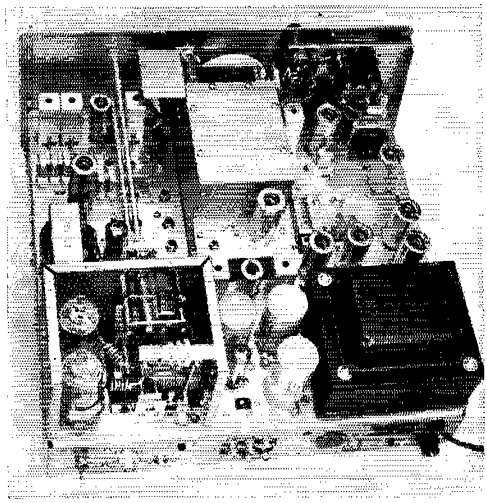
Transmitter Description

The circuit of the Star ST-700E is compatible with that of the SR-700E receiver, permitting the two units to be used in combination for transceiving. The transmitter, however, can be used independently with other styles of receiver. Physically, the Star transmitter closely resembles the SR-700E receiver. The likeness of the two pieces is apparent from the photo at the beginning of this article.

Five-band coverage, 3.5 through 29.7 Mc., is available. Upper and lower sideband selection is made possible from the front panel by means of a function switch. An additional switch position places the transmitter in the c.w. mode There is no provision for a.m. operation.

The transmitter circuit is rather straightforward; the block diagram of Fig. 3 illustrates how the signal is generated and shows the route over which it travels in the circuit. The triple-conversion technique is employed, the basic signal starting at 455 kc., being heterodyned to 2950 kc., then to 8000–8600 kc., and finally to the desired operating frequency. The v.f.o. tuning range of the transmitter is 5050 to 5650 kc., the same as that of the SR-700E receiver, making it possible to transceive with the two units.

Considerable emphasis was placed on the reduction of spurious responses from the transmitter. The designers used a balanced mixer at V_3, thereby reducing the level of the 2496.5- and 3403.5-kc. energy in the output of the first mixer. The circuit is shown in Fig. 4. An oscillator-frequency trap of the T-notch variety, tuned to 2496.5 kc., follows the first mixer stage.



Looking at the top of the transmitter chassis, the power supply is at the right-rear of the chassis. The p.a. compartment is at the left-rear of the chassis. The conversion oscillator, mixer, and driver stages are along the left edge of the chassis. A sturdily-built subassembly contains the v.f.o., front-center of the transmitter. Just to the right of the v.f.o., the 455-kc. mechanical filter can be seen. Phono jacks are located at the center of the rear apron of the chassis. These connectors are used to mate the SR-700E to the ST-700E when the transceive mode is employed. The key jack is to the right of the phono jacks. The antenna connector and a ground post are at the far left of the rear apron.

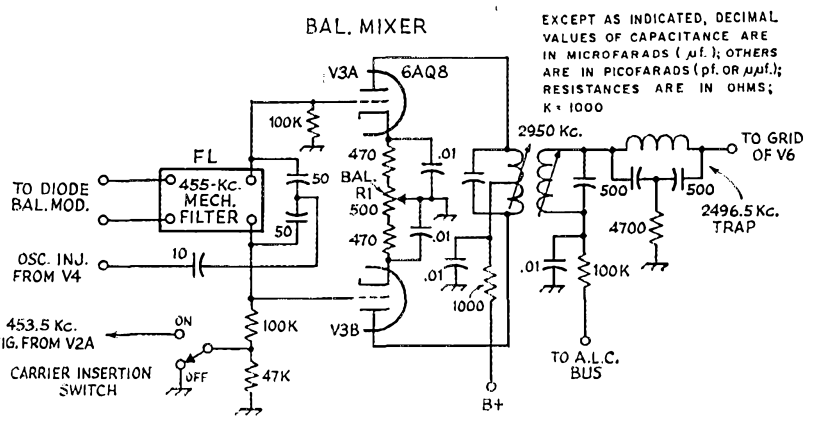
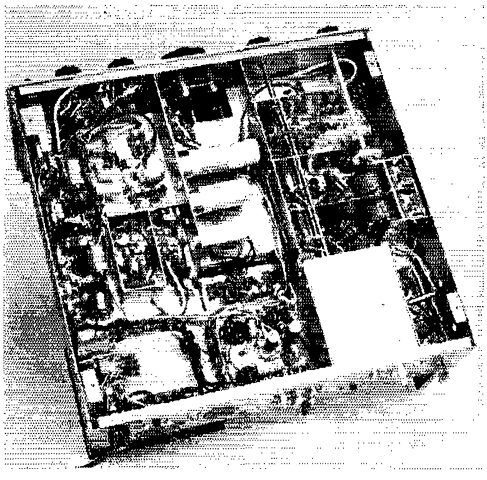


Fig. 4—Details for the balanced mixer stage are shown in schematic form. A 2496.5-kc. T-notch type trap is used between the balanced-mixer output and the grid of V6 to help eliminate spurious output from the transmitter. R1 is a balance control.

It offers a considerable amount of rejection to that unwanted frequency, aiding further in the reduction of spurious energy. Another contributing factor to clean output is a low-pass filter between the v.f.o., V_7, and the second mixer, V_6. The filter greatly attenuates harmonic energy generated by the v.f.o. The driver stage, V_9, and the p.a., V_{10} and V_{11}, are suppressed for parasitics. The p.a. stage is neutralized. These measures aid in transmitter stability while offering added insurance against spurious output.



Looking into the bottom of the transmitter chassis, the p.a. compartment is at the lower right. Ahead of the compartment are the conversion-oscillator, the mixer, and the driver stages. Metal plates shield the stages from one another. The remainder of the circuit is along the left side of the chassis. The power supply is located at the lower left.

The power amplifier uses two 6146 tubes in parallel and has a standard pi-network output circuit. The p.a. exhibits good stability on all bands, although the first model that was available in the U.S.A., the ST-700, was unstable on 80 meters. Because a circuit modification was made to correct the difficulty, the model ST-700E was born and it is this model that is currently available.

Structurally, the transmitter is very rugged. The v.f.o. is housed in a heavy-gauge metal chassis which is a subassembly of the main chassis. Extensive shielding is used above and below the main chassis to isolate the various sections of the circuit from one another, thus lessening the chance for instability and spurious output. Because the layout is neat and in logical sequence, the circuit is easy to trace from beginning to end — an aid to the user should repairs be necessary.

A rocker-type switch is mounted on the rear-top of the chassis, enabling the user to select either 115 or 230 v.a.c. (60 c.p.s.) operation. A metal plate mounts over the switch after the selection is made, thus preventing the switch position from being accidentally changed once it is set.

Both the transmitter and the receiver are finished in the same colors. Each cabinet is equipped with four plastic feet, two of which (front) are longer than the others. This feature raises the front of the cabinet higher than the rear, offering better operating convenience as far as reading the meter scale and the control labels is concerned.

All of the VOX controls — VOX GAIN, VOX DELAY, and ANTI-TRIP — are located on the front panel. A panel meter enables the operator to monitor p.a. grid and plate currents, and relative

power output. A switch located just below the meter selects the three monitoring positions. Plate-current, bias and relative-power meter-adjustment controls are located on the rear apron of the chassis. The sidetone control is on the top of the chassis, near the front panel.

Carrier suppression, and v.f.o. stability — both mechanical and electrical — checked out satisfactorily. When tested with a spectrum analyzer, the third and fifth order products were within acceptable limits. The signal quality, as monitored on a receiver, was good. Suppression of the unwanted sideband is good.

The equipment is easy to tune up and get operating. All of the front-panel controls are convenient to adjust because they are not crowded together as are those on some of the more compact equipment these days. A large main-tuning dial controls the transmitter frequency. It has smooth action and is calibrated in 1-kc. steps. The instruction book is complete and is easy to understand. — W1CER

Star SR-700E Receiver
Height: 7¼ inches.
Width: 15¼ inches.
Depth: 11½ inches.
Weight: 30 pounds.
Power Requirements: 115 volts or 230 volts a.c., 50/60 cycles. 65 watts.
Price Class: $400.
Importer: Interstar Corp., 5300 21st. Ave., Brooklyn, N.Y. 11204.

Star ST-700E Transmitter
Height: 7¼ inches.
Width: 15¼ inches.
Depth: 11½ inches.
Weight: Approx. 55 lbs.
Power Requirements: 115 or 230 volts a.c., 50/60 cycles, 285 watts.
Price Class: $555.
Importer: Interstar Corp., 5300 21st Ave., Brooklyn, N. Y. 11204.

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Heathkit Crystal Filter Modification Kit SBA-100-2

OWNERS of the Heathkit SB-100 transceiver[1] will be glad to learn that a crystal filter modification kit is available which makes it possible to select either a 2.1-Mc. or 400-cycle crystal filter by turning a single front panel switch. The 2.1-Mc. bandwidth is, of course, "stock" on the SB-100. The modification includes the new 400-cycle filter for use in c.w. reception.

Fig. 1 shows the filter switch which mounts concentric to the r.f. gain control. The old r.f. gain control is removed and discarded and the new r.f. gain/filter switch assembly replaces it. An escutcheon plate with switch position and gain control markings is held in place by the assembly.

Behind the panel, the old filter is removed and is replaced by two new filters which take up about the same amount of space as the single old one. A new switch bracket assembly must be installed and this requires removal of the entire front panel. However, the job requires only a few minutes' time and the entire modification shouldn't take more than an hour or so. Fig. 2 shows the new filters installed.

Operation of the SB-100 remains essentially the same. When changing modes from s.s.b. to c.w., the filter switch is positioned to agree with the mode switch setting.

The modification kit price is $50.95. After making the installation, you can return your old s.s.b. filter (if it is in good condition) for a $25.00 credit or refund from Heath.

— *W1CUT*

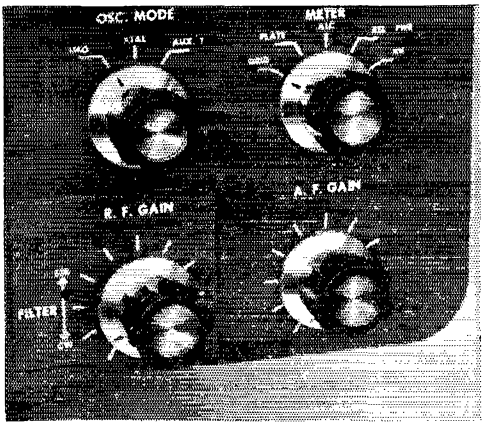

Fig. 1—The new filter switch is part of the r.f. gain control. The switch label plate comes with the modification kit.

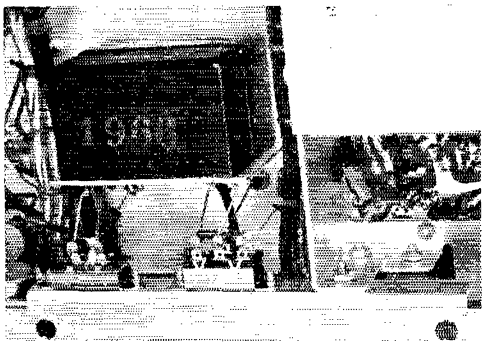
Fig. 2—The two new filters take up about the same space as the old single filter.

[1] "Recent Equipment," *QST*, September 1966, p. 45.

Technical Correspondence

EMERGENCY COAX CONNECTOR

Technical Editor, *QST*:

I would like to comment on the brief article in the "Hints & Kinks" section of April *QST* entitled "Emergency Coax Connector."

According to my calculations the adapter described has a characteristic impedance close to 100 ohms. Generally speaking, the discontinuity presented to a 50-ohm transmission line by the adapter will be small at h.f. and v.h.f. frequencies and one should obtain good v.s.w.r. characteristics. However, for use in the u h.f. region the mismatch will be more significant.

An improved match can be attained by soldering a sleeve over the two inner conductors such that the ratio of outer to inner coaxial conductor diameters will be approximately 2.3. This will result in an adapter with a 50-ohm characteristic impedance. — *Dennis J. Kozakoff, W4AZW, 5408 Talbot Drive, Orlando, Florida 32808.*

USING AIRCRAFT REFLECTIONS IN V.H.F. COMMUNICATIONS

Technical Editor, *QST*:

Most v.h.f. enthusiasts are familiar with "aircraft flutter." Combination of direct and reflected rays produces a fluttering that begins fairly weak, with a rapid rate, then grows stronger, with the rate reducing to nearly zero. Then the rate builds up again, and the fluttering grows weaker and finally disappears. This all occurs in a time span of from 10 seconds to as much as several minutes.

That a reflected signal of such strength is observed at random suggests that, with optimum techniques, it could be used for v.h.f. communication over paths where direct-ray signals are weak, or nonexistent. This has probably happened on occasion, perhaps without the amateurs involved realizing it. Our intent here will be to give some indication of signal levels to be expected when aircraft reflections are used intentionally, and to describe methods for this.

Aircraft flutter is observed normally on short paths, where communication is relatively good, but it should be usable over distances of 100 miles or more, on circuits where terrain obstructions make normal communication difficult. Vapor trails we often see are at an altitude that allows the pilot to see some 300 miles in any direction. Horizon distances for aircraft altitudes are given in Fig. 1. These great horizon distances do not necessarily imply use of aircraft reflections over similar paths. The beamwidth of amateur antennas is such that the percentage of the total radiated power is too small to produce a significant reflection over distances much greater than can be covered readily over open terrain.

I have conducted simple tests with TV signals to gain an insight into what may be reasonably expected. Stations 45 to 65 miles away were used. At these distances signals are normally weak on receiving antennas close to the ground, the optimum situation for high-angle pickup. TV signals were tuned in, and the antenna was rotated for weakest direct pickup. This makes aircraft reflections much more obvious, and the first time I tried it there were enough aircraft present to make it difficult to tell when I had really minimized the direct signal. Here in the Northeast I have found these reflectors to be present for sustained periods, day in and day out. Based on depth of fluttering I estimated the reflected signals to range from 30 db. below the direct signal to equal to it.

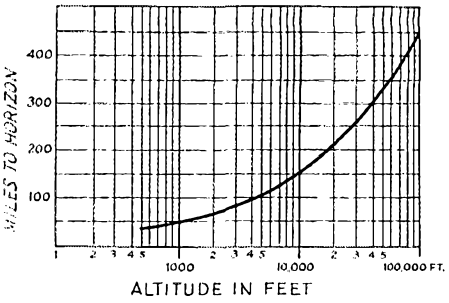

Fig. 1—Distance to the horizon, as seen from aircraft at elevations up to 100,000 feet.

I computed what the worst-case area of reflection might be, then applied this to voice and c.w. bandwidths for amateur use. The information of Fig. 2 implies 100 watts transmitter power, 3-kc. bandwidth for voice, 10-db. receiver noise figure, and antenna gain no greater than 10 db. over isotropic. This for a reflecting area of only 2 square meters. It can be seen that under these conservative estimates, stations A and B, 5 and 39 miles, respectively, from an aircraft would have a 10-db. signal-to-noise ratio in 50-Mc. communication on voice. With c.w. about 10 db. more margin would prevail.

Special circumstances are encountered with TV signals, as most TV stations concentrate their radiation along the horizon. Beam patterns may be only about 3 degrees above the horizon at Channel

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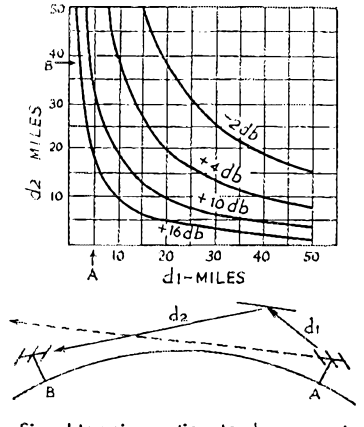


Fig. 2—Signal-to-noise ratios to be expected from aircraft reflections at 50 Mc. Information is for voice. Use of c.w. would produce about 10 db. greater margin over noise. In the example indicated, Station A at 5 miles from an aircraft and Station B, 39 miles, would have a 10-db. signal-to-noise ratio, with average 50-Mc. setups.

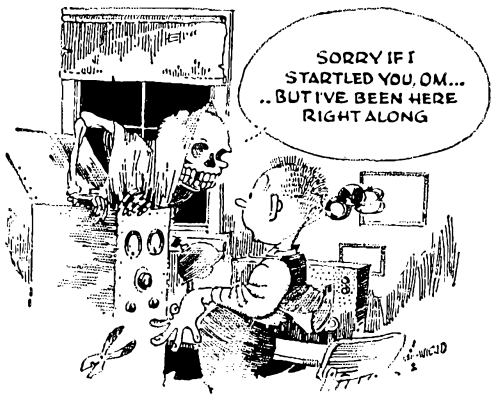
The Life You Save
May Be Your Own

Electrical Safety

Safety is a prerequisite for all of us. A knowledge of safety rules and first aid procedures may well save your life or that of a member of your family today. This article, compiled mainly from the Collins Radio Company's manual* Electrical Safety, *discusses the nature and effect of an electric shock. Read it. Apply the safety rules to your home and shack. Know the first aid techniques. Switch to Safety!

THIS hobby of ours — ham radio — is exciting. Depending on the individual's taste, it may mean traffic handling, DX chasing, chewing the rag, or building and testing new equipment. No matter what *your* favorite, chances are that you often handle electricity-carrying parts and wires, and often put yourself within a few inches of death.

Now, as long as those few inches remain between you and the accident, it's all right. But suppose your hand slips, and you haven't turned the power off. Or suppose you touch the lead to a filter capacitor, and you didn't discharge it first



Or suppose the ring you're wearing gets stuck between a couple of live components. Or suppose that ground connection isn't clean, and your "safe" circuit has become a lethal weapon without your knowledge. Almost any way you look at these things, you're DEAD!

There are a few simple *dos* and *don'ts* to make electronics as safe as possible. We'll list them later. But let's talk first about what happens when you accidentally touch a live circuit.

Effects of Electric Shock

Death from electric shock may result from any one or a combination of medical causes. The most common are paralysis of respiratory muscles and asphyxiation; hemorrhage, produced by increasing blood pressure during passage of an electric current; heart failure, resulting from ventricular fibrillation; respiratory failure resulting from damage to the nervous system; and skin and flesh burns and their complications.

The first of these causes, asphyxiation due to paralysis of the respiratory system, is usually associated with one of the other causes, although on occasion it's a killer by itself. When this happens, the respiratory muscles contract, stopping normal functioning of the lungs. Its victim suffocates.

When a current passes through the bloodstream, the temperature of the blood is raised, and blood pressure increases, sometimes to the point of breaking the walls of the blood vessels, causing a hemorrhage. This is *usually* associated with higher voltages or currents, but sometimes results from prolonged contact with lower-power circuits.

Of chief concern when dealing with low-voltage shock (which permits only a low current to pass through the victim) is a medical phenomenon called ventricular fibrillation. When this occurs, the heart loses its vital rhythm and muscles quiver in an uncoordinated manner, even after the current stops; and the heart cannot regain its rhythm. The victim is sure to die in this case, unless he is given immediate medical aid that only a fully informed and competent physician is qualified to administer. Artificial respiration is of no use to restore heart rhythm. Scientific groups estimate that current in excess of 10 ma. through the body can cause ventricular fibrillation or result in severe shock, or both.[1]

Respiratory failure resulting from nervous inhibitions or actual damage to the nervous system are usually associated with higher voltages (which allow higher currents to pass through the body). When the body receives a high-intensity electrical shock, the nervous system is temporarily paralyzed. The most common result is respiratory failure, which may often be counteracted by artificial respiration or a bodily jolt or jar. Paralysis of other parts of the body is often involved, sometimes for considerable periods after the current has been removed.

[1] As reported in *Electrical Safety*, a nonpublic manual of the Collins Radio Company Research and Development Laboratories, Cedar Rapids, Iowa.

Skin and flesh burns resulting from electrical shock do not differ much from other burns. If anything, they are apt to be deeper, and thus more serious. They usually occur at the point of contact with the electrical circuit and result from the passage of current through a body area of high resistance. Burns may also result from rings or other jewelry which, after being heated by contact with an electric circuit, dissipate their intense heat through the finger, wrist or hand of their wearer. Such burns are *deceptively* dangerous, since the layman does not understand how much heat his old high school or wedding ring can absorb; and he usually does not feel the pain for a moment after it has begun, by which time the burn may be quite severe.

Whatever the type of reaction to an electric shock, it requires immediate remedial action. Since a layman cannot distinguish the various possibilities, he should administer resuscitation if the victim is not breathing. This should continue until the victim revives, death has been diagnosed by a physician, or *rigor mortis* sets in.

The Nature of a Shock

Electricity works for you 24 hours every day — it's your slave. But if it is carelessly handled for as little as one one-hundredth of a second, you may be its victim. Generally speaking, factors which determine the seriousness of an electrical shock include body resistance, magnitude and frequency of current, path of the current through the body, contact time, and anticipation on the part of the handler. Some of these factors are self-explanatory; others could bear discussion.

Body resistance is found mainly in the skin surface, but when the skin is moist, resistance drops drastically. Once the *skin* resistance is broken down, current flows freely through the blood and body tissues. Resistance is very dependent on the condition of the skin. For example, the skin of the back of the hand, although apparently much thinner than that of the palm, is often very dry, and somewhat hairy, and offers very high resistance. Another part of the body — the back of the neck, for example — is not usually as dry as the back of the hand. Hence the resistance is much lower.

High voltages can almost instantly puncture the skin, leaving as little as 400 ohms resistance path for the current to travel through the body.

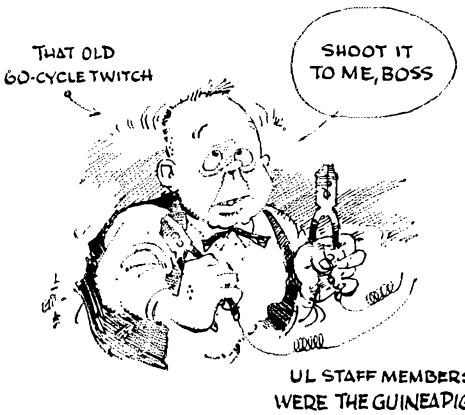
The chief difference between the physical effects of a.c. and d.c. is that direct current causes much less contraction of the muscles. Laboratory tests indicate that an individual can withstand a decidedly higher value of direct current and still maintain control of his muscles. At higher voltages (both a.c. and d.c.) the contraction of muscles at the moment of contact is so violent that it has the effect of a repelling blow. Mixtures of a.c. and d.c. have varying effects, but in every case, the higher the a.c. component, the less tolerant is the body to its passage. In particular, the common 60-c.p.s. alternating current is a very dangerous wave form. (The most dangerous range is between 10 c.p.s. and 1000 c.p.s.) There is a continuing decrease in muscular response as frequency is increased beyond 10 kc. At 2 Mc. and above, it is negligible. As the frequency rises through these high a.c. and r.f. ranges, dielectric heating effects become increasingly important.

TABLE A

Subject	*Voltage A.C.*	*Current in Ma.*	*Calculated Body Resistance, Ohms*
A	40	6.0	6670
B	32	7.5	4260
C	25	6.0	4170
D	20	8.0	2500
E	20	8.0	2500
F	33	9.5	3470
G	21	10.0	3500
H	30	8.0	3000
I	29	9.0	3620
J	31	6.0	5160
K	30	10.0	3000
L	21	9.0	2330
M	30	8.0	3750
Maximum	40	10.0	6670
Minimum	20	6.0	2330
Average	27.8	7.8	3560

Table A shows the results of a series of Underwriter's Laboratories tests in 1930, depicting the maximum currents at which subjects could retain control of their muscles. Members of the UL staff were used as subjects (ouch!). Electrodes consisted of a pair of pliers held in each hand. Current was 60-cycle a.c. in each case. (Other tests indicated that direct current could be withstood for a slightly longer time — until a hot spot occurred at the point of contact.)

The path through which the current flows is a factor in predicting the severity of a shock. It is less likely to be fatal if the current does not flow through or near nerve centers and vital organs. However, since the majority of shock and shop accidents involve currents which pass from



hands to feet, thus involving both the heart and lungs, there is a great possibility of a serious or fatal shock.

In general, the longer the current flows through the body, the more serious will be the result. Because considerable current will flow when a high-voltage shock is sustained, only a short exposure can be tolerated if the victim is to be revived. Time is especially important in regard to the severity of body tissue burns. Burning voltages which break down the skin resistance allow very large currents to flow, thus creating a more dangerous shock situation. Large currents — 10 amperes or more — may flow through the body. Even if fibrillation does not begin, severe burning of tissues, poisoning by combustion products, and possible hemorrhage may result.

The ability to let go decreases with time, as a result of fatigue and pain associated with the harsh, involuntary contraction of the muscles. Prolonged contact with currents only slightly in excess of the "let-go" limit may cause exhaustion, asphyxia, and unconsciousness followed by death. Hence, even a relatively small current becomes dangerous with time.

Switch to Safety

(...and replace those blown bleeders!)

One of the factors we listed was the element of anticipation. This may or may not be present in a shock accident. Anticipation means that the victim had time to prepare himself to handle his muscular reactions to the limit of his ability. Shock under such controlled conditions can be relatively minor. On the other hand, some people feel they can absorb an electric current through paths which do not involve the vital organs. This practice can be extremely dangerous. Not only might the victim fling equipment being held in his hands, endangering other people, but muscular actions and balance are uncontrollabl e for an instant; and a momentary loss of balance has resulted in many deaths by falling. And a shock can be fatal in as little as 1/100 second.

Happiness Is a Tight Ground Connection

"Happiness is a safe three-way grounded plug," to paraphrase Charlie Brown. "Happiness is a brand-new bleeder resistor, and a discharged filter capacitor in the h.v. supply. Happiness is a tamper-proof interlock switch. And happiness is staying alive."

There are a few simple rules to follow to stay happy and healthy. Some are *dos* and some are *don'ts*, but all are absolutely necessary.

Do turn off the power to a unit when it is not needed.

Do discharge capacitors — and don't assume they are discharged until you have shorted the circuit terminals to ground.

Do consider all bare wiring as live.

Do beware of high voltage anywhere, anytime.

Do keep one hand in your pocket while adjusting "live" circuits.

Do stay alert.

Do develop safe habits. Make it a rule to adhere to safety practices.

Do know your job. Study the circuit you're working on. Know the test equipment you're using.

Do think safety.

Do know artificial respiration and first aid measures.

Don't use faulty test equipment (or makeshift line cords or plugs, or worn and frazzled wires).

Don't work on high-voltage circuits when you are tired, dizzy, nauseated, feverish, or under the influence of drugs which cause drowsiness.

Don't work on high-voltage circuits alone. Have someone else there who knows first aid and artificial respiration techniques.

Don't assume a circuit is dead. Remember that filter capacitors do not discharge immediately when they are part of an *RC* network. If there is any doubt about the circuit, test it with a voltmeter or other suitable indicating device.

Don't wear earphones while working on electronic gear.

Don't wear jewelry.

Don't assume the equipment is grounded. (A simple test? Next time you're in your shack, take a look at some of your ground connections. If you haven't cleaned them recently, they may be crusted with oxides, virtually isolated from ground.) There should be no more than an ohm's resistance between your chassis and the ground. And do not rely on visual inspection for secure grounding. It can be misleading. Use a voltmeter if the power is on, and check the security of the ground connections.

Don't be careless.

Don't perpetrate jokes. Jokes involving human life are not funny.

Don't short out interlock switches unless *absolutely* necessary.

There are more rules, but these provide a framework for safety. Observe them.

First Aid

If you see someone overcome by an electric shock, the first thing to do is to *kill the circuit.* Unless you do so, his rescuers may be in danger.

If you are unable to kill the circuit, then carefully remove the victim from it, using insulation to protect yourself. Do not touch his body (even

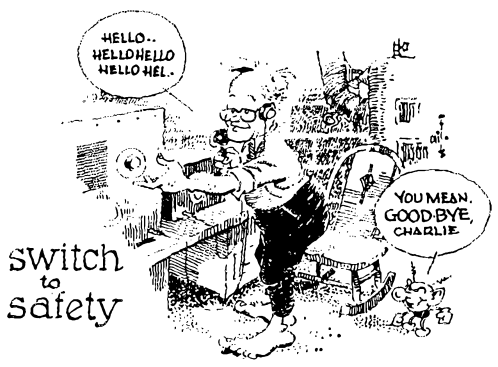
if you have turned off the circuit — you might have hit the wrong switch in the excitement).

When the victim is safely away from the power, turn him on his back. Unless it is impossible to give artificial respiration in that location, or you are endangering your own life, do not bother to remove the victim to another location (assuming he is unconscious). Every second of delay is serious.

Clear his throat. If there is foreign matter in his mouth or throat, wipe it out quickly, using your fingers or a cloth wrapped around your fingers. If a foreign body is suspected after failure of resuscitation, the victim should be placed on his side and a sharp blow delivered between the shoulders to jar the obstruction free. Then sweep your fingers through his mouth to remove it.

Conclusion

You, as a technician, should be well-informed of the potential hazards of electricity.[2] Members of your family and a majority of your friends are *not* well-informed. Have you told your wife what to do if a member of the family should be a victim? Above all things, did you tell her how to disconnect the circuit before she attempts a rescue? Can you say that *you* and *your* family are well-informed? Can you honestly say that your home and shack are accident-protected?



Promote safety on a 24-hour basis. Repair defective circuits immediately. Help your neighbor and family to know the basic rules of safety. Who knows, they might have to help you someday. Make safety a habit, not an unpleasant subject to avoid.

Most accidents of an electrical nature have as their basis the three following causes:

I didn't see
I didn't think
I didn't know.

When you work with electronics, be sure to *look* and *think*, so that you will *know* that your equipment is safe.

Now read that list of *dos* and *don'ts* again and then check your shack while you're thinking about it. Switch to Safety! QST

To apply mouth-to-mouth resuscitation:[3] Tilt the head backward and pull the lower jaw forward to clear the air passage to the lungs. Tilting the head only halfway back is *not* enough.

Using the other hand, pinch the victim's nostrils and place your mouth over his. Blow air into his mouth until you see the chest rise. Do not blow beyond the point where the victim's chest or abdomen expands. This first blowing effort will determine whether or not the throat is obstructed (see preceding paragraph). If the airway is clear, the rescuer's breath will supply the needed oxygen.

Remove your mouth to let the victim exhale. Some victims accept air easily through the nostrils but must blow out through the mouth. While he is exhaling, take a deep breath and re-inflate his lungs when he has expelled the last breath. Continue at a rate of about twelve breaths per minute. Should it become necessary to move the victim, continue resuscitation while he is being moved. NOTE: a brief return of normal breathing does not necessarily mean that resuscitation may be discontinued. Sometimes the victim again stops breathing. He must be watched. Resume resuscitation immediately, should he stop breathing again.

To avoid strain on the victim's heart once he revives, keep him lying down. If he revives before a doctor arrives, he should be given a stimulant such as a whiff of ammonia, or a hot drink such as coffee or tea. The victim should be kept warm.

[2] Additional *QST* sources are "Safety in Transmitter Operation and Construction," Grammer, March 1939 *QST*; and "Saving a Life," Mix, June 1953 *QST*. The ARRL Communications Department forms CD-79 and CD-84 also provide useful information. *Read* them.

[3] "Saving a Life," *QST*, July 1956, pp. 65 ff., describes application of artificial respiration by the Nielsen back-pressure, arm-lift method. Mouth-to-mouth resuscitation is almost universally recognized as the best method. The Nielsen technique is suggested only where the rescuer has qualms about the mouth-to-mouth method, or in case of necessity. Local chapters of the American Red Cross supply pictorial instructions describing mouth-to-mouth resuscitation. These training aids are free upon request.

Strays

It's always good to use the other fellow's language if you can. When the language is Spanish, a copy of the "Ham's Spanish-English Manual" should be quite helpful. The 45-page booklet prepared by LU7FAG contains not only translations of phrases and words useful in QSOs, but their phonetic spelling, too. It is sold by K4BZY, 1329 N.E. Fourth Ave., Fort Lauderdale, Fla. 33304. Price is $4.25 postpaid in U.S.A.

Mobile At 160

(m.p.h. That Is!)

BY W. HENRY HORNE,* W4MZP

AMATEUR radio figured prominently in sports-car road racing during the early growth of that sport in the nineteen-fifties, which was also a decade of rapid growth for amateur radio. The period saw the surging popularity of mobiling following the authorization of mobile operation on all bands. It was only natural then, that when safety considerations brought out the need for instant communications between race officials and remote parts of the race course, the hams were found enthusiastically ready for the job.

It was a common interest in these two avocations that brought amateur radio into a new phase of sports-car racing — this time into the car itself. Walt Hane, W4HXC, and the writer are also members of another Connecticut-based organization, the Sports Car Club of America, which sanctions nearly every road race held in the United States. Walt, who had won the 1966 SCCA Class B National Championship driving a Shelby GT-350, decided to enter a Ford Mustang in the 300-mile Trans-American and the 24-hour Continental races to be held at Daytona Speedway in February 1967. Such an ambitious undertaking for a single weekend was a new challenge to both of us, since our experience was largely limited to sprint races of 20 to 45 minutes' duration.

In almost any form of racing, communication between pit crew and driver is helpful; in an endurance race it is essential. Even in professional circles such communication is rudimentary at best, the crew signaling by means of short notes or figures on a chalkboard as the driver hurtles by, and the driver replying by hand and finger signals or merely a nod. The messages may be lap time, position in the race, distance behind or ahead of a competitor, or merely a word of encouragement. In short races these few signals are all the communications needed, since the driver is lapping at or near maximum speed and does not expect to make a pit stop. In an endurance race, however, many pit stops will be made, and races literally have been won or lost depending on time spent in the pits. How much better, then, if the driver can be in continuous communication with the pits, advising of the car's condition, suspected troubles, or an impending pit stop, which may be expedited by having the proper parts and tools ready when the car arrives. In the event of a breakdown out on the course, the value of driver telecommunication is obvious.

With this reasoning in mind, we included amateur radio in our race preparations. While Walt and the mechanics prepared the car, which included building an engine for each of the two races, I resurrected two f.m. transceivers, which had been idle for the better part of two years. These were a pair of Aerotron 7N20 prototypes, which I had designed and built during previous employment with that firm and had used for spot-frequency operation on 6 meters. These units, with 20 watts output, have a.c./d.c. power supplies, and may be used fixed or mobile by selection of the proper power cable. The mobile and base-station antennas were made by the Antenna Specialists Company and were vertically polarized.

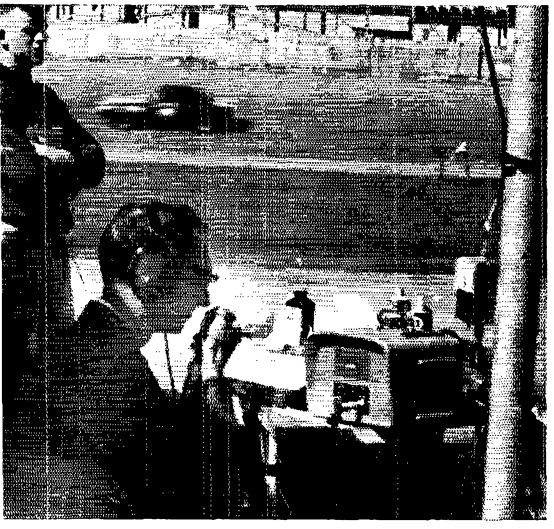
The Continental course at Daytona is 3.81 miles long, with 2.5 miles in the oval and the balance in a twisting road course in the infield. Even the best paved race courses can be sur-

*5416 Weirwood Ave., Orlando, Florida 32810.

prisingly rough when traversed at speed, and the suspension used on competition vehicles is not designed to enhance driver comfort. Neither is such an environment condusive to the longevity of electronic equipment. Since the rules of competition require that racing sedans carry a complete passenger seat, our shock-mounting problem was readily solved; strapped in by its seatbelts, the rig rode "shotgun" beside Walt, snug in its own bucket seat. The power cable was plugged into the back of the set, the antenna coax connected, and the rig was on the air. A quick exchange with W4MZP/4 in the pit verified that the rigs worked (at least at 10 feet apart) and Walt set out for practice and qualifying for the 300-mile Trans-American, which would start in about 2 hours.

The press of time had not permitted us to check out Walt's Navy-surplus chest mike, so the standard Shure dynamic with preamplifier was fitted into the clip atop the rig, on the premise that Walt would have time to drive one-armed and talk at least on the 3500-foot back straight, which was entered and exited via the high-banked turns which form the ends of the oval. Since the speaker would be as useless as in an F-104, a hearing-aid earpiece was used, over which Walt's safety helmet fitted without difficulty.

Copy in the pits was Q5 during practice, as one might expect with 20-watt transmitters only a mile or so apart. Nevertheless, a racetrack is a noisy place, electrically as well as acoustically, since many of the cars carry no ignition suppression. The Mustang, however, has always been equipped with the stock resistance-wire harness, a fact which should allay the fears of some performance enthusiastis who want to go mobile. Walt found, at least during practice, that the hand mike caused little difficulty, although the G-forces developed in the highspeed banked turns made replacing the mike a bit awkward at times. Copy in the car was not always solid, however, because of the high acoustic noise level; and cranking up the receiver volume drove the little earphone into distortion.



W4MZP at the mike in the pit.

By the end of practice we had determined that two-way radiocommunication with a race car is indeed practical with proper equipment, and Walt had turned a qualifying lap time averaging almost 103 miles per hour, peaking close to 160 on the back straight. Although this must certainly be the speed record for amateur land-mobile operation, we are not throwing down the gauntlet for anyone to break it.

Our 1966 Mustang was gridded seventh in a field of 31 cars, beside a Dodge Dart and behind a group of 1967 Cougars, Camaros, and Mustangs. A few laps after the pace-car-led start, after the pack had thinned out, Walt radioed in that the car was running fine and all gauges were normal. In spite of the extremely high acoustic-noise level inside the car, a noise-canceling mike would have been quite unnecessary. The combination of a low gain setting of the speech amplifier and close talking in the old ham mobile style provided solid reception with little background noise from the car. Reception in the car was another matter. If copy was difficult during practice with few cars on the track, it was well nigh impossible with roaring exhausts all around, especially from the Camaro with which Walt swapped positions with disturbing frequency. Despite the noise in the pits, we got good copy from the base-station speaker, although we wished someone had thought to bring a set of headphones.

Due to the difficult reception in the car, lap times were given Walt via the chalkboard. As the halfway point of the race approached, Walt was notified and made his only scheduled pit stop on the fortieth lap. In almost the time it takes to tell it, the car was fueled, tire wear checked, and Walt was on his way. Following an unscheduled stop for oil, there was no further contact from Walt. Despite the extra pit stop, he had worked his way into second position aided by the more serious troubles besetting the faster cars, and was threatening the Dart for the lead.

If this were being written in Hollywood, now would be the time to tell how our hero, overcoming insurmountable odds, spurred his year-old steed to victory; but it was not to be. With three laps to go, Walt failed to show up, and repeated calls failed to raise him. Surely if he was stopped on the track, he could hear us and would be calling. Within minutes after the victorious Dodge took the checker, Walt appeared in the longest walk a driver can know — from his broken car to the pit. A hasty post-mortem after the car was towed back to the pit revealed a suspicious bulge in the side of the oil pan. Also, a Jones plug on the power cable had worked its way out of the back of the radio.

Next day, the car was back for the 24-hour Continental, with the long-distance engine in-

(Continued on page 136)

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* W1JNM

Talking It Up

The "mean ham" articles which appeared all over the nation recently constitute an example of how bad publicity for one amateur became a kick-off for good publicity for the amateur in general. The headquarters received many indignant letters from amateurs demanding to know what action is being taken against the "mean" ham. Meanwhile, the public had been forcefully informed that amateurs nationwide were engaged daily in handling traffic for servicemen overseas.

The thing that escapes many of us about this incident is that it is by no means an isolated one. There are "mean" hams all over the place, some meaner than others. Incidents similar to this do occur — that is, incidents in which amateurs purportedly performing a public service are QRMed — whether deliberately or not is difficult to ascertain — by other amateurs operating casually. What made *this* incident noteworthy was that it got talked about, by the right people (the nation's press) at the right time (when the nation's emotions are in a high state about the morale of its sons overseas) to make it so.

We realize that most of the members who read this column are those who are interested in the subject of public service. Many *QST* readers probably do not even know it exists. The same can be said in general about public service operations, organizations and activities in amateur radio. Too many casual-type amateurs are unaware that the opportunity to serve in your amateur hat is available.

Perhaps we don't talk about this facet of amateur radio enough. If we were to make more noise, popularize it by "yakking it up," we might get more attention paid to it. In doing so, we have to be alert to the right place, the right time, the right manner in which to present it.

Preaching about duty, responsibility, moral obligation, the making of threats and imprecations — these are not effective with most amateurs. You have to be there with the goods at the right time, as was the reporter who wrote the release on the "mean ham."

So let's talk it up. At club meetings, let the membership know what is going on — not by giving a dry, factual report, but by telling them how much fun you had, and relating an amusing anecdote or two. *Write* it up, too, in club bulletins and other amateur papers. Make it plain, without just saying so, that those not in on it are missing something.

Left to right are WA4BXZ, WA4EWW and K4LLW providing simulated emergency communications for the Tennessee Association of Rescue Squads.

But don't forget one other thing. While you are doing all this talking and writing, don't forget that the basic thing in public service is *doing* it, not talking about it. Do it first, *then* talk about it. Empty talk serves no really useful purpose; but talking up what you do is essential for accumulation of support.

I'll Be There. . . .

It is characteristic of many amateurs to modestly claim that they are first class operators and to magnanimously offer their services "if you need me." "I'm too busy to take part in drills," they are apt to say, "but I've been through all that, and if you need me I'll be there."

In this connection, a recent communication from W6WRJ, SEC for the Orange (Calif.) section, contains the following admonition:

"OK, so you sign up with AREC or RACES but soon tire of the routine of the training sessions. You know that you are a pretty good operator. You know how to tune your rig so you can work Uncle Joe or your friend in Bula Bula.

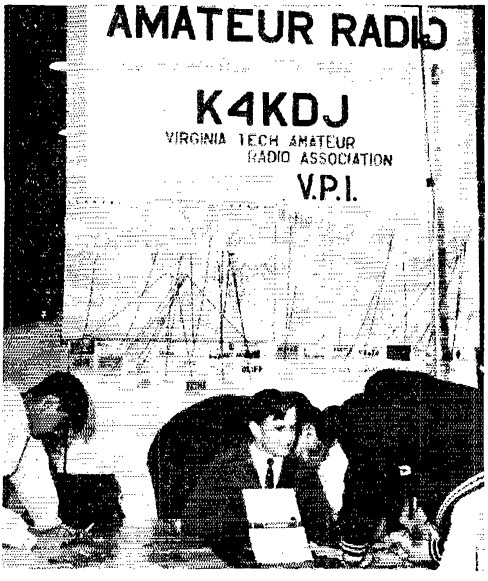
"But how are you on net discipline? How closely can you hit a net frequency and stay there? Does your equipment load and operate efficiently on the necessary frequencies? Do you know message handling procedures used in each net? Do you know when *not* to transmit?

*Communications Manager.

These are just a few of the things vital to operation during an emergency, when there is no time to learn them.

"Have you ever tried to build or repair something when you didn't have the proper tool? If you accomplished the job at all, you took a lot of time, expended a lot of effort and made a lot of unnecessary noise before you finished the job — and then the job wasn't as good as you could have done with the proper tool. Or, did you ever go to a tool box for a nice, sharp chisel, saw or plane, only to find that neglect had left them nicked, rusted, or just plain dull? This is why we hold net sessions, to keep sharp, to avoid getting rusty, to be *ready* for the time when we are vitally needed in the public service."

Thanks, Ralph, for these words of wisdom. — *W1NJM.*



Here is WB4AMI of the Virginia Tech Amateur Radio Association at the traffic desk during the Virginia Tech Festival Exhibition. Over 400 messages were handled and the hams manned their stations until 2 A.M. several nights because of the unexpected number of messages.

Diary of the AREC and RACES

On December 27, a few minutes after the "QTC" traffic net on 7215 kc. opened, W2ECA called in to report two cars in trouble at different points on interstate highway 90. WB2VJB, the NCS for that day, immediately reported the information to the New York Troopers in Albany. — *W2EAF*

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The following services were reported by the West Coast Amateur Radio Service: *April 17* — W9JEZ reported a traffic accident with injuries to K6KZI, who notified the Highway Patrol. *May 5* — WA6NYA reported a five-car accident to K2ARJ, who acted as relay to WA6DXJ who reported the information to the authorities. *May 15* — K6VDL, operating portable at Pine Mountain, Calif., used 7255 kc. to contact his doctor in Ventura. He had symptoms that were serious and the doctor advised immediate hospitalization. K6VDL was recuperating from pneumonia, according to the latest report. *May 27* — XE2UG telephoned W6ZOM and asked that he get on the air because XE1EEI needed to obtain a medicine for a patient ill with hepatitis. The arrangements were made via amateur radio and the drugs left for Mexico City for immediate transhipment to Guadalajara. *May 27* — W6AEV reported a traffic accident near Carpenteria. K6KZI called for a nearby station to summon aid. K6GHU of Santa Barbara and W6DZJ of South Pasadena called the Highway Patrol. W6AEV put out flares and the Highway Patrol arrived shortly. *June 1* — WB6HHZ reported to the net that some sheep were presenting a traffic hazard on the highway near Pleasanton. WB6DBS called the Highway Patrol with the message. *June 1* — WB6CQB reported a two-car accident on the Harbor Freeway of Los Angeles. WA6WHP called the Highway Patrol. — *WB6IZF.*

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On May 5, HL9TK heard a distress call that originated from a sinking schooner on Bombay Reef between the Philippine Islands and South Vietnam. The *Donte Deo* had run aground on a coral reef near the Parcel Islands and water had shorted out the generator and temporarily disabled the radio before the exact location could be sent. Nearly an hour later the ship managed to get the radio back on the air and give the needed information. A network of amateurs was established consisting of HL9KO, KA8AB, KA8LM, KR6AF and KG6IJ. Several ships and aircraft were dispatched toward the trouble spot. Three and a half hours later the *Donte Deo* was sighted and an aircraft dropped a survival kit. Later an amphibious aircraft completed the rescue, and the network of amateurs secured after nearly seven hours of continuous operation.

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On May 6, The Orange Section AREC furnished communications for the California Interscholastic Federation Tennis Matches. Courts at four different schools were used with match and player details coordinated via amateur radio. Operations involved sixteen amateurs and lasted for about nine and a half hours. — *WB6QAK, EC.*

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Also on May 6, the Hamden, Conn., AREC group of about fourteen amateurs demonstrated their public service capabilities during the 50th anniversary of the New Haven Chapter of the American Red Cross. About twenty messages were originated and many of the Red Cross personnel were impressed with the capabilities of the amateurs. — *W1NFG, EC Hamden, Conn.*

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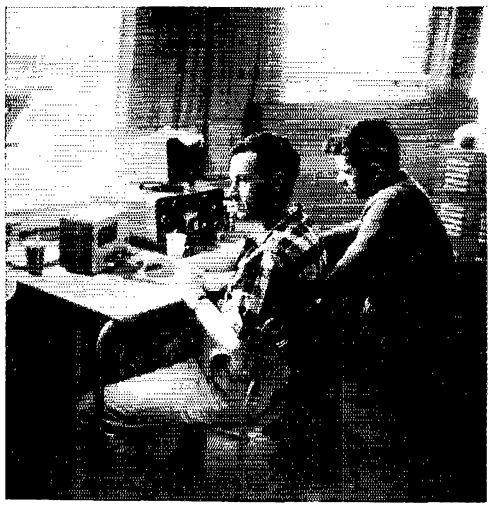
On May 16, K5HXR was called because of a university riot. He immediately contacted the SEC, the SCM, proceeded to the scene, kept in touch on 3900 kc. and prepared to set up on the 2-meter c.d. frequency. The riot was contained at 5:30 A.M. and the alert was secured. — *K5QQG, SEC STex.*



This is the 2-meter operating position with VE3FYY and VE3BOD at search headquarters during the "Kilbride" search effort. Details are in the July Diary of the AREC.

On May 20, an Air Canada DC8 training flight crashed at Ottawa international Airport, killing the crew of three. The Ottawa Valley Mobile Radio Club provided the communications from the crash site to Air Canada's operations officer in the terminal building for about 15 hours. Several members of the club participated under the direction of the assistant EC.

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On May 27, the Hazel Park Amateur Radio Club of Mich. operated twelve mobiles and a display booth at Green Acres Park. They handled 70 messages to service men during the Memorial Day parade festivities. — *W8JXU.*

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On June 3 and 4, a large forest fire in Northwest Ontario threatened Sioux Lookout. About 2300 inhabitants were evacuated. VE3EFX called the North West Ontario Phone Net and stations in neighboring areas responded by handling a number of messages relating to the safety of the families. VE3EFI returned to Sioux Lookout the next day and handled traffic for persons who restored the essential services after the threat had passed. The net met again that evening and passed traffic until the band folded. — *VE3EFX.*

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On June 5, quite a number of emergency power sources for amateurs were given a dry run prior to field day as a result of a power blackout. Five reports were received, most stressing that the amateurs were ready and contacted the agencies to be served, but there were no situations that needed emergency communications. The AREC in Passaic, N.J. supplemented the police patrol and operated a remote police base station.

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On June 10, K8DJF/mobile came upon an auto accident in Canton, Ohio. He called in on the local AREC frequency and was answered by K8DHJ, K8JZN and W8QMH. K8DJF stayed on the scene to assist with communications until firemen arrived and things were under control. — *K8DHJ, EC Stark County, Ohio.*

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Also on June 10, a severe weather alert was given out by the weather bureau for Northeastern Ohio. The Stark County AREC Net was activated and stayed in session for four hours. Liaison was maintained with the Ohio SSB Net and the local CB REACT organization. —*K8DHJ, EC Stark County, Ohio*

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From June 1 to 12, the PHD Net on 50.160 kc. had quite a number of alerts and stand-bys because of a dozen rainy days, seven of which were severe weather warning and four of which were days of tornado watch. On June 11 there was flooding near the towns of Smithville and Riverside, Mo. In the wee hours of the 12th a tornado destroyed three homes and damaged several others. WAØKUH operated the c.d. station at Liberty, Mo., and WAØQLN/mobile at Riverside throughout the night. There were fourteen messages handled and six amateurs who operated in the area. — *WAØVLL, EC Clay County, Mo.*

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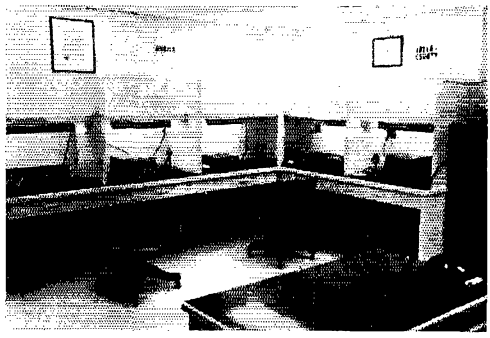
Forty-three SEC reports were received for the month of April, representing 17,573 AREC members. This is five fewer reports and 2129 fewer members than a year ago. The sections that reported are: Ala, Alta, Ark, BC, Colo, Conn, Del, EFla, EMass, EPa, Ga, Ind, Ill, Kans, Ky, LA, Mar, Mich, Mo, Mont, NC, Neb, Nev, NH, NLI Ohio, Okla, Ont, Org, Oreg, Que, Sask, SCV, SDak, SNJ, STex, SV, Utah, Va, Wash, WFla, WNY, WPa.

National Traffic System

Much fuss when NTS moved its entire schedule an hour earlier on June 1. Many said that NTS went on "daylight saving" time. This was the *reason* for the move, but NTS does not operate on "daylight" time or local time and hasn't for years. It operates on GMT, and will continue to do so. As and if the necessity dictates, it may change its schedule, but it will not change the kind of time it operates on.

Moving the time an hour earlier for all NTS nets and functions, it turns out, has almost as many disadvantages as leaving the time alone in the summer. For example the nets are now too early by the sun and suffer from poor propagation; but if we let them alone, some of the nets will be too late by the clock (the local clock, that is, by which we all live whether we like it or not). Staying on the same schedule all summer, as we have always done in the past, makes even the area nets pretty late by the clock for the younger element, the late region nets late even for the average, and the late section nets prohibitively late for almost everyone. Moving the time an hour earlier means that the section nets will be meeting in mid-afternoon by the sun, with mid-afternoon summertime high-sunspot propagation conditions. Region nets fare little better, and even the area nets meet in broad daylight, with the necessity to cover entire time zones. This may have been easy during periods of sunspot nulls, but it poses some difficulties now and in years to come when we will have a sunspot node.

There are solutions, of course. The area nets and some of the more widespread region nets could move to 7 Mc. TCC schedules could seek higher frequencies as the m.u.f. goes up, even going to 28 Mc. if needed. New functionaries and NCSs could be sought and put to work to replace those who find that summer activities make it impossible to



This is the RACES area of the Denver Emergency Operations Center.— *KØOVQ, RO Denver, Colo.*

continue. Or, if we stayed on the winter schedule all summer thus alleviating to some extent (but not entirely) the propagation problem but facing the late-hour problem, late region nets could be rescheduled for early the following evening and late section nets could be eliminated for the summer.

But it seems to us we ought to make up our minds what we want to do. This year, it was assumed the procedure of previous years would be followed — that is, the NTS schedule remain the same on GMT. Then, late in April it came to the attention of a busy headquarters that all but two or three states were being required to change over. Too late to make the changeover effective by the end of April, but convinced that the great majority of NTSers desired the change, we announced that NTS would move to a one-hour-earlier schedule on *June 1.* This announcement was not widely circulated until close to the changeover date, and by the end of April confusion reigned supreme, most NTSers failing to assume, as we did, that not having been notified otherwise, we would continue on the same GMT schedule as always.

As mentioned in June *QST*, the change is not a permanent one — that is, no decision has yet been made that we will automatically change the time of the NTS schedule twice each year as the populace fiddles with their clocks. We have yet to see how many states will pass legislation next year to permit them to let their clocks alone; and we have yet to assess the sentiment of NTSers in the light of this year's experience. Meanwhile, let's be thinking about it. Remember, the question is *not* "should we go on daylight saving time," because NTS operates on GMT and there is no GDST (not when the G stands for Greenwich anyway). The question is, do we change the NTS timetable to operate one hour earlier each spring and then back again each fall? — *W1NJM.*

May reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN	31	1801	1.217	58.1	95.7
CAN	30	1153	.849	38.3	96.8
PAN	31	1450	1.141	46.8	97.8
1RN	62	685	.364	11.0	93.8
2RN	62	575	.659	14.0	95.8
3RN	62	662	.481	10.7	100
4RN	57	485	.321	8.5	82.2
RN5	62	604	.327	9.7	89.9
RN6	62	1115	.734	17.9	100
RN7	55	554	.391	10.0	—
8RN	62	598	.388	9.7	95.7
9RN	60	601	.504	10.1	96.9
TEN	62	845	.736	13.4	80.0
ECN	29	76	.188	2.6	61.3[1]
TWN	30	620	.618	20.7	75.6[1]
Sections[2]	2480	13,246		5.3	
TCC Eastern	119[3]	847			
TCC Central	93[3]	693			
TCC Pacific	124[3]	962			
Summary	3237	27,572	EAN	15.6	85.8
Record	2819	32,465	1.322	17.8	—

[1] Region net representation based on one session per day

[2] Section and Local nets reporting (74): AENB, D, H, M, O, P, R, T (Ala.); ARSN, OZK (Ark.); SCN, SCS (Cal.); CCN, HNN (Colo.); CPN (Conn.); FAST, FATT, FMTN, QFN, SATN, TPTN, WFPN (Fla.); GSN (Ga.); QIN (Ind.); Iowa 75; OKS (Kans.); KRN, KTN (Ky.); LAN (La.); PTN, SGN (Me.); MDDS, MEPN, MTTN (Md.-Del.); EMNN (Mass.); M6MTN, QMN (Mich.); MJN, MSN, MSPN (Minn.); MNN, MTTN, PHD (Mo.); NJN, MJPN (N.J.); NLI-VHF, NYS (N.Y.); NCN, NCNN, NCSB, THEN (N.C.); BN, OSSB (Ohio); OLZ, SSZ (Okla.); EPA, EPEN, PTTN, WPA (Pa.); RISPN (R.I.); SCN (S.C.); TPN (Tenn.); TEX (Tex.); BUN (Utah); VTNH (Vt.-N.H.); VN, VSBN, VSN (Va.); WSN (Wash.); WVN (W.Va.); BEN, WSBN (Wis.); APSN (Alta.); GBN (Ont.).

[3] TCC functions performed not counted as sessions.

K1WJD sez a very poor month in representation after what looked like a good start on the year. W9DYG missed a session May 26 because of the "Big Blackout Night" (conditions, not power), and "I'm still all for the time change, even if all the statistics are down." W6VNQ issued net certificates to VE6ATH, W6WPF, *W7s* AAF LQE. Extreme difficulties existed on May 26 because of ionospheric conditions. W1EFW sez that 1RN has now tried out the system of having the EAN RX station become the NCS of 1RN the following evening and it works out OK — only one dissenting vote tallied to date. WA2GQZ issued net certificates to W2CKF, *WB2s* RKK WWH UHZ MOQ. K3MVO reports that the night of May 26 was a lulu! K5IBZ issued net certificates to W5MBC and WA4IJH; the early session is having trouble with short skip and 40 meters may be used for that session. K7JHA reports the first month of two sessions for several years and that the 2nd session attendance was poor; average and rate were down to the lowest figures in years. WØLGG reports that the new time is proving very unsatisfactory for the first session; the VE4s have tried to QNI and do not get through except with a relay. VE3BZB sez that conditions wiped out a couple of sessions; the new starting time has completely dashed any hope of Maritime reps unless the net is moved to 40 meters. K7NHL gives the credit for the jump in rate to KØZSQ for bringing USO traffic from Denver. No problems with the change in time except for the fine margin of band conditions. W3EML sez that except for the solar burst of May 25/26, TCC Eastern enjoyed a fair month. W9JUK issued certificates to K4DZM and WA8IAW; the recent aurora conditions had adverse effects on a few of the skeds. W7DZX sez that the report would have been pretty good if conditions had not taken things out of our hands from May 25 through the rest of the month.

The Indiana Phone Net on 3910 kc. was represented by W9VJX and W9QUH at the Randolph County Airport during the June 4 effort which maintained communications with Vietnam.— WA9GKF, SEC Indiana.

WB4CXM (assistant EC), WA4DIU (Communications Officer) and K4UWH (RM), operating during an emergency exercise February 23. About 60 messages were handled by the members of the Johnson City Amateur Radio Association of Tennessee.

May TCC reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	119	88.3	2250	847
Central	93	90.4	1413	693
Pacific	124	88.0	1962	962
Summary	336	88.8	5625	2502

TCC roster: Eastern Area (W3EML, Dir.) — *W1s* EFW EMG NJM, K1WJD, *W2s* GKZ GVH SEI, *K2s* RYH SIL/8 SSX, *WA2s* BLV UPC WBA/5, *WB2s* OHK RKK, *W3s* EML NEM, K3MVO, *W4s* DVT ZM, *W8s* CHT HQL UM, K8KMQ, *WA8s* CFJ KUW OCG. Central Area (W9JUK, Dir.) — K4DZM, WA4WWT, *W5s* GHP KRX, *W9s* DND DYG JUK QLW VAY YT, *WA9s* NFS NPB, *WØs* LCX TDR, KØAEM, WAØMLE. Pacific Area (W7DZX, Dir.) — *W6s* BGF EOT HC IPW TYM VNQ, *K6s* AJU DYX LRN, *WA6s* CVU ROF, WB6HVA, *W7s* AAF DZX HMA RBM/7 ZIW.

Other Net Reports:

Net	Sessions	Check-ins	Traffic
QTC	24	287	202
HBN	31	402	556
75 Interstate	31	1103	541
20 Interstate	23	308	2724
Mike Farad	55	385	279
7290	42	1163	654
North American	27	779	636
New England Teenage	31	310	115

QST

Happenings of the Month

RTTY CLARIFICATION ON SIGNING

In Docket 17377, FCC's proposals to streamline amateur identification rules, language relating to identification by "telegraphy" was first thought to include RTTY. If it did, the effect would have been to make identification on RTTY more restrictive; accordingly, the section was a cause for some concern among teleprinter enthusiasts, and among ARRL Directors at the May meeting.

In response to questions raised by the League, and specifically to an inquiry by W6AEE, FCC clarifies its intent in these words:

"Proposed sections 97.87 (a) and 97.87 (d) mean that the amateur radio printer operator is not required to transmit the call sign of the other station or stations being called or worked in International Morse. The word 'telegraphy' in the second sentence of paragraph 97.87 (a) is intended to apply only to stations using Morse for the 'exchange', not to stations using five-unit teleprinter code for the exchange."

The text of the docket appears on page 83, *QST* for June. The League's comment, in support, will appear in the September issue.

Lloyd V. Berkner

One of America's top scientists, Lloyd V. Berkner, died on June 4 at the age of 62. Lloyd was licensed as 9AWM in Sleepy Eye, Minnesota while a high school student; his early interest in radio led to his selection as radio operator for the first Byrd expedition to the Antarctic, 1928–1930. Shortly before that, he had assisted Amelia Earhart in preparations for her first transatlantic flight.

He later went to Washington as an engineer for the Bureau of Standards and took part in the Carnegie Institutes research program in terrestrial magnetism. During World War II as a Naval officer he helped develop the proximity fuse for antiaircraft shells and aircraft radar equipment. In 1949 he was picked by the Department of State to set up the military assistance program for NATO. From 1951 to 1960 Lloyd was president of Associated Universities, Inc., which ran the Brookhaven National Laboratories on behalf of the Atomic Energy Commission. He was a prime mover in freedom of scientific information and was instrumental in the International Geophysical Year of 1957–58. From 1958 to 1962 he was chairman of the Space Science Board, National Academy of Science, and in 1961 served a year as president of the Institute of Radio Engineers. Recently he has been first president and then chairman of the board for the Southwest Center for Advance Studies at Dallas, Texas. NASA presented him with its Distinguished Public Service Medal in 1966.

Though not licensed in recent years, Lloyd has remained a member of the League and has stayed interested in amateur radio. In March he wrote to Hq:

"As you know, I started my own career as a radio amateur and I have always been greatly impressed by the contributions that have been made by the amateurs to the progress of not only radio science but also to our technical and scientific strength. It has been a source of interest to me that many of our leading scientists and engineers have started their careers as radio amateurs. This provides to our nation strength that could hardly be acquired in any other way."

AMATEUR RADIO WEEK

Our listing in Chase's "Calendar of Annual Events" has stirred up interest in Amateur Radio Week among newspaper columnists, librarians and others who ordinarily have missed it. Though Congress still shows no sign of interest in declaring the Week nationally, a steady stream of local and state proclamations continues.

In addition to others previously reported, we have information on Amateur Radio Week in

When W4ZZ went portable at Mt. Le Conte in the great Smokies, he was looking for a reliable person to mail his notification to FCC, since mail goes out only two or three times a week. One of the visitors to the Lodge noticed the 20-meter vertical, and asked about the radio set-up. He turned out to be Commissioner Nicolas Johnson of the FCC, and he was perfectly willing to serve as messenger in this instance! Here W4ZZ and the Commissioner pose with WA4BVT (right) who joined in the high-level hamfest.

Arkansas, declared by Governor Winthrop Rockefeller for June 17–24; in Washington State, by Governor Dan Evans for June 19–25; by Mayor Neal S. Blaisdell of Honolulu for June 18–24, and our most consistant city, Englewood, N. J. June 18–24. Governor Rockefeller emphasized scientific endeavor and training for emergency and military communications. In Washington State, civil defense and emergency communications were instrumental in the declaration. The umpteenth Englewood paper (we've lost track, but it has been a good many consecutive years) emphasizes emergency work and the Field Day exercises. Honolulu's proclamation added the cultivation of international friendship to these other reasons for lauding amateur radio.

"Modeling Radiation Patterns of Whip Antennas," by Dale W. Covington, K4GSX, was voted best article in the January issue by the ARRL Board of Directors. Accordingly, the Cover Plaque award was presented to K4GSX (right) by Southeastern Division Director W4LVV (left) and assistant directors W4AUP and W4EEE at the Atlanta Hamfest on June 4.

ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions:

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1968–1969 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

Nomination is by peti ion, which must reach the Headquarters by noon of September 20. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director therefrom, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of as great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
Newington, Conn. 06111

We, the undersigned Full Members of the ARRL residing in the .....Division, hereby nominate .....of..... as a candidate for director; and we also nominate ....of.....as a candidate for vice-director; from this division for the 1968–1969 term.

(Name Call City Date)

The signers must be Full Members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term

OVERSEAS AND ABSENTEE BALLOTS

All ARRL members who are licensed by FCC or DOT but are temporarily resident outside the U.S. or Canada are now eligible for Full Membership. These members overseas who arrange to be listed as Full Members in an appropriate division prior to September 20 will be able to vote this year where elections are being held.

Even within the U.S., Full Members temporarily resident outside the ARRL division they consider home may now notify the Secretary prior to September 20, giving the current *QST* address and the reason why another division is considered home (e.g., holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern, but your *QST* goes elsewhere because of a different residence, please let the Secretary know, as soon as possible but no later than September 20, so you'll receive a ballot for your home division.

The Ozone ARC of Slidell, La. recently received its charter of affiliation with the League. Shown presenting the charter to club president, WA5FDD, is Delta Division Director W5LDH. Others (l. to r.) are (front row) W5PM, W5NGA, WA5FDD, W5LDH, W5PFT, WA5CKJ, (back row) W5KWY, K5AGI, WA5RGX, WA5QCX, W5PBQ, W5OAR, and WA5CKI. *(Photo by WA5QXH)*

of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or implementation, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, Conn., by noon EDST of the 20th day of September, 1967. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 8 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Atlantic;* Gilbert L. Crossley, W3YA and Jesse Bieberman, W3KT. *Canadian;* Noel B. Eaton, VE3CJ and Colin C. Dumbrille, VE2BK. *Dakota;* Charles G. Compton, WØBUO; the vice-directorship is vacant. *Delta;* Philip P. Spencer, W5LDH/W5LXX and Max Arnold, W4WHN. *Great Lakes;* Dana E. Cartwright, W8UPB and Charles C. Miller, W8JSU. *Midwest;* Sumner H. Foster, WØGQ; the vice-directorship is vacant. *Pacific;* Harry M. Engwicht, W6HC and Ronald G. Martin, W6ZF. *Southeastern;* Charles J. Bolvin, W4LVV and Albert L. Hamel, K4SJH.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1967

JOHN HUNTOON
Secretary

Alabama — The 1967 North Alabama Hamfest will be held August 20 in Florence, Alabama at the Lauderdale County Coliseum. For more information write Owen W. Livingston, WA4SCQ.

Arizona — The Amateur Radio Council of Arizona will sponsor the Annual Fort Tuthill Hamfest, located 6 miles South of Flagstaff on July 28-30. Talk-in on 3878 kc. and 51.0 Mc. Pot luck dinner on Sunday. Free camping permitted on site. For further information, contact Bob Dreste, K7VOR.

British Columbia — The BCARA Centennial Picnic will be held in Queen's Park, New Westminster, on August 13.

California — The Satellite Club picnic and transmitter hunt will be on August 13.

Delaware — The Delaware Hamfest is scheduled for August 27. Rain date is September 3. Location: Banning Park, Wilmington, Delaware.

Georgia — The Second Annual Ham-Nic will be held at the Sportsman's Club Pavilion (follow Ga. 53 East of Gainesville to sign), Gainesville, Lake Lanier, Ga. A real family ham picnic with activities for all. Mobile talk-in (10:00 A.M. to 1:00 P.M.) 3975 kc. and 50.25 Mc. Kentucky fried chicken hot box lunches available for $1.25.

Idaho — The WIMU Hamfest will be held at Mack's Inn, Idaho (20 miles south of West Yellowstone) on August 4, 5, and 6. Activities will include mobile hunts, treasure hunts, demonstrations, home brew equipment contests, and many other activities for the whole family. Information from P.O. Box 312, Lyman, Wyoming 82937.

Illinois — The Hamfesters Radio Club will hold its 33rd Hamfest Sunday, August 13, at Santa Fe Park, 91st and Wolf Rd., Willow Springs, Ill.

Illinois — The Quad City ARC and the Davenport ARC will hold a hamfest Sunday, August 20, at Fairy Land Park, located on Rt. 61, 12 miles North of Davenport, Iowa. Hours 8:00 A.M. to ? P.M. Free coffee and doughnuts 9:30 A.M. to 10:00 A.M., lunch, refreshments, and unlimited parking. Trunk sales, hidden transmitter hunt and plenty of other activities. Advance ticket donation $1.50 or 3 for $4.00; $1.50 at the door. For additional information and advance tickets, contact Wayne Youngberg, WA9RDC, 2308 Stadium Dr., Rock Island, Illinois.

Illinois — The Fox River Radio League will have its Shop-n-Swap Hamfest Sunday August 26, at Phillips Park Pavilion, Aurora, Ill. Swap tables, picnic grounds, rides for the kids, playground, food, and shelter. Talk-in on 145.35 Mc. and 3.94 Mc.

Illinois — The Minihamfest will be held at the Boone County Fair Grounds on August 20.

Iowa — The Iowa 75-meter Phone Net will hold its annual picnic on Sunday, August 13, at Mellose Park, Boone, Iowa. All hams and their families are invited. People planning to attend are requested to bring a covered dish and their

own table service. Soft drinks will be available for the children. For further information contact Ray Pollock, WAØFFN.

Iowa — The Quad City ARC and the Davenport ARC will hold a hamfest Sunday August 20 at Fairy Land Pak, located on Rt. 61, 12 miles North of Davenport, Iowa. Hours 8:00 A.M. to 00:00 P.M. Free coffee and doughnuts 9:30 A.M. to 10:00 A.M., lunch, refreshments, and unlimited parking. Trunk sales, hidden transmitter hunt and plenty of other activities. Advance ticket donation $1.50 or 3 for $4.00; $1.50 at the door. For additional information and advance tickets, contact Wayne Youngberg, WA9RDC, 2308 Stadium Dr., Rock Island, Illinois.

Kansas — August 20 has been set for the big Hamfest in Dodge.

Manitoba — The Manitoba Association of Amateur Radio Clubs will be hosting amateurs at the Centennial Mid-Continent Hamfest to be held in Winnipeg, Manitoba on September 2 and 3. The site will be the UMSU Building on the University of Manitobe Campus. There will be transmitter hunts, a social evening, and a banquet with a distinguished guest speaker. Main events will be held before Sunday noon to allow any W/K registrants to leave for return on Monday. For further information contact Jim Riddle, VE4JC, P.O. Box 475, Winnipeg, Manitoba, Canada.

Missouri — The Southwest Missouri ARC will hold its annual Picnic and Hamfest on August 27 at Fassnight Park in Springfield, Mo.

Missouri — The Zero-Beaters ARC will hold their annual Hamfest in Washington on August 6.

Minnesota — The Saint Cloud Hamfest will be held on August 13 at Wilson Park, Saint Cloud, Minn. Registration is $1.00, bring your own picnic dinner, free coffee. Join in the games, fun, eyeball QSOs. 11:00 A.M. to 6:00 P.M. Sponsored by the Saint Cloud Radio Club.

New Jersey — The Southern Counties ARA will again hold their annual Hamfest and Picnic at Egg Harbor Lake, Egg Harbor City, New Jersey. The location is just off Route 50, three miles North of the intersection with Route 30. The date is Sunday, August 27, beginning at 10:00. SCARA Hamfests are a family affair. In addition to the popular swapshop, there will be lake bathing, auction, children's events and tree shaded picnic and refreshment facilities. Registration is $1.00 per person or $1.50 for the entire clan. Monitoring will be on 50.2 and 147 Mc. More details from C. J. Hobert, Jr., 313 Shore Road, Northfield, N. J. 08225.

New York — The Central New York Chapter of QCWA will hold its first Annual Picnic at Harris Hill, Elmira, New York on August 5 at 1:00 P.M. All QCWA members and their families are invited, each to bring his own basket lunch. Outdoor grills are available. Talk-in frequency is 3810 kc. Let's get acquainted. See you there.

New York — The Fulton ARC will have a Ham Bake Saturday August 19 at Malone's, 1 mile West of Fulton New York on Route 3. The clams will be there . . . steamed, raw or in chowder. Corn on the cob and more. Food from 2:00 to 5:00 P.M., registration from 1:00 P.M. on. Price: $6.00 per ticket, only 100 to be sold.

Ohio — The Annual Findlay Hamfest will be held in Findlay, Ohio at Riverside Park on Sunday, September 10. Come and bring the entire family. Facilities for the ladies, amusements for the children. Tickets and information from Clark Foltz, W8UN, 122 W. Hobart, Findlay, Ohio 45840.

Ohio — The Tenth Annual Warren ARA Hamfest will be held Sunday August 27, rain or shine, at Community Center, Newton Falls. Follow the arrows from Ohio Route 534 and the Ohio Turnpike Exit 14. Get route slip at the Turnpike exit. Displays, swap shop, home brew and c.w. contest. Fall and wig style shows for the YLs. Talk-in stations on 10, 6, and 2 meters.

Pennsylvania — The Mt. Airy V.H.F. Radio Club is holding its 12th Annual Family Day and Picnic on Sunday, August 13 (rain date August 20) at Fort Washington State Park, Flourtown, Pa., in cooperation with the Delaware Valley Chapter of the QCWA. Come and get together with your families and friends for an old time outing of games, cook-out, and just plain relaxing for a day away from home. There will be games for the kids and activities for the YLs and XYLs. Free soda for all.

Pennsylvania — The 18th Annual Gabfest of the Uniontown ARC will be held Saturday afternoon and evening on September 9 at the club grounds on the Old Pittsburgh Road, North of Uniontown and about one mile from the CITGO service station, on the corner of Route 51 and the Old Pittsburgh Road. Registration is $2.00. Facilities on the grounds compell the club to make this a stag affair.

Pennsylvania — The 12th Annual Hamfest by Four York County Clubs will be held at Adams County Fair Grounds, 4 miles North of Abbottstown, Pa., September 3, rain or shine. Registration begins at 0900. Talk-in on 50.62 and 145.62 Mc. Plenty of eats, drinks, transmitter hunt, and activities for the ladies. For more information write K3POR, LeRoy Frey, 180 Albemarle St., York, Penna. 17403.

Pennsylvania — The WPA and KSSN traffic men and the AREC members from Western Pennsylvania will hold their annual picnic/discussion period on Sunday, August 27 at Clear Creek State Park. Take Route 36 North from Brookville, Pa. to Sigel and take Route 949 North from Sigel to the park area. Watch for signs.

South Dakota — The Yankton Radio Club members are getting prepared for the big South Dakota Picnic to be held August 19 and 20.

Tennessee — The Eighth Annual Cedars of Lebanon Hamfest will be held August 27 at Cedars of Lebanon State Park, ten miles South of Lebanon on Route 231 S. Talk-in on 50.25 and 3.980 Mc. Pot luck lunch at 1:00 P.M. Everybody bring enough food to feed your own party. Drinks will be available on the grounds. For further information, call W4VJW.

Texas — The Annual Northwest Texas Emergency Net and Picnic & Swapfest will be held Sunday, August 6 at the city Park in Levelland. Registration is free. Picnic tables will be provided. This is an affair for the entire family. Playground for the kids. Bring your own picnic basket and join us. Swapfest starts at 9:00 A.M., lunch at 1:00 P.M. Mobile talk-in on 3950 kc.

Vermont — The International Field Day will be held again at the Cliffside Country Club, Burlington, Vt., on August 13.

West Virginia — The Black Diamond Radio Club will hold its Eight Annual Ham-Pic on Sunday, August 27, at the Bluefield, W. V. City Park. For further information or reservations write P.O. Box 292, Bluefield, W. V. 24701.

QST

COMING A.R.R.L. CONVENTIONS

September 2-4, 1967 — Maritime Section, Moncton, New Brunswick
September 8-10, 1967 — Southwest/Pacific Divisions, Los Angeles, Calif.
September 9, 1967 — Kentucky State, Louisville, Kentucky
October 1, 1967 — South Carolina State, Lyman.
October 27-29, 1967 — Ontario Province, Ottawa, Ontario

ATLANTIC PROVINCES CONVENTION

Moncton, New Brunswick

Sept. 2-4, 1967

The ARRL Atlantic Provinces Convention will be held at the Brunswick Hotel in downtown Moncton, N.B., Canada all three days of the Labor Day weekend. Saturday's program beginning at 1:30 P.M. includes the general assembly, technical seminars, and annual meetings of NBARA, NSARA and the Sparkettes. There will be a tea and do-it-yourself hat show for the ladies. Evening activities are a barbeque and dance.

(Continued on page 68)

Sunday morning at 9:30 the ARRL Breakfast Forum will be held, with a bus tour for the family. That afternoon there will be a picnic and transmitter hunt, and Sunday evening the official banquet will begin at 7 P.M., with guest speakers and entertainment. At midnight the traditional ritual of The Royal Order of the Wouff Hong will be conducted for amateurs who are members of the League.

Monday will see additional technical seminars and a Morse Code contest. Exhibits, Swap Shop and a convention ham station VE1AOA will attract participants throughout the holidays. Babysitting service will be available, and separate seating for the youngsters during the banquet will give the OM and XYL a "night out."

Pre-registration is a must: until August 15 the rates are $8 for adults, $6 for children under 14, including the barbeque, dance, banquet and entertainment. After the 15th, fees are $10 for adults and $8 for children. The convention committee cannot guarantee to accept any registrations after August 28. Rooms start at $3.50 single, $5.00 double and reservations should be made prior to August 15 if possible. Trailer and tent camping facilities are also available. The address to write is Atlantic Centennial Convention, P.O. Box 115, Moncton, N.B., Canada.

SOUTHWEST/PACIFIC DIVISIONS CONVENTION

Los Angeles, Calif. September 8–10

The 1967 combined Southwestern/Pacific Divisions ARRL Convention sponsored by the Los Angeles Area Council of Amateur Radio Clubs, Inc., will be held September 8 through 10 at the Ambassador Hotel in Los Angeles. The convention will offer speakers, open forums, manufacturer's clinics, contests, mobile judging, a ladies luncheon and fashion show, SWOOP, the Royal Order of the Wouff Hong, plus many other events. Speakers include Lew McCoy, W1ICP, and other ARRL officials plus W. Bill Conkel, W6DNG, winner of the 1966 ARRL Merit Award for moonbounce experimentation. Barry Goldwater, K7UGA, will be the feature speaker at the banquet.

Other area attractions include numerous electronics firms, the new Los Angeles Music Center, Dodger's Stadium, famous night clubs and restaurants and the finest shopping area in Los Angeles.

Registration is $2, combined banquet and registration $10, until August 15; $3 and $12 after that date. Make checks payable to ARRL Convention and send to P.O. Box 3151, Van Nuys, California 91407. Room reservations should be made directly with the Ambassador Hotel, 3400 Wilshire Boulevard, Los Angeles, California 90005.

ARRL KENTUCKY STATE CONVENTION

Louisville, Kentucky September 8 - 9, 1967

The Louisville Ham Kenvention will be held Friday evening September 8 and Saturday September 9 at The Executive Inn, Waterson Expressway near the Fair Grounds in Louisville, Kentucky.

Scheduled for Friday evening is an open house for all visiting hams, a sneak preview with movies for the new hams and the Old Kentucky Ham Club dinner meeting, which all old timers are invited to attend.

Saturday's program includes forums on ham TV, RTTY, v.h.f./u.h.f., antennas, nets, MARS, public service, ARRL, DX with Stu Meyer, W2GHK and Gus Browning, W4BPD. Stu will speak and show his film on the rare DXpeditions. C.w. contest and "home-brew" contest will be held. Southern Bell Telephone Company will give a laser demonstration.

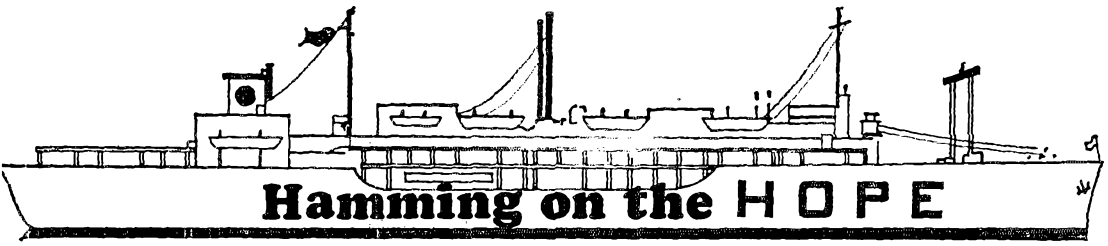
A fine program is arranged for the ladies, featuring a visit to Speed Museum, a lecture at the Planetarium and a dinner. A large "Flea Market" will be in operation for the traders. A banquet Saturday night will wind up the activities, with Mr. Ivan H. Loucks, W3DG, formerly in charge of the Amateur and Citizens Radio Division of the Federal Communications Commission, and now a communication and signal engineer, with the Association of American Railroads, as the featured speaker.

Governor Breathitt has, by proclamation, designated Kenvention Week, September 4 to 10 as Kentucky Amateur Week, in recognition of amateur participation in public service. A certificate signed by the Governor will be distributed by the Kenvention to certificate hunters working Kentucky hams during this week.

Admission tickets in advance $2.50; at the door $3.00. Banquet tickets $5.50; at the door $6.00. Ladies program $3.00 in advance. Banquet tickets are limited and reservations should be made without delay. For information and reservations write Louisville Ham Kenvention, Box 20094, Louisville, Kentucky 40220. QST

Strays

W4IIS wants to be sure no one will miss seeing his call letter plates. Walt mounted his past nine license plates in the rear of his car.



Hamming on the HOPE

BY HAROLD W. MORGAN, M.D.,* KØJTP

The hospital ship *Hope* is presently in Cartagena, Colombia, as part of the "People to People" program. She will be stationed there until December, 1967, when she will return to the States for refitting before going to Ceylon on her next mission of mercy. This is the sixth year that the ship has carried its program of teaching service to areas of the world requesting her help.

Ham radio is usually the only means of maintaining contact between the people on board and their relatives and friends at home. Telephone contacts are expensive and not too dependable from many parts of the world. The pay of the people on board is much less than they would receive at home and all the doctors and dentists donate their services, receiving only their transportation, food, and quarters while serving their two months' rotations. The entire project is supported by voluntary gifts of the people of the United States, and is the brain child of Dr. Wm. Walsh, who now spends his time as administrator of the program. The *Hope* itself is the old *Consolation*, a hospital ship taken from the mothball fleet following the Korean War, and rented to the project for one dollar a year. It is operated by the Grace Lines, at cost. The usual number of people aboard at any one time is about 135 plus the crew.

The full-time radio operator on board the *Hope* is Don MacLean, VE3BFA, of Sudbury, Ontario, Canada. Don is responsible for all the more-or-less official contacts and for handling traffic when no other licensed operators are on board. However, on most rotations there is a second operator among the doctors or dentists.

I was fortunate in being on board as a radiologist for two months. As a radio amateur, I had access to the ham rig and most evenings I spent about two hours making contacts with U. S. hams, passing traffic for the people on board.

The equipment in the ham shack was donated and is maintained by the Hallicrafters company. A 3-element beam antenna is used on the amateur bands and is mounted on the starboard after mast. The shack itself is located on "B" deck, a short distance from the dining area and is equipped with a telephone for paging purposes. The shack is a small room . . . four people make a crowd. However, frequently there were 10 to 15 people in and around the shack waiting for contacts with friends and loved ones at home. In order to have some order and as a means of instruction, a notice of "How to Behave in the Ham Shack" is posted on the radio shack door.

What is it like to be on the other end of a rare contact? First of all, it is fun to be DX, to have the state-side hams looking for you instead of having to fight the pile-ups for a contact. When the *Hope's* call, HK1AFG is sent, you can always count on getting several answers any time of the day or night. The cooperation of the amateurs is fantastic. As soon as operating habits are established, a group of regulars check in and ask if they can help.

Passing traffic between *Hope* people and their loved ones is a rewarding experience. It is not unusual for people to be crying when they make their first contact with their loved ones, and I know the same thing occurs at the receiving end of the contact. If you have ever been in on one of this kind of contacts, you can understand what "amateur service at its best" means.

"A clear channel would be appreciated" is a statement frequently heard on the air. After my two months on the *Hope* it makes me realize just how much it is appreciated. The party given me on my next to last day aboard for my radio work was a testimonial to how much that clear channel means to others, too. QST

* 104 Medical Arts Center, Mason City, Iowa 50401.

I.A.R.U. News

INTERNATIONAL AMATEUR RADIO UNION

John Rouse, G2AHL

John Rouse, G2AHL, Secretary and General Manager of the *Radio Society of Great Britain*, and Editor of the *RSGB Bulletin* died in London on May 26. Mr. Rouse was 46 years old and at the time of his death was thought to be recovering from a previous illness.

He joined the RSGB staff in October, 1952 as Assistant Editor and was appointed Editor in January, 1962. Two years later he was also appointed Secretary and General Manager.

Mr. Rouse had been an amateur for 30 years and following World War II had operated for a short time as VU2AL in India. He was especially interested in mobile and v.h.f. operation and was working on a new edition of the RSGB *Handbook* up to the day before his death.

TWO SOCIETIES ELECTED, THREE MORE APPLY

The *Faroese Amateur Radio Society* (FRA) and and the *Malta Amateur Radio Society* (MARS) have been voted into membership as a result of balloting in the December IARU Calendar. A review of both societies appeared in the February IARU News, page 80, of *QST*. Total membership in IARU now stands at 74 societies.

Three new applications for membership have been received by Headquarters and each is being voted upon in the June Calendar. They are the *Radio Club of Honduras* (RCH), the *Central Radio Club of Bulgaria* (CRKB) and the *Association des Radio-Amateurs Ivoiriens* (ARAI) which is the national society for the Ivory Coast. Membership in RCH is given as 82; CRKB has 3,584 members, and ARAI's membership is 54. Each society reports close co-operation with their respective government and that each government's attitude toward amateur radio is favorable.

MORE RECIPROCITY

El Salvador, Honduras, Switzerland and New Zealand have reached reciprocal operating agreements with the United States, making a total of 28 countries whose amateurs may operate while in the U. S. and vice versa. The agreements are usually reached by an exchange of notes between the foreign ministry and the U. S. ambassador; occasionally, first contact has been made by a foreign ambassador to the U. S. Department of State. The full tabulation of reciprocal countries is listed in a box elsewhere in this department; a list of Canadian reciprocities also appears in the box, a new feature.

DX OPERATING NOTES

Reciprocal Operating

(**Bold face** indicates changes since the most recent *QST* listing.)

United States Reciprocal Operating Agreements currently exist *only* with: Argentina, Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, **El Salvador,** France, Germany, India, Israel, **Honduras,** Kuwait, Luxembourg, Netherlands, **New Zealand,** Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, **Switzerland** and United Kingdom. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write headquarters for details concerning a particular place.

Canada has reciprocity with: Belgium, Bermuda, France, Israel, the Netherlands and U.S.

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, 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 are: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO XE XP YN YS YV ZP 4X and 4Z. Canadian radio amateurs 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 HK K OA TI W XE YS YV, 4X and 4Z.

DX Restrictions

United States 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, Indonesia (including West New Guinea), Thailand and Vietnam forbid radio communication between their amateur stations and amateur stations in other countries. U. S. amateurs should not work HS XU 3W8 or 8F. Canadian amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided are HS JY XU XW8 3W8 and 8F.

Correspondence From Members-

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

TECHNICAL ADVANCEMENT

¶ *QST* has become valueless to me as far as technical articles are concerned. Were *QST* a historical journal, the pre-occupation with vacuum-tubes might be justified; but not for a supposedly serious technical journal to publish an article in mid 1967 on construction of an electronic keyer with vacuum tubes! And not even in the April fool issue! Such a circuit was obsolescent 10 years ago, and thoroughly obsolete 5 years ago. In 1967, even a discrete component solid state keyer would be obsolescent, not to mention uneconomical.

This is 1967 — the age of cheap, reliable transistors and integrated circuits, and if *QST* is any barometer, the amateur has fallen from the forefront to the rear-guard in electronics. — *Jackson S. Wright, K2IYC/K1RUH, Lexington, Mass.*

¶ I just finished reading your May issue, and noticed something quite interesting: Not a single original vacuum-tube circuit in the whole magazine! Some Cambridge, Mass. author recently said in the February issue of another journal that hams have been relatively slow to adopt transistor circuitry. If this is true, it sure isn't your fault! — *Raphael Soifer, K1WXC/K2QBW, Cambridge, Mass.*

¶ The June issue of *QST* was one of the most sophisticated I have ever seen! Much high-grade technical writing covering very current matters. I only hope that increasing numbers of readers absorb this superior teaching. — *Temple Nieter, W9YLD, Evanston, Illinois.*

¶ It is more and more apparent we are turning into a bunch of knob twisters. What has happened to the idea of, "rolling your own"? Looking at the many advertisements in *QST* and other amateur publications it is no wonder the new hams, especially, rarely consider building their first rig. Granted, you have to be an engineer to figure out some things. But all it takes is a little incentive. Sure, it may cost more in the long run and the resale value may be nil. It's the fact that you take a bunch of junk and form it into a workable piece of gear which will work by your own hands. This in my mind is the "kick" I get out of ham radio, and talking with people who like to "roll their own."

Not everyone has the same opinion. There are so many aspects to ham radio that there is a place for everyone. This "kick" of mine should at least be tried by every ham and stressed to the newcomers. — *Bob Johnson, K1RNL/7, USS Ranger (CV-61), FPO, San Francisco, Calif.*

¶ Having graduated to General from Novice, after taking the exam, I began to think: "Wasn't that a bit *too* easy?" I think now that it was.

I keep comparing the test I took, to the test my father took when he received his General over thirty years ago. As most hams know, one of the most important steps in building anything for an amateur station, is the mastering of the schemetic diagrams. My dad, when he took his exam, had to diagram the transmitter he was planning to use. Although the transmitters in those days were relatively simple, that's still no easy chore. I could not draw the diagram of a one tube transmitter, and all I was asked to do when I tried for my General, was to identify five simple diagrams. I just had to tell one from the other.

There is really nothing wrong with lessening the requirements for an amateur license, yet I do think that the FCC should take a good look at the General exam that is being given. I am considering taking the Amateur Extra exam once I gain the knowledge, and then I will feel better, knowing that I am doing my part to keep ham radio a fraternal *and* scientific hobby.

Perhaps I shouldn't complain: I'm 13 years old, and enjoying this hobby immensely, and I'm looking forward to keeping it with me for the rest of my life. But I hope that the requirements don't ever reach the point where they are so easy anyone can get on the air, or amateur radio will see its downfall. — *Jonathan E. Kern, WB2WIX, Leonia, N. J.*

FEWER NEWCOMERS—CONTINUED

¶ Much of the difficulty about fewer newcomers could be overcome by aiding and encouraging Novices in their progress to General Class licenses. At the present, many individuals and clubs are doing an excellent job in training newcomers to be Novices. But, unfortunately, many of these programs lack the follow through of training Novices to be Generals. This lack leads to a high drop out rate of beginning hams.

Many people desire and need training beyond the Novice requirements. Provision of such training would greatly encourage a large flow of new talent into amateur radio. — *Nickolaus Leggett, WB2UEQ, Somers, N. Y.*

¶ Don't worry about fewer amateur operators being licensed! As in any voluntary activity, the core of personnel is what counts. The come-and-go surplus occurs in skeet-shooting, sailing, model building and photography too. The come-and-stay numbers seem to mount both with population and increasing spread of technologies and equipment. Some of my old *QST*'s show a few tens of thousands of hams; we had attrition then, don't forget. — *Temple Nieter, W9YLD, Evanston, Illinois.*

¶ I reside in a county with only four ham license holders (so far as I can find) and two of these are not on the air. Instead of complaining about the CB operators and lack of new members I decided the only way to increase membership was to increase interest on the part of *any one* who would listen to me. It took a lot of talking, calling of many meetings when no one would attend, but in the end I have made some progress.

I contacted the executives of both Boy Scout districts and had them to pass the word to explorer advisers and Scoutmasters; I contacted certain young people leaders in churches and asked their aid; I talked with radio supply houses to find names of people who were purchasing parts to repair radios; I talked with maintenance men in TV and radio shops to see if they knew boys interested in radio; I talked with teachers in high school; and, in general worked at the job of finding people interested in radio.

This resulted in 19 boys under 17 enrolled in class, 10 adults on a waiting list for a new class, and a CB club which wants a course of instruction for their entire membership (about 35).

I believe interest in ham radio by newcomers will be in direct proportion to the interest of ham radio license holders toward the newcomers. It will be in direct proportion to our interest in finding people who are interested in teaching them the code and theory so they can become license holders.

Not always can interested people find us. But with a little effort on our part we can find a part of them. — *R. B. Guthrie, WB4APP, Sanford, N. C.*

"MEAN HAM" PUBLICITY

¶ I was outraged this evening when I learned that some "mean ham" is interfering with communications between state-side amateurs and operators aboard hospital ships off the coast of Vietnam. No matter what view a person has regarding the merits of the U. S. presence in South-East Asia, there is no excuse possible for willful, deliberate and premeditated interference with the humanitarian efforts of the hams attempting to link servicemen off Viet Nam with their loved ones on the mainland. I can only hope that the FCC will investigate this matter and if the allegations against the amateur in question prove to be true, they will invoke all the penalties at their disposal. Only in this way will the rest of us again be able to state with pride our membership in the amateur radio fraternity, without at the same time having to apologize for the actions of some of our number. — *Albert M. Johnston, Jr., W4LXY, Alexandria, Virginia.*

¶ . . . I am afraid this single story has done more damage to the ham radio image in a day than the last ten years of public service work by thousands of men has done good. If the facts are as stated in the wire story, I certainly hope you folks at League Headquarters can needle the Commission into some sort of quick action. — *Louis B. van Dyck, Jr., K3LNG, Public Relations Officer, New York State Police, Albany, N. Y.*

¶ . . . With all of the good work that we, as active ham operators participate in, the time we devote to public services in time of emergency, little enough newspaper and other media coverage is obtained to build our public image. A single news item of the nature of this one will do more to tear down or defeat the cause which is the very source of our existence. — *Warren V. Bruner, W6VBU/AF6VBU, Carmichael, Calif.*

¶ The amateur fraternity in this area has been quite successful in obtaining good and well deserved favorable coverage, including a half page spread in our paper's Sunday supplement last Field Day. The damage done by one bit of front page coverage like this can offset years of good hard PR work. — *L. W. Moore, K9GFQ, Grabill, Indiana.*

¶ I was shocked by the title as I am sure many others were. The article itself, however, was not as detrimental to our art, pointing out that all the other hams were doing immense amounts of good. But anyone just reading the title or the first paragraph would turn the page with a hostility toward amateur radio. . . . This article has ruined the public relations work of many people. All this shows that the majority of hams have to work harder (or in some cases begin working) to improve the good public relations ruined by the minority. We need more interest to promote this. With Field Day, we get more attention and a larger portion of the public spotlight. But what would be even better is Field Day publicity all year around. There are several ways to do it; some new, some tried and proven. But looking forward to the results — it's worth a go isn't it?

I have done little about this myself, but the first thing after school (with the money from a job) I am joining a local club. I am joining the fight. — *Bob Zulinski, W8MAM, Berkley, Michigan.*

¶ . . . This is obviously the type of press coverage we do not need. It is a sad commentary on the ethics of the national press organizations that they seem to devote more space to bad news than they ever do to good.

It is my intention to contact the editor of this local paper and provide him with some examples of the fine services performed by hams which often go unnoticed in the press. I would appreciate it if you could send me some additional back-up material for this purpose. — *Fred C. Cupp, K8AOE, Willoughby, Ohio.*

[EDITOR'S NOTE: The "mean ham" publicity may or may not have hurt the image of amateur radio. Certainly the newspaper headlines were not generally favorable. The text of most reports, however, did point to valuable public services of radio amateurs. Good publicity for amateur radio is the job of us all — individuals and clubs. (See page 9, May *QST*.) For those interested in doing their parts, the League will supply on request, our booklet entitled "Getting Newspaper Publicity for Your Club and Amateur Radio" and other publicity aids.]

STOLEN EQUIPMENT

¶ This letter could start out — would you please report in *QST* that my Swan 350 serial #C-266110, my Webster Bandspanner Antenna and my microphone were stolen on the night of May 26.

It was — and I would appreciate your so reporting, including the fact that I would offer a reward leading to the return. But, there is an odd part of the story that is interesting: I had been reading the article in May *QST* on "Don't Lose Your Mobile Rig" and the magazine was lying open to this article on the floor of the car with a pair of pliers holding the page open. As far as I can figure, he used this pair of pliers to unscrew the nuts holding the rig in the car and then moved the speaker, which he apparently didn't like, over to hold the page. The job was so expert that I am sure the thief had radio experience if he was not an "amateur." I wonder if he read the article when doing the job? If he reads this note, I hope he will drop me a note! — *William A. Adams, W6ANN, Joshua Tree, California.*

DUES

¶ I notice that most of the letters published in *QST* on the dues increase are in favor of a higher price. In fact, I question if you are being honest in printing a sampling of all letters as I see few if any that are opposed to the increase.

I am aware that you select those letters that tend to support your views, but surely there must be a few that are against the increase.

I have been a League member for over 10 years, and I stayed in after the RM-499 disaster. Even *QST* seems to be running in second-place as the top ham magazine. Perhaps a good look at the direction we are going is in order. — *D. L. Baxter, W5KPZ, Tyler, Texas.*

[We make no such selection; we had to scratch to find comments in opposition to the dues rise — EDITOR]

¶ Enclosed, is check of five bucks and when this so called hobby gets so "high and mighty" that the magazine costs six-fifty, well boy it ceases to be a hobby. I am sending this check for my magazine, and not for that damn membership you're peddling! So next year, guess I'll be amongst one of your missing subscribers, not member. Now publish that, I dare you! — *Evan Wilkin, K9HNG, Homewood, Illinois.*

¶ ARRL is doing a splendid job, probably much more than most amateurs realize. As far as I am concerned, the five dollars I send in each year would be more than worth it if I had to but ask for one little bit of legal help regarding amateur radio, perhaps once in 10 years. I hope your Amateur Legal aid department keeps going strong. I just can't see how anyone, even a kid, nowadays, can't rake up a measly five dollars. — *Ray Staples, W4GWEK, Arleta, Calif.*

STARTING RIGHT

¶ Your MSG NR 126 was delivered in person by a young high school student WB6TYZ, Ralph Rissmiller, Jr., on ARRL stationery etc. I could see myself about thirty-five years ago. His dad drives him around delivering his traffic. I asked him into my house and showed him around. I even offered to let him go swimming any time he would like to when I'm home, hi. In talking to his dad he said that he can go as far as he wants to in ham radio for it keeps him off of the streets and he is making good grades in school. I agree with him. — *Clark W. Cox, K6IBI, Anaheim, Calif.*

GARBLED COMMUNICATIONS

¶ As an ARRL member, I would like to say a few words in regard to the elimination of garbled communications. We have, through our hobby, a wonderful means for worldwide communication between people of similar interests. I would like to list some points which I feel lead to garbled QSOs:

1) *Different definition of symbols.* Among these we find ignorance in regard to Q-signals, country prefixes, and c.w. abbreviations.
2) *Lack in preciseness of language.* Not enough use of symbols, and the use of flagrant generalities when answering questions.
3) *Status between sender and receiver.* This includes the language barrier, QSOs between old timers and novices, and other amateurs which are unable to find anything in common.
4) *Different experiences of sender and receiver.* Here QRM, QRN, QSB, and poor propogation with resultant poor QSOs is found.

Specific sounds and words don't communicate but people do. Therefore, let's make our hobby more into a medium for the sharing and exchanging of mutually understood ideas. The problem is that formal and informal rules get started, and each amateur has to be initiated and keep abreast of these. The key in learning to appreciate amateur radio lies in one word, communication! Let's communicate! — *Dan Beugelmans, WB6UBK, Los Angeles, California.*

PUBLIC RELATIONS

¶ Thank you very much for the material you sent for our club presentation on amateur radio to the Kiwanis Club. The program went over very well and considerable interest was shown.

The radio club is now making it known that they are available to put on a program for other civic groups or meetings. We think this type of program, well presented, will produce good public relations as well as create a better understanding of amateur radio activities. — *Paul D. Dilliard, WA8IBT, President, Lancaster (Ohio) Fairfield County Amateur Radio Club.*

ARMED FORCES DAY

¶ I think the League missed a good bet when they did not encourage every ham who worked the military stations on Armed Forces Day to QSL. I know the military stations QSL 100%, but don't you think it would be a swell idea if all of us hams QSL'd 100% and used the handy "remarks" column on our cards to express our whole-hearted support of the armed forces.

What terrific publicity could be realized by both groups if an article appeared in the newspapers saying that 1 or 5 or 10 thousand or more cards were received by these military radio stations, all carrying a message of support for the services!

I, for one, have already sent QSLs to AIR, NSS and WAR expressing *my* support. — *Walt Peterson, W2JDH, Rahway, N. J.*

TYPICAL NOVICE GEAR

¶ Did you ever wonder what the "average" Novice ham station was? I chose thirty QSL cards at random from my batch and added up the retail price of each piece of equipment (what a pain!) and came up with these figures.

The average transmitter price was $84.67, or about the equivalent of a DX60A. The transmitters ranged from DX20s and ARC-5s to Apaches and Ranger IIs.

The average receiver price was $236.00, or about the price of a Drake 2-C. Receivers ranged from Conar set to Drake R-4As and HQ 170As. The popular antenna was a dipole.

Popular transmitters were DX20s, 40s and 60s and Eico 720s and 723s. Receivers were usually Hammarlunds or Hallicrafters, and were usually above $200. — *Michael Ferguson, WN1HAO, Portland, Conn.*

The World Above 50 Mc.

CONDUCTED BY BILL SMITH,* W1DVE/KØCER

Meteor Scatter DX

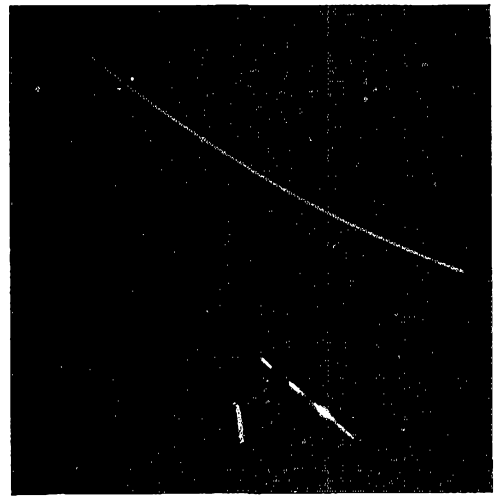
IONOSPHERIC propagation of the type common to 50-Mc. — such as *E* and *F*-layer — is a rarity at 144 Mc. Tropospheric DX on 144 Mc. is better than on 50 Mc., but seldom does it extend beyond 600 to 800 miles and it is not long before the 2-meter DX man has "worked-out" the states within his tropospheric reach. To work new states he has to extend his working distance. At two meters this means either moon-bounce or meteor-scatter techniques must be used. At the present time, at least, meteor scatter is more practical for most of us.

Astronomers recognize two types of meteors: sporadic and stream, or shower. About 80 per cent of all meteors encountered by earth are sporadic — something like 90 million of them every 24 hours! There are two variations of the number of sporadic meteors; diurnal (time of day) and yearly (from month to month). The diurnal variation is sinusoidal, with the peak at 6:00 A.M. local time and the minimum at 6:00 P.M. The number of meteors encountered at the peak is about five times that at the minimum. The difference is primarily caused by the motion of the earth in its travel around the sun. At 6 A.M. the earth's surface is facing the direction of travel, therefore colliding with the debris of comets, known as meteors. At 6 P.M. the same surface area is on the opposite side of the sun and fewer meteors are encountered.

The yearly variation is much slower and is related to the location in space of the various collections of debris. Activity from sporadic meteors reaches a broad peak during June, July and August; the minimum is in February, March and April. The radiants (points in the sky from which the visible trails of meteors appear to originate) of sporadic meteors are random, but are mostly concentrated in the plane of the earth's orbit and move in the same direction as does the earth around the sun. Therefore, the greatest number will appear to come from the southern sky, making north-south paths the best for sporadic meteor contacts.

Shower meteors are fairly predictable. The May, 1967, edition of this column, page 78, illustrates the best estimates that astronomers have to offer at this time. The times given are "local" time. These predictions can change due to a shower being deflected from its known orbit by another body such as a planet. And then after a period of many years, previously active showers, or streams, may become so evenly distributed and thinned out in their orbits that they are of little consequence. On the plus side, however, new comets and their associated debris are being discovered so there may be new showers appear of interest to 2 meter DXers. The August Perseids, which is the most reliable of all showers, is so evenly distributed that "peak years" — those when the earth passes through a concentration of debris in the stream's orbit — — are hardly noticeable and results obtained from year-to-year are nearly identical. The Perseids offer a good opportunity for the meteor-scatter neophyte to warm up his keyer.

When meteors enter the earth's atmosphere, molecular friction occurring about 60 miles above the earth's surface causes them to heat and burn, leaving ionized trails in their wake. Most meteors are the size of a grain of sand. It is their size and velocity that determine the amount of ionization they cause, but not necessarily the amount of the signal reflected from the trail. The reflection depends upon the arrival angle of the meteorite and the angle at which its trail is intercepted by the radio signal. Therefore, a properly-oriented meteor (Fig. 1) that is very small may produce more signal than a large, poorly-situated one. The best signals are obtained when the trail is along a line between the two



A Leonid Meteor as photographed by the Smithsonian Astrophysical Observatory Prairie Network near Woodward, Oklahoma on November 17, 1966. The curved line is the path of a star during the time exposure. The trail left by the meteor is broken because of the camera's rotation shutter. The time between the dashes is 1/20th of a second. (Smithsonian Astrophysical Observatory photo)

*Send reports and correspondence to Bill Smith, W1DVE, ARRL, 225 Main St., Newington, Conn. 06111.

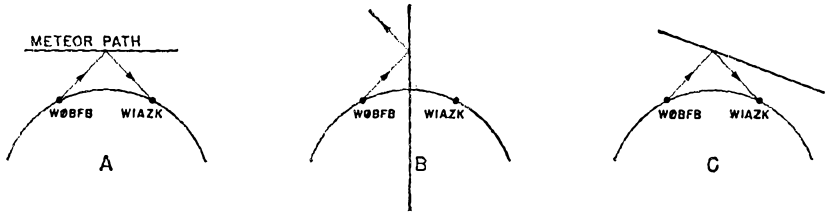


Fig. 1. *A represents the ideal arrival angle of a meteor for maximum signal reflection, B is the least desired and C is the best compromise.*

stations involved, and parallel to the earth's surface at the midpoint. The chances of getting such a perfectly-oriented meteor are small. Instead, we must settle for a larger number of "so so" meteors. The closer the path comes to a vertical incidence, the greater the density per unit area. This appears to be the ideal situation until we consider that a vertical trail reflects the signal away from the intended path. So, we must compromise and rely on those meteors arriving at an angle which is midway between the two stations wishing to communicate.

Meteors ionize in the *E* region and so the "skip" distance of meteor DX is about the same as single-hop *Es* — e.g. a maximum of about 1400 miles. Antenna height also has some effect on the skip distance. Signals reflected from meteor trails can take several forms: the sharp, common "ping"; a weak, almost residual signal that you can "feel" is there but that you cannot copy; and the burst, which is the most useful. The signal may last for a fraction of a second, or during dense showers they may last for several minutes — as during the 1966 Leonids. See page 83, January 1967 *QST*.

Meteor scatter is primarily a c.w. game, although several stations have used s.s.b. successfully. Power is not too important, but as with other forms of propagation, it may be helpful. See page 100, November 1965 *QST* for Sam Harris's comments on the power factor. What is important is a *good* antenna with a large capture area, and a stable, low-noise receiving system. ARRL's *V.H.F. Manual* is a good source of information on antennas that work.

Now that we know something about meteors and station requirements, how about a schedule? You must use a pre-arranged format, a rapid information exchange rate (fairly high-speed c.w. or s.s.b.), and precisely-timed transmissions. WWV is *the* time reference. Calling sequences are a matter of preference, as are the length of schedules. Sequences may range from 15 seconds to 5 minutes; schedules from 15 minutes to an hour or more. The information to be exchanged should be agreed upon by the parties participating in the schedule and will vary from operator to operator.

Space limitations necessitate this being a rather brief discussion of meteor scatter. An article in the April 1957 issue of *QST* by Walt Bain, W4LTU, is recommended reading as an additional source of information.

So, there you are: a method of making contacts on 144-Mc. over distances of up to 1400 miles, and without waiting for rare 2-meter *Es* or employing more expensive moonbounce equipment. Don't be alarmed if you're just getting started in meteor scatter; you'll find that most of the 2 meter scatter men are helpful and cooperative. You won't hold many ragchews on meteor scatter, but you will improve your states totals.

Weak-Signal Audio Filter

Weak-signal enthusiasts are constantly searching for db. Here is a circuit that has been kicking around for several years. I believe it was designed by Hank Cross, W1OOP, and described in *VHFER* in March, 1965 by Vic Michael, W3SDZ.

As a receiver's bandwidth is decreased, the signal-to-noise ratio improves, making weak signals more readable. If your receiver has a minimum bandwidth of 500 cycles you can pick up about 10 db. of signal with this 100-cycle filter. There is only one catch — you will have to practice using the filter before you will realize its potential. First, the receiver should be set at its narrowest passband. Now insert the filter and vary the b.f.o. tuning while watching the noise output on an audio voltmeter connected across the output of the filter. Tune for maximum deflection. Now tune in a weak signal; you will notice the signal will have a ringing sound as it is tuned through the 100-cycle passband. It may be desirable to leave the audio voltmeter in the circuit and use it as a tuning indicator. A great deal of patience and practice is needed to learn how to use this, or any other narrow-bandpass audio

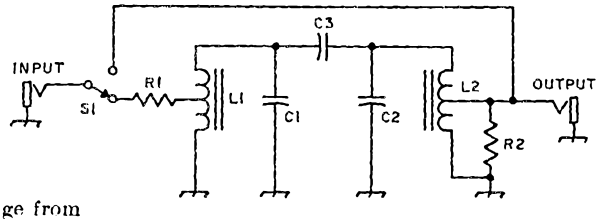
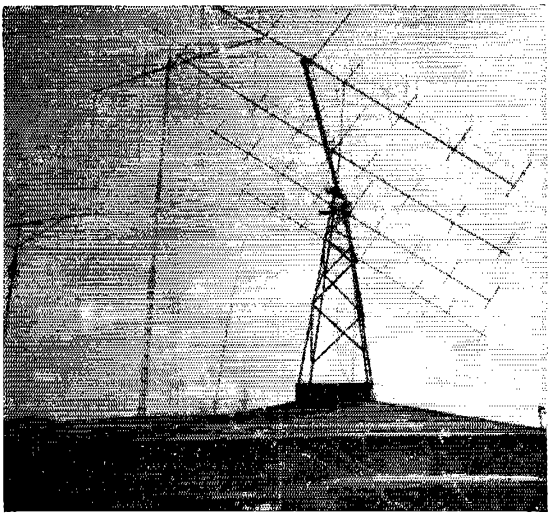


Diagram of the weak-signal audio filter. R_1 should match the output impedance of the receiver; R_2 is the same value of impedance as the headphones or audio amplifier. (An audio amplifier may be desirable to overcome insertion loss.) L_1 and L_2 are 88-Mh. toroids. C_1 and C_2 are 0.47 μf. and C_3 is .047 μf., paper tubular or mylar. The filter can easily be built into a small Minibox including a transistorized audio amplifier.



This is the 160-element collinear array at K6MYC, Saratoga, California currently being used for 144-Mc. e.m.e. tests with F8DO and VK3ATN. Mike uses the 4-element quad for h.f. liason schedules with fellow moonbouncers.

filter. The filter must be used with a receiver that does *not* drift.

There are two schools of thought about narrow audio filters. Some weak-signal enthusiasts, such as W2IMU and W3SDZ, believe the properly trained ear can do a better job of distinguishing a weak signal from the noise. I've heard tapes at W3SDZ that would tend to prove this. However, other operators like W6DNG are firm believers in filters, and visual readout such as the audio voltmeter or a pen recorder. I guess the only answer is that, if you're interested in weak-signal work, try both ways to determine which is best for you as an individual.

Another suitable filter having an audio amplifier was described by Lewis G. McCoy, W1ICP, in *QST* for December, 1966 on page 18.

R.F. Choke Guide

Here is a reference chart on the specifications of the commercially available r.f. chokes.

	Ohmite	
Part No.	*Inductance*	*Frequency*
Z-7	84 uh.	3-20 Mc.
Z-14	44 uh.	7-35 Mc.
Z-28	21 uh.	20-60 Mc.
Z-50	7.0 uh.	35-110 Mc.
Z-144	1.8 uh.	80-200 Mc.
Z-235	0.84 uh.	160-350 Mc.
Z-460	0.2 uh.	320-520 Mc.
	J. W. Miller	
9350-06	82 uh.	7 Mc.
9340-34	39 uh.	14 Mc.
9340-28	22 uh.	28 Mc.
9310-34	8.2 uh.	50 Mc.
9310-18	1.8 uh.	144 Mc.
9310-10	0.82 uh.	220 Mc.
9310-02	0.22 uh.	432 Mc.
	James Millen	
34301-82	82 uh.	7 Mc.
34301-39	39 uh.	14 Mc.
34301-22	22 uh.	28 Mc.
23301-8.2	8.2 uh.	50 Mc.
34301-1.8	1.8 uh.	144 Mc.
34301-0.82	0.82 uh.	220 Mc.
34301-0.22	0.22 uh.	432 Mc.

If you should prefer to wind your own the information may be found in the *Radio Amateur's V.H.F. Manual*.

OVS and Operating News

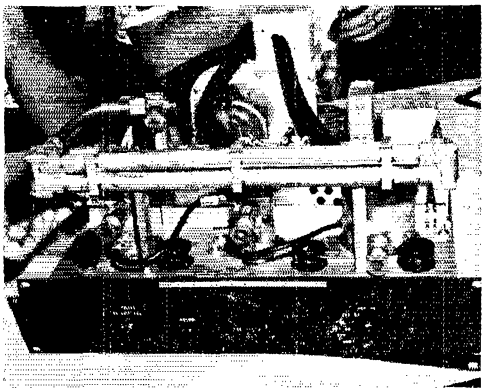
50 and 144 Mc. DXers experienced what were probably some of the best auroral sessions ever recorded, between May 25 and 30. The opening on the 25th was noted throughout the country. Al Olcott, K7ICW, in Las Vegas submitted this detailed report.

"Starting about 0130Z May 26 (May 25 local time) the very distorted and practically unreadable s.s.b. signal of WA6EXE was heard from El Monte in Southern California on 6 meters. He was fairly strong and appeared in several spots on the band. At first I tried tuning him in better with the phasing control, also trying A3 but could not improve reception. The antenna was rotated and peaks were noted on his signal from the southwest (direct path) and northeast. However, he was readable all over the compass. I immediately thought it was some form of back-scatter or possibly *TE*. A little later I heard a Montana station working one in Washington on s.s.b. No doubt about it, they were too close for *Es*, it must be *aurora*!!! Soon other signals started coming through on s.s.b. and c.w. My first contact was with K7PLR in Arizona, W7CNK in Washington was next, then K7GVB, Utah; WA5RYX, New Mexico; and WA6s EXE, SQI and AKM and WB6GEN all in the general Los Angeles area. I terminated 6 meter operation around 0230Z with many announcements that I was moving to 2 meters. At 0240Z, a very very weak signal right at the band edge (144 Mc.) was heard signing W7D??, strength S1. Later the signal moved up in the band, and I called CQ. The W7 came back, but it took about 15 frustrating minutes to get his call sign. It was W7DTS at Pocatello, Idaho! At 0252Z the signal strength was up to 56A. I shifted to s.s.b. and promptly lost him. But at 0314Z, K7ZIR in Beaverton, Oregon (845 miles) called me after several of my CQs. We traded reports on c.w. with loud fluttery signals that built up to S7–S8. Then I suggested we shift to s.s.b. and an uncertain contact resulted with weak signals. Very shortly after, no more signals were heard. A quick check of 50 Mc. at 0320Z showed that all signals had disappeared. This was the first observed aurora here on v.h.f. since I moved to Nevada in March, 1959. Careful listening for 8 years previously had netted nothing."

W1HDQ says the aurora openings in Phoenix and southern California are probably "firsts."

From Sarasota, Florida, W4GJO, reported "a real, honest-to-goodness six-meter aurora." Even with an S9 noise level, Grid worked W7JEU/4 in Alabama. W4HJZ in North Carolina and WA4MQE in Georgia. Grid's two-meter beam was down so he couldn't check that band. He says the only other aurora he has noted in Florida was on January 1, 1958. Other Florida stations told Grid of working W1, 2 and 8s.

W4GJO experienced a rare form of auroral DX on the night of June 5. Even 10 was dead until about 2335 GMT, when a VE1 came roaring in. The skip on 10 shifted around into the west around 0030 (June 6, GMT) and soon West Coast stations were heard. WA6HXW and W6BFJ reported on 10 that W0s were being heard on 50-Mc. aurora at 0100, and W5SFW said that he'd been hearing aurora signals on 6 for about an hour. At 0200 Grid started working Arizona and California stations on 6. Beam headings were unusually broad, peaking around 315 to 320 degrees, and the 6s reported hearings of about 30 degrees. In a matter of less than 10 minutes the western stations dropped out, with flutter increasing as they disappeared. Auroral buzz was heard on signals from Northern Florida, but no DX was coming through.



W6GDO says he has since removed the blower from the chassis of the 1296 Mc. transverter because of phase modulation introduced into the multiplier stages. The rig runs 40 watts output with 700 volts on the 2C39's. (AF6BUR photo)

This would appear to be a southerly occurence of the oblique bounce off the aurora, a type of propagation fairly common during high solar activity periods in the far north. VE8BY, KL7FLC and others have experienced it often, and there has been transcontinental DX of this kind at least once before within the confines of the contiguous 48 states. It's rare, though, and seeing it this far south is indicative of the interesting state of solar activity in this early-summer portion of 1967. The next couple of years, perhaps longer, could be a mighty interesting time to be living in the world above 50 Mc.!

For more than a year now W4HHK has been taking almost daily readings of solar noise on 432 Mc. As he discusses in detail elsewhere in this issue, every significant rise in solar noise has been followed by auroral displays and/or v.h.f. DX of an auroral nature. Until May 23, the highest reading of solar noise obtained had been 6 db. above the receiver noise level, but at 2050 GMT the 23rd, Paul zeroed his dish on the sun and saw his pen recorder go off scale!

In the next few minutes he calibrated the system to 16 db., but still the pen was off scale. By 2110 the level had dropped back to 15 db., where it remained until the end of this observation period at 2114. This was 432-Mc. evidence of the great solar flare that triggered the ionospheric blackout of May 23, and the auroral period May 25–30.

The following day noise readings were back to near the usual minimum, varying between 3.5 and 3.7 db. between 1500 and 1515 GMT, May 24. But on May 25, a high of 10.5 db. was recorded at 1457 GMT, tapering off gradually to 5.2 db. at 1557. That night, W4HHK saw a beautiful aurora, with rays extending as high as 30 degrees above the horizon. V.h.f. men in every part of the United States found themselves in the midst of one of the greatest auroral openings of all time.

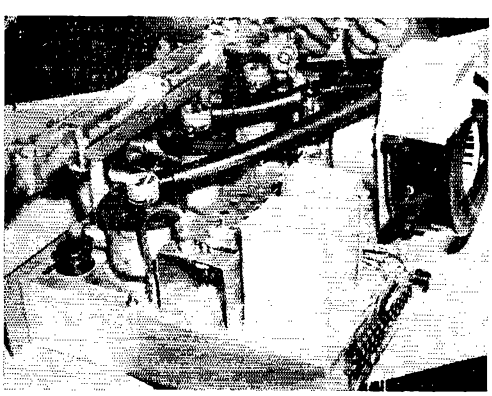
Now briefly from the more aurora-inclined states is a review of some of the 144-Mc. activity of May 25, 28 and 30. Lee Gray, K9AAJ, in Quincy, Illinois worked W3GKP, Maryland, for Lee's 37th 2-meter state. Lee also worked or heard K5TQP, New Mexico; K4QIF and W4HJZ, North Carolina; WØEKZ and WØALS, Kansas; W2AZL, New Jersey; WØLCN and WØLER, Minnesota; K5WXZ and W5NCE, Texas; WØEYE, Colorado and VE3EVW. Lee says some of the stations to the southeast and southwest of him were peaking with his antenna straight east and west, respectively. Although Lee kept an ear on 432, he heard nothing and somewhat surprisingly, no one else has reported noting 432 aurora signals. At Rochester, New York, K2YCO reports working three new states; KØMQS, Iowa; K4EJQ, Tennessee and W3RUE, Pennsylvania. K1HTV in Connecticut reports working many of the stations previously reported, but being disappointed in not raising KØGEY in Iowa on the Memorial Day opening. The Iowa station was S6 in Connecticut for about 30 minutes. The direct path is about 1000 miles! K2DNR at Hopewell Junction, New York reports a string of contacts including W9YYF near Chicago. W9YYF has additional contacts with K4QIF in North Carolina, W5ORH and W5WAX, both in Oklahoma, and several others. He also worked WØEYE in Boulder, Colorado for a nice 850-mile aurora contact. WØEYE was S8 in Chicago "for hours." From Alexandria, Virginia, K4SUM, caught four new ones among his QSOs with WA9DOT, Wisconsin; W9PBP and W9YYF, Illinois; W1AZK, New Hampshire; W8PT and W8TIU, both Michigan, and others. 50 and 144-Mc. results were similar in all areas. Thanks to all others who reported aurora contacts that are not acknowledged here. They are appreciated and have been recorded. This sampling is indicative of the geographical scope of the openings.

Seasonal 50 Mc. *Es* openings are reported from all sections of the country including contacts into Mexico and the Caribbean. WA9RAQ in Chicago says he heard *Es* on 87 Mc., probably from Mexico, in late May. Has anyone caught 144-Mc. *Es* this summer? K8MMM sent VP1PV, British Honduras, a crystal for 50.112 — and apparently six-meter sleuth W5SFW was one of the first to work the Central American. PJ2CT at Curacao, Netherland Antilles, should be active by now on six. In a letter to Headquarters, he indicated he may also become active on 144. Someone in the South should try him on tropo or meteor scatter schedules. PJ2CT's address is A. H. Hilhorst, Manager Verrietweg 7, Curacao, Netherland Antilles. As a result of Spring *TE* openings between North and South America, LU2FAO in Argentina climbed to 19 U. S. states worked.

K6RNQ, Pleasant Hill, Cal., 25 miles northeast of San Francisco, says that the aurora of May 25 was only the second he's heard in more than 10 years on 6. It was by far the best, and was in until 0230 GMT the 24th. Bob worked 12 stations in Oregon and Washington, and several in California, all on 50-Mc. s.s.b. Aurora contacts were made again June 5, though not as successfully as in the big May 25 party. As the auroral signals were disappearing, around 1930 PDST, May 25, K6RNQ heard an a.m. signal on 50.075 Mc. This could mean only one thing: Latin America, so Bob swung his beam around and identified the signal as the a.m. of TI2NA, reaching S9 at times, but with low audio, and a fast flutter fade.

This is a tip to anyone who wants to work into South or Central America. The openings may come in the morning or afternoon, via normal F_2 propagation, but don't overlook the possibility of evening breaks, as well. They are most likely to occur immediately following the breakup of an ionospheric disturbance and associated aurora.

Two-meter men of the Northeast should know, by now, that when they hear K4QIF coming through on the low end it no longer means an opening to North Carolina. Rusty has moved to Chesapeake, Va. (Norfolk area) and is savoring the joys of coastal inversions for the first time. He is working up the coast 375 to 500 miles almost nightly on 144, and hopes to duplicate this on 432, before long.



W6GDO displayed this 1296-Mc. transverter at the 1967 West Coast VHF Conference. The transverter is built around surplus "DME" equipment and a 50 Mc. s.s.b./c.w. exciter. (AF6BUR photo)

John Lawrence, KA7AB/KH6TH, sends an interesting report on 50 Mc. activity in Japan. John says JA6FR is about the only Japanese national actively chasing 50 Mc. DX and that most JA activity is with low-power a.m. rigs and small beams. John has stacked wide-spaced 5-element Yagis at 85 feet. He operates s.s.b. and c.w. and wants schedules for this fall. His address is John S. Lawrence, CMR #1, Box 860, 1955 Coo. Sq., APO San Francisco 96529.

1296 Warming Up

Developing activity and interest in the higher bands moves slowly, but in surges. Now and then a combination of factors gives us a nudge toward the next higher band. Development of low-noise r.f. amplifiers and efficient transmitting tubes did this for us on 432 in the early 1950s, and we've been making some progress ever since. Now the next higher band seems to be about to have its innings. In the past few months we've had many bits of evidence of increased interest in the 1215-Mc. band, particularly that portion at the high end where stable gear is customarily used.

This didn't "just happen." Varactor multipliers that develop usable amounts of power on 1296 with 432-Mc. drive; 2C39 triplers and amplifiers that really work, and deliver up to 100 watts output; transistor preamps that give usable gain, and noise figures much lower than we've ever achieved with vaccum tubes — these are some of the developments that make it appear that 1296 is an idea whose time has come, at last. Take Northern New Jersey, for example. K2JNG tells us that K2UUR, K2DZM, W2CCY, W2CQH, WA2VTR, WB2FWN, W2JBZ, K2PPZ, K2UYH and K2JNG are all now being heard regularly, running crystal control on or near 1296 Mc. We'll be having information on what some of these fellows and others are using in the way of 1296-Mc. gear, in *QST*, before long.

What Happened to the Comet?

Dr. Brian G. Marsden at the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts has expressed interest in the apparent negative results of the predicted meteor storm on June 6th. Dozens of 144-Mc. stations were active during the predicted shower, but reported results indicate that nothing other than normal sporadic meteor activity was in evidence. An astronomers report on the apparent failure of the storm to materialize was not available at the time of this writing. Headquarters is interested in observations during the mornings of June 6 and 7.

Swing That Beam!

Being creatures of habit, we tend to leave our v.h.f. arrays aimed in the direction from which we normally hear the greatest level of activity. This can cost us interesting contacts, and tend to discourage a fellow who may be trying in an area where there has been no known activity previously. A prime example is the sad case of VP9WB, who has been doing a fine job in Bermuda this summer on 6. Walt bemoans the fact that he often hears Atlantic Seaboard 50-Mc. men calling "CQ DX" with their beams west or southwest, blissfully unaware of the fact that they are getting into VP9. Walt usually operates around 50.28 Mc., and he puts a fine signal into eastern states and Canada during Es openings.

Alaska and Hawaii Worked on 6!

Since the last of the F_2 DX around 1960, it has been the fashion to think that a 50-Mc. WAS is out of the realm of possibility, because of the difficulty of catching States 49 and 50. Now it turns out that trying in the right places at the right times can turn the trick, despite the dearth of Es signals over these long paths in the past.

WB6NMT has been operating /KH6 on 50 Mc. since May 24, and has been keeping in touch with mainland 6-meter men on 21 Mc. This began to pay off at 0215 GMT June 16. W6PUZ, Pasadena, heard double-hop *Es* to W4, so contacted WB6NMT/KH6 on 15, and Louie fired up on 50.105 s.s.b. at 0245, and immediately worked WB6PUG, Chula Vista (near San Diego). This lasted only 45 seconds, and nothing else was heard at the Hawaiian end, until June 17, at 0132 GMT. At this time, W6PUZ called WB6NMT/KH6 on a c.w. sked, and got an immediate s.s.b. answer. WB6PMN, Los Angeles, also made the grade.

What appears also to have been multiple-hop Es provided a 50-Mc. two-way for K6RNQ, Pleasant Hill, northwest of San Francisco, and KL7FNL, at Tanana, 40 miles north of Fairbanks, Alaska, at 0530 GMT June 15. This was a c.w. QSO, with signals running 449. The band had been open from California to Washington earlier, and the KL7 came in just as the 7s were dropping out. This is typical of double-hop work on east-west paths, as well, and should be borne in if you tend to quit when the band *appears* to go dead! QST

West Coast V.h.f. Conference

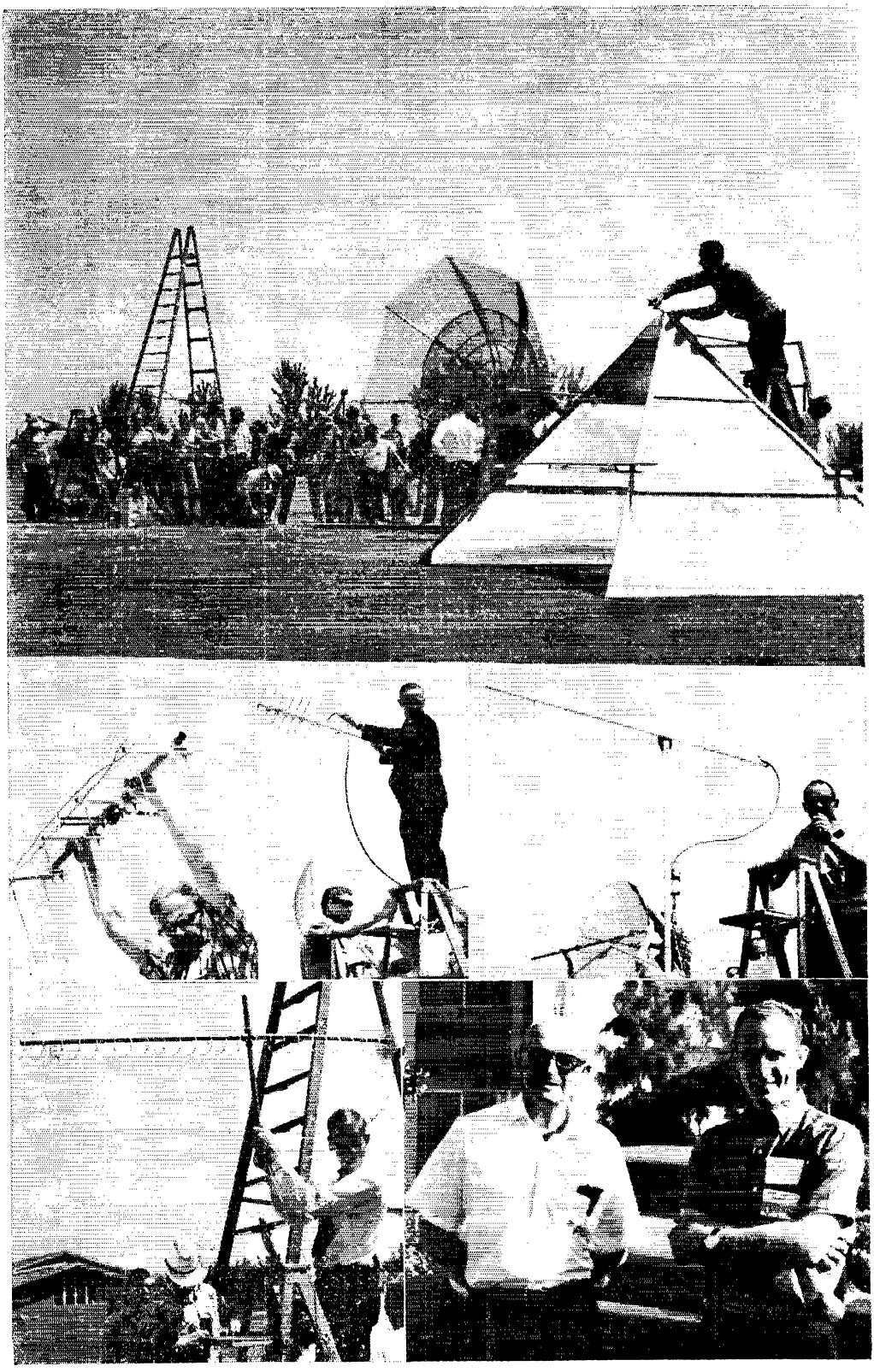
This annual affair has become something of an institution among v.h.f. enthusiasts of the Southwest. Though not big as hamfests and conventions go, it draws outstanding v.h.f. men from surprising distances. The Conference is held in different California cities, wherever there is a group willing to put it on. Santa Barbara, Porterville, San Jose (in connection with the ARRL National Convention in 1965) and Fresno are some of the places we can recall.

The 1967 event was held in Fresno, with long-time v.h.f. man W6BJI as chairman. (Gil was coholder of the 2½-meter DX record in 1940, and was the first amateur to make both WAS and WAC on 50 Mc., just by way of documenting his devotion to the world above 50 Mc.) Something over 60 v.h.f. men came from all California, as far north as Washington, and as far east as Las Vegas, Nevada.

The Conference gives the true enthusiast an opportunity to talk over problems and swap experiences with others of his kind, without the distractions of a big-time ham convention. An outstanding feature is the Antenna Measuring Party, a competition that has drawn ever larger numbers of participants and provided hours of entertainment, as well as information on how to build antennas that *work* on 432 and 1296 Mc.

Our pictures of the Fresno party are by George Chong, W6BUR. At the top we see some of the gang getting ready, with the dish of K6MIO and a horn by W6ZOP dominating the scene. At the left center, W6TZJ registers consternation upon seeing his 432-Mc. commercial collinear showing only 10.6 db. gain. Next, VE3DNR juggles a Yagi made with quad-type elements. Right center, WA6GYD demonstrates "a lot for a little" with a wood-boom 432-Mc. Yagi (from the ARRL V.H.F. Manual) that showed 12.8 db. Lower left, WB6IOM lines up his 24-turn helical antenna for 1296 Mc. Moon-bounce champs, W6DNG and K6MYC, lower right, add dignity to the occasion.

Two similar events are coming up in August. The Central New Jersey V.h.f. Society is putting on a 432-Mc. measuring party in connection with their hamfest at Johnson Park, New Brunswick, N. J., Aug. 13. The Central States V.h.f. Conference at Waggoner, Okla., will feature one in a two-day affair Aug. 19–20. More details in July *QST*, page 91.

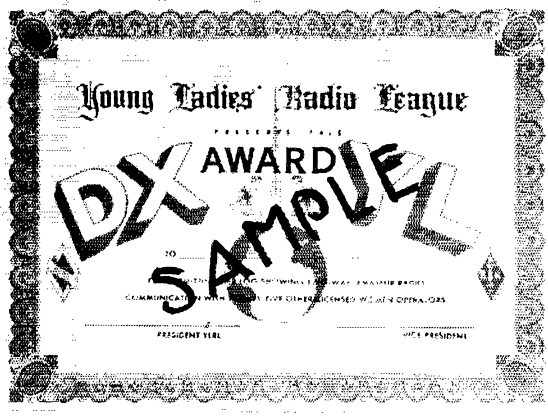


CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

DX-YL, "For Women Only!"

ONE question that every non-licensed person asks us "How far away can your set go?" or a similar phrase used by the uninitiated. The reply depends on the farthest DX we have worked, in the case of the Novice, those she has heard others working, and pounded harder at the code and the *License Manual* so she too could claim those far away places with the strange prefixes.

As we chatter about our DX contacts, we are also often asked, "But do you ever talk to any *women*?" We certainly do, and, thanks to YLRL, some of us can produce a certificate to prove that we have, for one of the most exclusive bits of "wallpaper" is the DX-YL Award issued by the YLRL, to those who have worked 25 YLs around the world. It is exclusive because it is issued to women operators only!



DX-YL Certificate

Conventions and hamfests, and other amateur radio gatherings usually schedule at least one meeting for the gals. We share the many other scheduled activities, but here the doors are closed to everyone but the feminine members of the amateur service, although, if we glance at the door, we may see some masculine eyes peeping through a crack during the fashion show. Like the conventions, the many certificates that grace our walls are available to everyone, and most of the awards that are sponsored by YLRL state "open to all licensed operators" in the rules.

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1046 East Boston St., Altadena, Calif. 91030.

Ursula Bürger, DL3LS, Remscheid, Germany.

Not so with DX-YL. Like the special events at amateur gatherings, this green and white piece of paper is marked "strictly feminine."

For most of us there is a thrill to working DX, and in seeking out hard to find places. For our achievements in this activity that began, we might say, when Marconi logged the first of all DX contacts, there are many awards. In 1958, the YLRL decided that, since they were a world-wide organization of women operators, it would encourage women of all countries to make contacts with each other. Beginning April 1, 1958, this DX-YL Award was made available, and on August 18, 1958, the first certificate was issued to Mollie, ZE1JE, in Rhodesia. In the past nine years, the certificate has gone to many women in both United States and Canada, and

Anny Jenk, HB9YL, Frutigen, Switzerland.

to 31 other YLs around the world. Those who have received it world-wide are:
CR7LU, DJ2YL, DJ2VKC, DL3LS, DL6VM, FG7XL, G2YL, G6YL, G8LY, HB9YL, H1PLH, KA2HA, KP4APX, OA4HK, OE2YL, OH5SM, TG9BC, TY2SO, VK2AIA, VK3KS, VP1OLY, VQ2WZ, YU2RBO, ZE1JE, ZL2JO, ZP5JP, ZS1NQ, ZS1RM, ZS5OB, ZS6APG.

The rules are simple, work a total of 25 DX gals from one station location or, within a 25-mile radius of the home station, and submit a copy of standard log information: date, time, station worked, frequency, her report, your report, type emission (phone or c.w.), and her name and address. Contacts do not have to be with 25 different countries, just with 25 different YLs. That's all there is to it. Your precious QSL cards remain safe and sound at home. The custodian of this certificate is Maxine Willis, W6UHA.

One other requirement, not listed in the rules, is perseverence, and patience, for of the huge amateur radio population of the world, only

Monique Tendron, FG7XL, Guadeloupe, F.W.I.

8000 are women. When that lovely certificate arrives it will answer the "do you talk to any women?" question quite effectively. But, also, it will indicate an experience that is unique in its individuality among certificates. Rather than "wallpaper" it means Elda, Thelma, Beth, Gerda, Monique, not calls alone, but people, YL-type people who have become real friends thanks to the quest of the DX-YL Award.

Plan Ahead

'Don't Forget Our "BIG DATE"
YLRL — 68
June 13-16, Denver Colorado.'

is stamped on all mail coming from Denver, these days. It takes a long time to plan an International YLRL Convention, so, while all this sounds terribly far in the future for those who will be there to attend the meeting, to the committee it probably seems like tomorrow.

The gals are combing every list they can think of to make sure that no one will be overlooked. They are lining up a very large array of prizes, including a special category called "Around the World." Has anyone a desire for a penguin? It is listed on the

Constance Hall, G8LY Hampshire, England.

"Around the World" list, and so far no one is saying whether it is a live or stuffed penguin.

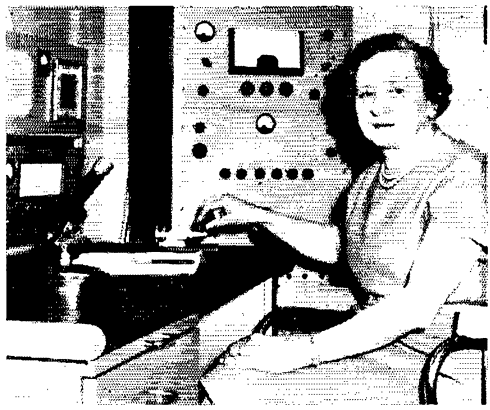
There are plans for absolutely mouth watering souvenirs and favors; naturally there is to be a banquet; sight-seeing tours of the Denver area that sound great, including the Air Force Academy, Palmer Lake, the Garden of the Gods, and Colorado Springs.

But the main theme will be: YL meeting YL — putting faces on fists and voices, and thoroughly living and enjoying the full meaning of the YLRL "signature" — "33." So, start planning right now, so that when the gates open, and advance registration starts, each of us can prove that the YLRL motto of QRV isn't just a group of letters. Plan ahead, way ahead, and BE ready.

W6UHA, Maxine Willis

The custodian of the YLRL, DX-YL Award, Maxine Willis, is more than qualified for her position, for she is an extremely active DX operator. Since she received her license in 1941, Maxine has specialized in DX, as her favorite form of operation, with a total of 304 countries confirmed, and, with OM, Ed, W6TS, has a combined total of well over 600 countries.

To many amateurs, DX means a contact made with another operator on the approved countries list. To Maxine it is far more. It is friendships with people all over the world who have not only worked



Thelma Souper, ZL2JO, Wellington, New Zealand

Maxine Willis, W6UHA

W6UHA on the air, but have visited with her and Ed at their home.

The call W6UHA, is known on the DX bands to almost everyone from her regular schedules with many YLs around the country and around the world. Her interest in people, what they are doing, and how they do it, has resulted in many associations and lasting friendships that have continued over the years, and are the intangible, but highly valued rewards of her operating. These are the real meaning of QSL cards that are tangible proof of the contacts that she has made.

A charter member of the Southern California DX Club, Maxine is a member of YLRL, Los Angeles YLRC, and holds, in addition to many other certificates, DXCC, WBE, WAC/YL, and YSRG. She was the second YL to earn the WAZ award, and of course she holds DX-YL. QST

August 1942

. . . The cover this month shows the cockpit of a Civil Air Patrol plane with radio equipment designed by Don Mix, W1TS, for the purpose. Many private planes acceptable for this service were without the necessary two-way equipment and here is a rig which fills the bill. All constructional details, tuning procedure, etc. are described in the article.

. . . John Huntoon, W1LVQ, gives practical details involving the War Emergency Radio service. Tables of organization are given, as well as the dope on necessary equipment to implement the service.

. . . Speaking of the above, George Grammer, W1DF, goes into the technical aspects of civil defense gear. He has some data on the stability of various transceivers, etc. The stability as set forth in the new regulations poses somewhat of a problem since there is no easy way of accurately measuring frequency closer than about 0.1%, at 112 Mc.

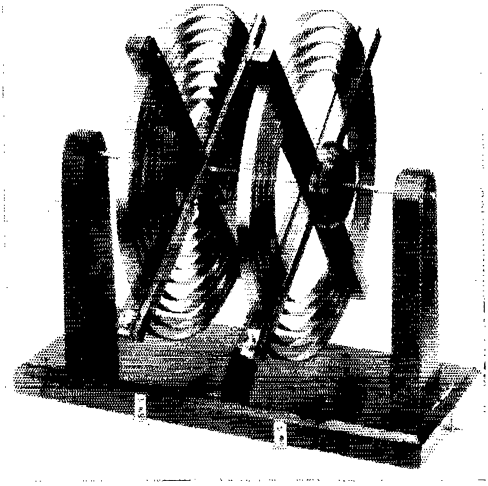
. . . Robert F. Shaw, W3AOC, continues his discussion, started last month, on microwave techniques. He describes cavity resonators and tells how to build them, giving considerable technical information on cut-off frequencies, etc.

. . . A study of the effect of horizontal magnetic fields on radio propagation is the subject of an article by Dr. E. Dillon Smith, W3PZ. While not directly of use to the average amateur, it does give strong clues as to what is happening on the bands.

. . . Clinton B. DeSoto, W1CBD, visits the Noroton Training Station and writes an interesting account of how navy radiomen are made. Quite a bunch of hams in the photographs.

. . . More on crytanalysis, by W1LVQ. Looks pretty complicated at first glance, but with careful reading it commences to make sense. This sort of thing is real fun if you stick to simple substitutions. When you get pretty good at it, try Poe's *Gold Bug*.

. . . Quite a little activity is reported by several amateurs using carrier-current techniques. There are a few more notes on light-beam communication and some further information on audio frequency induction and earth-current communications. Also more on r.f. induction fields, aircraft detection, supersonics and microwaves. These various fields offer plenty of opportunities for the amateur to experiment and have fun, too. QST



From the Museum of Amateur Radio

This fine example of an oscillation transformer was built and used by Charles H. Stewart, 3ZS, first Vice President of the ARRL in the heyday of the spark era. This rig would easily handle a full kilowatt on 200 meters or thereabouts. This type construction was very popular among amateurs since it was relatively easy to build. We suspect this one was used much above 200 meters since Mr. Stewart had a special license.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Yes, *how* time flies! We reserve August of every third year for your "How's" pix index. It's a welcome opportunity for us to credit and commend, once again, all whose unsolicited photo contributions helped brighten these DX pages in the recent past. You can abut the following rundown to previous treatments:

— 1964 —

July: YU2OZ, FO8AQ, DU1OR with DJ4OP, CR6CH. *August:* VK2SK, VP2KJ, CR7GF, 6Y5UC, XE2OK, VS6EY. *September:* VP8HF, Antioch (Calif.) DX Society, YN1LH, 9G1FK, VS1JY. *October:* 6Y5AH, LU4ZI, Australian s.s.b.ers, 5J4BF, PAØPN. *November:* UWØFK, EA4GZ, YU3NR, OH2BQ/OHØ. *December:* VK2AGH/L.H., CN8s AW FW, FO8BL, HM5s BF BG, ZK1AR.

— 1965 —

January: OHØNF, DL7FT-3A2CU-M1FT, UW9CC, CR7BS, HS1X. *February:* W4BPD, 9X5GG, 9Q5QR, ZC4TX, 4XØWF, VU2LE, VP2AX. *March:* 5H3HZ, CR7LU, KS6BL, ZK1AA, PY1MCC, HK4EB. *April:* 5A3TX, BV1USG, VU2s TP SX, PY2s CQ SO. *May:* 7Z1AA, HZ3TYQ/8Z4, K3SWW/KG6, ZB2AE, DU1TA. *June:* VP1GFQ, JA3WU, K3SWW/KG6's QSL factory, UT5EW, HBØs AFM AFU. *July:* SV1WW, OR4VN, LUs 3AAT 4AAR, TL8s AC AE SW, OH1s AG VA VB WY. *August:* HL9KB, HS1FJ, ET3RS, 4X4TP, KG6ALU, HKØAI, HK4TA. *September:* FR7ZI, I1s FO RIF AGI MAH BNU BLF AB FT TJD, IT1AGA. *October:* 9M4JY, 4S7NE, OA4KY, FG7XK, 9M6s AB AC. *November:* G2RO/DX, CE1AV, PI1SZR, HI8LC, YS1RFE, VS9ASP, CT3AQ. *December:* DJ2KS/PYØ-DI2DR, I1AHN, W2RUI, G3MWI, VU2AJ.

— 1966 —

January: KG6SB, 5Z4IR, HR2ABC, G5KW/YI, 9M4MT, OHØNI, YU3AT. *February:* KA5ZS, UA3BK, IT1TAI, VU2LWZ, UW9PT, UA9OH, ZB2s AM AO, ZP9AY. *March:* 4X4s HW SK, VR2CC, VK3NR, HC1JQ, ET3USA. *April:* *Meteor* (DI2DR), OE2EGL, HM1BB, CR6HF, 9Y4VT. *May:* W6FHM/DU1, MP4TBM, KX6s DR NB, UL7KAA, OY2GHK. *June:* VK2GW, EA8EX, YK1AA, FL8s AO MC RA, EL2AE. *July:* DU1s TNM TA, ZL1OY, VR6TC, DM4PKL, HC1EY/WØMBD. *August:* VP8HJ, PY7ACQ/p, UW4HZ, HM2BD. *September:* KR6MM, OA1BL/4, SV1BH, ET3AC. *October:* VP2AC, CO8RA, ZB2AX, 4X4HT/p, KA7AB. *November:* KV4CK, YN3FP, VR4CR, FH8s CD GF, PAØDEC. *December:* K6SRZ's QSL, 9M8RS, VKØMI, KL7AIZ staff, 9V1s JG JW, FL8HM, VU2JN.

— 1967 —

January: WØGTA/8F4, I1s AMP/M1 SGS/M1, 9L1TL, UA9s OH PP. *February:* CPs 5AJ 8AB, KV4EY, WA8RWU, DU1FP, YO2BI, LU6s ACS ACU, HK2DP, CR6s EI EO, ZS1XR. *March:* 4S7s DA GV NE, VU2LE antenna party, HB9s PQ YL, 4X4s QG UL VG. *April:* ZF1GC, VP1VR, KX6BU group, MP4TBO, FY7YG, Midland Gs, TN8AF. *May:* VP9BK, DJ1ZN/W2, VU2HGZ, KL7FKO, HC5NW. *June:* Old G5BD, K4IEX's "DXCC²" No. 47, WØTUT/mm.

QST, by design, is the product of its readership, a clearing-house or trading post for data from erudite tech articles through operating notes all the way to Ham-Ads. Some find it possible to help pull the wagon more consistently than others. These we salute!

For example, over the past 36 months we find that W1BB provided five usable shots for your "How's" DX album. Other prolific producers are Ws 2IWP and 7DJU with three apiece, Ws 1BGD 1BPY 1ECH 4VPD 5AI-5VA 6JFM 7PHO 7QYA 7WLL 8GIU 8IV, Ks 2UYG 9RNQ, WAs 4CZM and 6MWG with potent pairs. Other contributors to the gallery:

Ws 1BDI 1BPM 1HGT 1MD 1RAN 1TS 1WTE 2FX 2RJ 2SSC 3HNK 3ICQ 3MDJ 3ZNB 4DQS 4NJF 5LDII 5RU 6CZP 6EFV 6ISQ 6KG 6LDA 6OFF 6QHQ 7VRO 8EQA 9NLJ 9OGY ØAUB, **Ks** 1FLG 1IGO 1IJV 1SWG 1UOV 2EVM 2MGE 2MUB 4CAH 4EZL 4WMB 4YFE 5JVF 6JAJ 8RTW 8SSY 8VBS 9DKU 9EZH, **WAs** 1DJG 2EFN 6KHK 6SLU 6TFZ 8GSJ 9AXX 9BGK 9GQA, **WBs** 2FMK 2KUP 2RSS 6BMW 6GFZ 6KVA, **KH6**BZF, **VEs** 1ASJ 2AUR 3FXR, **DJ2**YJ, **G2**DC, **MP4**BEQ, **OD5**EE, **PY7**AKW, ex-**U2**GU, **VK5**NN, **VU2**CZ, **4X4**SK, India's ARSI, Brazil's CBDX, E. Evangelista, J. Gordon, G. Johnston, M. Kelly and the Kwajalein *Hourglass*.

Those Whites of ARRL — Deputy Communications Manager W1YYM and W1WPO of the bustling DXCC Desk — rate a special Jeevesian accolade. Though continuously up to their headphones in paperwork, representation and other League duties, Ellen and Bob found time to pass along no less than *thirty-eight* portraits for your pleasure. This is office liaison far beyond the call of duty.

Thanks, indeed, one and all. Now we're off again toward another pictorial DXCC. Any likely candidates for loan? *K!*

—Reprinted from May 1954 *QST*. (Dougie is a six-foot high school freshman now.—Ed.)

*7862-B West Lawrence Ave., Chicago, Ill., 60656.

What:

Occasional ionospheric lapses back to 1963-'64 levels are serving to emphasize the fact that DX conditions are becoming fabulous to the point of spoiling us. With 20 almost solid around the clock, 15 getting in good licks, and 40 paying off the night shift we've come to expect a WAC per sitting. Yet it wasn't long ago when summer was a DX slack season! "How's" reporters have been wearing their ballpoints flat on the subject of 11 Me., so let's scamper through an ample sampling of their success.

20 phone is really swingin' for Ws 1DYE 2DY 2EWO 3HNK 4NXD 5EHY 6EQB 8YGR 9LNQ, Ks 4TWJ 7INE 9UCR ØJPJ, WAs 6JDT 7BOA 8GGN 8MCQ 8PKG 9SXQ ØDYZ, WB2RJJ, VE2s AQI BUW, listeners D. Smith and W. P. Kilroy who worked, heard or heard worked CEs 1FC 2AA 6EZ 8AA 1-3 hours GMT, CN8s FC FV, CPs 1AB 7, 8AB, CRs 4AJ (202 kc. above 14,000) 1, 4BC (213) 9, 5SP (182) 22, 6CY (195) 21, 6GO 6HI 6IK (190) 20, 6IS 6LAB 7AP 7PC 9AH (197) 15, CXs 2CO 4AW 9AAN, DF2LE, DK0AA 3, DMs 2BEA 5, 4WPL (223) 6-23, DUs 1FH (229) 11-14, 1PAR (201) 16, 1SBP 15, 1RS 8RP/7 9FB 9MVC 9RT, EAs 8CB (332) 22, 8CE 8FG 9AZ 9EJ (125) 27, EIs 2BG 7, IJ, ELs 2O 8B, FB8WW (252) 12-13, FG7s XL XT (208) 22, XX 0, FH8CD 14, FK8s BG (207) 12, BK (233) 12, FL8RA (205) 23, FO8s AB (118) 9, AG 17, AQ 1, BH (154) 6, BQ (106) 7, BS, FR7s ZD (193) 15, ZL (119) 13, FW8RC, FY7YM (230) 14-22, GBs 2SM 3SBF 3SET, GC8HT (242) 13, GD3ENK (332) 18, GM3SVK (120) 21 of the Shetlands, HB0LL 22, HCs 1FY 2CC 2JA 5EJ 6GM 8FN (332) 19-20, 8JG (145) 22, HH9DL 23, HIs 7XTM 23, 8LAL 8XJG (247) 2, HK0s AI 21, QA, HL9s KH KP 16, TE (205) 13-14, TI (218) 15, HMs 1BB (105) 12, 5BF 14, HPs 1JC 9FM/mm (104) 6, HRs 1CN 1JP 1KAS 9EB, HSs 1CB 19, 1HL 1RZ/3 1WF 1WZ 4AK 16 all on the Ban, HVs ICN (275) 11-12, 3SJ, HZ1s AB (206) 5, AT, ISIs ALX (331) 22, VAZ, JAs galore including 4AI 4AO 4ZA 9AG 9IL, JH1CDE (110) 12, JT1KAA (110) 12, JXs 3P 5AK, JY6GVM, Ks 5DNB/KS6 13, 8NHW/XV5 (206) 16, 8VWM/KG6 (290) 16, ØOXV/CE0A, KA2s DL (230) 12, JP, KB6CZ (220) 11, KCs 4USJ (278) 6, 4USM (180) 3, 4USN (330) 2, 4USV 6AA 12, 6BO (201) 15, 6BW (244) 8, 6CL 6JC (230) 11, 6PE (290) 11, KG6s AAY (231) 12, ALV AQG FAE (205) 11, IF (204) 12, IG (280) 14, IJ (210) 11, SB (250) 12, SF (207) 13, SL (248) 11, SN (227) 11-12, KH6EDY (215) 12, KJ6BZ (338) 12, KL7s AM EBK FLB FQQ (330) 18, OJ, KM6BT (238) 11, KP6AZ 8, KR6s AB GF 13, LL MB (265) 13, NA QW (338) 7, UL (240) 11-12, KSs 4CC 6CJ 6CL (237) 12, 6CR (220) 11, KV4s BA (332) 21, BW, KW6s DS EJ (205) 11, EN (275) 2-12, KX6s BQ EQ FE, KZ5s AA EZ KF SO (295) 5, LJ2X, LX1s BW 20, DB (331) 21, DE WR 6, LZ1s BZ WD (133) 1, M1B, MP4s BCC BDL BEU 20, BGE (200) 3, MAX (200) 18, MAY 19, QAL (207) 19, TBO, OA4s BS CF 23, OG SO YM (332) 1, OD5s BA EU FA 18, OH0NI (202) 5, ON8XA, OXs 3KM 1-2, 3WX (229) 7, 4FC (208) 14, 5AR 4, OYs 5S (122) 11, 6FRA 7ML, PA9s CM CN, PJs 2CE 23, 2CR (109) 12, 2CT 2MI 14, 3CC 2, 3CL (180) 4-5, 4AC, PZ1s BW (188) 21, CF, SPs 2BSX 8AJK (185) 5, SUIs KG RA, SV0s WL (221) 22, WS WU (332) 0, WV 5, WX (331) 1, TF2s WJX (332) 23, WKA 22, WKH, TGs 8FA 9AD, TIs 2CJV (332) 20, 2IO 8LM (332) 22, TL8DL (230) 22, TN8AA (225) 21, TR8s AD AG (160) 21, TU2s AB AY (201) 0, BA (200) 1, BD, U5ARTEK, UAs 2CW 9BE 9DT 9KDL 3-4, 0AI 0CO 0NM (120) 13, 0YP (202) 12, UB5s LV ND RR SR 3, WI, UC2CU 5, UD6s BR 3-4, BV (211) 3, UG6SG (191) 3, UI8MN, UH8HD, UJ8AC, UL7s BU JA 2, UM8s FZ 3, KAB (205) 3, UO5WS, UP2s AX 13-14, KNP, UQ2s KAA 5, KFG 6, UR2s AR 4-7, KAA KAN KAW 21, UT5s BZ TO 5, UWs 9CC (310) 2-3, 9EF 9IF (168) 3, 0AA (189) 3, 0IE (202) 1, UY5ZA (332) 21, VEs 8MD (330) 0, 0NC 0NG 1, VKs 1BA (220) 14, 1GD (275) 12-13, plenty of 6s and 7s, 8AV 13, 9AG (230) 11-12, 9BS (245) 14, 9DJ 14, 9DR 9GN 9GR (188) 11-12, 9KS (151) 13, 9MK (210) 13-14, 9NT (224) 12, 9OM (273) 10-11, 9XI 0CR (331) 5, 0GP 0GT 7, VPs 1JEM (332) 21, 1LB 1LP 1NC 1TC (332) 23, 2AA 2AC (195) 23, 2AZ 2CAR 2GZW 2KM (250) 23, 2LS 2MH 20, 2SAA 2SAB 2SJ 2SY (332) 1, 2VZ (197) 22, 5AB 5RB 6KL (140) 8, 6WR (130) 22, 7DL 7DS (332) 17, 8FL 8HZ 8IU 9II 9SK, VQs 8AX 12, 8CA (200) 12, 9EF 9HB (202) 22, 9HJB (234) 19, VRs 2DI (240) 11, 2EK 2-3, 2FF 11, 3L 3O 5RZ (252) 5-6, VSs 5MH (250) 12, 6FS (230) 14, 9ALV (187) 19-2, 9MB (240) 1, VU2s DKZ 23, FN (122) 15, QS TN XL 16, WA0CHH/TI4 (184) 3, XP1AA, XW8s AX (213) 14, BS (202) 19, CF, oodles of XEs but no XE3s, YAs IFV (201) 14, 1HD 5RG, YJ8BW (200) 11, YK1AA 6, YN6MBT, YOs 2BB (189) 7, 2BC 3RO 17, 9AFT 5, 9VI, YSs 1ACS 1AG 1MAX (334) 2, 1OS 2CS 2JMR (138) 6, 2MBA (330) 0, 2MG, YU2NFJ (205) 23, enough YVs, ZB2AK 5-6, ZC4s CN 5, DW MO 5, ZDs 3D 8, 3C (270) 4, 5R 7KH (172) 8, 8RD (155) 20, 8RH 9BI (250) 19, ZEs 1AE 2JE 4JO (159) 6, ZF1GC (332) 22, ZK1AR 3-9, fourteen ZLs including 1AI (260) 6-7 of the Kermadecs, ZPs 3AL 3CD 3KT 5CF 1, 5JB 5JU, ZSs 2MI (332) 21 of Marion, 3BP 3JJ (122) 16, 3XG (110) 20, 9I (201) 11, 3A2MJC (261) 12, 3V8BZ (200) 0, 4M4AV, 4S7s NE (198) 12, PB (201) 12, YL (203) 17, 4UITU (123) 5, 4W1L, 4X4s AH (342) 5, CW 3, SO (332) 23, SW TP (135) 4, 4Z4s HB HQ (128) 19-20, JW, 5As 2TR (332) 21, 2TS 22-0, 5TV (332) 21, 5H3s JL JR KJ 18, 5LAs 2AJ 3, 2FD 8FD, 5N2s AAY (332) 23, ABF 15, 5R8s AS (220) 15, AZ, 5U7AL (180) 22, 5VZRQ (155) 18, 5W1AA (186) 12-13, 5X5FS, 5Z4s AA IR 19-20, JR KM (221) 20, 6O1AU (214) 20-21, 6Y5s AD (121) 21, AK AR 23, CG (332) 1, UC (221) 4, 7O7s EC (244) 11, LZ (195) 21, 7X0AH, 7Z3AB, 8R1s C (206) 7-8, G P (123) 21-22, S (208) 21, 9F3USA, 9G1s GA (242) 13, JM (162) 1, KM, 9H1s AM HB, 9K2AM, 9Ms 2AV 2DX 0, 2NF 2NY (203) 19-20, 2PO 17, 6JB 6JP 6MG (195) 14, 9N1s BG MM (240) 11, 9Q5s EP HF QR SS, 9U5s BB BD, 9V1s JY 15, LK MD MW (218) 15, MY NO (226) 14-15, NY, 9X5s AV 21, CE 20, SM (220) 20, SP (128) 21, WM (100) 22, 9Y4s LR and TX, very few using carrier-style a.m.

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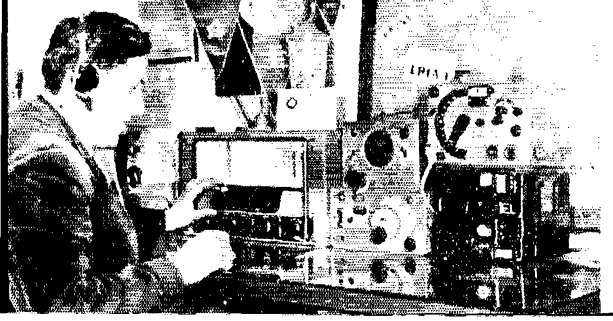
Gee willikers — we've just realized we have an eight-page *DX* column this month with orders to stay within five. The overseas contest season always pinches. Twenty c.w. will have to wait till next month when Ws 1CNU 1DYE 2GRD 2JBL 2JDH 3DPR 3HNK 4NXD 6EQB 7OEB 7VCB 8PKU 8YGR 9LNQ, Ks 3MNJ 4IEX 4TWJ 5EIZ 5VTA 7INE ØDEQ ØJPJ ØREV, WAs 1FGN 2KSD 4CZM 4QLP 4YDR 6JDT 7AUW 7BOA 7BOB 8GGN 8MCQ 8SXQ ØOXO, WBs 2RJJ 2VYU 6VVS, VE3GLG and IIER feed our kitty along with later filings. Maybe we'll have a chance to check other bands thanks to (15 c.w.) Ws 1CNU 2JBL 3HNK 5EHY 7VCB 8YGR, Ks 4TWJ 5MHG/6 5VTA ØJPJ, WAs 1GXE 3GJU 4YDR 6JDT 7AUW 7BOA 8MCQ ØOXO, WBs 2RJJ 2UOO 2VYO 2WKR 4EFE 6VVS, WNs 2ZQE 4FRY 6UVH, IIER; (15 phone) Ws 1CNU 2DY 2GTQ 3HNK 5EHY 8YGR 9LNQ, K5VTA, WAs 4YDR 6JDT 7BOA 7BOB 8MCQ 8PKG, Mr. Kilroy; (10 c.w.) WA7s AUW BOA BOB, WB6VVS, KH6BZF, IIER, 5Z4SS; (10 phone) Ws 1CNU 8YGR ØTGG, WAs 4YDR 7BOA; (40 c.w.) Ws 3HNK 7VCB, K4IEX, WA8MCQ, WBs 2RJJ and 6VVS. The way things are poppin' right now our coming fall DX session should be Cloud 10!

Where:

ASIA — "I'm continuing to represent 4X1s SK and SO as QSL manager," writes W2IWP, "but I dropped managerial duties for 4X4UL as of June 1st. No logs from Meir since last November. All QSLs from U. S. hams for 4X4UL have been returned with the suggestion that they try direct. However, I do hold his logs for QSOs from mid-1965 through October, '66, so I can confirm these on receipt of self-addressed stamped envelopes." Since the Middle East hotted up, QSL aide W3HNK reports a similar gap in liaison with clients 4X4s RD and UH. "Whenever their logs arrive I'll be able to move the stack I'm holding." By the way, W2QHH says 4X1CJ has need for a reliable U.S.A.-based QSL rep . . . . . WB2NZU's W/Ks-only managership for VU2VZ begins with QSOs of May 7, 1967 . . . . . "I was operator of HL9KW from April, 1966, to January of this year," acknowledges K5HTM, ready to confirm his contacts on receipt . . . . . "VS9ABL took U.K. leave in May, promising to send me his March and April logs," comments W4NJF. "No word from him yet, and I have a bushel of cards on hand, mostly from Sixes." . . . . . 1SWL's *Monitor* reports a fresh U.S.S.R. prefix displayed by UZ9UA, apparently the same region as UA9-UV9-UW9.

AFRICA — "We'll QSL 100 per cent in answer to all valid cards received," assures W4ZCB, referring to contacts scored during his G DL 5A 6W8 TU2 9G1 ZD8 and PZ1 ramble with W4EII in May and June. This fall they expect to visit HL HS ST2 VU2 YA 4S7 5N2 7G1



OK2KMB, shown here with operator Joseph at the dials, signed OK5KMB at a Czech hamfest last month. Such club *stations are numerous and very active in eastern Europe* where the number of amateurs tends to outrun available ham equipment.

QST for

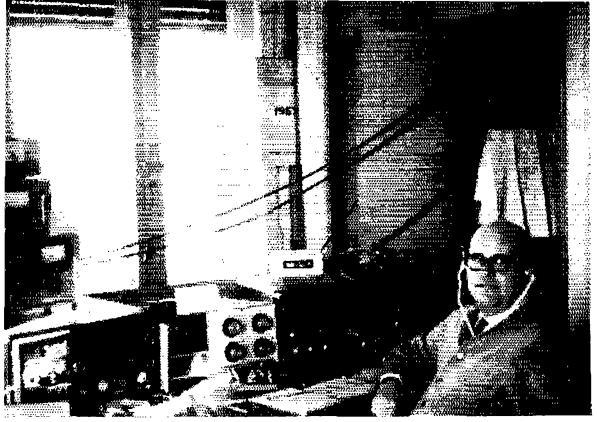
ST2SA is good for snappy Sudan QSOs and quick QSLs. Sid gets a kick out of 10- and 15-meter a.m. and c.w. but says his two harmonics cause quick QSY now and then. (Photo via W3BBO)

and 9N1 territory . . . . TG9EP, QSL helper for 5R8AX, is aroused by the number of s.a.s.e. he receives with U.S. postage affixed. We thought that problem was principally Canada's. No use shipping U.S. glued-down mint stamps outside W/K-land, fellows, APO-type routes excepted . . . . K1SLZ is QSL manager for WA3CJJ now in Kenya. If you work OM Chuck over there, QSL via Larry . . . . Liberia's annual field day unveiled that country's new 5LA prefix. 5LAs 2FD and 8FD really had the gang grabbin'. . . . . "I have all ET3AC logs now, also records for Blake's FL8AC activity," advises W4NJF. "My pile for 7Q7LC is getting bigger but perhaps 7Q7EC can get him to send me some logs."

EUROPE — NNRC's *Bulletin* mentions that QSL swaps by U.S.S.R. hams appear to be tightening up again. Instead of direct station-to-station exchanges they'll be sticking more closely to Box N-88, Moscow, inbound and out . . . . Single-sideband contacts with EA6AR in mid-July can be confirmed by the visiting operator, DL7FT, according to word via W1WPO . . . . G3APA, through K0GZN, says two IRCs are sufficient for airmail from England to this country. The recent shuffle in international postal rates has everyone a little shook . . . . VE4DB has evidence that two distinct ZB2AMs were active around the same time. One of 'em debunked his QSO but the other came through with a QSL from C.P.O. Mess, HMS *Kooke*, Gibraltar . . . . HAMU tells VE4DB that HV1CN's call is pirated on c.w. now and then . . . . Italian calls with prefix numerals other than "1" can usually be QSLd to the I1 of the same suffix. The significance of those variant numerals escapes us . . . . WA7BOB agrees that working a station with such a call as OH2BAD should be done with a grain or two of salt. But Dave's dad, W7BNZ, salted away the QSL a week after contact . . . . From OH2YV's Scandinavian Activities Contest announcement (see "Whence"): "All SAC participants are requested to confirm each contest QSO with QSL, a voluntary habit aimed at fostering QSL exchange all over the world."

HEREABOUTS — "In thirty months on the air I've received some 6000 QSLs from the U.S.A. alone," remarks TG9EP. "Almost every QSLer seems to want my card 'rush direct airmail', too often without the courtesy of including a self-addressed envelope. Instead of IRCs I can accept an *unaffixed* 15-cent U.S. stamp along with each s.a.e." . . . . W4NKA says he and WA4NKA both work their DX out of Atlanta but get their QSLs through different bureaus (p. 154, June *QST*). It's definitely an age of specialization, lads . . . . SCDXC's *Bulletin* observes that Australia is rigging up its own version of ZIP code, a four-digit deal . . . . DXCPR's *DXer* says the P.R. bureau holds a batch of QSLs awaiting claim by KP4s ATQ AZJ BNI BOJ CKB CKI CNN DA LA QV and YD . . . . K3AHN's QSL service in behalf of KV4FA commences with QSOs of April 29, 1967 . . . . W0VXO can help you confirm February 160-meter contacts with OA4O, PY1NFC, VP2s AZ KY and MK . . . . HP1JC wonders who's been signing HP2JC behind his back, suffixes being singular in Panama. When traveling he sometimes signs HP5-6-7JC but always sticks to HP1JC/2 when in the second call area. "Since I no longer answer improperly filled-out QSLs I can move faster through the backlogs." Juan points out that the emission mode is extremely important to certificates chasers, so don't omit endorsement for two-way s.s.b., RTTY, spark, etc. . . . . All hail our "QSLers of the Month," namely CR6GO, CT3AS, EI3S, FY7YM, G2RF, HC1LE, HH9DL, K9GZK, KB6CZ, KL7MF, KV4AA, KW6EJ, KZ5BC, LX1WR, MP1BBW, OE3PWW, OHs 1 VA 2BAD, OX5BO, SP3AIJ, VEs 4FZ 8ZZ, VKs 2AVA/L.H. 2GW 3XM 7SM, VP7NP, VR4CR, VS9ALV, WA1EAV/VP9 ZL3AB, ZS6AJO, 8R1G and 9G1FQ, each loudly applauded in "How's" correspondence from Ws 4NJF 5EHY 7BNZ 8YGR, K5VTA, WAs 2HIU 4YDR 6JDT 7BOB 8MCQ, VE3GLC and moultor Kilroy. Any particularly prompt postbox plunkers over your way? We'll gladly help you pat some backs . . . . *Alp!* W4REZ is trying to run down VQ4EZ of '58 and 4W1AA; K5MHG is foiled by VP1WH; and WA4YDR desires a tardy JA3GZN affidavit. Any hints? . . . . WA3CFK, WB2RJJ and VK5BB stand ready to shoulder QSL labors for deserving DX operators . . . . Ex-HC4TB, now at the address in the list to follow, urges those still awaiting his QSLs to be patient. "Much of my mail has yet to be forwarded from Esmeraldas, a procedure that could take months." . . . . "I QSLd my thousand Novice QSOs 100 per cent but returns are very poor," protests ex-WN8TND who by now should have resumed his DX career as WA8TND . . . . Now our individual recommendations in the QTH line, but keep mindful of the fact that these data are necessarily neither complete, accurate nor "official". . . .

CP6EX, P.O. Box 679, Santa Cruz, Bolivia
EP3AM/W4ZCB/W4EII (to W4ZCB)
FO8BU, Box 374, Papeete, Tahiti (or via REF)
FY7YN, R. Robinson, Rte. Mongo, Cayenne, Fr. Guiana
HB0LL (non-W/Ks via DL7FT)
ex-HC4TB, T. Brigham, 460 Westminster Av., Haddonfield, N.J., 08033
HL9KW (see preceding text)
HP3PJ, Box 74, David R.P.
HR1RCT, Radio Club of Tegucigalpa, P.O. Box 149C, Tegucigalpa, Honduras
IS1ALX, P.O. Box 33, Fiesole, Florence, Italy
K5BNB/KS6, % Dept. of Education, Pago Pago, U.S. Samoa
K6KII/KG6, C. Moore, Box 110, U.S. NavCommSta, FPO, San Francisco, Calif., 96630
KH6EDY, % R. Johnson, Box 36, FPO, San Francisco, Calif., 96614
ex-MP4TBO, R. Baines, "Moorfield", Hardstoft Rd., Pilsley, Chesterfield, Derbyshire, England
OA0UO, Aptdo. 280, Iquitos, Peru
OX4AA, Box 648, APO, New York, N. Y., 09121
PJ4AE, P.O. Box 186, San Nicolas, Aruba, N. A.
PY7s AOA/0 APS/0 AIN/0 (to PY7s AOA APS AIN)
SMs 5BUT 0BUT (via W3HNK)
SV0WU, W. Smith, NavRadSta "T", FPO, New York, N. Y., 09525
TA1KT, via R. Beatty III, K4IEX, 6316 Lee Lan Dr., Orlando, Fla., 32809
TG9EP/4/6/7 (Africa and Europe via DL7FT; others direct)
TI4FCH, Aptdo. 2412, San Jose, C.R.
TI5YOR, P.O. Box 93, San Ramon, C.R.
TL8DL, U. S. Embassy, B.P. 924, Bangui, C. A. R.
UPOL-13-15, % E. Krenkel, Box N-88, Moscow, U. S. S. R.
VK2BRJ, VK2BRJ/9 (via W4CHA)
VK9VM, I. Fisher, Box 502, Rabaul, T. N. G.
ex-VP8IQ, H. Dunleavy % Nora Murphy, 2474 Valentine Av., Bronx, N. Y., 10458
VS9s ARV HRV KRV, Sgt. R. Vasper, Royal Sig. Tp., 39th Msl. Regt. RA, BFPO 16, % GPO, London, England
VU2s EII ZGB (to W4ZCB)
VU2VZ (W/Ks via WB2NZU; see preceding text)
W4EII/EL/HZ/JY/9Q5 (to W4ZCB)
W4UAF/KH6, V. Melvin, 116 Main St., Honolulu, Hawaii, 96818
W4ZCB/EL/HZ/JY/9Q5 (to W4ZCB)
W0VXO/KV4/OA4 (to W0VXO)
ZS5XA, 39a Bulwer Rd., Durban, Ntl., S. Africa
ex-3V8GM-SP5ALG-SP9ALG-4X4UJ-4X0WF (via W2VLS)
4X4UL (see preceding text)
5A4TV, P.O. Box 178, Benghazi, Libya
8R1S, Box 739, Georgetown, Guyana (W/Ks via W9JVF)
9G1BA, Box 625, Tema, Ghana
9M6JP, RAF Labuan, Sabah, BFPO 660, % GPO, London, England
DX1HA (via DL0JK)
DL0RD (via DJ2XP)
ET3s HJ TC (to W4ZCB)
FL8DY (via REF)
GB3WGC (via G3PKY)
HL9KE (via WA4YDR)
I9RB (via W2GHK)
IT0ARI (via ARI)
JH1CDE (via JA1SEX)
JY6GVM (to W6GVM)
K1OTA/p/LX (to K1OTA)
KG6s SK SL (via W4FRO)
KV4FA (via K3AHN)
OA4KF (via W2JBL)
OX3XO (via EDR)
VR5RZ (to VK4RZ)
W5YZL/KH6 (via KH6DQ)
ZC4MO (via RSGB)
ZC4TX (via WA9KVA)
ZD7WR (via RSGB)
ZD9BI (via W2GHK)
4X4s SK SO (via W2IWP)
4X4UJ/W5 (via W2VLS)
5A1TY (to HB9ADP)
ex-5A4TQ (to TL8DL)
5LA8FD (via EL9B)
5R8AX (via TG9EP)
5Z4KN (via RSEA)
9H1AG (via RSGB)
9M2NY (to 9V1NY)



DJ7CX/M1 displays a well-appointed DXpeditionary installation in mountainous San Marino. He displayed his signal to advantage, too, for 1500 contacts earlier in the year. All this and room service!

PX1GM (to F2GM) ex-**9U5ID** (via W2GHK)
VP1SB (via VE1SK) **9X5GG** (via W2GHK)

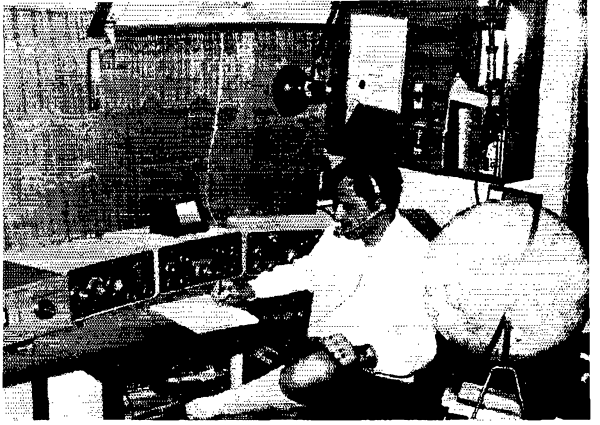
NOTE: For direct reply, unless specifically waived, self-addressed stamped envelopes (self-addressed envelopes with sufficient International Reply Coupons when appropriate) should be included in mailings to QSL managers designated herein. This is generally advisable when seeking postal response from *anyone*.

QTH donors for the suggestions preceding include Ws IWPO 1YYM 2DY 2JBL 2MEL 2YOZ 7UVR 9LNQ, K1TWJ, WAs 1GXE 7BOA, WN2ZQE, CX2AM, HR1MAS, KH6BZF, W. P. Kilroy, Columbus Amateur Radio Association *CARLscope* (W8ZCQ), DARC's *DX-MB* (DLs 1EP 3RK), DX Club of Puerto Rico *DXer* (KP4RK), Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, Eng.), Japan DX Radio Club *Bulletin* (JA1DM), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (WA6GLD), Utah DX Association *Bulletin* (W7LEB) and VERON's *DXpress* (PAØs FX LOU TO VDV WWP). Keep it rollin'!

Whence:

EUROPE — DARC (Germany) invites amateurs throughout the world to participate in its *WAE DX Contest*, No. 13 in the series, scheduled for c.w. from zero GMT, August 12th, to 2400 the 13th, and phone on September 9th–10th, same times. Non-Europeans will trade RST001, RST002, etc. (no "T" on voice, of course) with Europeans once per band at one point per QSO. Additional points are yours by sending "QTC" (QSO reports) to European stations at one point per QTC. Each QTC consists of (1) time in GMT, (2) station call, and (3) QSO number of any previous WAE Test contact. For example, WA9BRC raises DJ9YL and earns a contact point thereby; WA9BRC previously worked G3LUV at 1207 GMT for G3LUV's 96th Test QSO. So, besides the QSO point for his serial swap with DJ9YL, another point goes to WA9BRC if he successfully transmits "1207 G3LUV 096" to DJ9YL. WA9BRC can work DJ9YL later on the same band only for sending additional QTC. Over the entire Test period each QTC can be sent to Europe by WA9BRC but once, and DJ9YL can accept no more than 10 QTC per band from WA9BRC. Thus the more Test QSOs accumulated, the more QTC are available to parlay into additional points. *Scoring:* Multiply combined QSO and QTC points collected on all bands by the combined numbers of multipliers collected on all bands, the latter deriving from DARC's Worked-All-Europe Countries List — CT1 CT2, Germany, Spain, EA6, EI F FC G GC GD GI, Scotland, Shetlands, GW, HA, Switzerland, *Liechtenstein*, HV I IS IT, Norway, Bear Island, JW JX LX LZ, San Marino, OE OH OHØ OK ON OY OZ, Holland, PX, Sweden, SP, Greece, Rhodes, Crete, European Turkey, TF UA/UV/UW1-6 UB/UT/UY5 UC UN UO UP UQ UR, Franz Josef Land, YO YU ZA ZB2 3A and 9H1. Entries go to Dr. H.-G. Todt, DL7EN, Chlodwigstr. 5, 1 Berlin 42, Germany, postmarked no later than September 15, 1967 (c.w.) or October 15, 1967 (phone). Top Test performances in many regions will be rewarded with testimonials of merit. Now get to work on your northeastern stacked Sterbas, OMs . . . . . Last year's WAEDC results list these top U. S. and Canada scorers by call area (c.w.) W1BPW, WB2CKS, W3YUW, K1BAI, W5WZQ, WA6SBO, Ws 7PQE 8GQU 9IOP, WAØKDI, KH6IJ, VEs 2UN and 3IR; (phone) W1HQV, WB2FON, W3CBF, WAs 4PXP 5ALB, K1KVN/7, WAs 8RSL 9ISM ØKDI, VEs 2AFC 3BHS and 6SF. Our code contingent outnumbered mike participants 63 to 20, by the way, a higher ratio than last year's 57 to 31. Kingpins per continent are (c.w.) CP5EZ, CR6CK, SM2BJI, WØGTA/8F4, WB2CKS, 4X4HF; (phone) CX9CO, DJ6QT, HI8XAL, OD5BZ, WØGTA/8F4 and 5A2TR. Other WAE-list country leaders include (c.w.) CE6EF, CRs 6CK 7IZ, DJ2YA, EA2CR, EI5F, EP2BQ, F7DO, G2DC, GI3RTS, GMs 2HCZ 2SVK, HA1SD, HBs 9DX ØAGH, HP1AC, I1LAO, JA1EZT, KG6AQA, KH6IJ, KR6CU, LA1H, DLØNS/LX, LZ1AZ, OA4PF, OD5LX, OE1ZDA, OH2FS, OK1AHZ, ON4XG, OZ7BG, PAØLOU, PY1ADA, SP6TQ, TF3AB, UAs 3KFB 9WS, UB5KAI, UC2KMZ, UD6FA, UF6DD, UH8BO, UI8CD, UL7JE, UO5SA, UP2NK, UR2LO, VK2APK, VS6DS, XE1KKV, YO3KSD, YU3BC, YV5BOA, ZB2AX, 5N2AAF, 7Z3AB, 9J2BC, 9M2LO, 9Q5LJ, 9V1MY, 9Y4VU; (phone) CE6EZ, CN8BV, CR6DX, CT1IW, EAs 2CR 8CR, EP2BQ, ET3WH, F8GV, G2AJB, GI3RTS, GM3JDR, HA5DU, HB9DX, HP1JC, I1RBJ, W4FIJ/IT1, JA1MHV, KG6AQA, KP4CL, LA5HE, LZ1WD, MP4DAN, OD5BZ, OE1IZ, OHs 8SM ØNI, OK1AHV, ON5KY, OX5AR, OZ3SK, PAØEBM, PY2CFM, SM2BJI, SP5AKG, SV0WV, TG8CJ, TN8AA, UAs 3KBD 9WS, U5ARTEK, UC2BF, UD6BV, UH8BO, UO5SA, UP2NV, VK3MO, VPs 3HAG 5RB, VSs 6AJ, 9OC, VU2CK, ZC4MO, ZL1AGO, 4X4QA, 5A2TR, 5N2AAF, 7Z3AB, 9J2FK, 9M2OV and 9V1MY. Over all, the U.S.S.R. bunch outparticipated us almost two to one. Can we show 'em some dust this month and next? A comment by DARC: "At least two high-score logs were lost in a plane crash en route Berlin from Frankfurt last September." These appear to have included massive tallies from Ws 3MSK (K3EST op) and 2JAE which could have altered the preceding statistics considerably . . . . . SRAL (Finland) welcomes world-wide indulgence in the 1966 *Scandinavian Activity Contest* scheduled for (c.w.) the period 1500 GMT on the 16th of next month to 1800 the 17th, and (phone) on the 23rd–24th, same times, on 3.5 through 28 Mc. Non-Scandinavians will round up as many JW JX LA OH OHØ OX OY OZ and SM/SL stations as possible, swapping the usual RS- or RST001, RST002, etc., serials. Scores are calculated at one point per completed QSO, this total multiplied for final score by the number of Scandinavian band-prefixes collected (45 the possible maximum). Your log transcript listing date, GMT, station worked, serials sent-received, band, and notation of each new multiplier claimed, should be submitted with a summary sheet to SRAL, P.O. Box 10306, Helsinki 10, Finland, postmarked no later than October 15, 1967. Good opportunity to clean up on such certifications as OHA, OZCCA, WALA, WASM, etc. See you on that north Atlantic path! . . . . . Don't forget that *YO Contest* coming off on the first week end of this month as announced last *QST* . . . . . Check, if you wish, with DJ2XP regarding a certification centered on communication with summer youth camp station DJØRD . . . . . East Germany's *WADM Contest* occurs October 7th–8th. We've scheduled participation particulars for next month . . . . . W6TMP says inquiry to the secretary, Central Radio Club, P.O. Box N-88, Moscow, brings back a stack of data on Russian amateur radio — award specs, oblast list, etc. . . . . "Anyone needing Luxembourg should check into the YL net on 20 sideband," hints tuner Kilroy. "LX1DB is usually there at 2100–2300 GMT." . . . . . OE5LX is delighted with his more than 2000 W/K QSOs on 14-Mc. code and voice . . . . . Continental items noted in club periodicals: ON6AF was a DX special at the Brussels Aerospace Electronics Exhibition in June. . . . OH2YV's Award Hunters Club is going strong. EA4CR, DLs 1QT 9KP, OK3EA, UR2BU, IT1AGA and DJ2UU pace the awards race in that order. . . . K1OTA/p/LX may still be on as you read this — s.s.b. on 14,200, 21,350, 28,650 kc.; code on 7015, 14,015, 21,015 and 28,015 kc. . . . PX1s IE and JS, the handiwork of F9s IE and JS, will fire up again this month. Watch (phone) 14,110, 14,190, 21,340, 28,600 kc.; (c.w.) 21,020 and 28,020 kc.

ASIA — *All-Asian Dx Contest*, August 26–27: JARL invites world-wide participation in the 8th All-Asian DX Contest (a c.w.-only affair) from 1000 GMT August 26 to 1600 GMT, the 27th. Non-Asians will work Asians on 1.8 through 28 Mc., exchanging serials consisting of RST plus the operator's age (YLs are permitted to substitute two zeroes for the latter figure). Final score derives from total contacts multiplied by total band-countries worked. Single-band and multiband, categories are available, and only single-operator activity is permitted. Score one point per contact and use the ARRL Countries List to figure your Asian multipliers. Entries must arrive at the JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan, no later than December 29 . . . . . "I was very surprised and pleased to see your November '65 article in *QST*," declares Calcutta's VU2JKZ. That month we made mention of the licensing of 2JK in 1921, probably the first of Indian ama-



ZS8L becomes even rarer as ZS9D from time to time. This comfy Maseru layout is widely worked on 20, 15 and 10 sideband. Ulli, a Lesotho government surveyor, expects to visit the States with Mrs. ZS8L this autumn. (Photo via W4BRE)

tours. "My father, O.M. Gooptu, joined Silent Keys in 1963 after being active on the bands till '61 and an ARRL member to '59. He was a great experimenter with homebuilt microphones, beam antennas and v.h.f. projects. VU2JK's favorite antenna was the W8JK beam of the '30s. I decided that the oldest call sign in India should continue, so I became Novice VU2JKZ in 1965 and will shortly appear for my Grade One. VU2JK will still be on the air!" . . . . . W1YYM notes that UA9AB formerly signed UI8LB . . . . . ZC4TX, QSL whip for WA9KVA, is an RAF club installation thoroughly worked on 15 and 20 . . . . . WA4YDR has a like arrangement with HL9KE who keeps him busy with lots of QSOs on 21,315-kc. sideband around 0200 GMT . . . . . W2IWP describes a rugged field outing enjoyed by 4X4s MR SK TI UM and VW as 4X4HT/4 in late April near Tal Maresha. Come to think of it, there was quite a wild field day throughout that area in early June . . . . . Now Asiagrams courtesy literature of aforementioned clubs and groups: UA0s ER and FM, 14 Mc., with FF on 21, dispense loads of Sakhalin c.w. QSOs. . . . BV2A, 'tis said, holds the only Taiwan ticket. . . . The long awaited green light begins to flicker for our Pakistan colleagues. . . . Hi-fi interference is more troublesome than TVI for Yokohama KAs. . . . MP1TBO calls it quits for the U.K. after twenty kiloQSOs with 250 countries. . . . KAs 2DL (WB6ELA), 2DM (W8ARB), 2IJ (KH6IJ), 2JC (K9JFV), 2KK (WB6RJB), 2RR (WB6QIA), 2TJ (WA3DBX), 2USA (WA9THF) and 7CS (W7TNA) hold new or renewed FEARL memberships. . . . JA3MYK/mm, with QRP on 15, 20 and 40, sails 16-foot *Korassa* from California to his homeland.

AFRICA — "With seven new stations on the air the number of active 5Z4s has doubled," cheers 5Z4KN (WA6PKN) from Nairobi. "For the first time licenses are being issued to Americans, three so far. Credit for re-establishment of licensing here goes to the Radio Society of East Africa, the majority of whose members hold tickets in other countries as well. I'm on c.w. and s.s.b. daily, 1500-2000 GMT. 5Z4KE is very active on 14,050-kc. c.w., 1300-2100 GMT, while 5Z4s KK and KM join old-timers 5Z4s IR and JW on 10, 15 and 20 meters. When our rains stop I'll replace my dipoles with a 2-element tribander to help the NCX-5 along." Jerry, broadcast engineering advisor to Voice of Kenya's TV and BC operations, anticipates another year in 5Z4-land . . . . . "Finally received my license after a nine-month wait," exclaims TL8DL, formerly 5A4TQ . . . . . K4TWJ hears from 5A4TV, still holding out in Libya with an SB-200 around 14,195 kc . . . . . DL7FT learns that 3V8BZ, Tunisia's only current licensee, is a 20-year resident . . . . . W4s EII and ZCB confirm W6KG's findings that amateur radio is taboo in Mali . . . . . Trouble with his regular rig caused EL2AG to hit 20 s.s.b. with a borrowed HW-32. W4NJF expects a visit soon from ex-EL2AT, now Stateside . . . . . Cullings from the clubs press: W6s KG and DOD netted six kilo-QSOs with 132 countries in three r.f.-filled weeks as ZD3I. . . . ZD7WR is an RSGB-sponsored 28,983-kc. beacon rig, reception reports solicited. ZD7DI (G3JBQ), former VS6DI, likes 10 sideband around 1600 GMT, 20 meters at 2000 or so. . . . CN8FF expects to keep at it till March. . . . TL8SW tries his DX luck as 9Q5SR. . . . Bassas da India is a selected CR7GF challenge. . . . Spanish will aid in flagging down EA9AZ near 14,250 kc., 0600 GMT. . . . Who's got the prefix for Biafra? [2N5, Boss? — *Jeeves.*] (Cut that out, man.) . . . When the Aldabras sign up they'll displace the Maldives as smallest U.N. country.

K8NHW/XV5, though he's been sidebanding in Vietnam with local permission for some time, inadvertently caused a flurry of 15- and 20-meter FCC citations for W/Ks who worked him prematurely. XV5 contacts are off-limits for us per the International Telecommunications Union's ban list. K1YPE/XV5 was a recent FCC-authorized exception to the ruling. Keep an ear on W1AW's regular bulletin transmissions for fresh news of official action in such matters. (Photo via W6FAY)

OCEANIA — "VR5RZ commenced operation at 0410 GMT, May 30th," affirms the OM himself, VK4RZ. "Twenty came first with the KWM-1, then 15 and 10. No gear for 80 and 40. Operation on this Tonga island is sporadic due to fluctuating line voltage. The regulation is out of order and, since the last man in charge was accidentally killed by dynamite, nobody here knows how to fix it. The local hospital has power priority which means I write this practically in the dark." . . . . . ARRL President WØNWX adds comment from the Newton, Iowa, end of those DX fireworks detailed last month by VK5KO. "The 1802-kc. QSO with Adelaide took place at 1108 GMT, April 30th, VK5KO's signal came up out of the noise to peak at sunrise here, then faded out 12 minutes later. During the following 23 hours and 51 minutes we QSOd on the five higher bands for a six-band grand slam over a distance of 10,000 miles." Bob needed only an 85-watt Ranger for job, doubtless aided considerably by a 700-ft. copper span . . . . . 3C3DU says an HR-160 now is on the air at 9M8RY thanks to London (Ont.) Amateur Radio Club and VE3EMF. An alert VE6 was Yong's first contact with the gift . . . . . VK5BB's 900 p.e.p. watts dent all bands from 80 through 10. Bert's been active since 1947 . . . . . Pacifisms thanks to club newshawks: KC6CL skeds his OM, WØZNY, at 1100 GMT Wednesdays, 14,325 kc. . . . 9M6s JP and MG are behind VS5s CQ and DX. . . . Saipan, now about as rare as Los Angeles, has KG6s SB SF SK SL SM and SN splattering each other with 14-Mc. groundwave. . . . ZL4s MO and PH are mentioned in conjunction with Chatham isle.

HEREABOUTS — If anyone still needs proof that DX prosperity is here again, WN8TND offers the first claimed Novice DXCC qualification in years. "In my Novice period I worked 113 countries, confirmed 105, and have applied for WAC and WAS. My Ranger was never turned off, the receiver is a 75A-4, and the skywire a home-built 21-Mc. beam. Just took my General exam — hope I passed!" George's not-so-secret weapon, together with a rapidly developed operating skill, was an array of sixteen crystals. As most newcomers quickly discover, the guy nearest a DX station's frequency usually gets answered first . . . . . W3HNK notes KV4EY, another recent Novice DX sharpie, cleaning up the goodies on 10, 15 and 20 with Heath gear . . . . . "PY1NFC keeps summer operating schedules on 1826 or 1827 kc. at 0500-0600 GMT, Sundays," notifies top-band specialist WØVXO. "YV5BPJ also has been bitten by the 160-meter DX bug and should be on by now with a Valiant and HQ-175." KL7FRY plugs away regularly on 1804 kc. as described last month. And who says 160 is a dead DX duck in the static season — W1BB (1803 kc.) reports a QSO with G3PQA (1825 kc.) on June 11th . . . . . W2JBL had a visit from OA4PZ who hopes to settle in Jersey and eventually become a Two . . . . . Ex-HC4TB, also in N. J., terminated a Peace Corps assignment in May . . . . . 4X4UJ becomes 4X4UJ/W5 with the Army at Ft. Hood. Andre will be eligible for his own W/K call next year . . . . . With 10 back in DX shape we're due for a DX revival among the mobile clan. K4TWJ files claim to forty fast countries so far. Dave can press his wheeled deal to 200 watts W5HJP-W5DPS

(*Continued on page 144*)

Operating News

GEORGE HART, W1NJM, Communications Manager
ELLEN WHITE, W1YYM, Deputy Comms. Mgr.
Administration: LILLIAN M. SALTER, W1ZJE — *DXCC:* ROBERT L. WHITE, W1WPO
Public Service: WILLIAM A. OWEN, W1EEN — *Training Aids:* GERALD PINARD

Supplementing the Club Treasury. The recent announcement of an increase in ARRL dues reminds us to mention that there is a long-standing arrangement between the League and its affiliated clubs to provide for sending in membership applications and renewals through club secretaries. The way this works is that if you are a member of an affiliated club, you pay your club secretary your full ARRL dues instead of sending it in to headquarters. When he has collected an initial entry of ten such payments from the club membership, he sends the League a remittance for each member at a rate of $6 each. The difference goes into the club treasury.

After the initial entry of ten, subsequent entries can be sent in singly or in smaller groups. Note that this arrangement does not constitute a reduced rate for ARRL membership, but only a means of being of some slight financial assistance to affiliated clubs.

Just one precaution: make sure your club secretary sends the entry in! The League is not responsible for it until it is received here. There have been occasions when club secretaries have "sat" on membership entries while subject members' memberships expired and lost continuity. Our Membership Department tries to make good on such cases, but it is at best an anomolous situation which should be avoided if possible.

Club Affiliated Rules and Procedures. While we are on this subject, it occurs that many amateurs and club groups not affiliated with the League are unaware of the requirements and procedures for ARRL affiliation; also of the advantages. In brief, the principal requirements are that 51% or more of the members must be licensed amateurs, and 51% or more of the voting membership must be ARRL members. In the case of bona fide secondary school radio clubs with fast-rotating membership, the latter requirement is waived if *one* member (such as the faculty adviser) of the club maintains his ARRL membership.

The procedure is simple, straightforward and fairly routine. The club files with headquarters a copy of its constitution, a questionnaire form establishing its eligibility, and a "Resolution of

OPERATING EVENTS (*Dates in GMT*)

ARRL-IARU Societies-SCM-Affiliated Club-Operating Events

August	September	October
1-9 Boy Scout World Jamboree, K7WSJ, p. 10, last issue.	1-30 B.C. Centennial QSO Party p. 132 this issue.	6 **Qualifying Run, W6OWP**
4 **Qualifying Run, W6OWP**	2-4 **LO Party** (League officials, *only*).	7-8 VK/ZL, phone WADM
5-6 Illinois QSO Party, p. 108, last issue. YO Contest, p. 101, last issue.	7 **Qualifying Run W6OWP**	14 **Qualifying Run, W1AW**
6 Maryland-D.C. QSO Party, p. 107, last issue.	9 **Frequency Measuring Test**	14-15 VK/ZL, c.w.
11-12 Idaho QSO Party, p. 112, this issue.	9-10 **V.H.F. QSO Party** WAE DX Contest, phone, p. 86, this issue.	14-16 **CD Party, phone***
12-13 WAE DX Contest, c.w., p. 86, this issue.	9-11 Zero District QSO Party, p. 104, this issue.	18-19 YLRL Anniversary Party, c.w.
17 **Qualifying Run, W1AW**	15 **Qualifying Run, W1AW**	21-23 **CD Party, c.w.***
19-20 New Jersey QSO Party, p. 96, this issue.	16-17 Scandinavian Activity Contest, c.w., p. 86, this issue.	* League Officials and Communications Dept. Appointees, *only*.
26-27 South Carolina QSO Party, p. 120, this issue. All Asian Contest, p. 86, this issue.	16-18 Washington State QSO Party, next issue.	
	23-24 VE/W Contest, next issue. Scandinavian Activity Contest, phone, p. 86, this issue.	

On March 12, 1967, approximately 150 people participated in the dedication of the Houston Amateur Radio Club's brand new clubhouse, W5DPA. On the podium for the program was South Texas SCM, Jerry Sears, **W5AIR.** The many VIPs present included West Gulf Division Director W5QKF, SEC K5QQG and ECs WA5BUV and W5TFW.

Affiliation" form. The latter, assuming the club is eligible for affiliation, is then sent to the director of the ARRL division in which the club is located, for his approval. Once this is accomplished, the club is presented to the next meeting of the ARRL Executive Committee for the final granting of affiliation. The Communications Manager then notifies the club and subsequently forwards its hand-printed charter of affiliation. The latter are often presented to club officers by ARRL directors at formal ceremonies.

The advantages? Just briefly, here are a few.

(1) Eligibility for a long list of training aids such as films, slide collections, film strips, taped lectures. Most of these can be used by affiliated clubs *only*, because of limited supply. Some, including quiz material, are available to all clubs.

(2) On the mailing list for a weekly card bulletin of late amateur news, a quarterly CD bulletin, a regular club bulletin, other regular and irregular bulletins issued from the headquarters from time to time.

(3) Preferential treatment in scheduling of travel by headquarters personnel and by directors and officers of the League. Some directors designate certain affiliated club representatives as assistant directors.

(4) Periodic publicity releases, handout material and helpful information for obtaining publicity, how to put on conventions and hamfests, are all available to affiliated clubs from headquarters.

(5) Affiliated clubs are protected against commercial solicitation, but referred to for any legitimate amateur radio purpose.

(6) *Only* affiliated clubs are eligible for the Gavel competition in the VHF-SS, the DX Competition and the Nov. SS.

The disadvantages? We can't think of any, offhand; we doubt that there are any. It costs the club nothing — in fact, some financial gain can be realized, as pointed out above. All kinds of benefits are available. All that is asked in return is the club's support of and loyalty to the principles of the League. Under the circumstances, don't you find it a little surprising, as we do, that *all* amateur radio clubs aren't affiliated?

That W1AW Rhombic. Back in 1937, very shortly after the League purchased its 7-acre plot on Main St. in Newington, for the erection of a headquarters station, the first thing accomplished was the erection of a rhombic ("diamond") directional antenna, aimed at the west coast. Five (four of them 60' tall) western red cedar poles were purchased in Oregon and transported here at some expense, and planted at points on the property laid out in advance by a surveyor (W1OKY) to orient all projected W1AW antennas in accordance with a preconceived plan. The rhombic was the first antenna to go up.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate to May, Traffic:

Call	*Orig.*	*Recd.*	*Rel.*	*Del.*	*Total*
W0AIM	2116	2994	2511	2412	10033
K6BPI	4361	1942	1759	168	8230
W3CUL	354	1822	1693	123	3992
K9ONK	182	1085	997	49	2313
K5TEY	24	881	843	5	1753
W0LGG	16	779	740	16	1551
K6EPT	14	766	718	48	1546
W7BA	8	706	657	47	1418
W5OBD	38	546	546	0	1130
W6GYH	154	480	466	9	1109
W1PEX	55	481	413	36	985
W3EML	40	482	385	1	908
WB6BBO	29	430	392	15	866
K9IVG	10	479	355	20	864
K0YFK	42	391	1	417	851
W7ZIW	27	378	377	2	784
WA4SCK	32	373	360	3	768
W6RSY	133	321	183	60	697
W7HMA	93	300	291	9	693
WA2IGQ	11	340	292	48	691
WA7DXI	32	349	232	61	674
WA9PPA	3	332	295	34	664
W3VR	71	294	279	12	656
K7TCY	30	308	271	30	629
WB6QXY	32	278	278	5	592
K0ZSQ	176	207	20	187	590
WA9MHU	0	291	248	40	579
W8UPH	3	281	246	33	563
WA4BMC	131	76	38	7	552
W0LCX	24	261	250	11	546
W6VNQ	21	277	241	0	539
W4FOE	10	241	207	44	502
W6EOT	0	251	251	0	502
W1EFW	45	254	196	6	501
Late Reports:					
W7JEY (Mar.)	6	275	278	1	560

BPL for 100 or more *originations-plus deliveries*

WA9CCP 203	K7PWY 124	VE7BHH 106
W8IV 168	WA7BYP 114	WA3BLE 105
WA1FGN 144	WB2IYO 112	WA4AUG 105
K8LRK 144	W4BAZ 112	W0ISJ 104
WA1EJU 132	W6LNZ 111	WA3FPM 102
K1PNB 127	W3HNK 109	W3TN 102
K7CTP 126	WB4BPL 108	Late Reports:
K0MZZ 125	W2OE 106	WB4BPL (Apr.) 102

More-Than-One-Operator Stations

K4CG 236	W0ZLN 118	W0EEE 111
	K6BPC 111	

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: WB2PYI, WA4DXJ, W6DSC, WB6KIL, W6KVQ.

The BPL is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM, a message total of 500 or a sum origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

It consisted of 1400′ of wire, not counting the feedline, and was left unterminated.

The rhombic really worked. A visitor to W1AW before the building was complete hooked his portable 7-watt rig to it, worked Australia. In the fall of 1938, when W1AW went into operation officially from its new location, fantastic signal reports were received from the mid-Rockies, from the west coast, and from the South Pacific. During the intervening years until headquarters itself moved to 225 Main St. from La Salle Road in West Hartford, the problem of west coast coverage for W1AW was never serious. Whenever someone complained they couldn't hear the station, we could usually demonstrate that W1AW was laying down a wicked signal on 20 meters.

But the new headquarters building spelled the end of the rhombic — temporarily, at least. A three-element beam was erected atop a 60-foot tower, and tests seemed to indicate that it was the equal, or nearly the equal, of the rhombic and had the advantage of being rotatable. As time went on, however, listeners on the Pacific coast began to complain that W1AW was not copiable, and it was eventually decided to re-erect the rhombic.

The five original poles were still up, and experts

DX CENTURY CLUB AWARDS

From May 1, through May 31, 1967 DXCC Certificates based on contacts with 100-or-more-countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

K4WJT.....214	VE5PM.....120	DL7MQ....105	K2HCU....120	K1NEI.....101	K8EJN.....100
OH2BCZ...206	PY1BYK/7.119	K1PVB.....105	K9WEH....102	K8CBK.....101	K8VRF.....100
W6KNH....172	WB6IBL....112	K8WIJ.....105	KN0LTB...102	W4ROC....101	K9JLJ......100
WB2CGW..140	WB2QKG...111	LA5GC.....105	W3DBT....102	WA2OIL...101	LU3DSI....100
K4WSE.....128	WAØAMC..110	W2EGI.....105	W7GGG....102	WA2BHO...101	W8GGQ....100
HB9IX.....126	W2DGZ....109	W5AC......105	W9RMQ....102	WB2VCC...101	W9HFB....100
W4GHN....125	W7CAL.....108	W4DJT.....103	WA8TPL...102	EL2D......100	WA9IAT...100
W3FNV....122	DJ3YU.....107	WB2RIR...103	WA9SUJ...102	JA1TIH....100	WB6LCS...100
SM7CRJ....121	W6ZGZ.....107	WA9LUD...103	WB2NDS...102	K7HRW....100	
KA5RC.....120	K3UMM....106				

Radiotelephone

W6KNH....158	WA4GUZ...113	YU2NFJ....109	K2MVW....105	WA4WLX..103	KH6FQB...101
K2BQO.....132	6Y5DM.....113	DJ9WA.....107	WA4WHP..105	WB2QKG...103	VE4AS.....100
K4WJT.....131	OE18J.....112	WB2PWU..107	WØKHI.....104	DJ4ZD.....102	W6KOE....100
W6CDJ.....130	W4AV......110	W6CUF....106	5R8AK.....104	I1POB.....102	W9CCK....100
W4GHN....122	WB2RHX..110	W6UQU....106	W6ZGZ....103	K6HWC/1..102	WA4CQN...100
XE1MMM..118	W7WS......109	K1QMV....105	WA4LMD..103	K1PVB.....101	WB2OBO...100

Endorsements

Endorsements issued for confirmations submitted from May 1, through May 31, 1967 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

330
K4LNM
W2BQM
W8PHZ
WØAIH

320
K8IKB
K8ONV
W3AFM
W4JDR
W4MS
W5FFW
W5PM
W6CAE
W6ULS
W7UMJ

310
VE3RE
VE6JR
W8KIT

300
I1UA
OH1TM
PY2CQ
PY2SO
W1RAN
WA2RLQ
W3AYD
W4HKJ
W4VMS
W6ABA
W6ISQ
W6PHF
WA6GLD
W8LY
W9FJB

280
I1CQD
JA1BN
K8VDV
W3PH
WA4WIP
W6EUF
W6OF
W6RGG
W7HDL
W9IHN
XE1CE

260
K3HHY
K4YYL
OH2BC
OK1MP
OK3MM
ON5ZO
OZ7BG
SM5RK
W6BCT
W6DYJ
W6VVR
WB6LFR

240
HP1BR
K5LIL
W1HWH
W1LQ
W1WLZ
W2GRY
W5LJT
W9GXH
WØJRI

220
CR7LU
DJ5LA
I1EVK
F8SK
OZ7KV
SM5AJR
W1MDO
W1RLV
W6ANB
WA4LXX
WA6FTM
W8VLK
W9LKJ
W9LNQ

200
K7CVL
W1YRC
W5EJV
W5KGJ
W6LYC
WA4SUR
WA8LST
W9MCJ

180
JA4XW
K4MOJ
PY2BJH
W4FPW
W4ORT
W4UHC
W5EGS
W6TZN
WA4KXC
WA8HFN
WA9IBT
ZE4JS

160
DL1MD
K1OBT
K1SLZ
K3TVU
K5JVF
K6TZX
W1DYE
W1PYM
W3HTW
W7VSM
W9NVJ
WA2UBC
WB2PXU
WB4BDO

140
HB9ADP
I1AVD
K1CTQ
K1UHY
KØBHT
PY1FH
VE3OR
W6GTE
W8KC
W9NHP
WA2WEE
WA3CGE
WA7BOA
WA9JDT
WB6CPE
YU2NFJ

120
CE6EZ
DJ1QX
K2KXW
K2UFT
K3QVV
KØEEL
VO1HH
W1SWX
W3ABT
W4USQ
W5MOQ
W8TBZ
WA1DJG
WB2OQU
WB2PCF
WA4EPM
WA4SSM
WA4SYA
WA8GPX

Radiotelephone

330
W9WHM

320
W4SKO
W6BAF

310
K6LGF
W6ZJY

300
I1UA
K6CYG
K6HZP
K8ONA
W2BOK
W2FGD
W2ZTV
W7ADS
W7CMO
W8EVZ
WB2FSW

280
CT1PK
I1CQD
W1BHP
W4VMS
W9GMY
XE1CE

260
K3YBR
K8IKB
SM5RK
VE4OX
W3AYD
W4HKJ
W8COU
ZL3NS

240
K8VDV
W2GRY
W2JSX
W6FZJ
WA4GCS
WA4WAO
ZL3OY

220
DJ5LA
F8SK
I1EVK
I1RCD
K4YYL
W9DNE

200
K1OLT
K2ZFA
K3IVI
VE3RO
W2MM
W2PDB
W4TRG
W6ABA
W8LUZ
W9GXH
W9KXK
WØFUH
ZL3MN

180
DJ2MM
K3PDC
KH6BB
OZ7BG
W1MLM
W1YCH
W5EGS
WA8HFN

160
DL9CQ
VE3CYX
W6FHM/DU1
W6RGG
W6TZN
W7VSM
W9ZWH
WA1CJR
YU6CB

140
JA1BN
K3RPY
K4VKW
VE3ELA
W3KEK
W6OHU
WA4MUB
WA4SUR
WA8GKW
WB2CGW
WB2WOU

120
CE6EZ
VE2JD
VP9CP
W2QDY
W6AOI
WØSHY
WA3CGE

W1AW SCHEDULE, AUGUST 1967

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-2:30 A.M. EDST and Sunday 3 P.M.-10:30 P.M. EDST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request.

GMT*	*Sunday*	*Monday*	*Tuesday*	*Wednesday*	*Thursday*	*Friday*	*Saturday*
0000	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0020-0100[4]	.....	.....	3,555[6]	14.1	14.1	7.03[6]	14.1
0100	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0105-0130[4]	.....	145.6	3,945	145.6	50.7	1.82	21.41
0130	**Code Practice Daily[1A] 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSun.**						
0230-0300[4]	.....	.....	3,555	7.08	1.805	7.03	3,555
0300	RTTY-OBS[3]	.....	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]	RTTY-OBS[3]
0310-0330[4]	.....	.....	3,625	14.095	3,625	14.035	3,625
0330	Phone-OBS[2]	.....	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]	Phone-OBS[2]
0335-0400[4]	.....	.....	7,255	3,945	7,255	3,945	7,255
0400	CW-OBS[1]	.....	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]	CW-OBS[1]
0420-0500[4]	.....	.....	3,555[6]	7.08	3.945	7.03[6]	3,555
1700-1800	.....	21/28[5]	21/28[5]	21/28[5]	21/28[5]	21/28[5]	.....
1900-2000	.....	14.28	7,255	14.28	7,255	14.28	.....
2000-2100	.....	14.1	14.28	14.095	21/28[5]	7.08	.....
2200-2300	.....	21/28[5]	21.075[6]	21/28[5]	7,255	14.28	.....
2330	.....	.....	.....	RTTY-OBS[3,7]	.....	.....	.....
2330	**Code Practice[1A] Daily 10, 13 and 15 w.p.m.**						

[1] CW, OBS (bulletins, 18 w.p.m.) on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.
[1A] Code practice on 3.555, 7.08, 14.1, 21.075, 50.7, and 145.6 Mc.
[2] Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.
[3] RTTY OBS (bulletins) on 3,625, 7.045, 14.095 and 21.095 Mc. 170/850 cycle shift optional in RTTY general operation.
[4] Starting time approximate. Operating period follows conclusion of bulletin or code practice.
[5] Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.
[6] W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
[7] Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.
Maintenance Staff: W1QIS W1WPR W1NPG. *All times/days in GMT, general operating frequencies are approximate.

from the power company pronounced all but one of them in sound condition, after 30 years. One pole had been moved slightly so as not to be in the way of building construction, but not so much so as to affect the rhombic orientation materially. The condemned pole was replaced by a steel tower.

By the time you read this, the rhombic should be back in operation. It will be used primarily on 20 meters and should enhance W1AW's signal strength on most of the west coast. We do *not* expect miracles, however. Reports of signal strength at various points, compared with previous W1AW reception, will be appreciated.

Staff Changes. We regret to announce the resignation from the CD staff of Stan Israel, W2BAH. New in the contest branch is Kayo Stolarsky, WB2CON, a recent addition to the staff.

Scheduled to join the staff any day is Bob Miner, K8NPT, who will take his place as Public Service Assistant alongside W1EEN. We also have one part-timer in Gerry Cohen, WA1CYT, who will be with us until he goes back to school in the fall. — *W1NJM.*

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Aug. 17 at 0130 GMT. Identical texts will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6OWP only will be transmitted Aug. 4 at 0400 Greenwich Mean Time on 3590 and 7129 kc. *CAUTION!* Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT Aug. 17 becomes 2130 EDST Aug. 16.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 2330 and 0130 GMT, simultaneously on listed c.w. frequencies. At 0130 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 2330 GMT daily, speeds are 10 13 and 15 w.p.m. The 0130-0220 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending *in step with W1AW* (but not on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0130-0220 GMT practice on those dates:

Date Subject of Practice Text June *QST.*
Aug. 2: *It seems to Us*, p. 9
Aug. 8: *The 9TO Mark II Keyer,** p. 15
Aug. 17: *Working 2-Meter E-Layer DX**, p. 24
Aug. 21: *Amateur Radio — An International Resource*, p. 58
Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Aug. 25: *Power Amplification*, p. 69
Aug. 30: *The Plate Load*, p. 70

*Speeds will be sent in reverse order, with highest speed first.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are *required* on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, *zip code* and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

Communications Manager, ARRL [Place and date]
225 Main St., Newington, Conn. 06111

We, the undersigned full members of the.....
.....ARRL Section of the.....
Division, hereby nominate.....
as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— *George Hart, W1NJM, Communications Manager*

Section	*Closing Date*	*SCM*	*Present Term Ends*
Santa Barbara	Aug. 15, 1967	Cecil D. Hinson	Aug. 10, 1966
Alberta	Aug. 15, 1967	Harry Harrold	Apr. 10, 1967
Manitoba	Aug. 15, 1967	John T. Stacey	July 1, 1967
Virginia	Aug. 15, 1967	H. J. Hopkins	Oct. 11, 1967
Oklahoma	Aug. 15, 1967	Daniel B. Prater	Oct. 11, 1967
Rhode Island	Aug. 15, 1967	John E. Johnson	Oct. 12, 1967
Arkansas	Aug. 15, 1967	Don W. Whitney	Oct. 13, 1967
Indiana	Aug. 15, 1967	Mrs. M. R. Kroulik	Oct. 14, 1967
Vermont	Aug. 15, 1967	E. Reginald Murray	Oct. 17, 1967
San Diego	Aug. 15, 1967	Don Stansifer	Oct. 21, 1967
Delaware	Aug. 15, 1967	John Thompson	Deceased
Hawaii	Sept. 11, 1967	Lee R. Wical	Nov. 11, 1967
Wisconsin	Oct. 10, 1967	Kenneth A. Ebneter	Dec. 10, 1967
Western Florida	Oct. 10, 1967	F. M. Butler, Jr.	Dec. 15, 1967
Illinois	Oct. 10, 1967	E. A. Metzger	Dec. 15, 1967
New York City & Long Island	Oct. 10, 1967	Blaine S. Johnson	Jan. 2, 1968
West Indies	Nov. 10, 1967	A. R. Crumley, Jr.	Jan. 10, 1968

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Maine	Herbert A. Davis, K1DYG	June 9, 1967
Nebraska	Frank Allen, WØGGP	June 10, 1967
Eastern Pennsylvania	George S. Van Dyke, Jr., W3ELI	June 15, 1967
South Dakota	Seward P. Holt, KØTXW	July 3, 1967
Western Mass.	Norman P. Forest, W1STR	Aug. 11, 1967
Kentucky	Lawrence F. Jeffrey, WA4KFO	Aug. 20, 1967

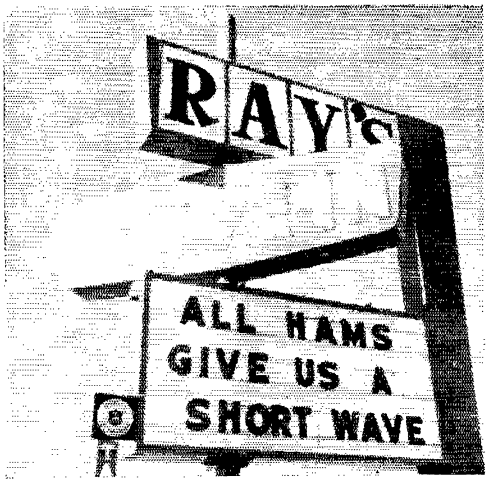
In the British Columbia Section of the Canadian Division, Mr. H. E. Savage, VE7FB, and Mr. Dan W. Gentry, VE7BBL, were nominated. Mr. Savage received 151 votes and Mr. Gentry received 95 votes. Mr. Savage's term of office began May 1, 1967.

In the Los Angeles Section of the Southwestern Division, Mr. Donald R. Etheredge, K6UMV, and Mr. H. G. Garman, W6BHG, were nominated. Mr. Etheredge received 718 votes and Mr. Garman received 674 votes. Mr. Etheredge's term of office began May 18, 1967.

In the Tennessee Section of the Delta Division, Mr. Harry A. Phillips, K4RCT, and Mr. Franklin Cassen, W4WBK, were nominated. Mr. Phillips received 308 votes and Mr. Cassen received 266 votes. Mr. Phillips' term of office began June 14, 1967.

In the Oregon Section of the Northwestern Division, Mr. Dale T. Justice, K7WWR, and Mr. Don Bunker, W7ZB, were nominated. During the process of balloting circumstances required Mr. Bunker to withdraw — so the League has certified the remaining candidate, Mr. Dale T. Justice, as SCM for the two-year term of office starting June 10, 1967.

Strays



W7VCB sends along this photo of a sign he saw in Washington State.

W3TMZ sends along this picture of his unusual license plate. Jack points out that the "DX 7388" designation was not specially issued. He stayed at the motor vehicle department until the number came up in rotation!

EIMAC 15 kW tetrode offers high power gain for advanced transmitters

Most new high-power 20 kW FM transmitters use the EIMAC 4CX15,000A tetrode for service as a Class-C amplifier. The tube features a new internal mechanical structure which minimizes rf losses, and is capable of operation at full power ratings to 110 MHz. EIMAC also recommends the 4CX15,000A for 220 MHz operation at lower power levels for VHF-TV transmitters. ■ EIMAC's long experience in tube technology and ceramic-to-metal sealing leadership have combined to produce a tetrode of optimum design and structural integrity. That's why the 4CX15,000A is used in more new transmitters than any other ceramic tetrode with similar characteristics. For more information write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.

RADIO-FREQUENCY POWER AMPLIFIER OR OSCILLATOR

Class-C Telegraphy or FM Telephony (Key-down conditions)

MAXIMUM RATINGS

DC PLATE VOLTAGE	10,000 MAX. VOLTS
DC SCREEN VOLTAGE	2,000 MAX. VOLTS
DC PLATE CURRENT	5.0 MAX. AMPS
PLATE DISSIPATION	15,000 MAX. WATTS
SCREEN DISSIPATION	450 MAX. WATTS
GRID DISSIPATION	200 MAX. WATTS

EIMAC
Division of Varian
San Carlos, California 94070

CHART YOUR COURSE TO EIMAC

for dependable, high quality power tubes

EIMAC TYPE	CLASS OF OPERATION / SERVICE	TYPICAL OPERATION — SINGLE TUBE								
		D.C. PLATE VOLTAGE	D.C. PLATE CURRENT (AMPERES)	D.C. SCREEN VOLTAGE	D.C. GRID VOLTAGE	APPROX. MAX. DRIVE POWER (WATTS)	APPROX. D.C. SCREEN CURRENT (AMPERES)	APPROX. D.C. GRID CURRENT (AMPERES)	APPROX. MAX. POWER OUTPUT (WATTS)	FILAMENT VOLTS / AMPERES
3-400Z	B / SSB	3000	.100 / .333[3]	—	0	32	—	.12	655	5.0 / 14.5
3-1000Z	B / SSB	3000	.240 / .670[3]	—	0	65	—	.30	1360	7.5 / 21.3
4CX250B[1]	AB1/SSB	2000	.1/.25[3]	350	−55[5]	0	0/.005[3]	0	300	6.0 / 2.5
	C/CW	2000	.25	250	−90	2.9	.019	.026	390	
	C/AM	1500	.20	250	−100	1.7	.02	.014	235	
4CX300A	AB1/SSB	2500[6]	.1/.25[3]	350	−55[5]	0	0/.004	0	400	6.0 / 2.5
	C/CW	2500[6]	.25	250	−90	2.8	.016	.025	500	
	C/AM	1500	.20	250	−100	1.7	.02	.014	235	
4CX1000A	AB1/SSB	3000	.25/.90[3]	325	−60[5]	0	−.002/.035	0	1680	6.0 / 10.5
4-65A	AB1/SSB	3000	.015/.065[3]	360	−85[5]	0	0/.006	0	130	6.0 / 3.5
	C/CW	3000	.112	250	−105	1.6	.022	.009	270	
	C/AM	2500	.102	250	−150	3.1	.026	.013	210	
4-125A	AB1/SSB	3000	.03/.105[3]	510	−95[5]	0	0/.006	0	200	5.0 / 6.5
	B/SSB[4]	3000	.02/.115[3]	0	0	16	0/.03	0/.055	240	
	C/CW	3000	.167	350	−150	2.5	.03	.009	375	
	C/AM	2500	.152	350	−210	3.3	.03	.009	300	
4-250A	AB1/SSB	3000	.055/.21	600	−110[5]	0	0/.012	0	400	5.0 / 14.5
	C/CW	3000	.345	500	−180	2.6	.06	.01	800	
	C/AM	3000	.225	400	−310	3.2	.03	.009	510	
4-400A	AB1/SSB	3000	.09/.30[3]	810	−140[5]	0	0/.018	0	500	5.0 / 14.5
	B/SSB[2][4]	3000	.07/.30[3]	0	0	40	0/.055	0/.10	520	
	C/CW	3000	.35	500	−220	6.1	.046	.019	800	
	C/AM	3000	.275	500	−220	3.5	.026	.012	630	
4-1000A	AB1/SSB	4000	.17/.48[3]	1000	−130[5]	0	0/.04	0	1130	7.5 / 21.0
	B/SSB[4]	4000	.12/.67[3]	0	0	105	0/.08	0/.15	1870	
	C/CW	4000	.70	500	−150	12	.137	.039	2100	
	C/AM	4000	.60	500	−200	11	.132	.033	1910	
3CX100A5 / 2C39A	C/CW[7]	800	.08	—	−20	6	—	.03	27	6.3 / 1.0
	C/AM[7]	600	.065	—	−16	5	—	.035	16	

[1] Ratings also apply to 4X250B.
[2] Ratings apply to 4-250A within plate dissipation limitation.
[3] Zero signal and maximum signal dc current.
[4] Grid and screen grounded, cathode driven.
[5] Adjust to give stated zero-signal plate current.
[6] For operation below 250 Mc only.
[7] At 500 Mc.

Above you see popular Eimac tube types suitable for ham transmitters. Remember this chart when you need a tube. And remember the name Eimac. It means power. Quality. Dependability. For Eimac has more know-how, more experience with power tubes than any other manufacturer. Your local Eimac distributor can supply you with any of these tubes listed and Eimac sockets to match. Or for complete data, write Amateur Services Department, EIMAC—a division of Varian Associates, San Carlos, California.

Station Activities

SCM — AREC — ORS — CP — SEC — OBS — TCC — OO — OES — AI OPR — EC — DXCC — CLUBS — RM — OPS — RCC — PAM — WAS — NTS — WAS

• 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—Acting SCM, John L. Penrod, K3NYG

John Thompson, W3HC

Regretfully we announce the passing of our SCM, Mr. John Thompson, W3HC. John was well known to amateurs all over the world. His life was dedicated to amateur radio. He was first licensed in 1922, and held many ARRL appointments. We will all miss him.

Again the boys showed their ability to muster up on 3905 kc. with emergency power during the June 5 blackout. W3SPL is operating portable from Indian River. W3CGV won the DSMN transmitter hunt. WA3DYG is the new RACES Radio Officer for New Castle County. Word is out that W3EEB soon will be heard on the v.h.f. bands. We welcome K3LGC back to Delaware. Don't forget the Delaware Hamfest, Aug. 27, Banning Park.

EASTERN PENNSYLVANIA—SCM, George S. Van Dyke, Jr., W3ELI—SEC: W3AES. RMs: W3EML, K3-YVG, K3MVO, W3MPX. PAM: W3FGQ. EPA C.W. had QNI 470, QTC 374; PTTN had QTC 319; EPA Phone & Traffic Net had QNI 745, QTC 213. K3VBA was initiated as NCS on PTTN. WA3FVK now is an ORS with a new antenna and bug. W3AIZ has gone for the summer. W3-EML made the BPL as usual. W3EU is traveling a bit. K3MVO, one of our anchor men, is busy as usual. W3ABT, U. of P. club station, boasts 72 operators. K3WEU has gone to Maine for the summer. W3CUL made the BPL plus. New officers of the Lancaster Radio Trans. Society are W3DYT, pres.; K3QAX, vice-pres.; W3LN, treas.; K3OEN, secy. K3HLN has 10-kw. emergency power now. WA3FPM made the BPL in May. WA3BSV will be QRT six weeks with the ROTC. WA3FXE now has 300 watts and an automatic keyer. K3VAX is working hard on that Extra Class ticket. K3WAJ and W3ZRQ manned NCS posts for the EPA Phone & Tfc Net during the East Coast blackout. K3HLN had the Montgomery Co. ARPSC Net all warmed up, too. WA3ERA is going mobile to Expo 67. WA3EXW will be a regular 3RN representative for EPA Mon. The EPA section had a meeting at the QTH of K3WEU. All types of appointees and all active nets were represented. Results: It looks like we may have the senior Pa. Phone Net back in the fold and the EPA Phone & Traffic Net picking up the job of phone traffic training as does PTTN. Both nets will be active and feed traffic to EPA. Because of the time problem 3RN traffic will go via EPA. If all goes well this should give EPA a big lift on traffic totals. W3SAO, V.H.F. PAM, has asked to be relieved and we are looking for a new V.H.F. PAM. Have a safe and pleasant summer vacation! Traffic: W3CUL 3992, W3EML 908, W3VR 656, WA3CTP 377, K3MYS 279, K3MVO 278, W3AIZ 210, K3YVG 190, W3FGQ 176, W3-MPX 166, WA3FPM 118, WA3AFI 110, W3HNK 109, WA3-ATQ 89, K3VBA 74, WA3EMO 69, WA3FVK 61, WA3GLI 56, WA3AIB 50, W3ELI 50, W3OY 43, W3KJJ 42, WA3BSV 41, W3VAP 38, WA3EEC 31, WA3FWT 28, K3HHB 26, K3HLN 23, WA3CFU 21, K3KTH 20, WA3EXB 8, WA3-ERA 6, WA3ERJ 6, WA3EXW 5, W3ABT 4, K3FOB 4, W3ID 3, WA3BJQ 2, W3EU 2, K3HNP 2, K3WEU 2, W3-YPF 2, K3VAX 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Carl E. Andersen, k3JYZ--

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QTC*	*QNI Ave.*	*Mgr.*
MDD	3643	2300Z	Daily	32	217	12.4	K3OAE-RM
MDDS	3643	0030Z	Daily	31	48	5.3	W3ZNW-RM
MEPN	3820	2200Z	M-W-F	22	52	21.7	K3NCM-PAM
MEPN	3820	1700Z	S-S				
MTMTN	145.206	0030Z	T-W-F	20	21	7.2	K3NOQ
MTMTN	145.206	0100Z					

Meet our new SEC, Walter Carr, W3LDD, Rte 2, Box 193, Havre De Grace, Md., 21078. Please route all emergency reports and information direct to him. EC appointees: WA3CFK, Washington Co.; WA3EKS, Prince Georges Co.; W3VCN, Kent Co.; W3WTW, Montgomery Co.; WA3CGT, Wicomico Co. K3GZK, W3PRC and W3LDD are reworking the MDC Emergency Operational Plan in preparation for the coming January SET. K3OAE reports many operators have recently dropped out of MDD and he is having trouble filling NCS and 3RN assignments. W3EEB, Delaware RM, will be acting MDD mgr. while K3OAE takes a California vacation. WA3GDG is improving his antennas. WA3ELA reports 6-meter openings but no KH6. WA3GVH keeps regular skeds with WA3EGY on 2 meters. W3GKP reports taking full advantage of the aurora opening on 2 meters. WA3GTX participated in the May FMT. The following participated in the Feb. FMT: K3FWX 8.5, K3VLY 1.7, W3EIS 15.9, W3EPR 110.5, WA5-KEL/3 25.0, K3DQH 65.5, W3CVW 37.5, W2UZN/3 52.8, K3CYA 143.0. Family illness is restricting W3CDQ's operation as OBS. Look for W3RKK on 80 again soon. W3MVB is a new OO, Class III. K3QFG is a retreaded ORS W3TN made the BPL. G5AFO/W3QCW reported in via a 20-meter sked with W3MCG and K3JYZ. K3NCM reports Frederick ARC was active in Field Day. W3JZY reports completion of antenna repairs. WA3GLP reports a new homebrew 15-meter preselector. K3QDC is set to transfer the work load to son K3QDD on his return from MIT for the summer. W3CBG reports a nice traffic total for his first ORS effort. W1ARR/3 failed to find any transgressors on the bands in May. K3CYA reports finding 6 intruders in our bands. K3FKU has assumed NCS duties on MDD (Sat.) WA3CFK reports his first RTTY QSO. W3ATQ has been QRL getting his daughter married. W3GEB reports his first bona fide traffic-handling. W3MCG doesn't like the new NTS sked time. W3GRF visited some of the hams in Berlin on a recent business trip. WA3EKP will be QRL in California for a short time. WA3GXN is a new General Class. Traffic: W3TN 150, WA3EKP 114, K3OAE 111, WA3CFK 105, K3JYZ 87, K3QDC 51, K3GZK 36, W3-ZNW 36, W3ECP 29, W3EOV 29, WA3ERL 26, W3EAS 22, W3ATQ 21, K3LFN 19, W3MCG 19, W3PQT 19, K3FKU 17, K3FQF 16, WA3CBC 15, K3VHS 12, W3CBG 11, W3-DPR 11, WA3CEK 9, WA3GDG 9, WA3GVH 5, W3JZY 5, WA3BDK 2, W3GEB 2.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Asst. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ. RMs: WA2KIP, WA2BLV. PAM: and NJPN Net Mgr.: W2ZI. NJN reports a traffic total of 295, with QNI 295 stations. N.J. Emergency Phone & Traffic Net reports a total of 138 messages and QNI of 485 stations. It is with deep regret that I report the passing of W2LY; W2BEI, former SCM of this section; and W3QV, former Director, Atlantic Division. All had over 50 years in amateur radio, and will be greatly missed. The Medical Amateur Radio Council, Ltd. held its 1st Annual Convention at Chalfont-Haddon Hall Hotel, Atlantic City, June 22. The SJRA will operate K2AA/3 and K3USN at the 50th anniversary celebration of Naval Aviation July 29/30. A special commemorative QSL card will be sent to all those making contact. K2PI had a nice write-up in a Philadelphia newspaper. WB2UZB applied for ORS; WB2WXA for OPS. W2LYV has now gone to s.s.b. W2ASQ and W2WI recently returned from Florida, where both worked portable "4" during the past winter. W2RYB has returned to 75 meters. W2HA is MC for the mobile round-table on 3805 kc. at 8 A.M. daily. WA2AAI has a new TR-4 transceiver. W2ZI recently returned from Expo 67 aboard the S.S. *Brasil*. W2ZEW has a new job with RCA, Princeton. W2ORS now is on 2 meters with the local C.D. Net. K2BG has retired from the railroad. K2AT now is using d.s.b. suppressed carrier system. WA2ANL, new EC for Burlington Co., requests all those interested in AREC to contact him. W2-

BAY is a new OVS. Traffic: (May) WB2MOQ 151, WA2-BLV 150, W2CKF 92, WA2UPC 59, WB2UZB 45, W2ZI 27, W2YPZ 22, WA2ANL 19, K2SHE 14, WB2SBD 13, WB2-WXA 9, W2ORS 8, WA2KAP 4, K2BG 2. (Apr.) WA2-BLV 152, WB2MOQ 110.

EIGHTH NEW JERSEY QSO PARTY

August 19-20, 1967

The Englewood Amateur Radio Association, Inc., invites all amateurs the world over to take part in the eighth New Jersey QSO Party.

Rules: 1) The time of the contest is from 1900 GMT Saturday August 19 to 0400 GMT Sunday August 20 and from 1200-2300 GMT August 20. 2) Phone and c.w. are considered the same contest. A station may be contacted once on each band. Phone and c.w. are considered separate bands. New Jersey stations may work other New Jersey stations. 3) General call is "CQ New Jersey" or "CQ NJ". New Jersey stations are requested to identify themselves by signing "DE NJ" on c.w. and "New Jersey calling" on phone. Suggested frequencies are: 1810 3530 3900 7030 7250 14075 14275 21100 21300 28800 kc., 50-50.5 and 144-146 Mc. 4) Exchanges consist of QSO number, RS(T), and QTH (ARRL Section or country). N.J. stations will send county for their QTH. 5) Scoring: Out-of-state stations multiply number of complete contacts times the number of New Jersey counties worked (maximum of 21). New Jersey stations multiply number of complete contacts times the number of ARRL sections (including NNJ and SNJ). 6) Certificates will be awarded to the first place station in each N.J. county, ARRL section, and country. In addition, a second place certificate will be awarded when four or more logs are received. Novice and Technician certificates will also be awarded. 7) Logs must also show GMT date and time, band, and emission, and be received not later than September 16, 1967. The first contact for each claimed multiplier must be indicated and numbered and if possible, a check list attached. Multi-operator entries should be so noted and calls of all operators listed. Logs and comments should be sent to Englewood Amateur Radio Association, Inc., 303 Tenafly Road, Englewood, New Jersey 07631. An s.a.s.e. should be included for results. 8) Stations planning active participation in New Jersey are requested to advise the EARA by August 5th of your intentions so that we may plan for full coverage from all counties.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 2200 GMT, NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed., TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT, NYS County Net on 3510 kc. Sun. at 1400 GMT and 2345 GMT on Mon. Appointments: K2DUR as EC Oswego County, K2JBX as EC Wayne County, WB2RHJ as OBS, K4RAD/2 as OO, WB2-VVZ as OVS. K2KNV was endorsed as ORS and OO. New RAGS officers are WA2AWK, pres.; WB2ELY, 1st vice-pres.; WB2MUF, 2nd vice-pres.; WB2YPG, secy.; WB2-VBK, treas. WA2HSB reports that Plattsburgh RACES provided communications and the P.A. system for the Memorial Day parade. Participants included WN2AXM, WA2s HSB, NVT, TRI and SNW. WA2DGN moved to Rochester. WB2PHM is on a 4-month cruise on the Mediterranean. The Black River ARC held a 2-meter transmitter hunt. WA2NDC found it. WA2YNS added an SB-200 to his station. The Rochester ARA WNY Hamfest was a real success. Attendance was greater than at any previous event. Unofficial attendance was set at 1500 with about 1300 accounted for. The Saturday banquet approached the 600 mark, which again broke previous records. This year a v.h.f. conference was an added attraction and the general program chairman, W2ICE, as usual had the fine cooperation of many hard-working committees, who are already at work on the next one to be held May 11, 1968. K2EKS has a new Swan 500. WB2MXO has a Heath HW-22A on 40 mobile. WB2VPK has a Swan 350. The Fulton ARC will hold a ham bake Aug. 19 at Malone's, one mile west of Fulton on Rte. 3 at 1 P.M. The Northern Chautauqua ARC welcomes new hams WN2AWX, WN2AWW, WN2AWY, WN2AWP and WN2AWS. The Canisteo Valley ARC Club paper reports that the RACES mobiles were called out at 2200 EDT on May 7 by the sheriff's dept. because a plane was believed down in a heavily wooded area. Search was resumed at 0600 only to be called off at 0730 because the plane was found to have landed safely. Would your group be able to respond in a similar emergency? Were you out Field Day? BPL honors go to W2OE. Traffic: W2SEI 425, W2OE 267, WA2NDC 142, W2RUF 118, K2QDT 94, WA2HSB 88, WB2GAL 75, W2HYM 72, W2FEB 65, W2MTA 46, W2RQF 45, K2OFV 25, W2FCG 22, WB2SMD 20, WA2YNS 18, W2BLO 16, K2IMI 12, W2PVI 10, WB2DMU 6, W2CFP 5, W2EMW 4, WB2BJN 3, WA2GLA 2, WB2VSL 1.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO. PAM: (v.h.f.) K3-VPI. RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 7:00 P.M. local time and KSSN, 3585 kc. Mon. through Fri. at 6:30 P.M. local time (does not operate during June, July and Aug.). The WPA and KSSN traffic men and the AREC members from WPA will hold their annual picnic/discussion period Sun., Aug. 27 at Clear Creek State Park. Take route 36 north from Brookville, Pa., to Sigel and take route 949 north from Sigel to the park area (watch for signs). The Greater Pittsburgh V.H.F. Society, WA3BAK, has a new bulletin for its official publication called *VHF Scatter*. It is an excellent publication by the editors W3BWU and K3EHK and is printed by K3HUJ. *VHF Scatter* reports that K3-VUT is in the Air Force stationed at McChord Field, Wash.; K3LWT has joined the gang in happy retirement; W3BWU is back in business on 2 meters; K3NNZ has a 4 eight-element stacked array up 130 feet on 2 meters and runs a Thunderbolt into it. W3UHN now has 139/151 for DXCC on 15 meters. *Spark Gap* reports that K3QHM and WA3RLW have new Swan transceivers. The Radio Association of Erie reports a new slate of officers: K3HFL, pres.; WA3GIV, vice-pres.; K3KJN, treas.; WA3FFD, secy. Congratulations to WA3BLE, who received his third BPL certificate and now joins the medallion gang. New EC appointees are K3PPM for Huntingdon County, W3-KPJ for Erie County. Endorsements are W3AUD as OBS and K3OTY as OPS. WPA traffic fell way off in May with 300 messages and 308 stations QNI. Traffic: WA3BLE 236, W3NEM 211, W3KUN 179, W3LOS 131, W3MFB 98, WA3-AKH 67, K3PYS 59, K3SOH 54, K3RZE 43, W3LOD 15, K3SJN 9, W3YA 6.

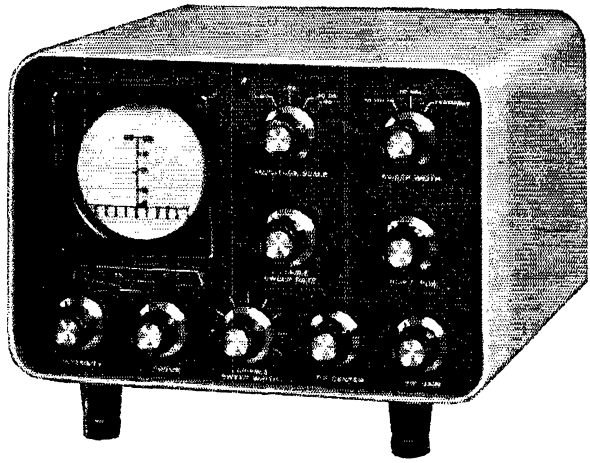
CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM. PAMs: W9VWJ, WA9CCP, W9KLB and WA9BLA (v.h.f.)) Cook County EC: W9-HPG. Net reports:

Net	*Freq.*	*Times*	*Days*	*Tfc.*
IEN	3940 kc.	1400Z	Sun.	10
ILN	3760 kc.	0000Z	Daily	151
NCPN	3915 kc.	1200Z	Mon.-Sat.	259
NCPN	3915 kc.	1700Z	Mon.-Sat.	161
Ill PON	3925 kc.	2300Z	Mon.-Fri.	411
Ill PON	50.28 Mc.	0200Z	Mon. & Thurs.	2
Ill PON	145.5 Mc.	0200Z	M.W.F.	No repo
TNT	145.36 Mc.	0200Z	Sun.-Fri.	372

W9NWK reports that the 75-Meter Interstate Single Sideband Net had a traffic count of 541, and the Ninth Regional Net's traffic was 601, according to W9QLW. The League's Executive Committee has declared the following duly affiliated societies: Notre Dame High School Radio Club, (Niles, Ill.), East Aurora High School Amateur Radio Club, (Aurora, Ill.) and the Radio Amateurs Downstate Illinois Organization, (Mt. Carmel, Ill.). This column's sympathy goes to K9SJR and her family upon the sudden death of her husband, Ray. Also our sympathy is extended to the family and friends of W9NW and W9DA, who also passed away. WA9MCR is now VØ2 operating nightly with the US Air Force from Goose Bay, Labrador, on 20 meters. A new Novice heard was WN9UHB (the XYL of W9VWY). W9HPG appeared on TV station WFLD, Chicago Channel 32, and spoke briefly on amateur activities and League affairs. WA9QXT received his WAS award. W9UBI has permanently moved to Denver, Colo., and is employed by the Environmental Science Services Administration. A new Technical Class licensee in the De-Witt area is WA9RSK. New appointments include: WA9-SID as OVS and K9HDZ as OO. K9UIY recently married, went on a European honeymoon and had eyeballs with Gs, DJs, HB9s, OEs and Fs. WB9USG, who is ten years old and in the fifth grade, is the youngest new Novice heard from this month. W1UED, of ARRL Headquarters Staff, was a guest at the Indianapolis Radio Club on May 31, the Decatur Radio Club on June 1, the Sangamon Valley Radio Club (Springfield) on June 2, the Streator Radio Club on June 3 and the Starved Radio Club Hamfest on June 4. W9BGX, Northwestern University Club station, has a new SB-401 and TH6-DX beam. Club officers include K9WEH and W9ICE. WA9NGB is taking

New! The Most Modern Amateur Radio Spectrum Monitor Ever Offered



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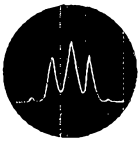

Analyzing Function — 10 kHz preset sweep width — indicate carrier 100% modulated by 2 kHz tone-log scale.

Scanning Function — approximately 250 kHz sweep width — indicates two signals above and three below the received signal, the strongest signal about 30 kHz down the band, down frequency being to the right.

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SB-620 SPECIFICATIONS — RF AMPLIFIER: Input frequencies: One of the following: 455 kHz, 1000 kHz, 1600 to 1680 kHz, 2075 kHz, 2215 kHz, 2445 kHz, 3000 kHz, 3055 kHz, 3395 kHz, 5000 to 6000 kHz. **Frequency response:** ±0.5 db at ±50 kHz from receiver IF. **IF frequency:** 350 kHz. **Sensitivity:** Approximately 10 uv input signal provides a visable signal (40 db mark) at full pip gain setting. **Spectrum analyzer:** Test signal input frequencies up to 50 MHz. **HORIZONTAL DEFLECTION: Horizontal sweep generator:** Sawtooth sweep produced by neon lamp relaxation oscillator. **Sweep Rate (Approximate frequencies):** 10 kHz preset: 0.5 Hz. 50 kHz preset; 2 Hz to 2.5 Hz. Variable: 5 Hz to 15 Hz. **Preset sweep width:** 10 kHz preset: 10 kHz. 50 kHz preset: 50 kHz. **Variable sweep width:*** 455 kHz (10 to 100 kHz); 1000 kHz (50 to 100 kHz); 1600 kHz (50 to 500 kHz); 1680 kHz (50 to 500 kHz); 2075 kHz (50 to 500 kHz); 2215 kHz (50 to 500 kHz); 2445 kHz (50 to 500 kHz); 3000 kHz (100 to 500 kHz); 3055 kHz (100 to 500 kHz); 3395 kHz (100 to 500 kHz); 5200 kHz (100 to 500 kHz); 6000 kHz (100 to 500 kHz). **Resolution:** 1 kHz. Note: Resolution is defined as the frequency separation between two equal adjacent signals such that the intersection between their respective pip indications is 30% below the apex amplitude. **Amplitude scales:** Linear: 20 db (10:1) range. Log: 40 db (100:1) range. —20 db Log: (Extends calibrated range to 60 db). **POWER SUPPLY: Type:** Transformer operated; fused at ½ ampere. **Low voltage:** Full-wave voltage doubler circuit, using four silicon diodes. **High voltage:** Full-wave voltage doubler circuit, using two seleium diodes. **Bias voltage:** Full-wave bridge circuit, using four silicon diodes. **Power requirements:** 120 or 240 volts AC, 50/60 Hz, 40 watts. **GENERAL: Tube complement:** (1) 3RP7 CRT, high persistance (yellow trace with screen filter). (1) 6AT6, detector vertical amplifier. (1) 6AU6, IF Log amplifier. (1) 6EA8, sweep oscillator, mixer. (1) 6EW6, RF amplifier. (1) 6EW6, IF amplifier. (1) 12AU7, horizontal, push-pull amplifier. **Diode complement:** (8) Silicon diodes, low voltage rectifier, DC filament rectifier. (2) Selenium diodes, high voltage rectifiers. (1) Silicon diode, voltage-variable capacitor. **Dimensions:** 10" W x 6⅝" H. x 10½" D.

*These sweep widths are minimum values. Actual sweep width ranges will be greater than those listed, depending on the receiver IF frequency for which unit is wired.

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advantage of a Moonbouncer antenna by installing a fifteen-element 30-ft. long 2-meter antenna. WA9PPA, WA9MHU and WA9CCP are BPL certificate recipients for May traffic. Traffic: (May) WA9PPA 664, WA9MHU 579, WA9SEO 373, WA9CCP 339, K9KZB 297, WA9OTD 294, W9EET 229, W9CGC 165, WA9NPS 142, WA9GUM 133, W9DOQ 102, WN9SPA 93, WA9QXT 83, W9JXV 65, K9BTE 59, WA9PFB 57, W9EVJ 53, WA9RSN 52, W9-HOT 51, WN9UHB 40, WA9PFB 36, W9CYH 31, WA9-QFT 29, W9IDY 27, WA9POZ 18, W9PRN 18, W9LNQ 14, K9HSK 12, WA9LDC 11, W9HPG 10, WN9UHA 9, K9-HRC 7, WA9FIH 3, K9DQU 2. (Apr.) W9JXV 168.

INDIANA—SCM, Mrs. M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: WA9GKF.

Net	*Freq.*	*Time*	*May Tfc.*	*Mgr.*
IFN	3910	1330Z daily 2300Z M-F	278	K9IVG
ISN	3910	0000Z daily 2130Z M-S	627	K9CRS
QIN	3656	0000Z daily	236	W9HRY

W9PMT, mgr. of the Hoosier V.H.F. Nets reports May traffic of 53. K9EFY, mgr. of PON reports May traffic of 116. K9DHC, mgr. of RFN, reports May traffic of 35. K9YFT, mgr. of the White River Valley AREC, reports May traffic of 16. QIN Honor Roll: K9VHY 26, K9-HYV 25, K9WWJ 23, W9BDP and W9QLW 21, K9DHC and WA9FDQ 20, WA9KOH 16, WA9RNT 15. W9QLW reports Ind. was represented 100% on 9RN. K9LVK will graduate from Ind. Military Academy as a 2nd lt. in Sept. W9JUK was voted chairman of the Central Area Staff. WA9ITB has received his DXCC and WAC certificates and made WAS on 80 meters. K9PNJ has moved to W6-Land and WA9LUG has gone back to Chicagoland. W9-VNE is back on 75 with a long wire after many year's absence. New officers of the Martinsville ARC are W9SMJ, pres.; W9ZSK, vice-pres.; K9EOH, secy.-treas. WN9UIR is building a transmitter and receiver *operating on* battery power. W9JVF is now QSL Mgr. for 8RIS. Mooresville ARC is conducting code and theory classes and newly-elected officers are K9EOH, pres.; K9ILG, vice-pres.; WA9PUZ, secy.-treas. If you know any amateurs overseas, please send an addressed envelope to the QSL Mgr. for them. Don't forget to put a stamp on it. W9KRJ finally got his tower up. K9IVG worked Kwajalein on 75 meters with low power. W9MEK has a new amplifier. *Amateur radio exists because of the service it renders.* K9IVG made the BPL. Traffic: (May) K9IVG 864, W9-QLW 322, W9JUK 287, W9HRY 238, K9FZX 234, K9HYV 224, W9MM 206, WA9FDQ 90, W9DKR 84, WA9OYI 75, WA9KOH 70, WA9KAG 62, W9RTH 59, WA9BGI 44, K9-VHY 44, WA9RNT 41, WA9MXG 39, W9SNQ 36, K9CBY 34, K9OXA 34, WA9BWT 32, K9KFM 30, W9YYX 29, WANPM 26, WA9KVP 20, W9PMT 20, W9UB 20, W9BUQ 19, W9FWH 19, K9RWQ 19, WA9BHG 18, WA9BWY 18, K9EFY 18, WA9GKF 18, K9ELE 17, WA9IZR 16, K9JQV 16, W9LG 16, WA9AXF 12, WA9GJZ 12, K9YFT 12, W9-BZI 11, WA9CFW 10, W9HWR 10, W9FJI 9, K9ILK 9, K9ONB/9 9, K9WGN 9, K9FZU 8, WA4RBQ 9 8, WA9-TUK 8, K9UEO 8, W9BDP 7, W9URQ 7, K9EOH 6, K9-GBR 6, WA9LUG/9 5, K9QVT 4, K9UZA 4, W9CMT 3, W9DGA 2, K9KTB 2, K9LMC/9 2. (Apr.) WA9GKF 23, WA9TUK 5, WA9ITB 2.

WISCONSIN—SCM, Kenneth A. Ebneter, K9GSC—SEC: K9ZPP. RM: WA9MIO. PAMs: W9NRP, K9IMR and WA9QKP.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
WIN	3662 kc.	0015Z	Daily	31	318	123	WA9MIO
BEN	3985 kc.	1200Z	Mon.-Sat.	27	314	184	W9NRP
BEN	3985 kc.	1700Z	Daily	31	567	86	WA9QKP
WSBN	3985 kc.	2200Z	Daily	31	1039	256	K8IMR
SWRN	50.4 Mc.	0200Z	Mon.-Sat.	23	240	6	W9JZD

W9JFP is a new OVS. W9UFY renewed appointment as EC. New officers of the BARS (W9YT) are K9ZMS, pres.; WA9CEQ, vice-pres.; K9FWF, secy.-treas.; K9KSA, chief engineer. WA9LIY has a complete new station with a new SB-34, linear and beam. Racine Megacycle Club members are active on 29.6-Mc. f.m. and hold transmitter hunts on that frequency. K9UTQ is active mobile on 20 meters with an SR-160. K9FHI also is active mobile. K9-ZMS will be operating portable VE5 during the summer. W9DYG, WA9OMO, W9KQB, WA9NPB and WA9RAK are active as 9RN NCSs. K9CPM is looking for someone on 2 meters in his area. Traffic: (May) WA9NPB 343, W9DYG 225, WA9QKP 194, WA9RAK 140, K9UTQ 130, W9DND 118, W9ABH 112, W9YT 112, WA9QNI 102, W9NRP 80, WA9NDV 63, W9AYK 51, W9CBE 36, K9FHI 29, K9CPM 27, K9GSC 26, WA9LIY 25, W9BCH 23, WA9SRV 16, K9-JMP 15, WA9TXF 15, W9ESJ 14, W9OTL 14, WA9KFL 12, K9OSK 10, WA9OMO 9, WA9PKM 5, WA9OFF 2, WA9-OMO/9 1. (Apr.) WA9IZK 210.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., WØ-TCK—SEC: WAØIEF. RMs: WØISJ, WAØEPX. PAMs: WAØMMV, WAØJKT, WAØDWM, WØHEN. MSN meets daily on 3595 kc. at 2330Z. MJN meets Tue.-Sun. on 3595 kc. at 0000Z. Noon MSPN meets M-Sat. on 3820 kc. at 1705Z., Sun. at 1400Z. *Evening MSPN meets daily on* 3820 kc. at 2300Z. MSTN meets Tue.-Sat. on 50.4 Mc. at 0330Z. Sun. at 0100Z. Minn. Wx Net meets daily on 3830 kc. at 2330Z. Remarks have been made that we don't have enough amateurs interested in public service work to provide adequate service in this field. We are being urged to concentrate on health and welfare traffic and turn the local *emergency and disaster communications* over to another radio service. Are we willing to turn this important and gratifying phase of our fraternity over to another group and perhaps even lose some of our frequencies because we cannot provide adequate reasons for keeping them? Our SEC has set a goal of an EC in each county. Shall those of us interested in this line of work back Gary with an active emergency group in each community and prove that we can and will continue to assist others with our communications experience in time of need, or shall we sit back and complain after it is too late? K6EA and WØMFW are back operating from their home in Bemidji. WAØQMP is operating 20- 40-meter c.w. with his new Eico 753. WNØ-RAG is a new ham in Dawson and already has worked 21 states and 13 countries. WAØEPX put up a new 80-meter dipole. WAØIAW built a homebrew designed cage antenna for 80. Check June *QST* for coming picnic dates. WAØ-MMV is publishing an informative net newsletter. Get on his mailing list by mailing him an expense donation. Congrats to new OPS WAØEZQ. WØFFX renewed as EC for Kanabec and Mill Lacs Counties. Traffic: (May) WAØ-EPX 302, WAØJKT 224, WØISJ 221, WØZHN 163, KØ-UYN 97, KØFLT 69, WAØMMV 66, WØOEZ 52, WØBUO 40 KØORK 38, WØTCK 38, WAØLKL 23, WAØIAW 21, KØIGZ 21, WAØDFT 18, WAØJPR 18, WAØEDN 17, KØZRD 17, WAØODB 16, WAØQAK 15, WAØLVK 13, WAØPXT 8, WØUMX 8, WØKNR 7, WAØMJF 7,WAØ-EZQ 6, WAØNQH 6, WAØHRM 5, WØKLG 5. (Apr.) K1OIK/Ø 40, WAØEZQ 5.

NORTH DAKOTA:—SCM, Harold L. Sheets, WØDM—SEC: WAØAYL. OBS: KØSPH. WB2LZJ is back from New York after a visit with relatives. Herb was stationed at the AFB while in Grand Forks. He works 40-meter c.w. WØDM attended the Dakota Division *Mid-American Convention* in Minneapolis, where he was the guest of a former pupil, WØNPE. The Roosevelt High School Radio Club, WAØQJX, is sponsoring the Second Zero District QSO Party Sept. 8-11, all bands and modes. If interested, contact John Nitzke, WAØ-NYK. Des Moines, WAØHUD and WAØELO did an outstanding job again on TEN in Apr., being first and second from North Dakota. Bob had a traffic report of 179 for April. The BARK of Bismarck elected KØ-HDA, pres.; WØPHC, vice-pres.; KØQYD, secy.-treas.; WAØMSJ, act. mgr.; KØEOF, custodian. They are working on a desk and rig for WØZRT, the club station. WAØEWW has been attending school at Wahpeton and has a Galaxy III mobile going. WAOOVT has an SB-33 to use when out of town. WAØEHQ built a keyer and it is working out FB. WNØRQY, the son of WØKSL, surprised his dad and got his Novice ticket while attending U.N.D. WØDM was retired June 1 from the Grand Forks Public Schools and will now enjoy his favorite band, 10 meters. Traffic: WAØELO 39, W9-QNI/Ø 7, WØDM 5.

SOUTH DAKOTA—SCM, Seward P. Holt, KØTXW—SEC: WØSCT. RM: WAØAOY. SSB Net Mgr.: KØ-BSW. Yankton Radio Club members are getting prepared for the South Dakota Picnic to be held Aug. 19 and 20. We hope to see everyone there who can make it. KOOTZ has moved to Brookings and installed his new antenna. WØRWM found his 811 via net inquiry. South Dakota C.W. Net Mgr. WAØAOY reports total QNI 51, QTC 8 in 12 sessions. So. Dak. S.S.B. Net Mgr. KØBSW reports 1013 QNI, 35 QTC, 158 informal. Two sessions could not be held *because of propagation*. KØ-BSW has now returned from his annual vacation. Traffic: WAØAOY 49, KØVYY 43, WAØLLG 32, WAØMWN 28, WAOCIJ 20, WØSCT 18, WAØBWJ 6, WAØBZD 2, WØDJO 2, KØYGZ 2, WØDVB 1.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: W5DTR. PAM: WA5GPO. RM: W5NND. NMs: WA5-PPD, W5DTR, W5MJO and K5ABE. The ARRL section of the Calico Rock MARSfest was well attended. W5-NND led a good discussion on traffic-handling in Arkansas and outlined the needs for improving our operation. WA5PKO suggests that the number of amateur radio

1 KW { DCA CIR 175-2A } 10 KW

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operators in Ark. could be substantially increased if each of us would encourage the female population to try "ham radio" as a hobby. Val and OM W5OXU visited W5ALL in New Mexico recently. W5OBD attended the SRRC Hamfest in Ill. June 4. Net reports for May:

Net	Freq.	Time	Day	Sess.	QTC	QNI	Time
RN	3815 kc.	0030Z	Daily	31	123	866	736
AFN	3885 k .	1100Z	Mon.-Sat.	27	12	701	1656
OZK	3790 kc.	0001Z	Daily	?	?	?	?
APON	3825 kc.	2130Z	Mon.-Fri.	23	81	328	660

The Arkansas EC Net now meets at 2300Z Tue. on 3815 kc. Traffic: W5OBD 1130, W5NND 106, W5MJO 76, WA5PPD 72, WA5KEF 70, WA5LYA 7, WA5PKO 4.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: W5BUK. RM: W5CEZ. V.H.F. PAMs: W5UQR, WA5DXA.

Net	Freq.	Days	Time	Net Mgr.
LAN	3615	Daily	2300Z	W5GHP
LAPON	3870	Sun.	1300Z	W5KC
DELTA 75	3900	Sun.	1230Z	WA5EVU

Please note the time of some of the nets. This change is caused by Daylight Saving Time. W5KC, incidentally, has joined the ranks of the OOTC. WA5DXA has a 54-ft. tower with five-element on 6 and eight-element on 2 meters. W5HUT is now vice-pres. of the GNOARC. WA5DRK has a 40-ft. tower with a four-element 6. WA5KLF has been having h.v. rectifier trouble. W5BJG has moved to Florida. W5MXQ reports that the Jefferson gang had another fine Steakfest. W5CEZ says he had a wonderful 4-week trip through the Midwest. His new mobile gear worked just fine. WA5PWX now has a "Twoer" and a keyer. W5EA reports the fishing up Monroe way has cut into his activities. W5MBC reports he is hot after DX. Incidentally, W5PM now has 322 c.f.m.d. WA5RRT, a new Tech., is working 6 meters. The BRARC *is moving its meetings* to the Civil Defense Building. K5ABD has a new tower. K5DSD has a quad up. W5EXI won a famous "you know who" necktie at the BRAC Hamfest. W5UQR reports v.h.f. activity continues along the La., Miss., Ala. and Fla. Gulf Coast at the usual level; with summer E skip 6 meters is expected to be great. The Ozone ARC V.H.F. Net averages over 10 check in per session. The GNOARC sends code practice on 21.4 Mc. Wed. at 2045 DST. Traffic: W5GHP 328, WA5PWX 76, W5KRX 70, W5MXQ 70, W5BJG 50, W5MBC 23, W5CEZ 18, W5EA 6, W5KC 6, WA5LGO 5, WA5DXA 4, WA5KLF 4.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. First, I want to express my pleasure at seeing all of the Miss. amateurs at the Semi-Annual Gulf Coast Sideband Dinner to celebrate W5JHS's birthday. The *recent earthquakes in Mississippi were well covered by the* amateurs. W5WMQ activated the Miss. Sideband Net and other nets were involved, including the 2-meter net. W5WMQ, with his Galaxy III and linear, was in a good position to handle the MSB Net. Stations standing by if needed were K5BWW, K5RUP, WA5KEY, WA5MWZ, WA5GOH, WA5EBZ, WA5CKL, W5IIQ, WA5EXS, WA5RKP, W5JCL, WA5GAV and W5VJ. WA5NWZ is becoming more active. WA5NLO is a real sparkplug for contests on all bands. W5BW installed a Balun in the 80/40 dipole. He worked AIR, NSS, WAR and NPG on Armed Forces day. K5TYP has funds for a real station. Traffic: WA5OKI 260, W5BW 57.

TENNESSEE—Acting SCM, Franklin Cassen, W4-WBK—SEC: K4RCT. RM: K4UWH. PAMs: W4PFP, WA4EWW, WA4CGK.

Net	Freq.	Days	Time	Sess.	QNI	QTC
TSSB	398	M-Sat.	23.20Z	26	1268	158
TPN	3980	M-Sat.	11.15	31	1072	NR
		Sun.	12.30			
ETPN	3980	M-F	10.10	23	382	27
TN	3635	Daily	09.00	55	321	154
			01.30			

Standard procedure for checking reliability of an emergency generator is *once a week*. How often is yours checked out? K4ZLE recently was graduated from Annapolis. WA4HGN is a new OVS. W4ZAC reports officers of the Veterans Adm. Hospital ARC in Murfreesboro are W4SZE, pres.; WB4FXY, vice-pres.; WN4CBZ, secy.-treas. Recommended reading includes the *Radio Amateur's Operating Manual* by W4MLE, the Annual Report of ARRL and the Annual Report of the FCC. Knoxville OVS activity is excellent, as reports of K4-PZT and WA4TJJ indicate. MARA (Memphis) held a successful radio school for Novices, Technicians and Generals coordinated by WA4VHM and assisted by W4DIY, K4ENA, K4PSH, W4WBK and others. The Naval Air Engineering Center will celebrate its 50th year. Those interested in its special radio operating schedule on July 29 and 30, contact WB2SPJ for further details. How do I count traffic? Please refer to June 1967 *QST*, page 76. This should clarify any confusion and/or misunderstanding. Traffic: (May) W4DIY 211, W4FX 174, K4UWH 151, W4PQP 99, WA4YEM 67, W4WBK 62, WA4YDT 43, K4MQI 34, W4PFP 28, W4CXY 26, WA4-YHO 25, K4UMW 24, WA4CGK 23, WA4NEC 21, W4TZB 19, WA4AJB 16, WA4ZBC 9, W4CAT 8, WA4EWW 8, W4TYV 5, W4SGI 2. (Apr.) K4VIS 37.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: W4OYI. Appointments: WB4BKG as OPS and OVS, WA4UAZ as OPS. Endorsements: W4NOA as EC, W4OYI as SEC, K4TXJ as OPS, WA4UAZ as ORS.

Net	Freq.	Days	GMT	Sess.	QNI	QTC	Mgr.
KRN	3960	M-F	1130	30	117	38	K4KIS
MKPN	3960	Daily	1330	31	344	107	WB4BTM
KTN	3960	Daily	0000	31	778	554	WA4AGH
KYN	3600	Daily	0000/0300	56	417	611	W4BAZ

The Falls City Area Tfc. Net on 50.7 reports 11 sessions, 54 QNI and 10 QTC. The Derby City Award, sponsored by the Louisville gang, was a big success. WB4FOT reports for the first time from Lexington and is active on nets. K4FPW has completed his RTTY terminal. WA4-GHQ is helping WA4QZV with his new antenna system. W4WNH still is handicapped for v.h.f. work with a poor location and no car for mobile work. Congratulations to W4WNH on his fine article in *QST*. WN4FVO is the XYL of WB4AFH. K4LOA has a new Ameco 2- and 6-meter transmitter. W4CDA is building the 2-meter amplifier per *QST*. W4JUI is having trouble with Cincinnati 6-meter skeds. W4BAZ has moved the slow-speed c.w. net (KSN) to 0300 GMT to give Kentucky a *late net session and at the same time serve as a training* net for new traffic men. WA4GMA temporarily is off while out of town on a new job. WA4TTE, now on a coop program with Evansville College, will be moving to the 9th call area. Traffic: (May) WA4DYL 407, W4BAZ 222, WA4UIH 192, WA4WWT 192, WA4AGH 175, WA4TTE 171, WA4KFO 124, WA4AUG 117, WA4VUE 93, K4DZM 87, K4MAN 87, W4YOQ 78, WB4AGO 68, WA4UAZ 51, WB4CJM 39, W4NBZ 36, W4KJP 28, WB4CIY 26, WB4-BTM 25, W4CDA 24, WA4GHQ 24, WB4BKG 21, W4-MWX 15, K4LOA 14, K4HOE 11, WB4AFH 10, W4BTA 9, K4FPW 8, K4VDO 5, WA4WWQ 4, W4OYI 1. (Apr.) WA4GMA 42, K4GOU 14, WA4ZIR 13, K4LOA 8, K4FPW 4, WB4AFH 1.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU. RMs: W8ELW, K8QLL, W8EU, K8KMQ. PAMs: W8CQU, K8JED, W8IWF. V.H.F. PAMs: W8-CVQ, W8YAN. Appointments: K8GOU, K8LNE, K8-LQA as OPSs; K8HPO as EC; WA8VHG as OVS. The Detroit ARA has kicked in its third hundred bucks to the ARRL Bldg. Fund. How's your club doing? W8IV made BPL again on Navy MARS refiles. Net reports:

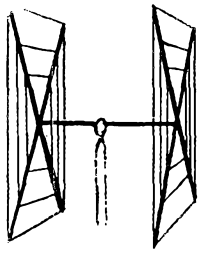
Net	Freq.	Time	Day	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	963	540	62	W8ELW
WSSB	3935	0000	Dy	1075	179	30	W8IWF
PON-DAY	3860	1600	M-Sat.	389	394	26	WA8OGR
B/R	3930	2230	M-Fri.	921	82	23	K8JED
PON-CW	3645	0000	M-Sat.	145	63	26	3C3DPO
Mich 6	50.7	0000	M-Sat.	341	44	27	WA8LRC
MTM	3605	0245	Dy	31	18	31	WA8QAF
M.E.N.	3930	1400	Sun.	251	19	4	K8JED
SW Mich 2	146.25	0200	Tue.	75	1	5	W8CVQ
UPN	3920	2230	Dy	761	110	31	W8OQH
LENAWEE 2	145.30	0200	Dy	267	52	29	WA8AAQ

Silent Keys: W8HHT, of Roseville and K8YAN, of Plymouth. New officers: Ford ARL—K8SSZ, pres.; WA8-GDT, vice-pres.; W8OVM, treas.; WA8NLL, rec. secy.; WA8KMW, corr. secy.; WA8FCL and W8AVI, act. mgrs.; WA8ORI, editor. The UPN *Swap-Shop* on 3920 at 2230 Sun. is doing real well. W8MRM (MICRC) had a ball at the recent OTs nite at Henry Ford Museum; and racked up a big batch of contacts. W2ICE presented a great slide/talk, called "The Golden Twenties." K8-DYI, W8LPA and WA8SIQ are all home from the hospital. The Hazel Park ARC had a fine swap/shop May 21. WA8SKU now has a 55-ft. telephone pole installed gratis. The HVARA is getting him going. WA8QHI has a new Swan 500 and WA8OCD a new HQ-100AC. K8ETU now is "Gramps" and W8VVR will be soon. W8VPC got the "Zeigenbein Award" in memory of W8-PLP, from the Central Mich. ARC. Great-Grandpa WA8JJE has a grandson whose initials are "JJE"! Flint had a big turnout of mobiles to help the boy scouts

GOTHAM'S AMAZING ANTENNA BREAKTHRU!!

How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 15 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since '53.

QUADS Worked 42 countries in two weeks with my Gotham Quad and only 75 watts . . . W3AZR



CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a foolproof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16′ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10′ × 1¼″ OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064″ diameter.

X Frameworks: Two 12′ × 1″ OD aluminum 'hi-strength' alloy tubing, with telescoping ⅞″ OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

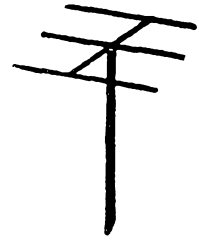
Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
TWENTY METER CUBICAL QUAD	25.00
FIFTEEN METER CUBICAL QUAD	24.00
TEN METER CUBICAL QUAD	23.00

(all use single coax feedline)

BEAMS The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9ADQ, and 4U1ITU. THAT ANTENNA WORKS! WN4DYN



Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36′ of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞″ and 1″ aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 El 20	$16	4 El 10	$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20′ boom

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters $14.95

V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters. . . . $16.95

V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters . . . $18.95

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

goodwill collection. Among those present were WA8SCI, WA8FYF, K8GOW, WA8AEE, K8ACN, K8PKG, K8PKW, K8LZJ, W8RTN, W8VGG, K8WKE, K8JWC, W8EFF and W8HRL. All net reports must be here by the fifth of the month. Traffic: (May) W1IWF 486, WA8OGR 367, W8HQL 313, WA8CQR 211, W8IV 185, W8ZGT 179, WA8IAQ 175, K8HLR 164, WA8PII 149, W8EU 125, W8IUC 122, K8KMQ 120, K8ZJU 106, WA8IML 101, W8CQB 96, W8QQK 95, WA8LKI 87, WA8LRC 82, W8FX 67, K8GOU 62, W8OQH 62, K8YGH 62, WA8AAQ 46, K8JED 44, WA8MCQ 43, W8ELW 41, K8HNN 41, WA8MAM 40, W8RTN 38, WATSB 38, K2SIL/8 35, WA8ORC 34, K8QLL 31, W8YAN 31, K3KRX/8 30, K8JGF 30, WA8LXY 24, WA8BQP 22, K8YQC 21, W8SWF 19, W8NOH 16, WA8PZT 16, W8UFS 15, WA8KRH 13, W8JTQ 12, W8AUD 11, K8TYK 11, K8MXC 10, W8SCW 10, WA8JDF 8, WA8UVX 8, W8BEZ 7, WA8KME 7, WA8SQC 5, W8DSE 4, W8TBP 4, K8VDA 4, W8WVL 2. (Apr.) WA8AAQ 33.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OGU. RM: WA8CFJ. PAMs: W8VZ and K8UBK. W8NBK won the National QCWA QSO Party Contest. W8BZX says W8WKN has a new SB-101. W8KUI joined the Silent Keys. WA8ROK says W8WIN has a new Swan 500. WA8PDD has a new HA-460 transceivers, WA8SVL and WA8SVM are new Technicians, WA8QDJ has a new Swan 250 and 50-ft. tower. WA8ROK has a new HQ-170A. W8BKH has a new HA-460 transceiver. WA8UKM has a new Swan 250 and K8TOL built a SB-101 transceiver. Toledo's *Ham Shack Gossip* tells us WA8SFW joined the Silent Keys. WA8WCB and WA8VCG are new Conditionals. WN8WAN, WN8WBF and WN8WGA are new Novices. W8VDR is in a hospital. WA8TCH is in the hospital for surgery. Appointments made in May were W8NAL as ORS. K8KWO and WA8TGA as ECs and WA8VNU as OBS. W8UPH and K8LRK made the BPL in May. W8AYR joined the Silent Keys. The Inter-City RC held an Old Timers Night. W8RLW reports that W8LKD joined the Silent Keys. Parma RC's *P.R.C. Bulletin* informs us the club held the P.R.C. Family Dinner where Mr. Cooper spoke about space communications. WN8WBS is a new Novice and WA8NYC joined the Silent Keys. W8TZO reports that K8UYE joined the Silent Keys and K8EUC received his first baby boy. The Van Wert ARC operates three nets, two on 50.640 kc., one on Sun. at 12:30 P.M. EST and the other on Tue. at 7 P.M. EST, and the third meets every Sun. on 3820 kc. Westpark *Radiops' Log* tells us the club held an auction and W8VM is home after a stay in the hospital. Southeast ARC's *Ham-Fax* says K8TOL has a new Heath SB-101 transceiver and a new Communicator 2. WA8SVM presented a travelogue on his trip to South America. Massillon ARC heard and saw Mr. Chess, of Hoover Company, give a demonstration of the many aspects of radio control and what it is doing in the hobby. Mt. Vernon ARD heard a talk on receivers by WA8KNP and a talk on antennas by W8UMH. From Springfield ARC's *Q-Fire* we learn that W8YAC was released from the hospital and is back at work and WA8IKN has a new Ameco transmitter and Swan 350 s.s.b. receiver. WA8THE is a new Technician. Might as well be SCM of one of this county's small sections as far as getting news from many of the club bulletins I receive is concerned. Bulletins were received from the Kettering ARC, the Columbus ARA and the Queen City Emergency Net without news I could use. Traffic: (May) W8UPH 563, WA8CFJ 280, WA8NTA 218, WA8PMN 169, W8QZK 163, W8GVX 159, K8LRK 146, WA8OCG 143, W8QCU 138, K8LGA 126, W8QXQ 122, WA8PQL 117, W8GRT 116, WA8LAM 106, WA8FSX 103, WA8DWL 99, W8TV 98, W8GOE 96, K8UBK 91, W8AUZ 88, W8LT 84, W8DAE 82, WA8KUW 79, K8ONA 77, W8HII 75, W8OE 74, WA8BTE 69, WA8SED 65, K8BYR 63, W8NAL 63, WA8TYF 61, W8ERD 43, W8OUU 43, WA8SHP 38, WA8NSL 37, WA8SCR 37, WA8FGD 35, WA8MHO 33, WA8EYF 25, WA8LOW 22, WA8PPK 22, W8UDG 22, WA8AJZ 21, K8DDG 21, K8LFI 21, WA8RWK 21, W8DQD 16, WA8RLW 16, W8DVM 13, K8QMR 10, W8WEG 10, K8WZI 10, W8BZX 9, WA8KPN 9, K8LGB 8, K8LXA 8, WA8QFK 8, WA8LAG 7, K8DHJ 6, W8EEQ 3, W8GIU 2, K8PJH 2, W8LZE 1, W8PMJ 1. (Apr.) WA8RWK 21, K8HKB 16. (Mar.) WA8MHO 64.

HUDSON DIVISION

EASTERN NEW YORK—SCM: George W. Tracy, W2EFU—SEC: W2KGC. RM: WA2VYS. PAM: W2IJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointments: W2HF, K2DMR, WA2VTR, WB2PZL and WB2OIM as OVSs. At the Westchester Club the speaker was W2GHK on "Accessories for the Amateur Station." The New Rochelle Club featured an ARRL presentation, "The History of DX." The club also handled the Memorial Day Parade in its usual fine style. W2CIN/K1ZXJ, WA2OJD, WA2PBX, WA2BXK and WB2BLT participated in the Feb. Frequency Measuring Test. Congrats. K2SJN received a Red Cross Citation as vice-director of communications for Westchester County. New officers of the Union College Club, W2UC, include WB2CNC, pres.; WA3FTB, vice-pres.; WB2OHZ, secy.-treas. Both K1OQQ and WA2RYO graduated this year. May was "home-brew night" at the Schenectady Club with several prizes awarded for excellence. At the Albany Club, WA2SFP spoke on his antenna farm near Schenectady. WB2UEQ operated portable from Wesleyan U. during the school year. WB2QYZ plans 2- and 6-meter mobile for the summer. WN2AAX is the XYL of W2CRS/K1UGQ, another ham family. Congrats. New officers of the Westchester Club include W2VRU, pres.; WB2MOI, vice-pres.; WB2MOI, secy.; W2VTA, treas.; W2SAF, W2KFB and W2AMK, dir. Potential AREC members in Westchester Co. are reminded to send applications to EC WB2FXB, not the SCM. WN2ZRK is a new Novice in Gardiner, N.Y. Welcome aboard. Traffic: WB2UHZ 204, W2UC 111, WB2TNB 94, K2SSX/2 82, W2EAF 77, WA2VYS 69, WB2JYV 58, WB2FOA 57, WB2UUD 26, K2SJN 21, W2ANV 15, WA2WGS 12, WA2ZPD 11, WB2IFN 9, WB2UEQ 5, W2ODC 2, WB2QYZ 2.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM: Fred J. Brunjes, K2DGI. SEC: K2OVN. PAM: W2EW.

NLI	3630 kc.	1915 Nightly	WA2UWA—RM
NLIVHF	148.5 Mc.	2000 TWTh	WB2RQF—PAM
NLIVHF	146.25 Mc.	1900 FSSnM	WB2RQF—PAM
NLIPN	3932 kc.	1600 Daily	WB2SLH—PAM
NLS (Slo)	3715 kc.	1845 Nightly	WB2UQP—RM

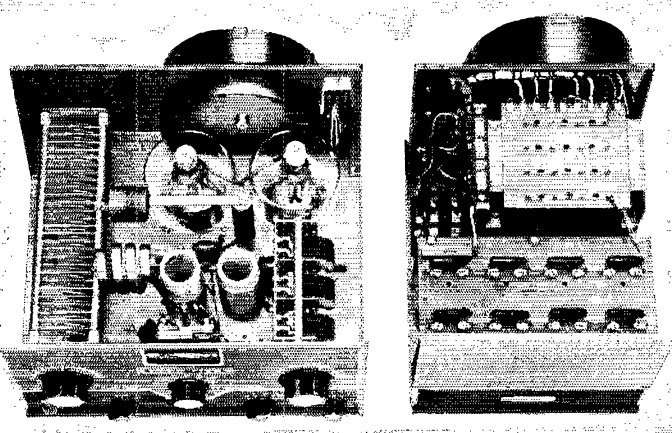
K2UBG, indomitable ORS/OVS, allows as how 75-meter propagation has been so stinko during May that it has no way to go but good. WB2UQP is threatening to get on 2 meters and get into the NLIVHF Net because he likes traffic on all bands. *How about you other rascals, why don't you threaten to do the samet* The TA-33 Jr. arrived safely at the WB2QIL abode and is on its way up the rugged old pole. WA2UWA, venerable sage of East Hampton, reporteth the Annual NLI Barbecue is slated for the last week end in Aug. at the WB2SLII plantation like last year. WB2HYK operated on Field Day with WB2OCA in the N.N.J. section. W2DBQ, first RM of NLI and recent linear-type telephone relayer, is laying plans to dive into RTTY. WA2PSL, intrepid Bronx EC, and his stalwart crew supplied the communications for the N.Y.C. Jewish Parade last May 28. K2IDB picked up a new Swan-500, but WB2AEK and K2MPK suggest he change that stupid 75-meter antenna! W2BCB says if it wasn't for the power leaks, traffic jams, leaky roofs and XYL chatter, life would be sweet. W2UJN, who had despaired of summer arriving at all, is estatic now that it's here and is contemplating quite a few operating milestones. WB2JJW, indefatigable OBS of the Nassau 10-Meter AREC Net, reports the mobile hunt season is in full bloom and you are invited to join. Hey, remember Nassau County patrolman-type WB2NGZ, tenacious old NCS of the NYSPTEN? Well, he is noweth Nassau County detective-type WB2-NGZ! Listen, W2PF is working on the hotel arrangements and program for the 20th anniversary of the QCWA which expects to be visited by the 40 remaining (out of 54) charter members on Oct. 27, 1967 in New York City. WA2JZX, also of the Nassau 10-Meter AREC, invites you guys to the hidden transmitter hunts taking place this summer. K2DDK figures there should be an appointment for DXing! W2BOT, Queens' intrepid 2-meter EC, reports that the Queens 2-Meter AREC Net is in a build-up phase and is looking for new members to participate in simulated emergency exercises and practice message-handling procedures. Traffic: WA2-UWA 492, W2GKZ 190, K2UBG 170, WB2UQP 145, WB2-QIL 71, WA2LJS 42, WB2RQF 39, W2EC 29, WA2PSL 27, W2DBQ 26, WB2AEK 22, WA2PMW 20, W2BCB 18, W2-UJN 18, WB2MZE 15, WB2JJW 14, WB2NGZ 14, WB2-YUV 10, W2PF 8, WA2JZX 5, WA2RUI 4, WA2QJU 1.

NORTHERN NEW JERSEY—SCM, Louis J. Amoroso, W2LQP—Asst. SCM: Edward F. Erickson, W2-CVW. SEC: K2ZFI. ARPSC Section Net Schedules:

NJN	3695 kc.	Daily	7:00 P.M.	W2BVE	RM
NJ Phone	3900 kc.	Ex Sun.	6:00 P.M.	W2PEV	PAM
NJ Phone	3900 kc.	Sun.	9:00 A.M.	W2ZI	PAM
NJ 6	51,150 kc.	M W Sat.	11:00 P.M.	K2VNL	PAM
NJ 2	146,700 kc.	Tu Sat.	10:00 P.M.	K2VNL	PAM
NJ PON	3900 kc.	Sun.	6:00 P.M.	WA2TEK	PAM

All times shown local in effect. New appointments: WB2NZU and WB2UIR as ORS, WN2YSH as OVS,

BLOCK BUSTER



NEW SWAN-MARK II
2000 WATT P.E.P. LINEAR AMPLIFIER

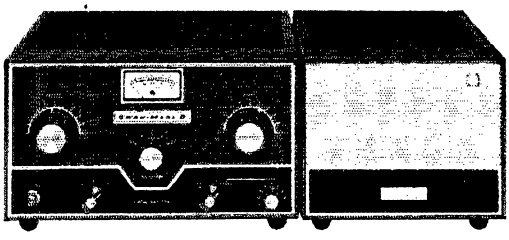
We are pleased to announce production of the new Mark II Grounded Grid Linear Amplifier, and confident that you will thoroughly approve its compact design and many quality features.

Two Eimac 3-400Z Triodes provide the full legal power input: 2000 Watts P.E.P. in SSB mode or 1000 Watts AM or CW input. Planetary vernier drives on both plate and loading controls provide precise and velvet smooth tuning of the amplifier. Greatly reduced blower noise is provided by a low RPM, high volume fan.

The new Mark II provides full frequency coverage of the amateur bands from 10 through 80 meters and may be driven by any transceiver or exciter having between 100 and 300 watts output. The amplifier measures 8″ high, 13″ wide and 14″ deep. Weight is 20 pounds.

The power supply is a separate matching unit which may be placed beside the Mark II amplifier, or with its 4½ foot connecting cable, may be placed on the floor. Component quality is of the highest caliber. Silicon rectifiers deliver 2500 volts D.C. in excess of 1 ampere. Computer grade electrolytic filters provide 40 mfd capacity for excellent dynamic regulation. A quiet cooling fan allows continuous operating with minimum temperature rise, thus extending the life and reliability of all components. Input voltage may be either 117 or 230 volts D.C., 50-60 cycles. Dimensions: 8″ high, 9″ wide, 14″ deep; weight 35 lbs.

If you are interested in high power and a truly clean signal, see the Swan Mark II at your dealers today.



MARK II AMPLIFIER with tubes $395 **MATCHING POWER SUPPLY $235**

SEE IT AT YOUR SWAN DEALER

SWAN ELECTRONICS
Oceanside, California

K2VAC as OBS (his sked is for RTTY on **14,095 kc.**), WB2FUW as OBS (his sked is Mon. through Wed. at 1755 on 3900 kc.). Endorsements: K2UKQ as ORS and WB2FUW as OPS. OO report: W2TPJ 23, WB2WWH is slowed down by a summer job. WB2UCS, put up a new 6-meter beam using a 24-ft. boom. K2EQP has transmitter trouble. W2PEV and WA2TEK are both out mobiling on 75. Congratulations to WN2YOZ, the XYL of WB2WNH, on passing the General Class exam. K2EIF completed his s.s.b. exciter and linear. He now has a complete homebrew station. WB2WIK is driving hard for DXCC with 12 new ones in a month. WN2YPQ's WAS now stands at 28/21. WN2ZSH is waiting for his General Class license. WB2RUM expects to have his repeater ready this summer. W2BVE also is W1EEI. WB2TQK is on 40 with a homebrew 15-watter. WB2RJJ received his WAS and applied for both DXCC and WAC. WA2ASM/2 will operate in the N.J. QSO Party from Hunterdon or Sussex County. Make every effort to put some time in this contest. It is FB with lots of activity. The BARA meets monthly at the Borough Hall, New Milford, the 1st Sun. of the month at 8 P.M. WB2TFH IS a seaman radioman assigned to the USCG Cutter *Campbell*. WB2FUW is home from college for the summer and is enjoying the traffic nets. WB2JWS is now on s.s.b. WB2IYO reports his May EC Traffic Net totals at 137 QNIs and 85 traffic. WB2MVI is assisting this net with his traffic training sessions each Thur. at 10 P.M. The frequency is 146.7. The net welcomes all newcomers and old-timers alike. Club officers please note: I receive letters and calls for club information in our section. Please forward date, time and meeting place of your clubs. I would like to update my records. Traffic: (May) WA2IGQ 691, WB2RKK 319, WB2IYO 213, WB2SSZ 170, WB2WWH 103. WB2UCS 81, K2EQP 79, W2PEV 78, WA2TBS 74, WB2WNH 71, WA2TEK 69, W2LQP 56, WB2SEZ 47, WB2KSG 45, WB2JWB 37, WB2UIR 34, WB2WIK 23, W2TFM 17, WB2CGI 15, WA2KZF 15, WB2TAZ 14, WB2FIT 13, WN2YPQ 13, WB2NZU 12, WB2QMP 11, WB2SJH 11, WN2ZSH 9, WB2FUW 8, WB2RUM 8, W2DRV 6, WA2ASM 4, WB2QJI 3, W2ABL 2, WA2CCF 1, W2EWZ 1. (Apr.) K2VNL 48, WB2OHK 34, W2BVE 29, WB2WIK 28. (Mar.) WB2FUW 23. (Jan.) WB2FUW 41.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, WØBDZ—Asst. SCM: Bertha V. Willits, WØLGG. SEC: KØBRE. PAM: WØNGS. RM: WØTIU. Story Co. ARC's new officers are WØPFP, pres.; WØPHT, vice-pres.; WAØNIX, secy.; WØIII, treas.; WØJIG, comm. mgr. The Roosevelt Hi-School ARC is sponsoring a Zero District QSO Party Sept. 8-11. W8FAW/Ø, from Michigan, is now in Iowa with Collins Radio. W5PXL, ex-KØOTV, now is in Dallas, Tex. Look for him on 75 meters. WØUCE, formerly from Grinnell, now is with the U.S. Navy in S.E. Asia. OVS WAØATA reports some good openings in May. WAØLYZ is hoping for Extra Class and 1st-class commercial licenses soon. In the meantime, he is converting his HW-32 to a tri-band rig. As traffic reports are compiled by WØLGG, please send them to her rather than to this office. Thanks to WØNGS for the 75-meter net report, and to KØTDO for the 160-meter Net report. The 75-Meter Net reports QNI 1126, QTC 178 in 27 sessions. The 160-Meter Net reports QNI 651, QTC 6 in 31 sessions. Traffic: (May) WØLGG 1551, WØLCX 546, WAØJUT 46, W8FAW/Ø 41, WØCZ 29, WAØDYV 24, KØAZJ 22, KØBRE 22, WØNGS 15, KØTDO 15, WAØAFY 9, WAØJEG 6, WAØDUB 5, KØGHH 4, WAØNRC 4. (Apr.) WØLJW 27.

KANSAS—SCM, Robert M. Summers, KØBXF—SEC: KØEMB. PAM: KØJMF. RM: WAØMLE. V.H.F. PAMs: WAØCCW, WØHAJ, WAØKSK, WAØLSH. Silent Key: KØRDK, Sdlna. One vacationer, WAØJOG, reported an eyeball QSO with K4LIB recently on a beach party. OKS, Kansas C.W. Net, now holds two sessions a day, 7 P.M. and 9 P.M. CDST on 3610 kc. Let's all be sure that we use the latest list of additional 9 questions that have been added to the study material for the Novice license. Refer to July *QST*. KØIEO will be operating VHK with the Peace Corps in Colombia, South America, for the next 2 years. A new Radio Officer appointed for Kansas Civil Defense is KØEVY. The Kansas Novice Net, QKN, reports band conditions were really bad in May. WAØJFV, net mgr., reported QNI 7, QTC 3. Kansas PI Net reports for May: North Central section, QNI 45 QTC 1; South Central section, QNI 13, QTC 0; Southwest section, QNI 18, QTC 2. V.H.F. AREC Nets: Zone 7, 2 meters, QNI 31; Zone 11, 2 meters, QNI 25, QTC 4; Zone 15, 6 meters, QNI 18, QTC 4; Zone 2, 2 meters, QNI 32, QTC 4; Zone 7, 2 meters, QNI 3; North Central V.H.F. Soc., QNI 40, QTC 10. Other AREC Nets: Zone 7, 75 meters, QNI 19, QTC 2; Zone 9, 10 meters, for Apr. QNI 23, QTC 4; May, QNI 22, QTC 3. Zone 13, 75 meters, QNI 73, QTC 1; Zone 15, 75 meters, QNI 57.

ZERO DISTRICT QSO PARTY

Sept. 9-11, 1967

sponsored by
The Roosevelt H. S. ARC of Des Moines

Rules: 0100-0400 GMT Sept. 9, 2000 GMT Sept. 9 to 0600 GMT Sept. 10, 1200 Sept. 10 to 0200 Sept. 11. All bands may be used as well as both c.w. and phone. Stations may be worked once per band (phone and c.w. are considered separate bands). Call CQ Ø.

Exchanges: Ø stations send QSO number RS(T) county and state, all others send number, RS(T) and state, province or country.

Scoring: One point per contact and multiply by the number of states (maximum 8) added to the number of different counties (maximum 682) worked. Ø stations use the sum of states, provinces and foreign countries as a multiplier. The club station WAØQJX counts five QSO points.

Awards: Certificates to first and second place in each state, province and foreign country and to the top scorer in each Ø district county.

Frequencies: 1815 3575 3950 7075 7230 14,075 14,300 21,075 21,290 28,600 and u.h.f. and v.h.f. bands. Novices try 3720 7165 and 21,110.

Logs showing dates, times, stations worked, exchanges, bands and modes and claimed scores should be sent no later than Nov. 1, 1967 to the Roosevelt H.S. ARC, WAØQJX, c/o John Litzke, WAØNYK, 1000 56th St., Des Moines, Iowa 50312, please include s.a.s.e. Watch for rare county expedition stations and for WAØKXJ, WAØNYK and WAØQJX operating from three counties simultaneously. (QSLs for these stations should be sent with logs.)

	Days	*Freq.*	*Time*	*QNI*	*QTC*
Ks S.S.B. Net	Mon. through Sat.	3920 kc.	1830 CDST	732	241
Ks Phone Net (KPN)	M-W-F	3920 kc.	0645 CDST	143	16
Ks Phone Net (KPN)	Sun.	3920 kc.	0800 CDST	112	49
Ks C.W. Net (QKS)	Daily	3610 kc.	1900 CDST 2100 CDST	227	207
Ks Weather Net	Daily	3920 kc.	1800 CDST	770	28
Ks EC Net	Sun.	3920 kc.	1300 CDST	38	14

Traffic: (May) WAØMLE 392, WØINH 274, KØMZZ 184, KØJMF 152, KØMRI 148, KØHGI 137, KØKED 133, WAØLLC 102, KØBXF 74, WAØKDQ 63, WØAVX 62, WAØCCW 42, KØEMB 40, WAØJOG 38, WØFII 36, WAØKHA 33, KØGZP 32, KØUVH 22, KØLPE 18, KØGII 9, WØFDJ 6, WAØKDZ 5, WØWFD 4, WAØKDJ 3, WAØJSH 1. (Apr.) KØMZZ 3.

MISSOURI—SCM, Alfred E. Schwaneke, WØTPK—WØBUL has renewed appointment as SEC. WAØOVG has been apointed EC for St. Clair and Hickory Counties. KØAEM has been reappointed RM as he again becomes manager of the Show-Me Net (SMN, 3580 kc. daily 0300 GMT, 10:00 P.M. CDST), replacing KØJPL, who is QRL. WAØKUH was appointed PAM as manager of PHD. Appointments renewed: WAØELM as PAM; KØONK as ORS/PAM. It seems that most section nets are operating on Daylight Saving Time so the schedule below may be in error until this can be verified. WØAIM again is editor of *Tri-State QRM*, publication of the Tri-State ARC of Joplin. WAØJIH is the new editor of *HARK* (HARC K.C.), replacing WØTFQ, who was editor for over 15 years. KØAEM is the new editor of KØLIR *Sidebands* (St. Louis ARC, Inc.). The Zero-Beaters ARC will hold its Annual Hamfest in Washington Aug. 6. WNØRNS is Nov. Cl. in Washington. The following received Public Service Awards for work in the Orick tornado in Jan.: KØSPE, KØIQS, WAØKUH, WØAMO, WAØQLN, WØDDX, WØGYX and WØKHT. WAØPUL is Gen. Cl. in Raytown and has a new vertical. WAØEMX graduated from Graceland Coll. with an A.A. in medicine. KØJPL is back in Mo. and active in OO work again. OO reports were received from WØQWS, KØYIP and KØJPL; au OVS report from WAØITU.

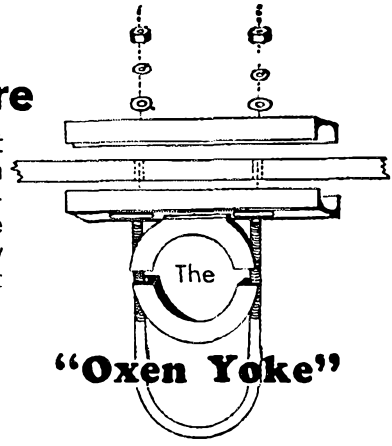
Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
MEN	3885	2230Z	M-W-F	13	152	13	WØBUL
MNN	7063	1900Z	M-Sat.	26	82	59	WØOUD

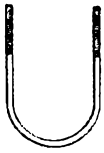
Do It Yourself Universal Beam Antenna Hardware

Yes, by popular demand, this time-tested product designed by W8FYR is again available so you can build yourself a better beam antenna. Any form-fitting element holder channel locks with any yoke size. Correct size U-bolt A or C are automatically supplied. Several tons of these quality die-cast clamps are in use the world over.

Complete Clamp **$2.29**

Insulated type clamps also available



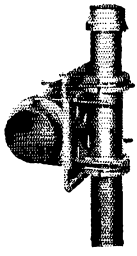


SIZES
A or C
5/16 x 18

¾-⅞-1-1⅛-1¼-1½

1¼-1½-1⅝-1¾-2-3

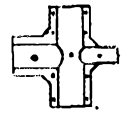
When ordering element to boom clamps, furnish us with element and boom size. When ordering boom to mast mounts, furnish us with boom and mast size.



HEAVY DUTY BOOM TO MAST MOUNTING

Heavy die cast mounting plate uses 4 U-bolts and 4 yokes. Size required. Available as a single or dual plate assembly.
Single Plate Mount **$8.95**
Dual Plate Mount **$11.95**

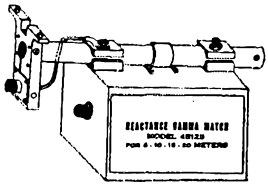
BOOM TO MAST T MOUNTS



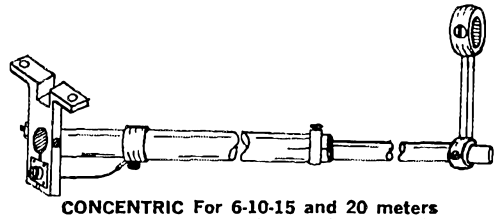
These die cast form fitting boom to mast mounts are a sure way to keep that beam in the air. Low in cost. Buy high in reliability. Available in

1¼ in. to 1¼ in.	**$2.95** Net
1½ in. to 1½ in.	**3.95** Net
1½ in. to 2 in.	**4.95** Net
2 in. to 3 in.	**6.95** Net

Reactance Gamma Matches



For 6-10-15 and 20 meters, designed for coaxial lines for perfect unity. Power to 1000 watts and over — The ideal match for unbalanced line to balanced antenna. Will fit KIRK "Oxen Yoke" clamp. Provisions are also made for mounting to boom when other than KIRK Oxen Yoke antenna clamps are used. Makes antenna tuning extremely easy. Tune in five minutes. Gamma unit becomes part of gamma line. Shipped with complete installation instructions and easy tuning method. **$14.95**



CONCENTRIC For 6-10-15 and 20 meters

An inexpensive way to match an unbalanced line such as RG-8U or RG-11U to a balanced antenna is by this concentric gamma. Unit will handle maximum legal power. Always specify boom and element size when ordering for proper contacting bracket.

BAND	6M	NET PRICE	$5.95
	10M		6.95
	15M		7.95
	20M		8.95

Send 10¢ in stamps for complete brochure and technical manuals giving construction methods and designs of monobander, interlaced dual and tri-band full size arrays.

KIRK Electronics

6151 DAYTON-LIBERTY ROAD DAYTON, OHIO 45418
PHONE: AREA CODE 513 — 835-5028

MoSSB	3963	2300Z	M-Sat.	25	500	143	WØRTO
MoPON	3810	2100Z	M-F	21	179	154	WØHVJ
PIID	50.4	2430Z	Mon.	5	74	7	WAØKUH
HBN	7280	1705Z	M-F	27	532	77	WAØBHG

Traffic: WØAIM 10,033, KØONK 2313, KØAEM 251, WØEEE 224, KØRPH 192, KØYBD 158, WØZLN 143, WØOUD 110, WØHVJ 84, WAØJIH 61, WAØFMD 51, WAØLOG 47, WAØHQR 42, WØZBR 42, WAØLYE 41, WAØELM 30, WAØEMX 30, KØENH 21, WØGQR 17, KØORB 16, WØRTO 15, WØBUL 11, WAØNGC 10, WAØQBF 8, WØGBJ 2, KØYIP 2.

NEBRASKA—SCM, Frank Allen, WØGGP—SEC: KØOAL. May net reports: West Nebraska Phone Net, WØNIK, QNI 651, QTC 41. Nebr. Emergency Phone Net, WAØGHZ, QNI 1917, QTC 81. Nebr. C.W. Net (NEB), WAØGHZ, 1st session QNI 97; 2nd session QNI 93, QTC 182. Storm Net, WAØKGD. 1st session, QNI 1206, QTC 113; 2nd session, QNI 883, QTC 89. Nebr. AREC C.W. Net, WAØEEI, QNI 9, QTC 3. Nebr. Morning Phone Net, WAØJUF, QNI 1100, QTC 90. Nebr. AREC Phone Net, WØIRZ, QNI 144, QTC 3. Dead End Net, KØUWK, QNI 294, QTC 42. The Dead End Net has suspended operations until Sept. 1. Teen-Age Net, WAØORO, QNI 205, QTC 34. A reminder, all AREC applications may be sent direct to V. A. Cashon, KØOAL, P.O. Box 488, Chadron, Nebr. 69337, if you have no EC. Traffic: KØQIX 172, WAØGHZ 167, WAØLOY 107, WAØHWR 96, WØLOD 85, WAØBOK 58, WAØGVJ 58, WØGGP 48, KØIXY 44, KØJTW 39, KØKJP 37, KØJFN 36, KØPTK 30, WAØOHO 29, WAØPCR 24, WØBFV 20, WAØIXF 20, WAØJKN 20, WAØQMZ 20, KØDGW 15, WAØPOC 14, WØZJF 14, WAØAES 13, WØGJO 10, WAØIBB 10, WAØJUF 8, WØHOP 7, WØWKP 7, WAØFNY 6, WAØIXD 6, WØWR 6, WØEGQ 5, WØNIK 4, WØVEA 4, WAØIBL 3, WAØKHE 3, WAØNYM 3, WØWZR 3, WAØEUM 2, WAØJAV 2.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John McNasser, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for May:

Net	*Freq.*	*Days*	*Time*	*Sess.*	*QNI*	*QTC*
CN	3640	Daily	18:45	31	414	418
CPN	3880	M-S	18:00	31	546	240

High QNI: CN—WA1HSN, W1ZFM. WA1FGN, WA1FNJ and W1KAM. CPN—W1GVT 30, K1DGK 27, W1YU 26, WA1EEJ 25, K1EIC 24, W1LUH 22, WA9QVU/1 and W1YRH 21, K1MBA and K1SRF 19, K1OQG 18, K1LGB 17 and WA1FVH 16. W1QV, W1PRT, W1WHQ and W1GVT were pleased to attend the Danbury CARA Annual Dinner. Stratford ARC's new licensed members include WN1HNL, WN1HNM. WN1HMN and WN1HNO. Welcome to amateur radio! The Conn. Counties Award is of interest to many—contact W1WHQ for details. W1WHR, Southington EC, has appointed W1AGJ tech. advisor. W1EFW NTS outlet and K1CSY MARS outlet. Communications are needed for the National Canoe Regatta in Columbia Labor Day week end. Please contact W1HHR or the SCM for details. Sorry to learn that W1YXB was hospitalized as the result of accidental contact with high voltage. The Teen Age Net is active on 3885 kc. at 7 P.M. Slo Speed Net (EASN), 3740 kc. at 6 P.M.. W1KAM RM, reports for May: 31 sessions, QNI 341, QTC 68. K1HTV worked 27 states in 7 call areas on 2 meters! WA1FJU has a new SB-101. W1BDI is vacationing in Maine. WA1FNJ is collecting parts for the 811A final. Congratulations to: WA1FGN, WA1FJU and W1EFW for May BPL; WA1FVH for 25-w.p.m. certificate; WA1FXT for top honors in his high school graduating class; K1YON for consistent reports on 220-, 432 and 1215-Mc. activities. Summer is going fast but it is not too late to improve that antenna system while the weather is good—do it now! You will be glad, come winter! Traffic: W1EFW 501, WA1FJU 214, WA1FGN 160, W1EEN 159, WA1CYV 155, WA1FNJ 154, WA1HSN 125, W1AW 119, WA9QVU/1 108, W1KAM 102, K1LMS 102, W1YU 77, W1GVT 67, WA1HEW 60, WA1FVH 58, K1SXF 57, K1UDD 54, W1BDI 41, W1YBH 33, K1SRF 24, W1KUO 16, W1ZL 12, W1CUH 9, K1OQG 7, W1BNB 6, W1BKI 5, K1YGS 5.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from these ECs: W1s LVK, JSM, STX, RPF, UJF, K1s WVW, DDE, ERO, PNB, DZG, W1MMY and W1OG are Silent Keys. W1ZOC is RO and K1YGW Alt. RO for Avon. New check-ins in our Novice Net on 3733: K1NGQ, WN1s GBT, HQV, HJX, WA1s DWL, DYU, W1SKQ is on many bands, WB6BST, ex-K1EAF, now is working the Capeway Club members. W1s ALP and EAE presented the Charter of ARRL affiliation to the Capeway RC at W1RGH's QTH. WA1GFT, now General, is on 75 and 15 phone. WA1DJC says a local TV dealer has helped his club with junk TVs for parts. K1DZG will be operating up in VO1-VE1-Land. K1YUB has a rig in the car for 6. W1DMD won 2nd place for Mass. in the First Zero QSO Party and is 14th to receive the "Worked All N.Y. Counties" award. K1RNL is out of the Navy. The South Shore Club held its annual banquet with old-timers W1s AL, BA, DD, AKN and AKC present. WA1FUO has a Swan 350. WA1CRT has an NCX-3 and will be on 20 and 40. W1IKR, of Everett is giving code practice on 6. W1BHD is advertising manager for *Spark Gap Times* of the OOTC. K1WVW has a Clegg 2, 60-ft. tower and 3 beams on a 72-ft. mast. W1RST is very busy at work. WA1BFD is on 160 c.w. WA1EYY has a new Mor-Gain antenna for 75-10. WA1s FSH and FSI went to Bermuda. W6JCF/1 is on the nets. K1HVV, K1DIR/1, W1JDS, W1EZD and W1AQE finished in that order in the Mass. 1966 QSO Party, says W1MX. On Armed Forces day WA1s ECY and DWS were at Ft. Devens where they relayed traffic on 6. We are sorry to lose K1WJD, who is going back to W.N.Y. where he will be K2KIR again. W1BGW got a 55-w.p.m. code certificate from the Conn. W.A. He is on the Beep NFSK RTTY Net on 7140 kc. Sun. A.M. W1HIL is going after Extra class. The 128 Contest Club is now affiliated with ARRL. W1BPW is pres.; K1DIR, secy. W1SIV is home from the hospital. W1HNW is on 10 and 15 s.s.b. and is active in the North Shore RC. WN1HHK is on 2, 15 and 40. W1PLJ took part in the Feb. FMT. K1HRV, Norwood ARC secy., says the club will have 10 new Novices soon. WN1HRV also belongs to this club. New appointments: K1HHN as EC for Norwood, WA1DEC/DED as OPS, WA1DFL as OVS. Appointments endorsed: W1s ZQQ and RST as OOs; W1s EHT, HNW, K1NLQ and WA1BZJ as ECs; W1DOM and W1HIL as OPSs; K1KUY and K9AQP/1 as OVSs; WA1FRI as OBS. K1GTX is in the hospital.

Net	*Days*	*Freq.*	*Time*	*QNI*	*QTC*	*Sess*
EMN	Daily	3660	2300	306	225	31
EMN	Mon. through Fri.	145.8	0000	183	205	31
EMNN	M.W.F.	3733	2230	79	66	14
8MN	MTWTF	50.85	2330	221	9	22

K9AQP/1 built a mobile transmitter for 2 and 6. K1FFE has a transistor converter for 2 using T1S348. K1FWF has a 5894 final for 220 Mc. New officers of the Mass. Chapter of the NAHC: K1WRO, pres.; W1DOM, vice-pres.; K1MTM, secy.-treas.; WA1DFL, awards. K1FJM is working on a hetrodyne exciter for 2. W1IAU passed the General Class exam. He. K1WYS and WA1DDO are members of the Whitman FD Assn. W1AIE has a new tri-band beam. WA1FXV built a v.f.o. for 6. W1KCO and K1LDC went to Expo 67 and took s.s.b. rigs. WA1DPX has 8 over 8 skeleton slots on 2. WA1HPS is the new editor of *Quannapowitt RA News*. Traffic: (May) W1PEX 985, W1EMG 331, K1PNB 295, W1OJM 199, WA1EYY 169, W1UIR 118, W1OFK 106, WA1EVY 101, W1DOM 80, W1CTR 50, K1CLM 48, WA1FSI 44, WA1EFN 41, WA1DPX 40, W1AOG 32, W6JCF/1 31, K1ZGH 29, WA1DED 28, WA1DEC 24, WA1ECY 23, W1MX 23, K1GKA 18, K1LCQ 16, K1WJD 15, K1ESG 13, K1VOK 10, WA1GCH 9, K1OKE 9, WA1DFL 7, W1BGW 4, W1CT 4, K1WJD 1. (Apr.) K1YZB 113, K1ESG 16, K1GKA 16, W1HIL 2.

MAINE—SCM, Herbert A. Davis, K1DYG—PAM: K1WQI. RM: W1BJG. Traffic nets: Sea Gull Net, Mon. through Sat. on 3940 kc. at 1700 to 1800; Pine Tree Net, daily on 3596 kc. at 1900, c.w. The PAWA held a very nice banquet in May at Holiday Inn with 105 persons attending. The PAWA will hold meetings all summer, same time and place. K1RQE is at Fort Knox on duty. K1OYB is home on vacation from W6-Land. The word from W1BJG is that the small crew on PTN has 100% activity in the c.w. world. The famous few hold down the fort to keep things going and keep the state active in IRN and the PTN. All the boys need is a little more help here and there from any interested stations. Traffic: K1WQI 65, W1GU 53, W1BJG 42.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX-K1DSA—SEC: Open. PAM: K1APQ. RM: Open.

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*	*Mgr.*
GSPN	3842	2300Z	M to F	27	912	109	K1APQ
GSPN	3842	1330Z	Sun.	—	—	—	K1APQ
VTNHN	3685	2230Z	M to F	27	105	55	K1UZG
NHEPN	3842	2230Z	Sat.	4			K1YSD
MV AREC	50.82	0100Z	M to F	23	264	50	K1DWK
CC AREC	50.44	0100Z	Sun.	4			WA1DAO
RC AREC	146.7	0100Z	Sun.	4			WA1DKD

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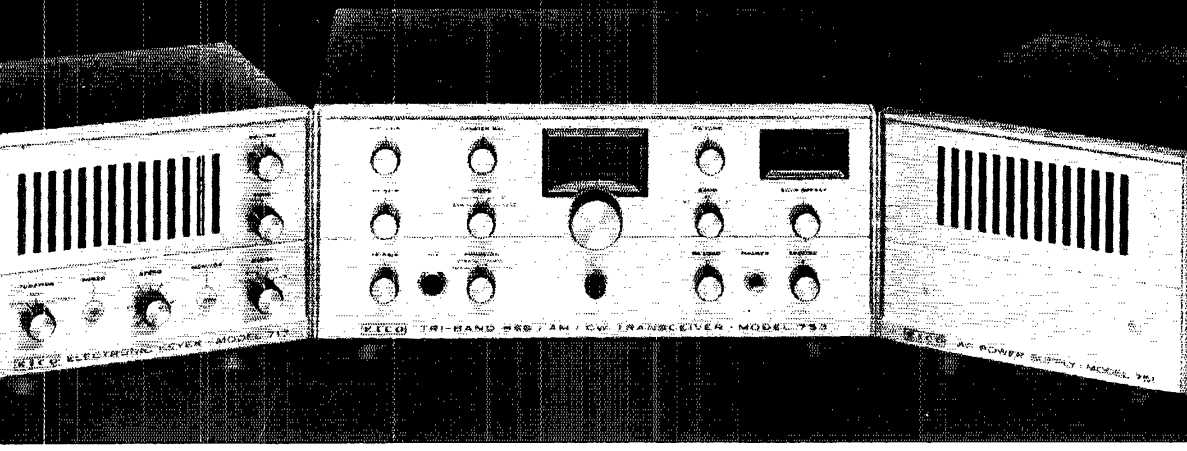

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The EICO 753 is a complete 3-band transceiver, offering SSB/AM/CW operation with conservatively rated 200 watts PEP on all modes (rated for maximum efficiency rather than maximum possible input power). A new Silicon Solid State VFO provides full coverage of the 80, 40, and 20 meter bands. Assembly is made faster and easier by VFO and IF circuit boards, plus pre-assembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The EICO 753 is at your dealer now, in kit form and factory-wired.

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SPECIFICATIONS: Output Voltages: 750 volts DC at 300ma, 250 volts DC at 170ma — 100 volts DC at 5ma, 12.6 volts AC at 4 amps. INPUT VOLTAGE: 117VAC.

EICO Model 752 Solid State Mobile Power Supply: (Not Shown). For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload. Output voltages identical to Model 751. Input voltage 11-14 volts DC.

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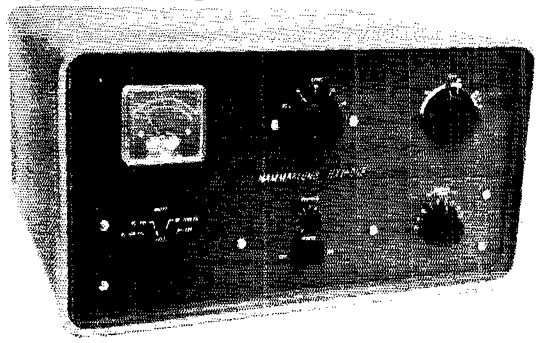

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Appointment: K1SLR as OVS. *Endorsements*: W1RCC as OPS, W1TFS and K1NBN as OOs. K1YSD is moving to a new QTH and is giving up the SEC position. Bob did an excellent job and will be missed. W1FOG is now W2BYE. New hams: WN1HQI Portsmouth, WN1-HQP Dublin, WA1HQR Franklin. Contoocook Valley Radio Club's new officers are WA1BSU, pres.; WA1HAT, vice-pres.; K1VWM, treas.; W1MKA, secy. During Armed Forces Day W1MTX operated AIR. WA1DAO is moving to New London, N. H. K1NBN is back from Hawaii. K1RNN is on the air in W6-Land with an HW-12. W1ALE is asst. net mgr. and K1BGI is traffic mgr. for the MVAREC Net. Highest scores outside of N.H. were K8ANA, K1PRB and W8WVU in the New Hampshire QSO Party. A GSPN certificate was issued to W1BHA. K1PCY has a new NCX-3. K1APQ had 152 check-ins on the 1000th consecutive session of the Granite State Phone Net. Traffic: K1BGI 87, W1MHX 28, WA1EUJ 16, WA1DAO 11, WN1HGL 10, W1SWX 8.

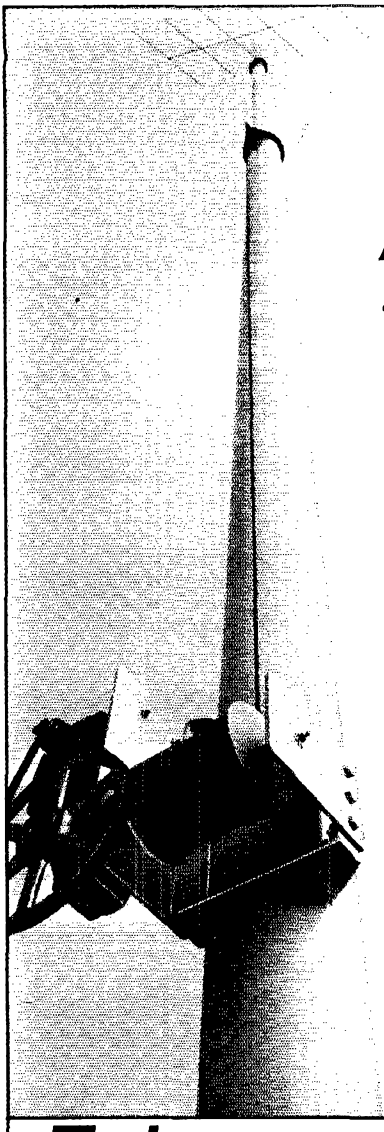
RHODE ISLAND—SCM, John E. Johnson, K1AAV —SEC: K1LII. RM: W1BTV. PAM: W1TXL. V.H.F. PAM: K1TPK. Section Net certificates were issued to WA1EST, WA1DPV, WA1ESO, WA1EEJ and K1FZS. The Cranston Radio Assn. elected K1QZV, pres.; W1-POP, vice-pres.; WA1GGE, secy.; K1KCA, treas. W1-SYE, the Newport County RC, has two new Novices, WN1HXK and WN1HXJ. A new theory class will begin and code classes for new hams will be held. Club certificate No. 73 was presented to WA1FFL. The W1AQ Club of Rumford has issued the following WRI certificates: No. 93 to WA8CLZ, No. 94 to W4OWE, No. 95 to K2VGR, No. 96 to W2BWW, No. 97 to K8KTM, No. 98 to PY5ASN and No. 99 to WA1EEJ. K1CBO, a club member, has two new hams in his family. His 12-year-old daughter is WN1HQD and his 10-year-old son is WN1HQE. The club's code and theory class was taught by WA1BFH, K1PEL, W1WAC and K1LII. Nine candidates completed the code and theory and to date WN1-HXN, WN1HXO and WN1HXP have received their Novice tickets. The club will set up a Novice station for the new class. WA1EQF and K1SYN, of the club, are proud fathers of new harmonics. Traffic: WA1EEJ 232, W1TXL 191, W1YKQ 178, W1BTV 89, K1VYC 43, K1TPK 26, WA1CSO 19, K1VPK 13, K1NQG 2.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. RM: K1UZG. May net reports:

Net	*Freq.*	*Time*	*Days*	*QNI*	*QTC*	*NCS*
GR. MT.	3855 kc.	2130Z	M-S	739	20	W1VMC
VT. FONE	3855 kc.	1300Z	Sun.	No report	—	W1UCL
VTNH	3685 kc.	2230Z	M-F	105	55	K1UZG
VTCD	3990½ kc.	1400Z	Sun.			W1AD
VTSB	3909 kc.	2130Z	M-S	676	30	W1CBW
		1230Z	Sun.			

Don't forget International Field Day Aug. 13 at Cliff-side Country Club in Burlington. The Franklin County Club has a nice certificate for working 3 stations. W1-UXK is planning on a National 200 soon. The Catamount Club meets every Thurs. on 50.4 Mc. at 7:30 P.M. Traffic: (May) K1BQB 138, K1UZG 39, K1MPN 34, W1FRT 17, WA1GUV 7, W1KJG 1. (Apr.) W1KJG 2.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. RM: W1DWA. W1DGJ was the guest speaker at the May meeting of the Valley Amateur Radio Club. K1GPK is the new vice-pres. of the club. K1ZOC is getting a TR-44 rotor to go with his TR-4. New officers of the Cathedral High Club in Springfield are WA1FVN and WA1EDM, co-pres.; WN1HHO, vice-pres.; WN1HWM, secy.; Paul Donovan, treas. A reminder once again—Worcester County is in the West Mass. section. Some of its stations are sending reports to the East. Mass. SCM. W1PHG spoke on transistor at the May meeting of the HCRA. K1IJV and W1UKR took active parts in the convention at Swampscott. K1-UOR and her OM are training Boy Scouts and Novice candidates. W1QWJ and K1RPB gave interesting talks at the convention. K1PMK is now a gramp. W1NY is setting up high power at Wellfleet for summer operation. Doug Rice, ex-W1FQX, is now WA4NZI at Pompano Beach, Fla., working 15- and 20-meter s.s.b. He sends his best to all the old-timers here. RM W1DWA submitted his usual very excellent report giving the following information on WMN: 31 sessions with 85 messages handled. The following were active at least 10 sessions: W1DVW, K1AEC, K1IJV, W1DWA. He recommends Section Net certificates for WA1FJW and K1AEC. By the time you read this P.O.Box 249, Lanesboro, Mass. will be the permanent address of W1BVR. Traffic: (May) W1EOB 122, K1IJV 116, W1DWA 106, W1DVW 44, W1-BVR 40, K1WZY 38, WN1HHA 12. (Apr.) WN1HHA 11.



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IDAHO QSO PARTY

August 11-12, 1967

The Eagle Rock Radio Club of Idaho Falls, Idaho, is pleased to announce a QSO Party to be held on the last two days of the week-long Market Lake Centennial Celebration.

Rules: 1) The period will be from 0001 GMT August 11 until 0300 GMT August 12, 1967. 2) Idaho stations send contact number, signal report and city and county. All others send contact number, signal report and city and state, or province or country. 3) Score two points for each two-way exchange. Idaho stations use states for multiplier, others use Idaho counties for the multiplier. The final score is the sum of scores for each band used. Note that phone and c.w. are *not* considered separate bands. 4) Logs must show date and time (in GMT), band, mode, station worked and full exchanges. 5) Send a copy of your log with a summary sheet to H. H. Conley, W7DMP, 930 Homer Avenue, Idaho Falls, Idaho 83401. Deadline for logs is September 15, 1967.

NORTHWESTERN DIVISION

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes Mon. through Fri. on 3935 kc. at 7 P.M. MDT. W7IUO plans to build a complete station and is working lots of DX on 15 meters with 50 watts. W7GYG was in an auto accident and is recovering OK. K7VAT has a new 813 final, W7QC put up a new beam and is active with traffic. K7YFF reports good DX results with a new 10- and 15-meter quad. WA7ETO is converting an ART-13 and is working on a 75-meter mobile. FARM Net report for May: 24 sessions, 634 checkins, 76 traffic handled. Traffic: K7HLR 277, K7OQZ 36, W7GGV 19, WA7ETO 18, WA7EWV 9, W7ZNN 9.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY. OBSs: K7EGJ, K7UPH.

Montana Traffic Net	3910 kc.	1900 MDST	M-F
Montana PON	3885 kc.	0815 MDST	Sun.
Montana RACES	3996.5 kc.	0930 MDST	1-3 Sun
Missoula Area	3890 kc.	0900 MDST	Sun.
Great Falls AREC	3910 kc.	0930 MDST	Sun.
Butte Anaconda AREC	144.450 Mc.	2000 MDST	Sun.

Endorsements: K7SVR, W7TYN and W7CJN. A new call in the Anaconda Area is WN7HIX. New calls in the Bozeman area are WA7EHD and WA0ATY/7, who has his Amateur Extra. WA7FBJ has a new quad antenna up. K7JBH, of Bozeman, took first place in the I.E.E.E. regional paper contest and will go to the national presentation. A call inadvertently left out of the list of amateurs taking part in Operation Westward Ho was W7VNE. Mal, the EC of Deer Lodge County, was the big push behind the whole affair. My apologies, Mal. W7NJI, K7DCB and K7JBW helped to locate the scene of an airplane crash. K7DCB and K7JBW flew a search plane. W7NJI, a member of a rescue team, helped recover the bodies. W7VNE has a new s.s.b. rig on the air. Four amateurs received Bachelors Degrees from MSU at Bozeman: K7DYD and K7QWB EE, K7JBA PE and K7JBW geology. WA7DLW has a new SB-101 on the air. WA7COY is on with a transistor rig. K7LZF has a new 2-meter rig on in the Missoula area. PON traffic: 200. Traffic: K7PWY 178, W7FL 75, K7EGJ 54.

OREGON—SCM, Everett H. France, W7AJN—RM: W7ZFH. Section Net reports: WA7AHW mgr. AREC Net, sessions 31, total attendance 661, traffic 1, maximum number of counties 17, QSTs 8, contacts 63. W7ZFH mgr. OSN Net, sessions 22, total attendance 107, traffic 66. W7MLJ, a new OPS, sends in his first report and he also is Radio Officer for Lake County RACES. The station is located in the basement of the Court House and consists of a Globe King 500-C, an HQ-180-C, HX-50, NCX-3, 30L-1 and a Hy-Gain vertical on the pigeon loft on the roof. W7DEM reports that the Southern Oregon Radio Club, representing members of the ARPSC and MARS, furnished communications for the Memorial Day White Water Boat Race. The base station was located in the bandstand of the local park and was operated by W7ADF and WA7EEJ. K7RDP and WA7CKL operated from the juncture of Dowell Road and the river. WA7AHP and a non-amateur gave the position of the racers at the mouth of the Applegate River. K7YNO and a non-amateur operated from the

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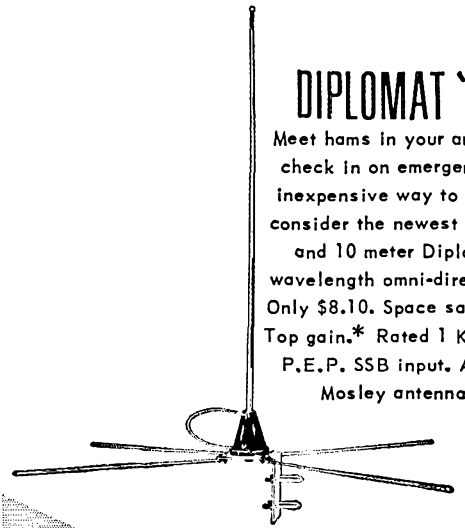

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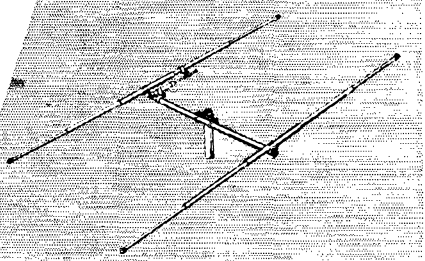

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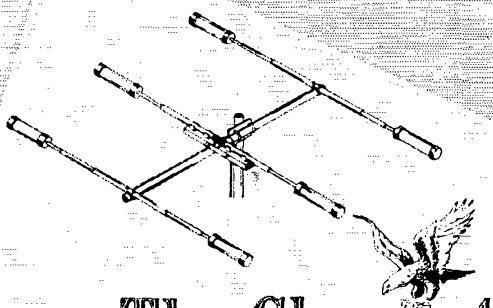
Hams are working lots of DX with this 5-band *mobile antenna! Full* power rated. Use on 10 meters without coil. Interchangeable coils for other bands. Adjustable upper whip section for peaking antenna to desired frequency. Coils with whip tip pre-cut and set for each band, available (extra). Hinged break over.



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Findley Bend area. K7CMV and W7DXY reported from Robertsons Bridge. WA7FFJ, W7CMK, WA7FEM and WN7HDV were in the Dunn Riffle area. WA7ADW, WA7FHX and WA7ADT, were at the Evans Riffle turnaround point and buoy marker. W7DEM, K7YQM and K7PMB gave reports to the base station. As this will be my final report as your SCM, I wish to thank all those who sent monthly reports and helped to make this column of Oregon activities possible. Again, many thanks. Traffic: (May) K7RQZ 332, WA7BYP 185, W7ZB 88, W7GUH 45, WA7EES 43, W7ZFH 35, WA7DOX 24, W7DEM 9, W7MLJ 8, WA7DWK 4. (Apr.) K7RQZ 248, WA7DWK 16.

WASHINGTON—SCM, William R. Watson, K7JHA —RM: K7CTP. PAM: W7BUN.

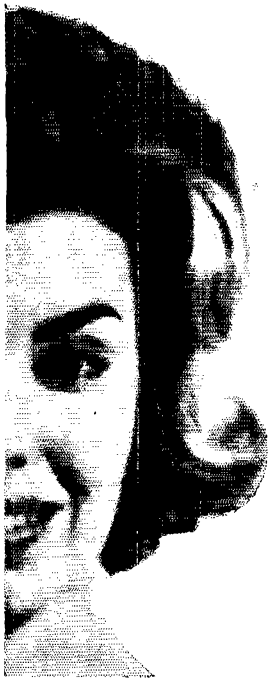
WSN	Daily	3535 kc.	0100Z	QNI 337	QTC 496	Sess. 31
WARTS	Ex. Sun.	3970 kc.	0100Z	QNI 1326	QTC 112	Sess. 27
NTN	Daily	3970 kc.	1830Z	QNI 920	QTC 505	Sess. 31
NSN	Daily	3700 kc.	0030Z	QNI 464	QTC 148	Sess. 31

K7JHA extends sincere thanks for the support given him in the recent SCM election and plans an active administration. K7CTP has been appointed as RM. W7BUN is a new PAM. The Wash. group including N.W. Dir. W7PGY, SCM K7JHA, Asst. Dir. W7LFA, RM K7CTP and PAM W7BUN met with the Wash. State C.D. Director and Governor Evans. By official action Governor Evans declared the week of June 19 through 25 Amateur Radio Week in Washington State. In other action the Governor stated that the amateur license plate fees would remain the same. The c.d. director and his communications officer outlined the Washington c.d. program and the provisions by which the AREC and RACES groups can best combine under the ARPSC. W7AIB says traffic is up on WSN. W7MCW took a Calif. vacation. W7HMA vacationed Eastward and lost his mobile antenna. K7MICA sends in his first traffic report. The Bremerton ARAB Hamfest was attended by 134. W7BTB is logging KL7 traffic on 20. K7JHA vacationed in Texas. K7VNB reports poor band conditions. K7JHA reports the N.W. Tech Net recessed until Sept. 10 because of band conditions on 75. K7NZO is now at a new QTH in Bremerton. WN7GWL is hitting the DX. WN7GPZ is in San Diego on the USS *Ranger*. W7AXT finally found the neon sign power leak and also has an application pending as OO. W7WCW, W7IEU and K7MHL have OBS appointments ending. W7HDL sends in an FB OO report. W7GYF reports 10 new countries worked. W7BUN is QRL assisting with State Hamfest plans at Yakima. K7UTT has a new rig. W7ZIW had the rig to herself for 2 weeks with the OM in Hawaii and made the BPL again. K7MGA made the traffic column. W7DZX still is going strong on TCC, our NTS backbone. W7UWT sends in an SEC report with 11 county coordinators. The Boeing Club is sponsoring a 1967 QSO Party the week end of Sept. 16, 17 and 18. K7JAJ is the new editor of *Parasite*. K7YFJ is the new WARTS Mgr. Traffic: (May) W7BA 1418, W7ZIW 784, W7HMA 693, WA7DXI 674, K7TCY 629, W7DZX 444, W7JEY 358, W7PI 342, K7CTP 247, W7BTB 175, K7VNB 62, K7MICA 61, W7MCW 52, W7IEU 37, K7JHA 34, W7APS 21, K7MGA 21, W7AIB 13, W7GYF 12, W7AXT 11, W7OEB 8, WA7EMM 6. (Apr.) W7AXT 7. (Mar.) W7JEY 560.

PACIFIC DIVISION

EAST BAY—SCM, Richard Wilson, K6LRN—W6UZX is now an ORS. W6TYM is out of school for the summer. WB6QNE received a certificate for 40 w.p.m. from the Conn. Wireless Assn. W6CBF participated in Armed Forces Day activities and the EMT. WB6PCQ fights a high noise level to QNI NCN-RN6 and PAN. WB6FHH continues to QNI NCN. WA6FBS is back on the air and is working for MB Associates in San Ramon. W6IDY visited Japan in May. WA6UFW is a new Official Bulletin Station and transmits the ARRL bulletins as well as the Pacific Division bulletins on 3.900 Mc. each Thurs. at 8 P.M. local USB and 14.300 Mc each Sun. at 4 P.M. local USB. There are some who feel that NCN should be split or something be done to reduce the confusion from the long list of QNIs. I would like to hear from you traffic men on this. How many would be interested in forming an East Bay Net? Does anybody have any ideas? WA6RRH still is on the BARN and MARS 2-Meter Nets. Traffic: (May) WB6PCQ 435, W6UZX 128, W6TYM 109, K6LRN 78, WB6FHH 16, WB6QNE 14, WA6FBS 8, WA6RRH 5. (Apr.) W6TYM 71, WA6RRH 10. (Mar.) W6TYM 98.

HAWAII—SCM, Lee R. Wical, KH6BZF—SEC: K6EWZ/KH6. PAM: Vacant. V.H.F. PAM: KH6EEM. RM: KH6GGR.



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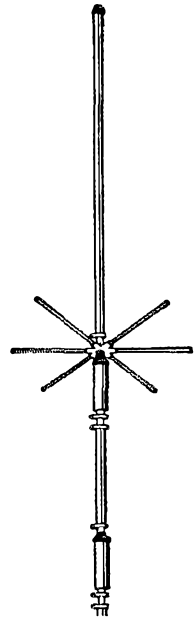

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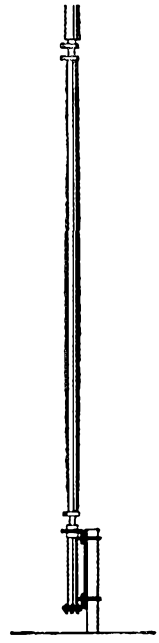

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The Hawaii QSO Party held May 13-14 was a success despite poor band conditions and the committee is already planning for next year's QSO Party. The logs and QSLs still are rolling in and the results will be announced later. Those wishing a list of all winners should send their SASEs to the committee. USASTRATCOM Pacific MARS reports the addition of the Intra-Far East Net in support of S.E. Asia. W6GY and KH6AX have been keeping skeds on 20 meters. Freeman QSYed to FO8-Land and Bali Hai, etc., for several weeks. KH6-GFI, in Kailua, leaves for the Mainland to attend school in Iowa. ZS3HT came to the "Islands" for a vacation for a few days during an around-the-world trip. K6EWZ/KH6 worked FO8BJ on Clipperton for a new one. KH6GHC has been working DX on 20 meters mornings. John heard 4S7, 7Q7, ZD9, 5H3 and XW8. Other DX-chasers heard have been KH6BB, KH6CBQ and KH6GDR. KH6EOQ reports he no longer is QSL Mgr. for KJ6DB and will finish off the logs he has now. K8PKY/KB6, ex-VR3L, called me on the landline while passing through Honolulu on his way back to Wood's Hole Oceanographic Institute in Massachusetts. Hope to see many of you at the Southwestern/Pacific Division ARRL Convention Sept. 8, 9, 10 at the Ambassador Hotel in Los Angeles. Traffic: (May) KH6BZF 14, KH6GHC 1. (Apr.) KH6EOQ 36.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: WA7BEU. Installation of the following directors and officers of the NARA was held at a banquet: W7-THH, W7YKN and K7VYT dir.; W7SKP, pres.; K7-NKF, vice-pres.; HH2PR, secy.-treas.; WA7EGW, Sgt. at arms; W7CX, trustee. W7PBV coordinated with WB6AXY for a tour of Goldstone, which was enjoyed by K7NYU, W7PBV, W7PRM, WB6AXY, K6OLJ, WA6-SAY, WA6SEY, W6TCK and their families. K7RKH and son John made a trial run to Castle Cliffs, Utah, to prepare for the U.H.F./V.H.F. Field Day. They contacted Nevada and California stations. K7RBM is home running a lot of traffic with W7AAF. New amateurs in Las Vegas are WN7GRC and WN7HFL. W7PBV attended the Fresno Hamfest. W7TVF will QSO and QSL anyone needing a Nevada contact. The Southern Nevada Two-Meter F.M. Assn. has about 40 active members, repeater input 146.94, output 147.5 W7BIF is the new secy. of the SNARC. Traffic: K7RBM 69, K7HRW 24, K7-OHX 12, WA7BEU 1, W7BIF 1, W7PBV 1.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC: WB6BWB. ECs: WB6MXD, K6RHW, WB6RSY, W6SMU, WA6TQJ. RM: W6LNZ. ORSs: WB6RSY, W6VUZ, K6YZU. OPSs: WB6EAG, K6IKV, WB6MAE, WA6TQJ, W6VUZ. OBSs: W6AF, WB6MAE, W6NKR, WB6PHQ, WA6TQJ. OOs: W6GDO, WB6MPP, W6ZJW. OVSs: WA6XCB, WA6FWU, W6GDO, WB6-BZU, of the Dunsmuir ARC, attended the Siskiyou and Shasta Co. AR picnic at Castle Craigs SP. W6JDN reports that W6YNM has become a Silent Key. W6DDC has retired from the Southern Pacific after 40 years of service. W6GDO has completed a 1296-Mc. s.s.b. exciter and worked K6HCP in San Jose 2xSSB. The Chirps held its "Annual" banquet in Sacramento June 2, and plans to attend the International YL Convention in Denver next year. WB6RSY is now an A-1 Operator. Club member W6NKR has been busy mountain-topping down in the southern part of the state. W6LNZ made the BPL again with *100 originations plus deliveries* with 11 QTCs to spare. W6VUZ has been working DX from his mobile rig. W6VVD is getting 160-meter mobile going in Chico. W6JRY has a Model 14 machine and has joined the Chico area RTTY group. The 2nd Annual California QSO Party is scheduled for Oct. 16 to 17. How about putting some of Sacramento Valley's rare counties on the map? Information is available from WB6KIL of the Claremont Ham Club in the L.A. section. Traffic: (May) W6LNZ 199, WB6RSY 127, WB6-MAE 24, K6YZU 18, W6NKR 3, WA6JDT 2, W6VUZ 1. (Apr.) W6NKR 4.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD WA6IVM is scouting some new QTH locations in the quiet areas. K6CAZ is readying a move to Occidental in coastal Sonoma County. WB6GVI is now in the U.S. Navy for some active duty. W6UDL returned from his vacation in June and started to remodel the shack again. W6SLX still is looking for a move to W7-Land and a 2nd-class radiotelegraph ticket. WA6NDZ still is working on an ARC-12 transmitter and associated power and control system. W6GQA got a call and a QSL card from a PY4 during a recent CD Party. W6PTS was in

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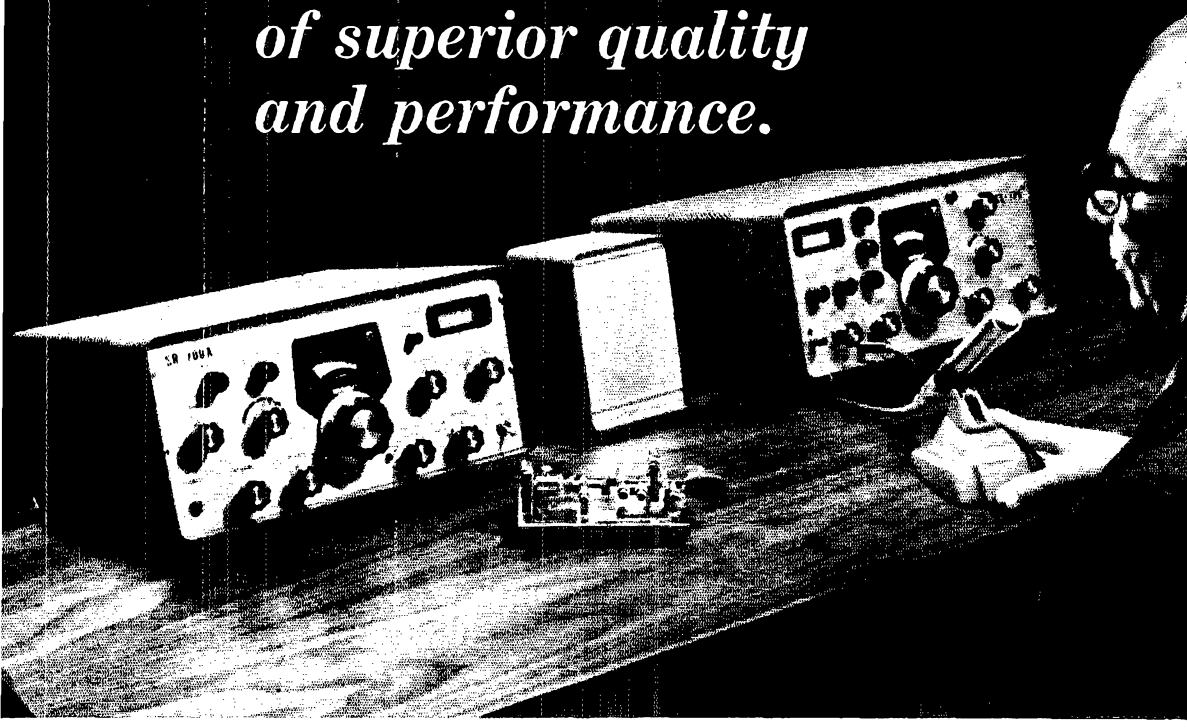

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the Marin General Hospital during May and found himself a featured player on TV when KPIX produced a feature on the Heart Unit there. WB6OGF produced a new call, WB6VKF, for the family Lake Tahoe QTH. W6WLV and W6KVQ continue to be the heavy traffic-handlers within the section. Field Day saw several clubs on the air with their emergency power. San Francisco, Marin, Sonoma and Humboldt Counties amateurs were heard operating. W6AFQ is using his retirement to catch up on his operating time and for travel. The Marin Amateur Radio Club has purchased 2-meter equipment to use in its emergency operations. WB6UJO was operating portable in the Portland area in early June on a vacation trip. The San Francisco Section *Courier* was back in the mails in June after the editor got his typing hand back. Backpackers WA6DJI and WA6AUD figure that their portable operations in the Sierra will be curtailed this year because of the still deep snows in June. W6CYO and W6PTS have *come up* with DXCC *recently* and W6PTS has been voted into membership in the Northern Calif. DX Club. Novice examinations appear to be increasing and new calls are appearing on the air locally. The San Francisco Section Net continues to meet on 3900 kc. at 1830 local time Mon. and Fri. The NCN needs outlets in Marin and Mendocino Counties. Check in on 3635 kc. at 7:00 P.M. local time. Traffic: W6WLV 309, W6KVQ 284, WA6AUD 18, W6BWV 11, WB6OGF 4, WB6GYI 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—It is with deep regret that I have to announce the untimely death of W6HKV. Harold always conducted himself as a gentleman. He was exuberant in his ham activities and his equipment was always kept in the best of condition. He enjoyed life and, I suppose, ham radio was uppermost in his heart as he very rarely missed any club meetings of the Fresno Radio Club and never missed any of the R-9 Radio Club. He attended nearly every ham convention in the northern part of the state, and I do believe he made 90% of the hamfests here in Fresno. Two days after the Fresno Hamfest, Harold suffered a very severe stroke at his work, was in a coma for a week, then a brain operation lasting four and one-half hours was performed, but his heart couldn't take it. Among the hundreds attending his funeral were W6QON, W6JXY, ex-W6AKK and W6LTO. W6PPO and W6JUP were pall bearers. I will miss Harold very much, and I know that those who knew him, also will miss him. He was tre Mayor of Kingsburg for the past 13 and one-half years. W6JUK is on 6 meters working DX using an eleven-element beam. W6LOC is *building* a new *house with a good antenna farm*. W6ZYR has a Swan 500. W6PPO is off the air for the first time in 22 years as his exciter went kaput. Traffic: WB6HVA 239, W6ADB 196, WA6SCE 30, WB6TFU 23, K6OZL 20.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: W6NVO. SEC: W6VZE. RM: W6QMO. W6ACW is active on NCN whenever possible but very QRL with work. W6ASH is busy with Red Cross coordination as well as the Oscar Bulletins from W6EE. Times for the bulletin sked are 0200Z Fri. on 14030 and 0500Z Sat. on 7015. K6YKG reports copy of NPG during Armed Forces Day. K6LFZ, EC for Hollister, reports activity on Mission Trail and MARS. W6MMG was *busy planning for Field Day with the NPEC*. W6ZRJ is busy with school work and has been accepted for a summer NDEA Institute in Media at San Jose State College. Even teachers have to go to school sometimes. WB6IZF operated portable at the Boy Scout Camperee at Hunter Liggett, mostly on 40 meters. W6RFF is busy with work and college courses but finds time for NCN when possible. W6YHM is not in Alaska for the first summer in several years. Don is filling on various schedules *while in the field with the USGS*. K6HGV *is* active with Navy MARS. W6QBY is a new call on NCN. Paul is operating from Redwood City. W6AUC is active on several nets, as OO and worked K6AUL who was on location with the USGS in Northern California. W6PLS is very busy with QCWA work and reports that DX conditions have been poor. K6DYX is filling in on TCC schedule and sending bulletins. W6DEF reports the activity for Redwood City. Hal sent a fine AREC letter to his members explaining operation of the group. He also was making plans for a week at Tahoe. W6YBV works NCN as well as RN6 and PAN. W6RSY made the BPL. W6ZRJ sends code practice at 10, 15 and 20 w.p.m. on 3590 kc. Tue. through Thurs. GMT at 0230Z. Traffic: (May) W6RSY 697, W6YBV 352, W6DEF 111, K6DYX 36, W6PLS 35, W6AUC 27, W6QBY 25, K6HGV 10, W6YHM 8, W6RFF 6, WB6IZF 3, W6ZRJ 3. (Apr.) W6ASH 30, W6ACW 4.

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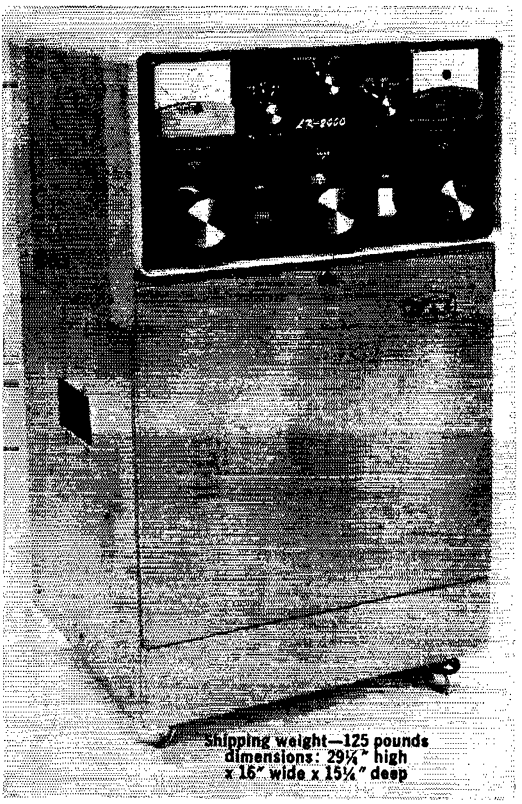

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ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—Asst. SCM: James O. Pullman, WA4FJM. SEC: WA4LWE. RM: K4CWZ. PAM: W4AJT. V.H.F. PAM: W4HJZ. W4NAP, EC for Rockingham County, reports they now have a 6-meter AREC net meeting Wed. and Sun. at 2100 EDST on 50.3 Mc. K4VAZ has a new Swan 250, also has a new six-element beam up 100 feet for 6 meters. Two new Novices now enjoying 80-meter c.w. are WN4FRQ and WN4FRR. WA4UVH is sporting a new pair of 4-400As. WB4CVM has his brand-new General Class license. WB4BGL is now asst. manager of NCN(E) and WA4ZLK is the new asst. manager of the Novice net. W4NAP has a new five-element beam up on 6 meters. The new Novice net is progressing nicely and I am very pleased with the traffic reports from its members. W4HJZ reports very good aurora on May 25. He worked W1-, 2-, 3-, 8- and 9-land on 2 meters.

Net	*Freq.*	*Time*	*Days*	*QTC*	*Mgr.*
NCN (E)	3573 kc.	2230Z	Daily	179	W4IRE
NCN (L)	3573 kc.	0200Z	Daily	123	WA4CFN
THEN	3865 kc.	0030Z	Daily	121	WA4GMC
NCNN	3710 kc.	2100Z	M-W-F-S	41	WB4BGL
SSBN	3938 kc.	2330Z	Daily	36	WA4LWE

Traffic: (May) WB4BGL 268, W4EVN 193, WA4CFN 128, WB4DVO 67, WA4ZLK 59, W4RWL 52, K4CWZ 47, WA4VNV 46, W4LWZ 34, W4AJT 30, K4EO 29, WA4FJM 26, W4BNU 25, WN4DWN 20, WA4VTV 14, K4ZKQ 14, WA4NUO 12, W4OSG/4 12, W4NAP 10, WB4DDK 8, W4ACY 6, WA4KWC 5, K4TTN 5, WB4CVM 4, WA4UVH 4, WN4EQW 3, WN4FGU 1. (Apr.) WN4DWN 18, WA4NUO 4, W4UWS 4. (Feb.) W4UWS 3.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LNJ—SEC: WA4ECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: WA4EFP. Beth, WA4EFP, was elected S.S.B. net manager and chairman of the advisory board. WA4QKQ and K4GRG were elected assistants.

SCN	3795 kc.	Daily	0100Z/0400Z	May Traffic 155
SCSSBN	3915 kc.	Daily	0100Z	May Traffic 131

The Anderson Radio Club 2-Meter Net meets Thurs. and Sun. on 145-44 Mc. The 10-Meter Net meets Thurs. and Sun. on 28.775 at 2130Z. The hurricane season is upon us. Watch the nets and weather. The Greenville V.H.F. Society is planning a v.h.f. convention in early Nov. Watch for announcements. WA4LTS is back after trips up east. Traffic: WA4APD 130, WB4BZA 128, WB4DXX 55, WA4VZQ 48, K4VVE 46, W4PED 38, WA4NWI 36, W4JA 34, W4NTO 33, K4LNJ 30, WA4ICF 25, WA4HFA 21, W4WQM 20.

SOUTH CAROLINA QSO PARTY

August 26-27, 1967

All amateurs are invited to participate in the second South Carolina QSO Party, sponsored by the Low Country Amateur Radio Club, Inc. of North Charleston, S. C.

Rules: 1) Contacts will be made during the periods from 2000 GMT to 0500 GMT on Aug. 26 and 27, and 1400 GMT to 0500 GMT on August 27 and 28. Full or part time operation is permitted. 2) All bands, all modes and the same station may be worked on different bands and different modes for extra points. 3) The general call will be CQ SC. 4) Exchange QSO number, report and state, province or country. South Carolina stations give county for QTH. 5) Score one point for each contact and multiply by the number of different S. C. counties worked. S. C. stations multiply by states, provinces or countries. 6) Certificates will go to the first place winner in each state, province or country and the first three winners in S. C. 7) Suggested frequencies, plus or minus 15 kcs. of 1820 3550 3950 7040 7240 14070 14240 21070 and 21270. 8) Logs showing date, time, band, mode, and location of station worked with claimed score, to be mailed no later than Sept. 15, 1967 and sent to: Contest Chairman, LCARC Inc., P. O. Box 5026, N. Charleston, S. C. 29406.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB. RM: WA4EUL. PAM: W4OKN. W4CGE, who was very active in phone and c.w. nets several years ago, passed away in May. Another successful Roanoke Hamfest was held and PAM W4OKN was awarded an NC-200 transceiver at the affair. WA4TDQ petitioned the

FCC and received the new call W4QDF; he was first licensed over 50 years ago. WA2URI/4 has received the CWA 45-w.p.m. certificate and has applied for ARRL Life Membership. WA4FCS again is active in the section after an overseas absence. W8FCI/4 also can be heard on the nets again; he was formerly K4TSJ. WA4UMX has accepted an engineering scholarship at Cornell. The SCM office has received many comments about the poor operating characteristics of some in our section traffic nets. Stale or undelivered traffic and lousy unintelligible c.w. seem to be the chief complaints. Net managers are urged to review their training programs and standards. For the remainder of the summer, nets operate on indicated frequencies and GMT times, manager's call also is given.

3680	2230 & 2300	WA4EUL
3935	2200 & 0200	W4OKN
3835	2300	WA4LVE

Traffic: (May) WA4DXJ 403, K4CG 269, W4ZM 269, W4DVT 256, W4NLC 177, W4RHA 153, WA4EUL 117, K4FSS 105, K4KNP 89, WA2UFI/4, 75, WB4DHT 63, W4MUJ 50, W4SZT 50, W4OKN 38, WB4PBG 37, WB4PBG 37, WB4DRB 32, W4BZE 22, W8FCI/4 20, WA4URN 18, WA4WFQ 17, W4SHJ 14, W4KX 13, WA4FCS 11, WA4SZI 9, W4MK 8, K4SUM 8, WA4QQC 7, W4ZMT 5, WA4DAI 4, W4JUJ 4, W4PTR 4, WA4UMX 4, WA4WQG 4, K4ITV 3, W4KFC 3, W4OP 2. (Apr.) W4BWF 84.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA. RMs: W8HZA, K8TPF, W8LMF. PAMs: K8CHW, W8IYD.

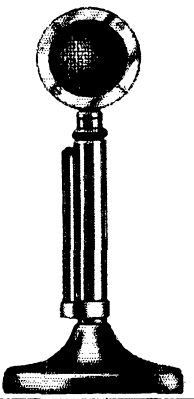
Net	*Time*	*Freq.*	*Days*	*QTC*	*Net Mgr.*
WVN	0000 GMT	3570	Daily	74	W8HZA
WVN	2230 GMT	3890	Mon.-Fri.	65	WA8RQB

WA8BUM moved to a new location in Princeton. WA8UKO provided excellent photos and publicity for the State Radio Convention. WA8LAL *mobile keeps in* touch with home through his son's station, WA8PWM. W8IMX and WA8IMX are active in the state's traffic nets. Remember the Black Diamond Ham Picnic Aug. 27 at Bluefield. W8GQE received good publicity on his 14-Mc phone traffic. Another father-and son team is K8WMQ and K8WWW. W8ETX and W8IRN are new QCWA members. The Kanawha Radio Club won the ARRL Field Day Trophy at the State Convention. WIUED *represented* ARRL *Headquarters.* W8EHA has retired and now finds more time for radio. Is your club represented on the State Radio Council and what new *projects would you like to see?* Your comments would be appreciated. W8LD and W8QG are active on 75-meter s.s.b. Traffic: W8SQO 73, W8IMX 60, W8HZA 57, WA8RQB 31, K8BIT 24, W8CKX 24, W3FKB/8 5, W8IYD 4, WA8KQX 4, WA8LAL 4, WA8IMX 3, W8JM 3, K8MQB 3, K8CHW 2, WA8CKN 2, WA8NDY 1, WA8PWM 1, WA8PXF 1.

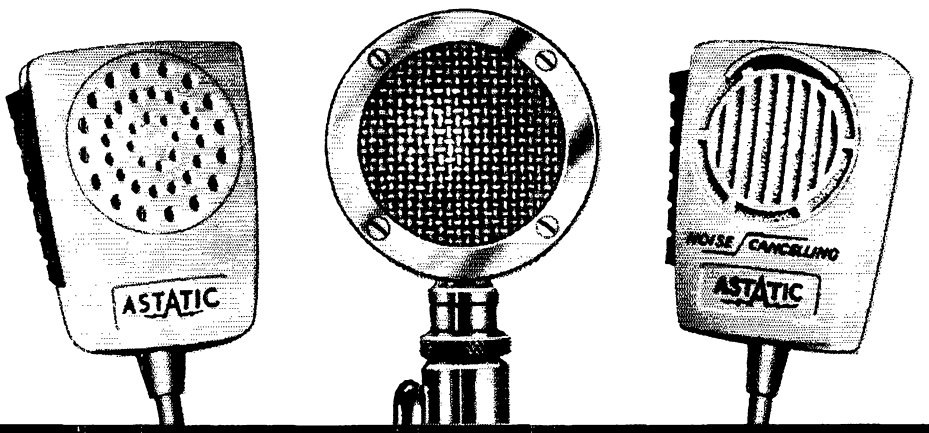
ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, KØFDH—Asst. SCM: A. Hankinson, WAØNQL. SEC: WØSIN. RM: WAØLCM. PAM: WØCXW. Congratulations to KØYFK and KØZSQ on their BPL awards, which they both earned by way of hard work in public service. KØYFK continues his nice work on the Colorado Weather Net and KØZSQ burned plenty of midnight oil in sending Mother's Day messages for servicemen at Lowry AFB. WAØNQL spent considerable effort and time with the Boy Scouts and is to be commended for his work in teaching and training. When the National Traffic System changed over to Daylight Saving Time we lost our NTS liaison with the Columbine Net, the largest phone net in Colorado. To fill this gap, the Colorado Evergreen Net was established and is meeting nightly at 0200Z on 3808 kc. Colorado amateurs wishing to help distribute traffic are invited to participate. For those of you who wish to utilize NTS for outgoing traffic, remember that CCN is now your only outlet. This net meets at 0030Z on 3780 kc. nightly, so get out that rusty old key and join us. Traffic: KØYFK 851, KØZSQ 590, WAØLCM 176, WØKAU 132, WAØMNL 91, WAØNQL 89, WØUAT 86, WAØJEV 68, WØDGM 52, WØPGX 45, KØDCW 39, WAØJTB 22, KØSPR 20, WA5PVE 4.

NEW MEXICO—SCM, Bill Farley, WA5FLG—SEC: W5ALL. PAM: WA5MCX. Our SEC wants to thank everyone for the help and cooperation during the recent forest fires. Your SCM is writing this month's column from the banks of his favorite fishing lake in Arkansas. Yes, it's vacation time and he is a portable. Worked New Zealand on 10 meters the other night using the 75-meter coax dipole. Why don't you take the rig on your next vacation? You never know what help you



THE WORLD'S NO. 1 MICROPHONE



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might be even though you may not have the most sophisticated of antenna systems. W5HDR has the use of a new Swan 350 and is really working 15 meters. Had a nice visit with him and learned that he plans a trip to Florida soon for a vacation. W5PTQ is all set to depart for Guam to teach for the next two years. Wish some one would come up with a hamfest in the cool pines of Cloudcroft for this summer. Any takers? Traffic: WA5FLG 53, WA5RBU 34, WA5MIY 3.

UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7WKF. RM: W7OCX. Section Nets:

BUN	Daily	7272 kc.	1836Z
UARN	Sat.-Sun.	3987.5 kc.	1400Z

WA7GTU, K7SOT and WA7FKT have earned Section Net certificates for their work in BUN. WA7ADK reports business as usual after repairing severe lightning damage. The gang at BYU club station W7OHR has gone home for summer vacations, following a very successful year of traffic-handling. Communications for this year's Friendship Cruise on the Green and Colorado Rivers was handled by WA7BRB, K7MMO, W7RQT, K7NJY, W5FDW and W7VSS. W7RQT continues to work new states on 2 meters via Aurora. Traffic: (May) W7LQE 161, W7OHR 138, W7OCX 68, WA7BME 34, K7SLX 17, K7SAI 8, WA7ADK 2. (Apr.) W7JSS 5.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: WA7CLF. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM. Nets: Pony Express, Sun. at 0830 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 7255. New appointment: K6UJV/7 as OO. Phil now lives in Cheyenne. WA7CLF was voted as Wyoming's Ham of the Year at the recent hamfest. WA7EWC should have his new transceiver on the air by now. I know everyone joins me in wishing the best for K7CSW and his new bride—the former Ruth Toman. Another signal on the air from Casper is WN7HDB. K7ITH has been working in South Dakota and on one of his trips got caught in a Wyoming blizzard, but was able to help some stranded motorists and the Highway Patrol. Traffic: W7TZK 47, WA7BFV 15, WA7DNZ 15, K7SLM 14, K7AHO 10, K7POX 8, W7NKR 6, K7YPT 6, W7CQP 4, K7WUR 4, W7BHH 3, W7BKI 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAM: WA4EEC. RM: WA4EXA. With a great Field Day now out of the way, let's all get busy on our v.h.f. gear and plan for a bang-up good V.H.F. QSO Party during the week end of Sept. 9-10. The Huntsville ARC's officers are W4NML, pres.; K4TUT, vice-pres.; WA4WGF, secy. WA4GGD is now one of our OPS appointees. WB4BLX is a new ORS. The North Ala. DX Club is growing in numbers and contacts. This fine group welcomes all serious-minded DXers in the section to join in with them. K4WHW and W4FPI were guests of the Limestone ARC June 3. The club would be most happy to visit with any of the other clubs and offers any assistance possible to your group. Traffic: (May) W4FVY 125, WA4FYO 125, WA4UXC 102, WB4DIN 93, WA4EXA 93, K4WHW 65, K4AOZ 60, WA4EXB 50, WB4DCR 42, WA4GGD 38, K4BSK 37, WB4EKK 32, WB4BLX 27, K4UPL 21, K4PMO 20, WB4DGF 17, WB4CYU 16, WA4MTG 15, K4HJM 12, WA4VUG 12, W4FPI 9, K4KJD 8, WA4AQM 7, WA4EEC 7, K4NJY 4, W4DGH 3, W4YRM 3, K4EAO 2, W4NML 2, WA4WLD 2, WA4ZFA 1. (Apr.) K4NUW 58, WB4BLX 47, K4HJM 4.

EASTERN FLORIDA—SCM, Jesse H. Morris, W4MVB—SEC: W4IYT. Asst. SEC: W4FP. RM: C.W.: W4ILE. RM RTTY: W4RWM. PAM S.S.B.: W4OGX. PAM 40M: W4SDR. PAM 75M: W4TUB. V.H.F. PAM: WA4BMC. Spring has sprung and v.h.f. is doing business in a grand fashion. Many who were practically out of business because of line noise are now back in business, thanks to our much-needed rain. HPEG and his XYL were the guests of W4EDT and his XYL in Atlantic Beach recently. The Italian visitors also made trips to other parts of the state before returning to their homeland. WN4FLW reports much activity since receiving his license. Daylight Saving Time has forced most of the early nets to slip an hour in order to be effective. I would like to mention here for all to read about the outstanding OO activity of W4UF. W4EXM and his XYL will be visiting in Clearwater in Sept. All traffic-handlers, please read about counting traffic by W1NJM in June *QST*. WA4OHO is now QFN manager. It is with much sadness that we report the passing of K4KDN. Herb was manager of the Gator Net and had a long history of public service. And finally we should note that most of those reports at the end of

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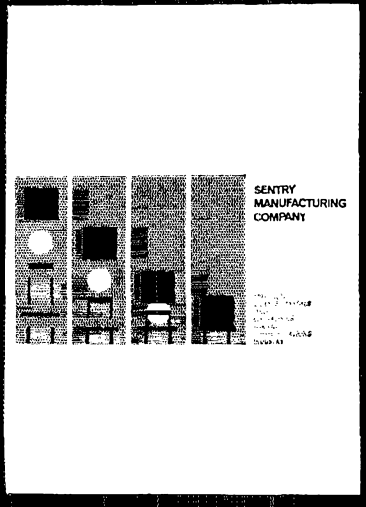

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this which are indicated as late were not late at all but merely indicates that your SCM goofed last month. Traffic: (May) WA4SCK 768, WA4BMC 552, WA4NEV 364, W4FPC 227, WB4BPL 118, WB4DSP 109, W4SDR 106, W4FP 102, WA4YII 98, K4IEX 83, WA4HDH 82, WA4YIH 81, WA4QLZ 78, W4MVB 73, WA4OHO 62, K4DAX 58, W4AKB 56, K4COO 53, W4OGX 53, W4EHW 50, WA4MRK 43, W4SMK 43, W4YPX 42, K4ILB 39, WA4TWD 39, W4VDC 38, W4IAD 37, WA4TJS 37, WA4DEL 33, WA4BGW 30, K4QCG 29, WA4IVE 28, WA4CTQ 27, W4NGR 27, K4BY 26, K4LPS 24, W4ZAK 21, W4BKC 17, W4GDK 16, WA4WOW 16, W4DVO 15, WA4EYU 15, W4TJM 15, W4CWI 14, W4GUJ 14, W4KRC 14, W4VPQ 13, K4ENW 12, W4SCY 10, K4SJH 10, WA4WZZ 10, W4QBY 9, WA4NBE 8, W4PBK 8, W4TRS 8, WB4CAP 5, K4EBE 3. (Apr.) WB4BPL 106, W4FP 105, WB4DSP 82, WA4MRK 52, K4DSN 43, W4KRC 11, K4ENW 7.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP. SEC: W4DDY. RM: W4CZN. PAMs: K4PKK, WA4WDE, W4NXD operates a Swan 350 and attic dipole. WB4AYN reports 6-meter DXing good but not consistent with openings to VE3 and the Northern States with the Cal. and Tex. area at times. W4ISS reports on a solar flare in May. W4VHH has a kw. and 40-element beam on 144.129. K4HQI advises of good 50-Mc. conditions during May, with all districts except 6 and 7 plus VE2, 3 and 4. K4TQU and K4PZS demonstrated 420 gear at a meeting of the Athens V.H.F. Society. K4HQI worked his 44th State on 50 Mc. W4LRR reports a new baby girl and lots of DX. WB4EBS has a new SB-101. WA4NJP is on 6 and WA4EFY on 2. K4TXK is getting good results (90 miles) with a half-watt on 2. DL5KS is looking for Columbus contacts. W4DDY reports 16 stations active in the area net on 145.71 Mc. W4GXU—"More power for Georgia on 160."

Net	*Freq.*	*Time*	*Sess.*	*QNI*	*QTC*
GSSB	3975	0000 GMT	31	818	73
GSN	3595	2400 & 0200	62	487	153
GTN				124	32

Traffic: (May) W4FOE 502, W4CZN 130, K4AHO 92, K4BAI 85, WA4WQU 74, W4PIM 73, WA4RAV 69, W4RZL 63, W4DDY 55, W4FDN 45, W4FQX 29, WA4JES 13, K4AJF 8, W4GXU 8, WA4LLI 7. (Apr.) W4FOE 468, WA4MZI 6, K4TXK 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4IKB. PAM: WA4ZGI. RM: W4BVE. Section net reports:

Net	*Freq.*	*Time*	*Days*	*Sess.*	*QNI*	*QTC*
WFPN	3957 kc.	2200Z	Daily	31	531	130
QFN	3651 kc.	2230/0200Z	Daily	62	—	—

Pensacola: W4EUB is now custodian of the Corry Field club station, WA4ECY. Pensacola is well represented on QFN, with K4BSS/4, W4COE, WA4ECY, WA4IIF and K4LAN. Ft. Walton: WA4VSI has his ARC-1 converted for 2-meter s.s.b. Defuniak Springs: W4ECM was hospitalized for some time in the Pensacola area, but took his HW-12 along to check into WFPN, Panama City: WA4ZGI is the new Bay County EC. The Tyndall MARS Club has a 2-meter repeater in operation. K4VFY is the section's top contest man. K4OOC is going into 2-meter f.m. in a big way with base station and 2 mobile rigs. Chipley: W4IKB has a 146.94-MC. f.m. base station on the air. Blountstown: WA4CIH is announcing for the local BC station. K4YSQ *commutes to Tallahassee daily.* K4NML only hams on week ends when home from school at Troy State. Bristol: WA4VXD took an 18-month job assignment in Thailand. Quincy: The GENTS Club had Jim Lovette, of DAYCO, and your SCM as guests at the June meeting. WA4CZK works 75-meter s.s.b. now with an SB-10/DX-100. Traffic: K4VFY 353, K4BSS/4 150, W4BVE 104, WA4EOQ 34, W7BNR/4 34, W4IKB 31.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—SEC: K7NIY. PAM: W7CAF. RM: K7NHL. Endorsements: K7OIX as OO. New appointments: W7CAL as OO and WA7GOG as OBS. It is with deep regret that we report that WN7GRZ, of Tucson, has become a Silent Key. WA7GIO passed the General Class examination. New Novices are WN7HHI, WN7HHG and WN7HPD. The DX King of Arizona, W7AH, has been working on his beam. Delegates to the Amateur Radio Council of Arizona are the Arizona Amateur Radio Society, W7QNO; the Arizona Amateur Radio Club, W7CAF; the Coconino County Amateur Radio Council, W7WGW; the Copper State Roadrunners, K7UJV; the General

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LOS ANGELES—SCM, Donald R. Etheredge, K6UMV—RMs: W6BHG, W6QAE, WB6BBO. PAMs: K6MDD, W6MLZ, W6ORS. Congratulations to May BPLers: K6EPT, W6GYH, WB6BBO, WB6QXY, K6BPC. The *newly-formed San Francisco Valley DX Club* meets the 3rd Tue. of each month at 19260 Sherman Way, Reseda. Officers are W6PUY, pres.; W6FET, vice-pres.; K6UJW, secy.; W6BUD and W6FSJ, board *members.* WA6TYR is promoting 50-Mc. c.w. work. WB6KVA is now an Army MARS member! WA6WJT is doing a fine job with the West L.A. AREC. W6YRA, at UCLA, is QRT until after the summer, according to WB6QMF. K9ELT/W6DQX spent a week in W9-Land on a vacation. K6EA will be operating as WØMFW for a few months. K6QPH, from the land of the So. Cal. V.H.F. Club, is back in action with a *new inverted Vee on 80.* W6TXJ, new RACES Area A Coordinator, reports he has capabilities on 2 through 160 meters. K2PHF/W6DGH is working on his doctorate at UCLA. A new owner of a Swan 350 is WB6UHF, W6PUZ, V.H.F.-OO, is working Central and South America via 50 Mc. Congratulations to WA6WKF on being reelected operations manager of the So. Cal. Six Net! K6BPC handled traffic through SCN while at *Paramount Festival Days* operation and also provided communications for the parade via W6FNE, K6AVQ, WA6ARC, WA6KIK, WA6KVS, WA6WKF, K6QPH and WB6IMV. The Southwestern and Pacific Division joint ARRL Convention will be held Sept. 8, 9, 10 at the Ambassador Hotel in Los Angeles. Don't miss it! Traffic: (May) K6EPT 1546, W6GYH 1109, WB6BBO 866, WB6QXY 592, K6IOV 322, W6FD 208, K6CDW 199, W6AQE 174, WA6KZI 154, W6MLF 126, K6BPC 118, W6OEO 95, WA6WKF 89, K6ASK 65, WB6SCK 46, W6BTV 45, WA6TYR 38, WB6KGK 34, K5ANS/6 29, WB6QMF 28, W6BHG 27, WB6KVA 26, W6HUJ 22, WA6WJT 21, W6USY 18, W6YRA 17, W6DQX 15, WA6UCR 14, W6TN 10, K6EA 9, K6QPH 9, W6PCP 8, W6TXJ 8, WB6GGL 6, K6UMV 5, W1KUX/6 4, WB6AEL 4, W6DGH 2. (Mar.) WA6TYR 37.

ORANGE—SCM, Roy R. Maxson, W6DEY—The San Bernardino Microwave Society holds meetings the 1st Thurs. of each month at Corona City Hall 7:30 P.M. per K6HIJ, corr. secy. W6FB advises the Desert RATS held its Annual Picnic May 21 at Whitewater Fish Hatchery. OT K6VF, of Sun City, also visited and viewed Fred's antique wireless gear. K6IME, SCN mgr., asks traffic operators to please note the extra SCN sked at 0430 GMT. WA6TAG, EC, will be in Idyllwild for the summer and advises a new AREC member is WB6NXB, in Yucca. W6WRJ, SEC, notes that WB6RVM is the new Asst. EC for the 75-Meter Net and WA6GQJ, Olancha, is EC for Inyo County. RM WA6ROF's new QTH is 6372 Cymbal St., Yorba Linda 92686. WB6UTC received a 35 w.p.m. sticker. WN6WKN is active with a DX-35 and an S-120. WB6RJX got RCC. PAM WA6IDN is newly married and converting the XYL to ham radio. Club secretaries, please advise the place, time and dates of your meetings. We need 6- and 2-meter ECs for AREC expansion. Traffic: (May) WB6JFO 175, WA6ROF 145, WB6TYZ 140, WB6UTC 55, K6IME 54, WB6AKR 50, WA6KVA 14, W6WRJ 10, K6GMA 6, W6FB 5. (Apr.) WB6RJX 129, WB6TYZ 36.

SAN DIEGO—SCM, Don Stansifer, W6LRU/WA6VUI—The San Diego V.H.F. Club was active during the V.H.F. QSO Party from Tecate Peak. W6EWU, Asst. SCM and longtime AREC/ARPSC worker, returned home in June from a European vacation. SEC W6SK reports a total of 138 AREC members in the section as of June 4. Sorry to report the passing of W6ARN, of Ocotillo, an active AREC member. OVS WA6OSB was off the air recently because of a change of address. The Palomar Radio Club had 61 contacts on three bands during the Fiesta in San Marcos. The newest club in the area is the Chula Vista Amateur Radio Club. K6TWO is Radio Officer for civil defense in Chula Vista. New intake for the W6 QSO Bureau is San Diego DX Club member W6RCD, who reports that over 40,000 cards were received during the month of May for California hams. WB6OHZ and WB6OIA vacationed in Alaska. Remember the convention in Los Angeles, Sept. 8-10. Traffic: K6BPI 8230, W6VNQ 539, W6EOT 502, W6BGF 296, WA6TAD 34, W6LRU 24, WB6MPD 10, W6NWG/6 9.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6OKN—SEC: WB6NDP. The Satellite ARC did the type of preparation that all should do prior to Field

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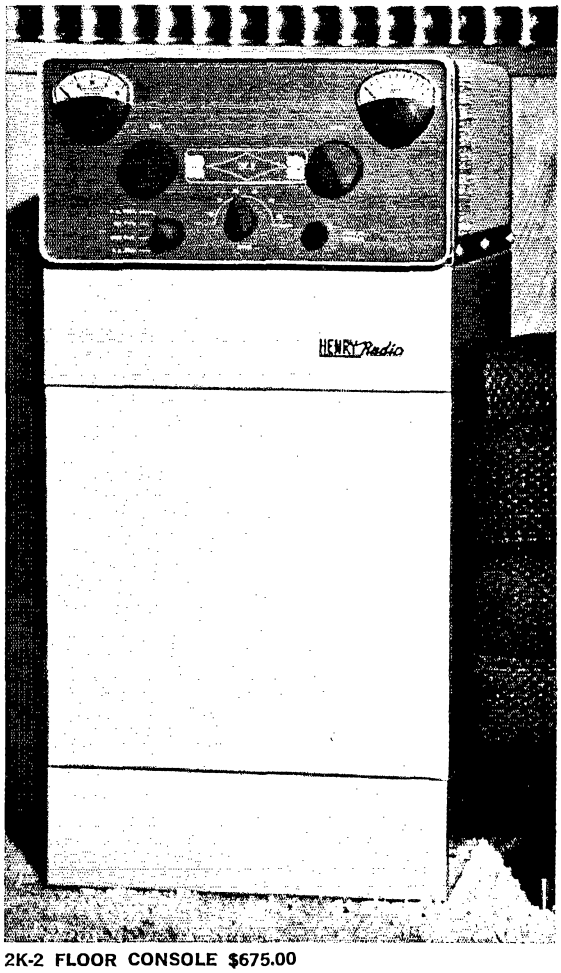

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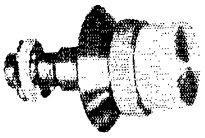
Day. They had a Field Day Antenna Party one week ahead of time as a dress rehearsal. The Satellite ARC Net is on 2 meters Mon. and Fri. at 8 P.M. on 146.25 Mc. Coming events for the Satellite Club are: Aug. 13—Picnic and Transmitter hunt. Sept. 16—a steak dinner. K6AAK has purchased a Hy-Gain Hy-Tower for installation at his summer retreat at Bass Lake. WB6UHE is gathering parts to build a linear to go behind his SB-100 Heathkit. I must complain that for several months I have not received either activity reports or traffic reports. Surely someone somewhere is doing something.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI. PAM: W5BOO. RM: W5LR. Sometimes I wonder about the various clubs that take the time and trouble to get affiliated. Do you do this just to get recognition or are you sincere in trying to promote amateur radio? In your letter of acknowledgement of becoming an affiliated club you were requested to inform your SCM of your activities. There seems to be a reluctance on the part of the secretary to drop a line to the SCM informing him of your activities. Some clubs do and others wonder why two or three clubs are always mentioned and others are not. Some groups that are not affiliated keep me informed of their activities more than the affiliated clubs; therefore they get the publicity. All of you can understand that I can not be a member of all the clubs but I would appreciate getting a club bulletin so that I may include your activities in this activities column. The Tarrant County Six-Meter Net elected the following new officers: WA5NVC, net mgr.; WA5OOG, secy.; WA5OTR, NCO; K5HAG, treas. Thanks to Mr. W. R. Christianson, the father of WA5KXX, for donating a Chevrolet Van for the use of this net. The KC Club of Ft. Worth has started a Novice training class. K5HWX has departed for Zurich, Switzerland, to teach a few hours in the seminary and will attend the university while there. W5BFA is in the Army, stationed at Ft. Polk, La. W5PCZ is a new OO. Traffic: K4UBR/5 200, WA5AGH 85, WA5RAN 35, W5PBN 20, W5JSM 7.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5ZCJ. RM: W5QMJ. PAM-75: W5PML. PAM 6 meters: K5VFR. PAM 2 meters: WA5LBI. We are happy to report that WA5OHX has accepted the EC postion for Kay County. The Oklahoma Central V.H.F. Club has applied for a club station license with WA5DOA as trustee. The permanent location will be Oklahoma City Civil Defense Center. W5HXL heads up the new theory and code classes which began June 8 at Aeronautical Hamshack. K5OPK is busy assembling an SB-101. A new Novice in Vinita is WN5SBW. W5QMJ, RM for Oklahoma, is settled in his new location and is back on the air. W5QAY was in charge of Field Day operations for the Central V.H.F. Club at Oklahoma City. The emergency plan for amateurs in Oklahoma was mailed before I left on vacation. If you did not receive a copy and want one, please let me know. W5TKT is the new Radio Officer for Oklahoma County Civil Defense. K5IZH received his license and is operating 40-meter c.w. with a homebrew transmitter. OLZ reports 23 sessions, QTC 97, QNI 56. SSZ reports 19 sessions, QTC 88, QNI 51. Traffic: K5TEY 1753, W5MFX 20, K5JGZ 28, W5PAIL 22, WA4KZA 10, K5MTC 7, WA5MDN 4, WA5OHX 4, K5OCX 2.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5KLV. RM: W5EZY. W5KR was appointed RACES Radio Officer for the four-county Rio Grande Valley Area; also new Emergency Coordinator for Cameron County. Art is an old-timer with worlds of experience. Nice to have him aboard. WA5LNV is vacationing in California. OO W5NGW has been helping with the QSL Bureau for Southern Texas. He says he hates to see all the "luscious" cards go into the Dead File for a year and then be destroyed for lack of a self-addressed stamped envelope. Come on, you guys, if you work any DX at all get your SASE to the QSL Bureau immediately. WA5QKE has been off the air with rig trouble. Best of luck in getting squared away. EC W5DAA spent a good part of May in the hospital. He is getting along fine now. EC WA5NHL says the Huntsville ARC operated its Field Day July 4. All scores should have been tabulated by the time you read this. Best of luck to all. K2EIU/5 finished his SB-101, a 3-band quad at 60 feet and doing all the good. TEX Traffic Net participation is holding up well. Come on in, fellows, get your key wet and join TEX at 0100 and 0300Z daily on 3770 kc. Traffic: (May) WA5LNV 73, K2EIU/5, 45, W5AC 44, W5BGE 42, W5EZY 42, W5-



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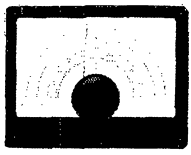

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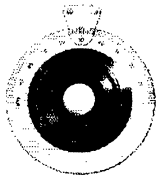

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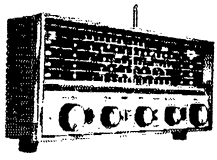

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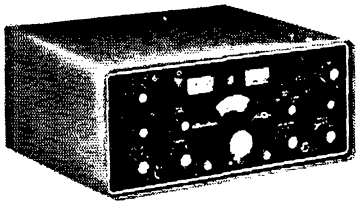

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ABQ 38, WA5MBC 32, K5MHF 24, WA5QKE 20, W5-TFW 12. (Apr.) K5HZR 183.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM: VE6ADS. ECs: VE6SA, VE6SS, VE6-XC, VE6PL, VE6AFQ. ORSs: VE6BR, VE6ATH, VE6ATG. OPSs: VE6HM, VE6SS, VE6ADS. OOs: VE6HM, VE6TY, VE6AKV. OBSs: VE6HM, VE6AIF. VE6TG is in the hospital at the present time. VE6FS is keeping us posted on his condition and I am pleased to report that Harry seems to be progressing quite well. This month's column was written by VE6FK. VE6AFQ and the Southern Alberta AREC did a very commendable job during the severe May snowstorms in Southern Alberta. As you all know our two phone traffic nets have now been amalgamated as the Alberta Public Service Net. The APSN meets daily at 0130 GMT (1830 MST) on 3770 kc. Many of the larger centers still are not represented on the net. It only takes about a half-hour of your time and isn't a difficult operation, so how about letting us hear from Vegreville, Camrose, Grand Prairie, Ponoka, etc. VE6AKA has built up a matching device for a mobile whip. It's nice to hear VE6NW back on the air after a pretty long absence. The Galaxy makes a pretty nice comeback rig. Traffic: VE6ATH 183, VE6HM 62, VE6FK 23, VE6XC 21, VE6AOO 13, VE6ADK 5, VE6FS 4, VE6SS 2, VE6WN 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7-FB—I would like to thank the amateurs of B.C. for their confidence in me by returning me as SCM for a third term of office. VE7JI now is on with s.s.b. and a 20-meter beam. VE7BQF still is improving on the "Slot" for 2-meters, plus beams for other bands. VE7-BQH has been working DX on 2, with the help of meteor showers. VE7BLO won certificate No. 17 for working one hundred Canadian stations for Centennial Year—at least one in each province. Nanaimo ARCs new officers are VE7GR, pres.; VE7BDR, secy. The coming year looks real good. VE7AOX posted Hong Kong for several years. During the rush hour on a bridge full of traffic VE7MQ ran out of gasoline and was lucky for VE7AOF, who was in the rear and on 2 meters, fell in behind and pushed. VE7QT was re-elected pres. of the Victoria SWC. VE7BQA passed the Advance Class test. The Kootenays were well represented at the C.D. Conference. Both ECs attended. VE7OF now is on 2. VE7AIY and VE7AKB both have s.s.b. KW2000As. VE7UJ and VE7BCM are constructing an s.s.b. transmitter of their design. VE7-DH has gremlins in both rigs, too busy "rockhounding." VE7DBN is busy with junior baseball and as a volunteer fireman. VE7RV, skin diving? Traffic: (May) VE7BHH 162, VE7BQA 58, VE7BLO 32, VE7BLS 9. (Apr.) VE7BLS 17.

B.C. CENTENNIAL QSO PARTY

September 1-30, 1967

In honor of the Canadian Centennial celebration, the British Columbia Amateur Radio Assn., Inc. is sponsoring a QSO Party, Sept. 1-30, in 1967, inclusive, with rules as follows.

1) One point per QSO with each station. Each station may be worked three times on 1 band; i.e., c.w. RTTY and phone. For this contest, f.m., a.m. and s.s.b. count as phone. 2) B.C. stations score by QSO points times ARRL sections times DX countries. Out of B.C. stations score by QSO points (no multiplier). 3) Certificates go to the top scoring station in each ARRL section and DX country. The top station out of B.C. wins the Dogwood Trophy. 4) Send logs to Les West, VE7AKB, 960 Keith Road, West Vancouver, B.C., Canada.

MANITOBA—SCM, John Thomas Stacey, VE4JT—SEC: VE4JC. PAM: VE4EX. RM: VE4EI. We welcome two new hams to the Brandon area, VE4OZ and VE4YC, both products of the Brandon ARC code and theory class. VE4LG has his FET receiver working FB. VE4SC is finding 6 meters rewarding. VE4RE has completed a 20-watt transceiver for 6 meters. VE4-EI is operating portable from Flin Flon. VE4WT broke an arm cranking up a tractor on the farm. The Phone Net reports an active roster of 31 stations with an additional 13 reporting in on a casual basis. Our RM again reminds us that MTN will move to 3615 kc. Oct. 1. With NTS shifting to Daylight Saving Time MTN will operate at 0100Z Oct. to May and 0001Z May to Oct. The Phone Net will continue at 1900 local

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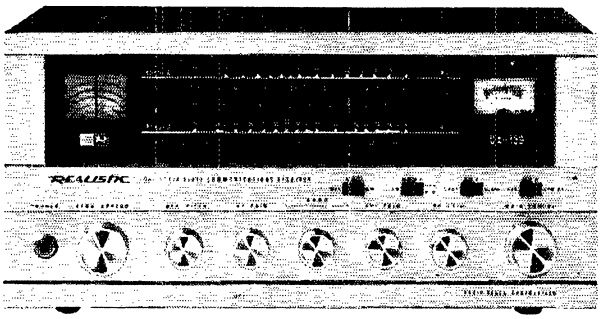
time the year round. All stations are urged to support one of the traffic nets. Contact the RM or PAM for net details. Applications for appointment as OPS, OO and V.H.F. PAM would be welcome by your SCM. Net reports: Phone—sessions 31, QNI 354, QTC 11. C.W.—sessions 31, QNI 126, QTC 117. Traffic: VE4LG 98, VE4RW 90, VE4NE 81, VE4JT 54, VE4SC 12, VE4XN 8, VE4EI/4 6, VE4JK 3, VE4FO 2, VE4EX 1, VE4MK 1.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI. SEC: VE1HJ, VE1FQ, VE1ZP and VE1RT are in the hospital and we wish them all a speedy recovery. Congratulations to VE1PL, who won the Bermuda Contest this year. The VE1s seem to have a monopoly on this contest. VE1TL recently received his Advanced amateur ticket. VE1AFB and VE1OI are active on 2 meters in the Halifax area. VE1AFB recently caught an excellent 2-meter opening, working many stations in the W1 and W2 area and hearing a W4 in North Carolina. Congratulations to VO1AW on earning his USA-CA award for working 500 U.S. counties. VE1AMR has been chasing rare DX on 40 c.w. lately. VE1AI recently acquired a TA33 Jr. rotator and 40-ft. tower. Convention time is drawing closer and from all indications the Moncton Club has a top-notch program lined up for all members of the family. It is becoming quite difficult to get sufficient items of interest to fill this column. I am sure that many of you are undertaking interesting projects, so how about dropping me a short note so that I can include them in this report? Traffic: VE1RT 17, VE1ABS 10, VE1AMR 10, VE1OM 5, VE1MX 4.

ONTARIO—SCM, Richard W. Roberts, VE3NG—The gang in Galt will be host to HI7XTM from Santa Domingo during the month of June. Sam is a native VE3, from Galt, of course. Operators from Hamilton and Toronto districts AREC were alerted to proceed to the village of Kilbride near Hamilton to search for a missing school girl, age 10, thought to have been abducted. The Scarborough Club has a centennial cover for its paper. The Quinte ARC did valuable work in assisting the Picton Flying Club Air Rally. Observers were at Belleville, Napanee and Consecon. Mobiles were used to communicate with the main base at Picton Airport. The Ottawa area now has its 2-meter repeater station operating. The call is VE3CRA, frequency 146.940 Mc. Location is Gatineau Park, north of Ottawa. Two-meter buffs note when you visit the Ontario Division ARRL Convention in Ottawa in October. With a heavy heart, I regret to inform you of three Silent Keys, VE3DSG, VE3EOS and VE3CJL. To all of their families and loved ones, our sincere condolences. The Canadian National Institute for the Blind wishes to know the names and calls of all sightless hams in Canada. Forward the above info to Dave Lloyd, VE3AW, 16 Hawthorne Ave., Toronto. The following gals were elected for 1967-68 to the offices of the Ontario Trillums: VE3DGG, pres.; VE1AKO, vice-pres.; VE3BBO, secy. This is Canada's first all-gal radio club. The gals have an interesting bulletin paper named *T.O.T. Topics*. The editor is VE3CLY. 44 Innisdale Dr., Scarborough. Traffic: VE3ATI 77, VE3DBG 58, VE3NG 55, VE3DVE 53, VE3BZB 52, VE3EAM 46, VE3BUR 31, VE3GI 28, VE3DU 24, VE3AWE 21, VE3ETM 9, VE3VD 4.

QUEBEC—SCM, J. W. Ibey, VE2OJ—SEC: VE2ALE. RM: VE2DR. PAMs: VE2BWL, VE2AGQ. Our thanks to those responsible for the operation of VE2XPO at Expo 67. This station is open to all licensed amateurs visiting the World Fair area. VE2PX has had much to do with this station. The Boy Scouts at Grand Mere now have the call VE2CPS. During May and June operations on 80 meters were very poor and many schedules had to be changed to suit. A well-attended meeting of appointees was held in Quebec City in late May. Here we discussed AREC, net and related problems. Those attending were VE2AP, VE2WM, VE2BAI, VE2DBF, VE2BWL, VE2BYS, VE2AGQ, VE2ALE, VE2BU, VE2BUB and VE2OJ. VE2RM, atop Mount Rigaud is now in full operation. Par VE2ALE: Nous remercions VE2BWL arrangment assembly 27 May 67 a Ste. Foy aussi tradiction pratique operation ARRL en langue Francais. V2BAI fait grand ouverage AREC a Chicoutimi. Tous les amateurs langue Francais doit rapports les activities chaque mois a VE2OJ ou VE2ALE. Une autre grand mercie a ROLLY de pops (VE2PX) pour son grand travaille Expo 67 station VE2XPO et son equipage. VE2ATE fait relay de la Maurice 2 meter au reaseau section west du Quebec v.h.f. chaque lundi et vendredi soir. Traffic VE2DR 75, VE2AJD 44, VE2OJ 33, VE2AGQ 30, VE2BVY 23, VE2EC 19, VE2BGJ 15, VE2ALE 13.



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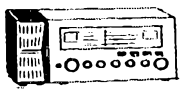

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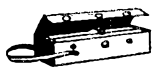

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"It Seems to Us . . . "

(Continued from page 9)

where you can lay hands on it quickly in an emergency. We will be allowed to transmit soon and then you will need it."

The object was duly received at Hq. The Editor, fully mindful of the historic significance of the occasion, took the instrument to one of the first Board meetings in New York, May 3, 1919, subsequently duly reporting in *QST* that "each face noticeably blanched when the awful Wouff Hong was . . . laid on the table." By an action still a part of the League's official records, that Board voted that the Wouff Hong be framed and hung in the office of the Secretary of the League. There it remains to this day.

We know the significance of the Wouff Hong. We don't know the significance of its weird shape. Not even the beloved T.O.M. (revealed, after his death, as none other than our first president, Hiram Percy Maxim) ever explained that. Nor was the precise manner of its use ever prescribed, although it perhaps may be guessed with a little imagination. But as the years passed, it continued to grow in the affections of amateurs the country over, old-timer and youngster alike. It became the inspiration of the Royal Order of the Wouff Hong, the amateur secret society of ARRL convention. Today, it is thoroughly entrenched in the lore of amateur radio as its most sacred symbol.

The Wouff Hong!—see it when you next visit ARRL Hq. QST

Mobile At 160

(Continued from page 69)

stalled. This differed from its predecessor only in that it had a lower compression ratio and fed power through a faster rear axle ratio, which allowed fewer engine r.p.m. for a given car speed. The rear end of the rig was modified also, with a foot of safety wire to ensure that the power plug stayed put.

A 24-hour race seen at one sitting can be a tiring thing, and a recapitulation of it more so. Suffice it to say, most of the excitement was engendered by the Ferrari prototypes seeking vengeance on American soil for the resounding defeat handed them the previous year on their home grounds at LeMans by Ford. Our Touring Car class could not hope to compete for an overall win, and even to finish such a race may be a major accomplishment. The radio, however, played its expected role in this race, which

(Continued on page 138)

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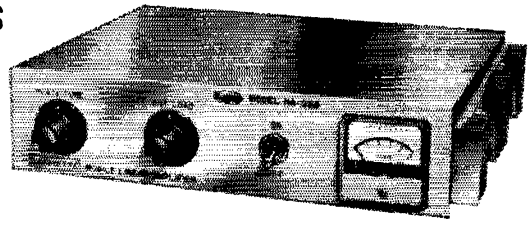

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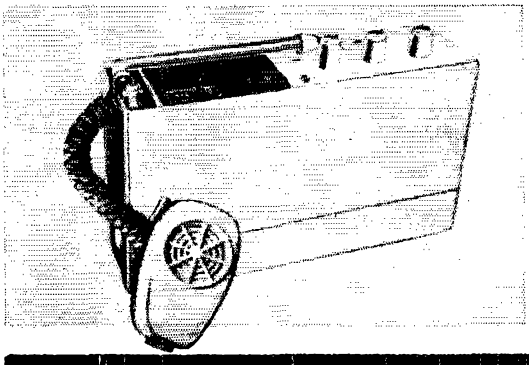

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(Continued from page 136)

like most of its type, is won or lost in the pits.

After the race was underway, Walt began to read back periodically the vital statistics of the car: oil pressure, oil temperature, water temperature, fuel pressure, and maximum engine r.p.m., which were recorded in the pit. A crude telemetry system to be sure, but it would show any trends toward deterioration, which, if caught in time, might be corrected before failure occurred.

Reception in the pit was improved over the day before. A pair of large-cushioned headphones shut out the terrific din of the Ford, Ferrari, and Porsche prototypes, but there was another problem. During yesterday's sedan race, the squelch had never even sputtered until Walt spoke; today was different. From the moment the first Ferrari engine was cranked until the pack was halfway around the course, the squelch never closed, and the racket created by half a dozen 12-cylinder engines turning 9000 r.p.m. must be heard to be believed! Discrete ignition pulses cannot be recognized; the din sounds more like white thermal noise.

Walt's relief driver during the 24 hours was Tom Yeager, owner of the car. Prior to his first stint at the wheel, Tom received a full rundown on car and course conditions via radio from Walt, and radio silence was maintained during his turns at the wheel. Base-station operation was shared with Don Wiggins, W4EHU, who also took the photographs of our endeavors.

The radio was particularly indispensable when, just after daybreak, Walt lost a rear wheel in the road course while charging hard to recoup time lost in the pit. After alerting the crew to his problem, Walt walked back to the pit for the necessary tools and parts, and returned to the car to effect repairs. Under the international rules of racing, only the driver may repair a disabled car outside the pits. The mechanics may tag along and advise, but any assistance, even from a spectator, means automatic disqualification. The rules offer no objection, however, to the driver's requesting that the needed items be made ready prior to his return to the pit.

The thirty minutes lost in replacing the rear axle shaft were irrevocably gone. It remained only to finish and hold onto our position, and that we did. Of the 30 finishers out of 60 starters, we finished 16th overall and 4th in our sedan class. Although many factors would have contributed to a higher finishing position, it is clear that what degree of success we enjoyed was due in large measure to our communications advantage. Any future undertaking of this sort will certainly include dual earphones of greater power capability for the driver, and probably a chest mike and foot switch. The base station will have a noise-compensated squelch, particularly if we expect any Ferraris around.

And speaking of the Ferraris, it is now a matter of record that they obtained the revenge they sought. Perhaps next year we will be there to witness the new confrontation, if not to participate in it. QST

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432 Mc. Solar Patrol

(Continued from page 31)

3.5-db. noise level. Auroras are associated with high solar noise levels, the "magic number" for the writer apparently being a minimum level of about 4.7 db. This level and higher has been observed on ten separate occasions, and seven individual auroras, apparently related, have been reported. Aurora appears more likely when high noise levels are observed on two or more successive days. Delay between noise peak and aurora has been one to three days, though some occurred on the same date. More observations should give a clearer picture, and improve forecasting. Thus far the relationship of F_2 and transequatorial 50-Mc. propagation to solar noise is not well defined, though this could improve when the F_2 layer rises into the 50-Mc. region more consistently.[14] Sporadic-*E* seems hardly related, if at all.

The equipment and techniques described should not be considered the ultimate or best way. This is simply an account of a 432-Mc. experiment, in the hope that it will shed some light on the subject as it relates to amateur v.h.f. enthusiasts, and perhaps stimulate others to do similar work. Possibly observations by a number of stations could be coordinated to provide an auroral warning service for the v.h.f. community, during the peak years of Cycle 20.

The writer owes special thanks to Third Army MARS for the dish and related equipment; to W1HDQ for propagation reports; to *Sky and Telescope* for auroral reports; to the American Association of Variable Star Observers for sunspot data; to K2TKN, W3GKP, W3OII, WAØIQN and others for their assistance in making this project possible.

Late Report On the afternoon of May 23, W4IHHK recorded solar noise on 432 Mc. in excess of 15 db. Visual observation showed exceptionally large spots approaching the center of the solar disk. On May 25 came the most widespread auroral display in recent years. V.h.f. communication via the aurora was reported as far south as Sarasota, Florida, and auroral contacts were made in Southern California for the first time. The disturbance continued through May 30, with peaks on the 25th, 28th and 30th. For more details, see *The World Above 50 Mc.*, July *QST*. QST

[14] The correlation between solar activity and extreme peaks of F_2-layer m.u.f. was first observed by G6DH in the 1930's. For his slant on it, relating to 50-Mc. DX, see "Any DX Today?" January, 1948, *QST*, p. 27. The correlation with transequatorial 50-Mc. DX is indicated in a summary of 1950 work by South American 50-Mc. operators, in "The World Above 50 Mc.," May, 1950, *QST*, p. 49.

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K1MAX, Edwin R. Stanley, Peabody, Mass.
W1MMY, Clarence G. Eggers, Sharon, Mass.
W1OG, Donald B. Lovis, Lexington, Mass.
W1ONW, Stanley Malko, Salem, Mass.
W1UQH, Leo Choquette, N. Dartmouth, Mass.
W2BE1, W. W. Filson, Audobon, N. J.
ex-2DC, 2FD, John Stofan, Teaneck, N. J.
W2IY, Edward W. Dugan, Jersey City, N. J.
WA2KNA, James H. Sayers, Albion, N. Y.
W2LF, Eugene H. Handler, Rochester, N. Y.
W2LY, Roger Barrington, Merchantville, N. J.
W2LYF, William Rieger, Friendship, N. Y.
WA2LYH, George L. Rebel, Glen Cove, N. Y.
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W2RGA, George T. Smith, Rochester, N. Y.
WA3DAO, Gordon T. Rosborough, Hyattsville, Md.
K3DLA, Stanley E. Fey, Willow Grove, Pa.
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W3HC, John Thompson, Wilmington, Del.
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K4JKR, Joseph G. Mullen, Williamsburg, Va.
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W5TGW, Walker Barton, Bertram, Tex.
W5ZQN, William S. Mason, Sr., Beaumont, Tex
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W6ASP, James N. Petersen, Santa Monica, Calif.
WA6HIY, Oscar Bonter, Sherman Oaks, Calif.
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W8HG, Carl Schardt, Cleveland, Ohio
WA8WIQ, S. Harold Denton, Charleston, W. Va.
W9AST, Ernest M. Patchman, E. Chicago, Ind.
ex-9AWN, Lloyd V. Berkner, Washington, D. C.
W9COA/K9ZHW, Norman E. Winzel, E. Troy, Wisc.
W9DA, Herman Gisseler, Chicago, Ill.
ex-9EGT, 8AMC, Ervin E. Trommer, Milwaukee, Wisc.
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W9GW, James Wells, Crystal Lake, Ill.
WA9HJA, Kennith I. Chase, Champaign, Ill.
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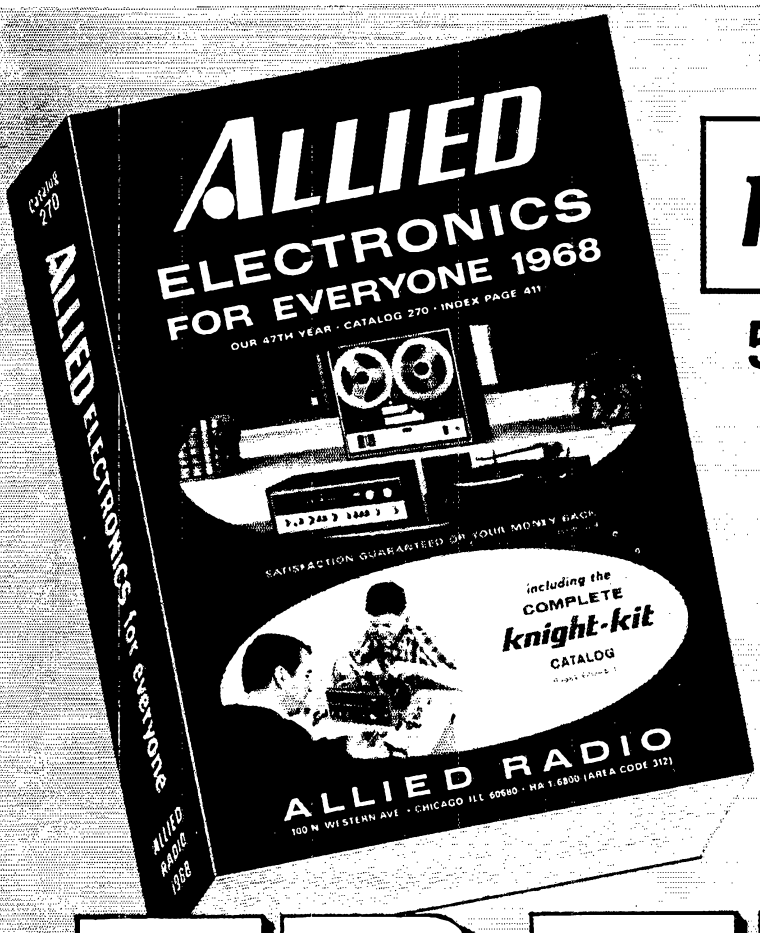
Because of the need for accuracy in our "Silent Keys" listing, please send all notices to the ARRL and include both name and call of the deceased



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Gimmicks and Gadgets

(Continued from page 47)

type control, R_2, used was salvaged from a computer board obtained at a surplus store. A Mallory MCT-1 miniature control would be a suitable, and much less expensive, substitute.

The r.f. choke, RFC_1, was necessary to eliminate r.f. feedback in the audio system when the preamp was used on v.h.f. No trouble was encountered on h.f. using 1 kw., but 2 meters was another problem. The preamp itself was suspect (W1CER reports that the MPF series work well up into the v.h.f. region); however, the source of the trouble was the length of connecting cable between the unit and the Communicator. RFC_1, inserted in series with the output, cured the problem. If feedback is encountered, the origin should be pinpointed, and a bypass capacitor, r.f. choke, or both, should be used. If the trouble is the preamp itself, filtering should be done in the gate lead.

Getting your feet wet with new devices is always fun, and other projects with FETs will soon suggest themselves. QST

How's DX?

(Continued from page 87)

regrets our term "7-Mc. VOA noise" in June's column, George, who has worked extensively with Voice of America, is understandably proud of the vast task the outfit has undertaken with a barrage of rigs ranging from 250 to 1,000,000 watts on frequencies from 176 kc. to 20 Mc. "Noise" just seems more descriptive than "interference", though, especially if you try to cut those sidebands with amateur peanut whistles. We'll compromise and stick to "QRM", George . . . . WA9LIO already has filed a limerick for next May's DXHPDS clambake. Not bad . . . . W7VCB is trying some old-style Lazy-H beams, a design used by the Six gang to terrorize DX in the '30s. Ken regularly feeds data on nonamateur 14-Mc. interlopers to Intruder Watch. Do you? . . . . Consult HR1MAS for specs on a fresh Radio Club of Tegucigalpa certification commemorating establishment of new amateur regulations in Honduras . . . . W2QHH, pioneer collector of DX testimonials, finds his DX activity curtailed by local noise and a fatiguing mail route . . . . "Later this year I plan to activate TG9EP/4/6/7," discloses TG9EP. "There are no TG1-2-3 call areas." . . . . KL7FLB reportedly gads about on OM Fletcher's celebrated Ice Island . . . . SCDXC's organ reveals that W6AM can cut in only nine bidirectional rhombics these days . . . . Utah DX Association now is 17 strong . . . . W8ZCQ, in the *CARAscope*, skewers W7Ks who would sneak disguised voices out of the phone subbands to cajole sideband juicies upward. QST

Technical Correspondence

(Continued from page 53)

13 and 6 degrees at Channel 2. An aircraft near a TV tower may be too high to provide a strong reflection. You probably will detect aircraft more readily when they are nearer your end of the path. The geometry of a 40-mile path shows that with a 3-degree elevation of the pattern you will not detect aircraft higher than about 10,000 feet. On lower channels (wider vertical pattern) the maximum aircraft height would be about 22,000 feet.

If two amateurs point their v.h.f. antennas at aircraft they are not limited in this way, except as the percentage of their total radiation reaching the aircraft gets progressively smaller with increasing aircraft height and distance. Without tilting the antenna, the radiation angle can be raised by moving the array closer to ground. A half wavelength, 10 feet at 50 Mc., would be good.

Practice in communicating via aircraft reflections is best done with stations near the maximum direct-ray distance. This can be estimated from Fig. 1, or by the formula D (miles) $= 1.32\sqrt{H}$ (ft.) where H is the height of the antenna above average terrain. Cooperating operators should move their antennas to the same side of the direct line, until signals drop to where they can just hear each other. Air traffic tends to be in lanes, so the side of the direct path that will see the most aircraft should be used. Once the presence of aircraft is detected by fluttering signals, the source may be tracked by making short transmissions and moving the antennas for maximum signal. Do not expect results from aircraft passing overhead, unless the antenna is both small and low, or has provision for controlling the elevation angle.

General cooperation in the matter of antenna aiming may make it possible to communicate over obstructed paths without precise control of the antenna. The average 10-db. antenna will have an azimuth beam width of about 60 degrees, so aiming is not critical. Some evidence of aircraft will be found if stations are transmitting with their antennas aimed at the general area that has been shown by experience to provide most frequent interceptions.

The information of Fig. 2 represents results obtainable with average installations. This is a technique mainly for those who are interested in trying something a little different. Hopefully there will be enough of this kind of hams in many areas to make things interesting, especially on a cooperative basis. — *Henry G. Root, W1QNG, 23 George St., Littleton, Mass. 01460* QST

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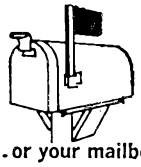

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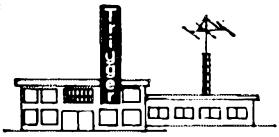

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Tops in performance and appearance, thoroughly and beautifully reconditioned, and clean as a pin. Alignment, calibration as good as new, and frequently better. Listed below are but a few of the hundreds of items and accessories currently available. Write for complete listing and prices.

LIKE-NEW BARGAIN SPECIALS FOR AUGUST

DRAKE TR4	$519	SX111	$147	GALAXY 3B AC	$239
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DRAKE T4X	339	SX122	209	HO145C	169
SWAN 350	299	SX130	127	HO170AC	279
SBE 34	349	SX140	77	SP600JX	399
SB2LA LINEAR	199	NC109	79	SB300	199
CLEGG 66ER	149	NC125	89	DX100B	87
INTERCEPTOR	257	NC183D	199	HX10	219
JOHNSON RANGER	89	NC303	239	SENECA VHF1	177
KNIGHT T150A	87	NCX3	179	HA14 & HP24	137
AMECO TX62	119	NCX5	389	CENTRAL 100V	379
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SPECIAL

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LIMITED QUANTITY NEW FICO KITS

753K SSB TRANSCEIVER $149.95
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722-VFO W/AC SUPPLY $34

A SMALL DEPOSIT WILL HOLD ANY UNIT ON LAY-AWAY.

Trigger Electronics

7361 NORTH AVE. • RIVER FOREST, ILLINOIS 60305
(WEST SUBURBAN CHICAGO)

SUNDAY TELEPHONE SERVICE
11 A.M.—3 P.M.

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously noncommercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is **no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate.** Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

OLD Old Timers Club now over 160 members with verified 2-way contacts before 1926. Life membership $15.00. Bi-monthly "Spark Gap Timers" $2.50 annually. Roster free to members. Write Secretary, W5VA, Box 840, Corpus Christi, Texas 78403.

12th ANNUAL Hamfest by Four York County Clubs again sponsored at Adams County Fair Grounds, 4 miles north of Abbottstown, Penna. Sept. 3, 1967, rain or shine. Registration begins at 0900 hrs. Talk-ins 50.62 and 14562 Mc for the mobiles. Plenty of eats, drinks, transmitter hunt, for XYLs and ladies, Auction, etc. For info write K3POR, LeRoy Frey, 170 S. Albemarle St., York, Penna. 17403. Keystone V.H.F. Club.

"SAROC" Thanks all participants and exhibitors for a wonder fun-convention. Stellar Industries, EG. & G., Southern California Edison Company, Brad Thompson Industries, Mission Ham Supplies, California Highway Patrol, Henry Radio, Tristao Towers, Weatherbie Electronics Center, Swan, Tri-Ex Towers, Collins, Hallicrafters, Hy-Gain, Radio Products, Linear Systems, Hotel Sahara, MARS, Raytheon, Superior Engraving, United States Airforce, WCARS-7255, W6SAI, 1968 "Saroc" at Hotel Sahara, Las Vegas, Nevada. World Entertainment Capitol. January 4-7. QSP, QSL-card, zip and telephone number for details to Southern Nevada Amateur Radio Club, Box 73, Boulder City, Nevada 89005.

The Wood County Amateur Radio Club announces its annual HAM-A-Rama Sunday July 9 at the Fairgrounds, Bowling Green, Ohio. Write to W8PSK, 324 South Grove St., Bowling Green, Ohio 43402 for details.

LOUISVILLE Ham Kenvention—Sept. 8-9, 1967. Beautiful Executive Inn Motor Hotel, Waterson Expressway at State Fair Grounds, Louisville, Ky. Participate in the technical sessions, forums, banquet and flea marke. Bring XYL for day of women's activities. For information write Louisville Ham Kenvention, Box 20094, Louisville, Kentucky 40220.

THE Friendly Favorite: Warren, Ohio. A.R.A. Hamfest, August 27, Newton Falls. Follow arrows from Rt. 534 and Turnpike Exit 14. Contests, Swap Shop, XYL-YL program.

FAIRBANKS, Alaska Centennial Exposition. KL7ACS Official Station. Visitors call on 3866 or 145350. Informal get-togethers, Kings Kup, Noble Street, noon Saturdays. Commemorative QSLs issued.

FULL Day of demonstrations and entertainment at one of the world's largest science museums. National Amateur Historical Radio Conference, Sept. 23, Dearborn, Michigan. Write W2QY, 69 Boulevard Parkway, Rochester, N.Y. 14612.

MOTOROLA used FM communication equipment bought and sold. W5BCO, Ralph Hicks, 813B No. Federal Hiway, Fort Lauderdale, Florida.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

SELL:Eimac 4X250B tubes. Guaranteed gud condx. $6.50 each, $10.00 paid repair in U.S.A. Send check or m.o. Everett Stidham, Jr., W5LQ, 722 So. 30th, Muskogee, Okla.

HALLICRAFTERS S-40 recvr $20 plus delivery. Gerald Black, R #1, Essexville, Michigan 48732.

TUBES, Diodes and Transistors wanted. Astral Electronics Corp., 150 Miller St., Elizabeth, N.J. 07207.

SELL, swap and buy ancient radio set and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

QSLS?? Largest variety samples 25¢. DeLuxe 35¢. (Refunded) "Rus" Sakkers, W8DED, P.O. Box 218, Holland, Michigan 49423. (Gospel QSL samples 25¢). Zipcode Directory $1.50 postpaid (does not contain large cities' complete lists).

QSLS "Brownie" W3CJI. 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Illinois).

QSLS-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo, Ohio 43601.

DELUXE QSLS Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples, 10¢.

QSLS. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1944 N.M. 18, Gladwin, Mich.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

CREATIVE QSL Cards. 25¢ for catalog, samples, 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-1, Atascadero, California 93422.

RUBBER Stamps $1.15 includes tax and postage. Clints' Radio W2UDO, 32 Cumberland Ave., Verona, N.J. 07044.

QLS, finest, YLRL's, OMs, samples 10¢ W2DJH Press, Warrensburg, N.Y. 12885.

QSLS, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal snazy, unparagoned cards (Wow!) Rogers KØAAB, 961 Arcade St., St. Paul, Minn. 55106.

3-D QSL cards, recognized leader among raised designs. Compliments aplenty! Prized collector's item. Samples 25¢ (refundable). 3-D QSL Co., Monson, Mass. 01057

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz. 85017.

QSLS 300 for $4.35. Samples 10¢. W9SKR, George Vesely Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLS 3-color glossy 100, $4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLS-100 3-color glossy $3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLS stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

ORIGINAL EX-IN double holders display 20 cards each in plastic, 3 for $1.00 or 10 for $3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John K4MNT, Box 198T, Gallatin, Tenn. 37066.

QSL's; Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLS. Fast. Catalog 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio 43935.

QSL's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLS. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors 100-$3.00 up. Samples 15¢. Agent for Call-D-Cals. K2VOB Press, 31 Argyle Terrace, Irvington, New Jersey 07111.

PICTURE QSL Cards for your shack, etc. Made from your photograph. 1000 $14.50 Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Penna. 19140.

QSLS. Fast service. Free samples. Bolles, W5OWC. Box 9363, Austin, Texas.

QSLS. Radio Press. Box 17112. San Diego, Calif. 92117.

QSL, SWL, cards that are different. Quality Card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

QSLS, 100, $1.25 postpaid. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803

CRAZY QSLS. Very attractive. Samples 10¢ or SASE. WA8NYB, Print, 645 Reynard Avenue, Cincinnati, Ohio 45231.

QSLS. Fast service. 100, $3.00. Free samples. Joe, WB2YIV, 518 Glenmere Ave., Neptune, New Jersey 07753.

QSLS. Second to none. Your personal combination from largest selection Glossy reds, blacks, calypso, Pinecraft, vellum and crystallon. All ink colors. Many card styles. Fast service. Samples, 25¢. Includes your call in beautiful 4½ inch letters. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

RUBBER Stamps, name, address: $1.25 postpaid. Mertin, Box 656, Fayetteville, Arkansas 72701.

PERSONAL, Different, low cost colorful QSLs. Samples, 10¢. Carl, WA6ZHD, 5437 Charlton Way, Hollywood, Calif. 90028.

CANADIANS: Best used gear list in Canada. Free Etco, c/o Mary, VE2ANN, Box 744, Montreal 3.

CANADIANS, Must clean out the place. Receiver TMC GPR-90 and SSB adaptor, Model GSB-1, like new, in perfect working order, $375.00; SX-42 receiver complete with R-42 speaker, cabinet and tilting base, spotless, like new, $275.00; receiver CR-91 (surplus AR-88), $150.00; tubes 813, $3.00; 829, $4.00; 1000 Kc xtal, $1.50, C. Gutman, 7526 Mountbatten Rd., Cote St. Luc, Montreal 29, Que., Canada.

FOR Sale: Transmitter, Knight T-60, 60-watt 80-6M cw/am, $40.00. Heath VFO #VF-1, $10.00. W3DYL, 1224 McKinley St., Philly, Penna. 19111.

FOR Sale: Perfect SB-400 Heath transmitter, $200.00; HE-56 Lafayette 6-meter converter $12.00. Richard Hennis, 3409 Sevier Drive, North Little Rock, Arkansas 72116.

SELL: Heath MR-1 w/speaker, MT-1 w/station power supply. $80. K3QPV, Chapel Hill Rd., Huntingdon Valley, Penna. 19006.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts. 617-598-2530 for the gear u want at the prices u want to pay.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

DUMMY Loads, 1 KW, all-band, $7.95; wired, $12.95. Ham Kits, P.O. Box 175, Cranford, N.J.

WANTED: 2 to 12 304TL tubes. Callanan. W9AU, 118 S. Clinton, Chicago 6, Ill.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts. BC-610, GRC-2, Autodyne, Bethpage, L.I., N.Y. 11714

TELETYPE: Buy 28s, sell parts. W4NYF, Schmidt, 405 NW-30th Terr., Ft. Lauderdale, Fla.

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.

We Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

RTTY Gear for sale List issued monthly. 88 or 44 mhy toroids, five for $1.50 postpaid. Elliott Buchanan, W6VVC, 1067 Mandana Blvd., Oakland, Calif. 94610.

CASH Paid for your unused Tubes, and good Ham and Commercial Equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NYC 10012. Call 212-WAlker 5-700. Vacation closing: July 24-Aug. 7th.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: GArfield Area code (201)-773-3320.

HAM Discount House. Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation on your needs. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

ESTATE Liquidation offers. Big list. Parad Engineering Service, 284 Rte. 10, Dover, N.J. 07801.

WANTED: Model #28 Teletype equipment. R-388, R-390A. Cash or trade for new amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101.

TOROIDS, 88 mh uncased, 5/$2.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

SELL: CQ, QST, Handbooks, old radio magazines, any quantity. Buy Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

NOVICE Crystals, all bands, $1.30 each. Free list. Nat Stinnette, Umatilla, Fla. 32784.

FREE Catalog. Loads of electronic Bargains, R. W. Electronics, Inc., 2244 South Michigan Ave., Chicago, Illinois 60616.

AMATEUR Paradise Vacation. Livingstone Lodge, Mascoma Lake, Enfield, N.H. Cosy cabin for two weekly. $50.00. Swimming, Fishing, Boats, Sports, ham radio, Dartmouth Golf, tennis, hot showers, fireplaces, light-housekeeping, children half. Lake Shore Camp Sites. Literature, Al Q. Livingstone, W2QPN, Livingstone Lodge, RFD Enfield, (Mascoma Lake), N.H. 03748.

WANTED: Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R388, R390, GRC. Any 51 series Collins unit. Test equipment, everything. URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co., 308 Hickory St., Arlington, New Jersey 07032.

INTERESTING Sample copy free! Write: "The Ham Trader," Sycamore, Illinois 60178.

SELL: Hallicrafters SX-62A with Q-Multiplier, excellent condition With 15" speaker in portable cabinet, $300.00. M. Pellegrino, 65 Maspeth Ave., Brooklyn, N.Y. 11211. Tel: ST 2-5830.

WANTED: For personal collection: QST, May 1916; Learning the Radiotelegraph Code, 4th Edt.; How to Become a Radio Amateur, Edition 12; The Radio Amateur's License Manual, Edition 10, 11, 12. List of Stations (1914); Map of Member Stations (1914), W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

HAM'S Spanish-English manual. Gabriel K4BZY, 1329 N.E. 4th Ave., Fort Lauderdale, Florida 33304.

HALLICRAFTERS SE-150 transceiver P-150 A.C. supply. New tubes. Perfect. Want to build. Ship prepaid stateside. All reasonable offers considered. R. T. Evans, Box 95, Britt, Iowa 50423

COLLINS 51J4 wanted. Will consider one needing work if complete. Please write condition and price to Winram, 175 W. 12 St., New York 10011.

FOR Sale: Complete set UTC, "LS" Series, transformers for broadcast or amateur transmitter including power, bias, audio, and high level modulation. Power adjustable 1 KV to 4 KV at 1.2 amps., continuous duty rating. Perfect condition, and priced to sell. Geo. W. Smith, Jr., W5HIP, Rte. #1 Box 71-Z, Pottsboro, Texas 75076.

SSB: Heath HX-10, HR-10 mobile/fixed combination: TA-32Jr, all accessories. Good condition. Joe Spivack, 7 Linden Ave., Belmont, Mass. 02178.

TR-4, $480.00; AC-4, $83.00; DC-3, $123.00; R4-A, $330.00; T4X, $330.00; MS-4, $17.50; RV4-, $83.00; L-4, $58.00. Factory-sealed boxes, fully warranted. Mel Palmer, K4LGR, Box 10021, Greensboro, N.C. 27404.

BEST Offer paid for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

BILL Ogg at Evansville Amateur Radio Supply, 1629 S. Kentucky, Evansville, Indiana 47713, says check these Summer Bonus Savings! Bonus #1: a free, matching AC-Supply with the purchase of a Swan-350 or Galaxy MK II at $420.00 each or Swan 500 at $4.95. Bonus #2: a free, matching, AC supply plus a MS-4 speaker and Turner 454X with the purchase of a Drake TR-4 at $599 or a T4-X, R4-A combo at $799. We prepay most shipping charges. Send us a stamped envelope for a deal you've been looking for.

HEATH HO-10 monitor. $45.00; National NC-303 with 6 meter converted. $270.00; Utic 650 with VFO and mike. $140.00; Jones Bendix Micromatch. $20.00. K1SCJ. Richard Ravich, 10 Coolidge Rd., Marblehead, Mass. 01945.

COLLINS Owners: Now is the time to get that long awaited conversion. If you want the very best in receiving capabilities this upcoming season, a VCZ front end conversion is your answer. 75A4's, $69.95; 75-S series, $34.95 complete. In stock: converted 75A4A's for immediate shipment. Dealers in fine used Collins gear. Write for details. VCZ Sales, 5 Pinetree Rd., Ramsey, N.J. 07446. Tel: (201)-327-9494.

CASH. Want 32S-3 in A-1 condition only. Fifi Lopez, XE9YL, Box 7565, Mexico City.

EXCELLENT Opportunity for licensed amateur, with technical qualifications for mail order Amateur-CB sales and customer service. Previous experience desirable. Interested applicant should possess capability to handle sales correspondence. Call or write: Mr. Wickman, World Radio Laboratories, Inc., 3515 W. Broadway, Council Bluffs, Iowa 51501. Phone 328-1851

FOR Sale: SB-101 and SB-200. Wanted, kits to wire, Heath preferred. 12% of cost, some in stock. Professionally wired Lan Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna.17112.

WANTED: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Test-sets, Accessories, Specially Collins. We pay cash and freight. Ritco Electronics, Box 156, Annandale, Va 22003. Tel:(703)-560-5480 Collect.

EXCELLENT Heath SB-300 receiver, SSB c.w. AM filters, plus manual. Going transceiver. Just aligned and sharp. $265.00 shipped prepaid W. Rohrbach, 34 Lincoln Ave., Chatham, N.J. 07928.

HAMMARLUND HQ-160 rcvr. $150.00; SP-600JX, $285.00; Heath DX-100, $85.00; SB-10, $65.00; Johnson Courier 500W linear, $90.00; DB-23 Preselector, $10.00; 110VAC coax relay, $8.00; Astatic mike, $10.00 All in perfect condx, w/manuals. Sabelberg, Box 142, San Andreas, Calif. 95249.

WANTED: Schematic diagram and operating instruction manual for Globe Scout, Model 65 transmitter. Al Berman, W9APV, 622 Pleasant Ave., Highland Park, Illinois 60035. Tel: 432-6522.

FOR Sale. KWS1 and 75A4. Late serial and modified. Excellent condition. Manuals and cables included. Dr. C. L. Samuelson, 539 So. Main St., Findlay, Ohio 45840

DRAKE 2B, 2BQ, Calib, manuals, very fine. Ship prepaid to first $175.00. certified. W7HWL, 1932 Bonita, Las Vegas, Nevada 89105

WANTED: Full time sales representative needed to sell a quality line of nationally known 2-way radio equipment in the North Central and Mid-Western areas of the country. Salary, Commission, plus expenses. Liberal company benefits. Ideal opportunity for ham or CB'er with a knack for selling. Must be willing to travel. Reply: Mr. Warren Whittel, P.O. Box 536, Baltimore, Md. 21203.

ESTATE Liquidation of W2ZVO: SB-10, mint condition, Viking with manual. First certified check for $250. I will ship. 34 mhz, 46 to 56 mhz. See ARRL Handbook 1951, excellent condition. All with manuals. For best offers. Will answer all replies. Mrs. E. W. Hague, c/o Gene Fry, K2CW, 69 Ashland Road, Summit, N.J. 07901. Tel: (201)-273-7488.

REAL Deal for Novice: HQ-145, Heath Q-Mult., spkr. DX-20, T-R switch, and more. All in FB condition Jim Nestor, WN8-WHL, 2008 Smithville Western Road, Wooster, Ohio 44691. Tel: (216)-345-6778.

CLEGG Zeus TX and power supply; Clegg Intercepter with 2 coax relays, all manuals; D-104 mike. $750.00. Superior Instrument Co. VTVM. $20.00; Heath 6 meter converter, $25.00. Mrs. Helen A. Roark, Executrix of the Estate of WA4GXR, P.O. Box 267. Franklin, Ky. 42134.

HAITIAN Dispensary needs portable generator. Situation not permitting amateur operation, I solicit help from brother hams to obtain a 3,000 watt generator for my dispensary here in Ouanaminthe, Haiti. Willing to pay reasonable price or will appreciate S&H or TV stamps to help obtain this badly needed item for heloing my poor. John Henault, O.M.I., W1EPA, 76 School St., Revere, Mass. 02151 Tel: AT-42029. Will be stateside from July to October at above address.

HEATH HR-10 rcvr. $49.00; TA-33JR beam, $49.00 (with AR-22R rotator, $69.00). WB2EYZ, 2154 57th St., Brooklyn, N.Y. 11204. Tel (212)-256-5014.

WALKIE-Talkies. Two Heath GW-21A 100 mw. hand-held CB transceivers in excellent condition. ideal for conversion to 10 meters. $50.00. W7DQS. 2418 E. Pierson, Phoenix, Ariz. 85016.

WANTED: Mainline TTTL F.S.K. converter as described in August 1965 QST. Would prefer auto start capability. Quote price. Bart Perrotti, WA1BAL. Lakeville, Conn. 06039.

WANTED: National HFS. Must be in vy gud condx. K2UUR. 13 Georgetown Parlin, N.J. 08859.

WANTED: McMurdo-Silver 100 Kc. IF amplifier: Luck AGC unit: 32-B or Invader 200 SSB. W9TMH, 1652 Milwaukee Ave., Chicago, Illinois 60647

GONSET: Comm. IV, 6 meter, $200.00, like new, been used on the air for two months only. Mobile halo included. WA8-MRU, Mike Beall, White Pigeon, Michigan 49099.

BEST Reasonable offer takes QST magazines 1956 thru 1960; CQ magazines 1947 thru 1960; HG-10 VFO, HT-40 transmitter, S-40 receiver; Hy-Gain Monobrake, large inverted prop pitch motor; Telrad frequency standard. W3EPV, 817 Hamilton Boulevard, Hagerstown, Md. 21740.

LICENSE Plate with call-letters. Only $1.00. With reflective paint, $1.50 Special club rates. Guaranteed. Permanent, impressive. E. L. Crouch, K4ANE, 2040 Broad St., Paducah, Kentucky 42001.

SELL: RME DB-20 Preselector, $15.00; Century tube-checker, floor model, $50.00; Eico 625 tube-checker, $15.00; 24-hour clock, $6.00. W2UGM. 66 Columbus Ave., Closter, New Jersey 07624. Tel: (201)-768-1884.

WANTED: KWM-2/2A. 75S-3B/C. S/Line accessories. Give price, condition, year made. Heinlein, W7BIF, 107 Wyoming, Boulder City, Nevada 89005.

MUST Sell for college expenses: Homebrew TV Camera *including tubes, vidicon, lens, and converter).* Best offer wins. Lee Wimbs, 3006 Northampton, Greensboro, N.C. 27408.

DRAKE R-4 receiver, few hours of use in perfect condition with manual. First certified check for $250. I will ship. Philip Cohn, W1FMA, 84 Birch Road, Longmeadow, Mass. 01106.

RTTY Channel Filters, octal mounted, 2125/2975, $5.95 pair. FSK units for 32-S-3, variable shift, easy installation, $14.95. 88 mh. toroids, uncased, 5 for $2.50. Harman Zachry, WA6JGI, 3232 Selby Ave., Los Angeles, Calif. 90034.

WANTED: Thordarson 20D82. Astor, 488 Paine, Wyckoff N.J. 07481.

VHF'ERS: Heathkit Twoer, $35.00; SBA-300-4, two-meter converter, $15.00. Both excellent condition. You pay shipping. Gary Confrey, WA1EDJ, Rte. 80, Killingworth, Conn. 06417.

SELL: Twoer, never used, in A-1 condition. Triband beam wanted. Like to trade. WB6VCM, 959 Clinton Rd., Los Altos, Calif. 94022.

SELL: Complete station NCX3, NCXA, NCL2000, SC-101A, Ameco two-meter converter, Waters model 334, keys, mikes, extras; $500.00. Pick-up deal. W3EIX, Box 1014, Secaucus, N.J. 07094. Tel: 863-4681.

HQ-170AC, guaranteed like new condx. Will ship prepaid. $275.00. WA8LTX, Tom Knott, 4011 Windward Drive, Lansing, Mich. 48910.

HEATH HW-32 with calibrator and HP-13 supply, $125.00. Julian Eng, 1 Herald Plaza, Miami, Fla. 33133

SELL: Hallicrafters SX-140 K receiver, works well. $75.00. Charles Rhodes, 172 Park Lane, Titusville, Fla 32780.

HT-37, SX-101A, perfect, $195.00 each. TA-33 Jr. $25.00. WA5AXS, 618-18th Ave., Texas City, Texas 77590.

SELL/Trade BC-221J frequency meter. Excellent. With calibration book technical manual, 115 VAC regulated power supply, lift-cover cabinet. $95.00. Want high power telescope (equivalent Lafayette Polaris) or recording barometer. Sell new Tecraft Criterion converter, Mod.144, xtals for 75A4 $45.00 Dumont oscillograph Type 164-E, manual, good, $25.00. K2CR, Dick Zucker, Water Mill, L.I., N.Y. 11976. (Tel: (516)-726-4585).

1916 OSTs needed for personal collection. Price secondary. Ted Dames, W2KUW, 308 Hickory Street, Arlington, New Jersey 07032.

MINT Condition Collins 75S1 receiver with Waters rejection tuning. Original owner. $300.00. W1FYG, 66 Hourigan Dr., Meriden, Conn. 06450. Tel: (203)-237-0634.

EICO 753 SSB/AM/CW transceiver, AC supply, microphone, calibrator, excellent, $145.00. Twoer, DCPS, $25.00. WB2KDB, 351 Howe Ave., Passaic, N.J. 07055

FOR Sale: Mint condition Collins 516E-1 power supply. 351D mobile mount. $200. W2TG.

DRAKE 2-B, xtal calibrator, Heath Q-mult., speaker, $190.00; Apache transmitter, $100. Both in mint condition. SX-43 receiver. Older model but good shape. $55.00. Philadelphia area. K3DCY. Tel: (215)-886-5912.

HEATHKIT Mohawk RX-1 receiver, 160-2 meters, AM, CW, SSB. Perfect in A-1 mint condx. Electrically and physically. Latest model. $175.00. Mike Matich, WA9NVN,1101 Ewing Ave., Chicago, Illinois 60617. Call (312)-768-3099.

SELL: HQ-170A receiver, $240.00; Heath Marauder transmitter, $225.00, both mint condition. Perfect Johnson Thunderbolt amplifier and extra new 4-400A, $285.00. Health Ham Scan, $60.00; monitor 'scope, $50.00; Lafayette bug, $6.00. Knight SWR monitor, $10.00. Johnson KW low-pass, $9.00. Michael Zakin, WA2SZM, OL-80837.

FREE Subscriptions to electronic magazines are available to qualified buyers of electronic components for their employers. Send $1.00 for details and addresses of sixteen free magazines. Universal Company, Box 1165, Richardson, Texas 75080.

LETTINE 240-40 watt phone/cw, $20.00; Miessner "EX" signal shifter, 807 output (bandswitching) $15.00; Bigrig; 4-866s power supply, modulator Pr. 805s, new 300 watt modulation transformer, final pr. 100TH (just have one), uses plug-in coils. Enclosed 5½ ft. metal cabinet, door in back, $70.00. K4CCY, 206 Henderlite, Salisbury, N.C. 28144.

APACHE TX-1, $120.00; HQ-160 revr, $115.00. Both $225.00. WA2GPF, 14 Grove Street, Waldwick, N.J. 07463.

WRITE, Phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, Galaxy, Gonset, Hallicrafters, Hammarlund, Hy-Gain, Johnson, Millen, Mosley, SBE, Henry Linear, and most other equipment. We try to give you the best service, best price, best payment terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

WANTED: Heath SB-401 or SB-400, any condx. For sale: Knight T-150A AM, CW, 150-watt xmtr and coax relay, $60.00 *ppd.* Fred Scharmann, WA8MQO, French Creek Rd., Avon, Ohio 44011.

HENRY 2K mint condition. Serial No. 130. $475.00. Dr. George Mack, W4HUE, 4108 SW 5th St., Fort Lauderdale, Fla. 33314.

BEST Offer Hammarlund HQ-110 revr. with clock, speaker, S-meter and new 2-meter dial. H. Mancine, K2ZOS, 1330 Mamaroneck Ave., Mamaroneck, N.Y. 10543.

SP600JX1 $200.00; BC-221 P/Sply Calif. hook, $25.00; (2) 4CX1000A, good, make offer; Vibroplex bug, $10.00; Available Sept. Trade? Need Johnson KW Matchbox. D. Meeves, USNGA, 215 North 7th St., Council Bluffs, Iowa 51501.

GOING To college. Selling mint condition SX-101A. $180.00; HT-37 with extra pair finals, $230.00. Will deliver to 100 miles or you pay shipping. D. Johnson, 1358 Birch Hill Rd., Mountainside, N.J. 07092.

MUST Sell: 75S-1 with Waters Q-mult., $250.00 mint. GSB-100, $165.00; NCL-2000 without 8122 tubes, $325.00. Bruce Zaleiski, WØKYP, Rte. 1, Kathryn, North Dakota 58049.

FOR Sale: Heathkit SB-400, $300.00. Hammarlund HQ-170C, $180.00. All offers considered WA7BNM, Bruce Horn, Box 402, Coos River, Coos Bay, Oregon 97420.

VIKING 500, in excellent condition. Spare tubes, ready for SSB. Best offer over $250.00. RME-6900. Looks and operates like new. $150.00. Moving to an apartment and need smaller rig. Henry Oles, 616 Coitsville Rd., Campbell, Ohio 44405.

OSTS 1937 thru 1958, complete set. Also 2 copies 1936: 7 in 1935, 9 in 1934, 9 in 1933 and Dec. 1932. All vy gud condx. Best offer. Prefer pick-up deal, otherwise you pay freight. Al Palmer, W1KIO, 111 Wilfred St., West Hartford, Conn. 06110.

CRYSTALS: Airmailed: SSB, Nets, MARS, Novice, Marine etc. *Custom finished etch stabilized* ET-243, .01% any kilocycle or fraction, 3500 to 8600 kilocycles $1.90, (five or more this range $1.75 each) (Nets: ten or more, same frequency $1.40). 1700 to 3499 and 8601 to 20,000 $2.75 with overtones supplied above 10,000. 10,000 to 13,500 fundamentals $2.95. Add 50¢ each for .005%. Add 75¢ each for HC-6/u metal miniatures. Have many crystal groups for construction articles in ARRL publications including QST, "Handbook," SSB and Mobile manuals and other. Inquire. Write for order-bulletin. Crystals since 1933. Airmail 10¢/crystal, surface 5¢. C-W Crystals, Marshfield,Missouri 65706."

INVADER 200, like new condx, $239.50. Collins 32V-3 in excellent, mint condition, $195.00; HRO-60 with coils A,B,C, D,E,F and AC 15 meters band-spread, crystal calibrator 100 and 1000 Khz, narrow band FM adaptor and speaker, $250.00. Hallicrafters SX-42, clean and in perfect working order, $95.00 14AVQ and LC80Q with relay, $20.00. Roger Batista, WB2ZBM, 1219 Taylor Ave., Bronx, N.Y.C. 10472.

FOR Sale: DX-40, $23.50; HG-10, $19.50; Vibroplex "Bug" $9.50; S-108, $44.95; 6M xmitter, $24.00. Misc. items. Shipping extra. K4JCX, Box 162, Oak Ridge, Tenn. 37830.

FIELD Effect Transistors. MPF-102, MPF-104, TIXM-12, $1.20 each. Bob, W3TOO, 4015 Montpelier Rd., Rockville, Md. 20853

COLLINS 75S-1 revr, best offer above $250. W5LCD, 7150 Cliffbrook, Dallas, Texas Tel: 239-8196.

FOR Sale: HW-12 and HP-23, both in excint physical and electrical condition. Tim Garrett, WA4VVM, P.O. Box 272, Halifax, Va. 24558.

2 KW PEP SSB amplifier, Johnson Thunderbolt, Serial 96353. Not a scratch—perfect condition. Relay operated, time delay step start. With instruction book, $295.00. Large broadcast quality modulation transformer, 12,000/4000 ohms, .75/.5 amps., 52DB. Wanted: Ranger II, W3LL, 324 Broadmoor Rd., Baltimore, Md. 21212. Tel: 301-435-0226.

FOR Cash. All in good operating condition. Mosley 71 ft. tower with all cables, anchors, etc., $195.00; SX-101A (used 100 hours), $245.00; HT-32A, $245.00; GSB linear 201, $175.00; Astatic 10D mic. w/stand, $22.00; Ham-M rotator w/control and trans. cables, $65.00; Mosley TA-33 w/40 m. kit, $65.00; RF Analyzer MM2, $50.00; Micro-Match indicator and coupler, $15.00. Gordon M. Dunning, K3CBS, 800 Woodburn Rd., Rockville, Md. 20851.

THREADED Brass items: rebuilding beam. Write Walt on fasteners. Many brass items, washers, in stock. Write for list. See July ad. Sample washer card, 10¢. Washer, machine or wood screw samples, 25¢ postpaid. Walt, W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

SURPLUS Specials: Oscilloscopes 3" CRT, for 19" rack mntg, $39.50; regulated pwr supplies (3) voltages Max. 225-250V at 550 Ma., $39.95. Write for complete details on these and many other interesting items at bargain prices. Electronics Surplus Co., P.O. Box 1225, Boston, Mass. 02104.

DISCOUNT Prices and time payments. New equipment in factory sealed cartons at discount prices. Pay only 10% down, monthly payments as low as $10.00. Swan SW-350, $365.00; SW-500, $430.00; SW-250, $286.00; Ham-M, $99.95. Drake TR-4, $511.00; R-4A, $349.50; T-4X, $349.50; L-4, $599.00; Galaxy V Mk II, $365.00. SB-34, $360.00; SBE linear, $219.00. Save up to 25%. Write for quote before your purchase. Reconditioned bargains, NCX-3, $199.00; SW-240, $179.00; Eico 753, $159.00; SB-33, $159.00; SW-350, $299.00, Galaxy V, $299.00; HT-37, $179.00; HT-32, $179.00; GSB-100, $125.00; SX-117, $199.00. Send for list. Bryan, W5KFT, Edwards Electronics, 1320-19th St., Lubbock, Texas 79401. PO-2-8759.

SCR-522 with power supplies. Good condition. $50.00. Cash and carry. WB2TKL.

SELL: SB1-LA linear, in excellent condition, $165.00. Flora Strickhausen, 715 Tyler, Apt. 36, Topeka, Kansas 66603.

CHEAP: SX-110 with manual, $60.00. No scratches, no "bugs." K3MTG, Mt. Vernon, Oxford, Penna. 19363.

WANTED: Collins 30L-1, 312B-4, and SM-2 microphone. Clean, reasonable, for cash, no trades. All inquiries answered. Jesse A. Warren, 2311 Buckingham, Westchester, Ill. 60153. WA9KWC.

COLLEGE Forces sale of Heath SB-100, $300.00; DX-60, $40.00; HG-10, $20.00. Assorted other gear. WA4JXC, 204 Larkspur, Rome, Ga. 30161.

HEATH Apache, SB-10 and Mosley CM-1 receiver. First $200 certified check. Freight collect. E. J. Furno, WA4KJX, 13310 108 Ave. N., Largo, Fla. 33540.

VIKING II and Globe VFO, in excellent condition, $90 takes both, or make offer for either. Shipped c.o.d WA8SRQ, 6606 Evening St., Worthington, Ohio 43085.

FOR SALE: Swan 350 and AC power supply, late model, excellent condition. $365.00. G. W. Boles, 5305 North Drexel, Oklahoma City, Okla. 73112, telephone: *WI 6-6963.*

COMPLETE Set of QSTs from 1917 to present. Will sell as set only. Best offer. Write: Mrs. Barbara L. Kurtz, 23 West Northern Ave., Apt. A, Springfield, Ohio 45504. Phone: 322-7464 after six.

FOR Sale: Heathkit DX-60 transmitter, 90 watts, runs at 75 watts for Novice. Like new, $60.00. 10 Novice crystals, $10.00. Both for $65.00. R. L. Jewell, 18 Meudon Dr., Locust Valley, L.I., N.Y. 11560.

K5VCP selling HT-37, $210.00; Drake 2B, 2BQ, 2AC xtal clbrtr, $200; HA-1 T-O keyer w/Vibroplex key, $50.00. Equipment looks new condx, works perfectly. W/ original cartons, manuals. Xmtr rcvr delivered within 150 mi. radius. K5VCP, 6829 Rowan, Houston, Texas 77036.

TOROIDS-88 mhy., center-tapped, unpotted, 5/$1.50 postpaid. Never out of boxes; TX-62, $120.00; TR4A rotator, $24.00; model 26 like new, $55.00. Page printer paper, $5.50/ case. Heath VF-1 VFO with FSK, $12.00; SX-28, $40.00; HQ-140XA, $25.00. Viking Valiant, $150.00 (like new). Wanted: Capacitor decade, Gonset 2 meters, Polycom 6 and two, Audio oscillator, Tri-Band beam, ARR-15 receiver, Van, W2DLT, 302Z Passaic, Stirling, N.J. 07980.

COMMUNICATIONS Specialists. Amateur equipment repaired, kits wired, tested, custom building. J-J Electronics, Windham Road, Canterbury, Conn. 06881.

PLEASE Write for 3-page list of Ham and Lab Bargains. Examples: Tektronix 511 scope, $50.00; H-P 520 counter, $40.00; Beckman 1556 counter, $40.00; G.R. 1302 oscillator, $40.00; Brush DC amplifier, $20.00. Hammarlund SP-400X $60.00; RCA missile launch panel, $35.00; Webcor stereo recorder, $40.00; swivel office chair (trade?) $15.00, etc. Large SASE appreciated. WA9DYE, 114 Lake View Ave., Milwaukee, Wis. 53217. Want: (Trade?) revolver, .22 auto rifle, microscope, portable electric typewriter, consider others.

RIDERS Radio manuals, 18 vols., $2.00 each; RCA audio osc., $10.00; Silver VTVM, $15.00; Weston set analyzer, $10.00; 1/6 HP repulsion motors; large switchboard meters, some surplus gear. SASE for list. WITF, E. A. Turner, 2 Virginia Circle, Reading, Mass. 01867.

NEED Linear, SB-200 etc. Can offer nice Ranger I. Navigator, or HQ-129X in part. Late Ranger I, $85.00; HQ-129X, $80.00; Navigator, $62.00. WA4LIG, 306 E. Gilpin Ave., Norfolk, Va. 23503.

HEATH DX-60 transmitter, HR-10 receiver, HG-10 VFO, HM-11 SWR bridge, Turner 454C mike, and speaker. New condition, package deal only: $175.00. Thomas Ellett, WAØIAK, 1809 Meadow La., Ames, Iowa 50010.

COLLINS 32S-1, 75S-1 with 500 OPS filter, 312B4, 516F2. Rohn commercial tower, AR-22, TA-33. $1000. W5BKU, P.O. Box 313, Richardson, Texas 75080.

WANTED: SX-24, SX-25, Junker S-Meter, must be good. Nagle, 806 Pocahontas, Oxon Hill, Md. 20022.

FOR Sale: Almost new Hy-Gain 10-meter beam, 10-15 meter quad; Hy-Gain 20/40 meter beam, LM freq. meter w/book, Eico sig generator, Eico 5" scope, Johnson Navigator 10-160 meter, 60 watt cw trans; real bombs. Work either AB1 or Class C. W6IBD, 780 South Grand Ave., Pasadena, Calif. 91030. Tel: MU-22915.

COMPLETE Station: Collins KWS-1 transmitter S/N895 1 Kw cw/ssb, Collins 75A-3 receiver, plug-in product detector, vernier tuning, 3 and 1 kc. mechanical filters, DB-23 Preselector, Heath SWR bridge, Q-multiplier, all built into $300 metal console cabinet with formica top. Original price, $3000; first $800 takes all. Will split KWS-1 alone, $450 firm, 75A3/3 kc filter $250.00 or offer, cabinet $100. Gordon Kittel, K3AIG, 16 Jacqueline Dr., Paoli, Penna. 19301. Phone (215)-647-2750.

SELL: Perfect, like new, NCX-3, NCX-A in box 1½ years. Late model. First $285.00 takes it. New Heath MM-1 meter, wired, $29.00. L. Conner, Box 11, Grandview, Ind. 47615. Phone MI-94921.

KWS-1, excellent condition. Best offer over $500. Sry. no shipping. Earl Crawfis, W7ATV, 2909 E. Grovers, Phoenix, Ariz. 85032.

HRO RAS receiver, $40.00; 3 antique wall telephones, $75.00 (trade?); Atwater Kent 55C, RCA radiola 66, plus many antique radio parts $75.00. WA9IYF, Box 22, Milan, Ind. 47031.

GOING SSB. Sell: In use, Apache TX-1, $90.00. Also mint, perfect Heath IP-20 regulated supply, $75.00. Also new teletype regenerative repeater, $20.00. Pick up deal only. Gariepy, 2624 Kroemer Road, Ft. Wayne, Ind. 46808.

SELL: Hammarlund HQ-170 rcvr, like new condx, $200; HG-10 VFO, $25.00; HT-40 xmtr with 9 xtals and ant., $60.00; Mosley CM-1 rcvr, $100.00. Ship F.o.b. with manuals. Joseph Danielson, 189 Oak Knoll, Niles, Ohio 44446.

COLLINS (R-388) 51J-s receiver: Hammarlund HC-10, Panoramic Panadaptor, PCA2T200, all for $400. Hallicrafters HA-2 with power supply, $200.00. Sorry, no shipping! Jim Geras, W2MVR, 109-12 227th St., Queens Village, L.I., N.Y. 11429. Tel: (212)-HO-48377.

EICO Sig gen. 315, new condx. W2AV 1:1 balun. Mosley TA-31 Senior. Will ship. Best offer. WB2OQK, 1129 Astor Ave., Bronx, N.Y. 10469.

EXCELLENT Heath Warrior, 2B trade/best cash offer. WB6SBJ, tel: (415)-322-2959.

REPAIR and install Amateur Radio Transmitters, receivers and accessories. Ted Drell Electronics, Inc. 4103½ Dumaine St., New Orleans, Louisiana 70119.

SX-122 with calibrator. $175.00. W. Thiele, 215 E. Main, Somerville, New Jersey 08876.

WANTED: 32S-1, 2 or 3. State price on your first reply. WA3BKR, 1009 Frederick Road, Meadowbrook, Penna. (near Philly) 19046.

RTTY Sale. Model 28 KSR, $300.00; 75S-2, $275.00. 75S-3, $375.00; HX-10, $200. Also TD, reperfs, TU, etc. Send for list. W3BKY, 1681 Bellemead Dr., Altoona, Penna. 16602.

VHF: TX-62, VFO621, $150.00; NC-300, clean, $150.00; Ameco 6-meter converter and preamp, $15.00; Mohawk 417A 2-meter converter, $25.00. All for $275.00. WA9RDZ, 406 W. Rudisill, Ft. Wayne, Ind. 46807. Tel: 745-7279.

KWM2, 516F2, ser. No. 10652, $725.00; KWM-1, noise blanker, AC supply, $400.00; 30L-1, $325.00. All clean. 10-B, new, $55.00; 20-A, $80.00. Harvey Wells, "Z" Match, $55.00. K6KYB, 2903 Yearling St., Lakewood, Calif. 90713.

SALE: Transmitters T-60, Elmac A-544, manuals and GD-396 headphones, all $60.00. Will sell separately. Sherm, WN4FJO, 1509 Carolina, Kingsport, Tenn. 37664.

EXPANDING national sales organization needs new amateur products and accessories. You make it and we'll sell it, our trade name or yours. Mann Enterprises, P.O. Box 292, Deerfield, Illinois 60015

SHOP Around, get the best deal you can and then try Gel! 21 years of service to amateurs in South Texas and now ready to serve Hams anywhere. Bob Douglas, W5GEL, Douglas Electronics. Box 6697, Corpus Christi, Texas 78411.

HT32A, $250.00; 2B/2BQ/50 and 100 Kc cal., $200.00; KW Kompact/AC p.s. $105.00; all parts for pair 3-400Zs linear and PS, $200. David Windisch, K3BHJ, 3402 Oakenshaw Pl., Baltimore, Md. 21218. Call (301)-235-0466.

SELL: 40-20 M., AM KW/Supply, $115.00. 60 ft. windmill tower, rotor, and 20M beam, $175.00. F.o.b. Swap on 75A-4, 75S- xceiver, and etc. W9CKQ, Rt. 2, Box 209-A, Geneseo, Ill. 61254.

WANT Any HRO-7 coils or HRO-5 or HRO-M. Especially BC band and 15 M band-spread. W2HUG, 226 Linden Place, New Milford, N.J. 07646.

COLLINS PTO, 70E-24 for 75A-4, new, $39.00; 70E-23 for KWS-1, new, $39.00. 70E-15 for 51J, new, $49.00. Richard E. Mann, 430 Wilmot Rd., Deerfield, Ill. 50015.

SELL: National NC-200 (new), $200.00; Heath HX-10, $175.00; HA-10, $90.00; HW-32, $60.00; HA-14, $75.00; HP-14, $50.00; SB-620, $90.00; Ham-M, $65.00; DB-23, $20.00. Prop-pitch motor, $15.00 (pick-up). F.o.b. K8RFC, A. Gouker, Box 544-A, R #1, Sawyer, Michigan 49125.

TOOOOBES: 6146B, $4.00; 6CW4, $1.40; 811A, $4.25; 4D32, $15.90. All new, boxed, guaranteed. Free catalog. Vanbar Distr., Box 444Z, Stirling, N.J. 07980.

DRAKE R-4, mint condition, with extra xtals, $295.00. Cush-Craft 28 element 2-meter quad, $25.00. Robert Hanna, WA1-EEC, 68 Marron Ave. Stoughton, Mass. 02072.

GALAXY III, AC supply, $195.00. W5HNZ, Rte 3, Box 15, Haynesville, La. 71038.

PANADAPTOR, SP-44, like-new condition, instruction books and cable, $45.00. G. M. Anderson, K5GFB, 520 Pasadena Ave., Metairie, La. 70001.

WANT: Good homebuilt RTTY only transmitter, ready to go. 400 watts or more. No junk! Thompson, 5 Palmer, Gorham, N.H. 03102.

WANTED: C.W. filter for Collins 75A-4. Stan Pierce, 23 Linden St., Norwood, Mass. 02062.

DRAKE TR-4 transceiver with AC power supply. Still in warantee and in original cartons, with manuals, plus 10-D mike and SWR bridge; $695.00. Al Kreibich, WØFSH, 3240 So. Birch St., Denver, Colorado 80222.

TV-RCA-TK-20 film camera, with TM6-B master monitor and console, trade or sell. Want: 75S-3B. Also sell RTTY complete Model 19, $100.00, Model 15, $75.00, Model 14 TD, $35.00; Model 14 reperf, $40.00. All sync motored. Mainliner II TU, $125.00. Scope built in. Perfect SX-115, $275.00. W4AIS, 7 Artillery Road, Taylors, S.C. 29687.

COMMAND Sets: BC-459A 40-meter transmitter, BC-696 80-meter transmitter, BC-455B 40-meter receiver, $12.00 each. 750 volt and 250 volt power supply, $25.00. Barton, 1315 Angle Rd., #13, Kingsville, Texas 78363.

"HOSS TRADER" Ed Moory offers two each of the following equipment opened and displayed at our store, and at Hamfests, with factory warranty. SB-34, $309.00; NCX-5, $439.00; TR-4, $479.00; T4-X, $339.00; R-4A, $338.95; L-4, $549.00; Swan 350, $339.00; Swan 500, $398.00; new NCL-2000 linear, reg. price $685.00. Cash price, $488.00. Sorry, no new Collins equipment below their advertised price. Package deal: New Mosley TA-33 beam and demo Ham-M rotator, $195.00; Special Rohn 50 ft. heavy-duty foldover tower, prepaid, $189.95; Demo Ham-M rotator, $89.50. Used Swan 500, $375.00; used Ham-M, $85.00. Used gear: Drake 2-A, $145.00; Ranger I, $75.00. Ed Moory Wholesale Radio Co., Box 506, DeWitt, Arkansas 72042. Tel: (a.c. 501)-946-2820.

COMPLETE Station: 90W, CW-AM trans, reduces to 75w for Novice, $40.00; HG-10 VFO w/power supply, $20.00. Lafayette KT-320 rcvr w/matching speaker, $40.00. Judd Goodman, WB2-VOG, 101 Hillwood Lane, Plainview, N.Y. 11803. Tel: 516-WE5-5726 call after 6:00.

WANTED: Johnson Matchbox 250-275 Watt. K1WHY, Scully Road, Somers, Conn. 06071. Tel: 749-7950.

BUY Of a lifetime: $1,800 firm price, no deals. Sell only as complete package. Will not ship, sry. Collins 32S-3 with 516F-2 power 75S-3B 500-200 Kc filters, 30S-1, 312B-4 console, Henry 2K linear with power supply, Hallicrafters HA-1, Vibroketer, Electro-Voice 664 mike, Millen 92200 Transmatch, Sinser PR-1 Panadaptor, Central Electronics MM-2 'scope with RM adaptor, Simpson #262 VTVM, all manuals and cables. K6TQR. Phone: 664-4317.

KNIGHT T150 transmitter, 80-6 meters, like new, $90; HQ-170A VHF, with matching speaker, like new, $250.00. Franklin Chaiom, 1437 Ocean Parkway, Brooklyn, N.Y. 11230. Tel: DE-6-0918 after 6 P.M.

MUST Sell: Drake Model 2B receiver, Drake model 2BQ "Q" multiplier, less than thirty operating hours, like new; best offer over $200. Also Johnson Viking Adventurer xmtr and Johnson Viking VFO. Make offer for one or both. Write to Rad Michielson, Green Street, Smethport, Penna. 16749.

HAMMARLUND HQ-170A purchased new eight months ago, absolutely perfect condition, $175.00. Don Payne, W4HKQ, Box 525, Springfield, Tenn. 37172. Nite phone: (615)-384-5643.

SELL: Heath HR10, $50.00; Eico 720, $50.00, with manuals. Dow relay, $7.00; QST preamp, $5.00; c.w. filter, $7.50. 2M xtal conv., tuner and power supply, $25.00; 2M 8-el. Hy-Gain beam, $12.00. Will answer all inquiries. K3WUN, Leon Stetzler, 233 9th, Shoemakersville, Penna. 19555.

HT-17 transmitter, excellent for novice, $25.00. Vibroplex key with case, $15.00. K3DGO, 566 Swamp Road, RD-3, Doylestown, Penna. 18901.

WANTED: Atko Min-Keyer. Carsner, Box 407, 935 Geary St., San Francisco, Calif. 94109.

WANTED: Record cylinders for Thomas A. Edison Amerola gramaphone for personal collection. Must be in good condition. Trade? WAØJTB, 427 Delaware Way, Sterling, Colorado 80751.

SALE: NCX5 transceiver with power supply, used about 2 hours on receive only. $400.00. Charles Gifford, 2035 Koehler Ave., Dayton, Ohio 45414.

DRAKE TR4 AC3, DC3, MMK3. Faultless, one owner. Package deal postpaid $575.00. Will separate. Consider part trade good general coverage receiver. WA5ERC, Chuck Crisler, 154 Ronald Blvd., Lafayette, Louisiana 70501.

SELL: Hammarlund HQ-100AC, with speaker, $150.00; Heath DX-60, with crystals, key, $60.00. Ameco PCLP Nuvistor preamp, $20.00. All in like-new condx, no scratches. Manuals included. Will ship. Ken Adamo, 25 Curtis Pl., Staten Island, N.Y. 10301.

SWAN 350, latest factory modification including provision for remote VFO. Mint condition. $325.00. W6OVW, 244 Loring Ave., Los Angeles, Calif. 90024. Tel: 279-1660.

HALLICRAFTERS SR-500 with mobile power supply, brackets, mike and speaker, $275.00. WAØIMK, Bill Brogdon, 13720 Vincent Avenue South, Burnsville, Minn. 55378.

GALAXY RV1 VFO, never used, $50.00 in factory carton. Galaxy C.W. monitor, $15.00; Original Vibroplex Bug, $15.00. Everything is in outstanding condition, with no scrapes or scratches. Phil Gluckman, WB6SSA, 19790 Merribrook Drive, Saratoga, Calif. 95070.

WANTED: Novice crystals, will pay cash or offer trade. Mike, 4744 North Temperance, Clovis, California 93612.

BC-610E and associated equipment for trade or for sale. Richard F. Pennington, 103 Merrill St., Parsons, West Virginia 26287.

SELL: Johnson Ranger I, $100.00; Hammarlund HQ-110, $90.00; Vibroplex Speedkey w/case, $12.00. All in excellent condition. Shipping collect. Certified check or money order only please. WA1FKT, David Heeley, 30 Brookshire Road, Hyannis, Mass. 02601.

HEATH SB-300, perfect, filters. Deliver N. Calif. $265.00. WB6TOQ, 11450 Enchanta Vista, San Jose, Calif. 95127.

SELL: Stancor A-3899 Poly-Pedance 600 watt modulation transformer. Only 8 months old, cost $155.00. Will sell for $125.00 or your best offer. Also Ameco 621 VFO, used only about three months. Will sell for $40.00. Leo Vander Linden, WA9HNJ, 3330 E. Northland Ave., Appleton, Wisconsin 54911.

WANTED: Heathkit "Chippewa" KL-1 linear and companion KS-1 power supply. Gene Beckwith, K2SFP, Powers Road, East Pembroke, New York 14056.

FOR Sale: Lampkin 205A, $165.00; Hallicrafters S-38, $20.00. WRL TC-6A, 6 meter Transceiver, $25.00. W8YLJ, RFD 2, Bryan, Ohio 43506.

DRAKE 2B, 2BQ, at AC, $195.00; Drake 2BS, $6.00; Elmar AF67, $25.00. Harold Beebe, W9OEQ, Box 25, Mokena, Ill. 60448.

SELL: SX-101 Mark III, $140.00; DX-100, all modifications, $80.00; HT-41 linear, $125.00. Shipped collect. K5LTW, R2, Box 124, Sherman, Texas 75090.

JOHNSON Pacemaker SSB xmtr, $135.00; National NC-270 rcvr, $110.00; both for $240.00. Good condition. Fred, WA4URA, RFD 4, Clarksville, Tenn. 37040.

DRAKE TR-4, matching RV-4 remote V.F.O. and cabinet, and AC-4 115 V.A.C. pwr. supp. In mint condx. Used total of 30 hours. RV-4 never used. For sale with original cartons and book. $485.00. First certified check takes all. No hagglers, please. Doug DeMaw, W1CER/W8HHS, c/o ARRL Hq.

USED Radio texts wanted: Jasik, Harvey, Jordan, Harper, LaPort, Knowlton, Henney, OSRD, etc. Also back issues BSTJ, Proc. IEEE (British) Part B, AIEE and a set of BSP's. W3AFM.

HAMMARLUND HQ-170 VHF with matching speaker, 6 months old, like new condx, $300. Heath DX-60, $50.00; VFO HG10, $25.00; 14AVQ vertical antenna, $20.00. All in A-1 condition. Robert Martin, P.O. Box 288, Umatilla, Fla. 32784.

SELL: 10-12 5" Heath 'scope-probes. $55.00; T-O keyer and key, $80.00; AR-22 rotor, $20.00. Local deal. Jim Minikel, 517 East Emerson Avenue, Monterey Park, California 91754. WB6MQE.

WANTED: Hy-Gain or Telrex beams. Three element or larger 40M, five element or larger 20M, five or six element 15M, six element 10M. K5JZV, 5847 South Pittsburg, Tulsa, Oklahoma 74135.

COMPLETE Station, DX-60, Knight VFO, SX-110; all good, clean. Best offer takes it. Also have Gonset VHF Communicator VFO, mint. WB2UZE, 198 Delaware Ave., Freeport, L.I., N.Y. 11520. Tel: (516)-379-9578.

JOHNSON 6NZ Thunderbolt $419.00; 6N2 converter, $27.00; Ameco six meter converter, $12.50; six meter SSB transmitting 50 watt converter, $30.00; two meter SSB transmitting converter, $15.00. W9JCE, 370 Aspen Lane, Highland Park, Illinois 60035.

RTTY Fans: Read the RTTY Journal, exclusively on amateur radioteletype. Articles on how to build, operate, DX, VHF, class, ads, etc. Sample copy 30¢, $3.00 per year. RTTY Journal, Box 837, Royal Oak, Mich. 48068.

HT-44 with PS-150 in excellent condition. $240.00. WA9KZF, Fred Bobzien, 525 Winsor Dr., Antioch, Illinois 60002.

FOR Sale: HRO-60 with coils A,B,C,D,E and speaker. Product detector, crystal calibrator, upper and lower sideband. Beautiful condition. $225.00. W. R. Cook, 2706 W. 12th St., Erie, Penna. 16505. 8330441.

WANTED: Tri-Ex tower, prop pitch motor, Telrex beams, baluns. What have you? W8PRM, Box 130A, Bridgeport, W. Virginia 26330.

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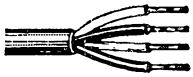

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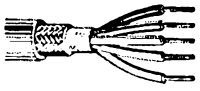

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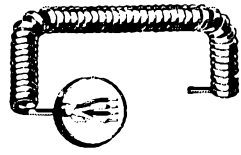

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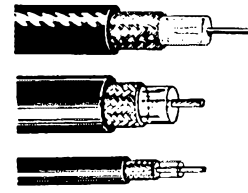

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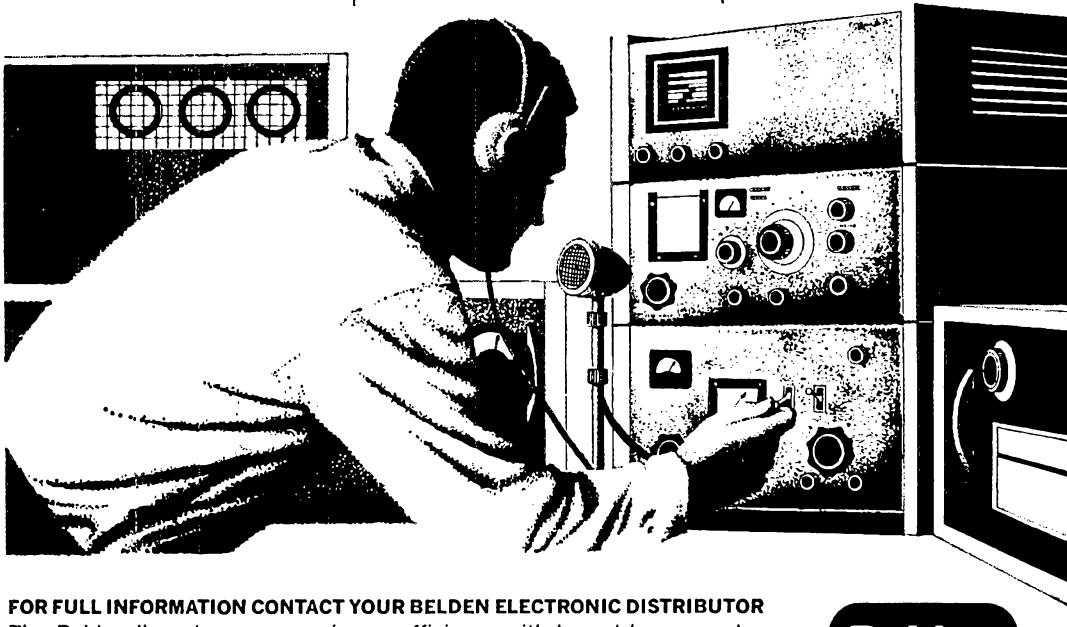

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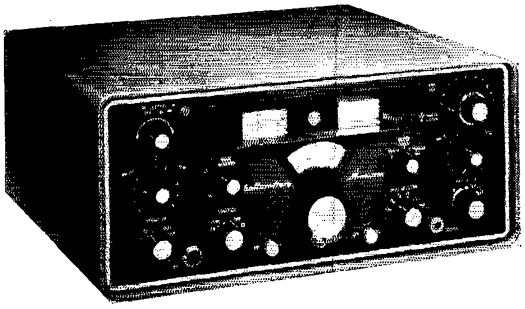

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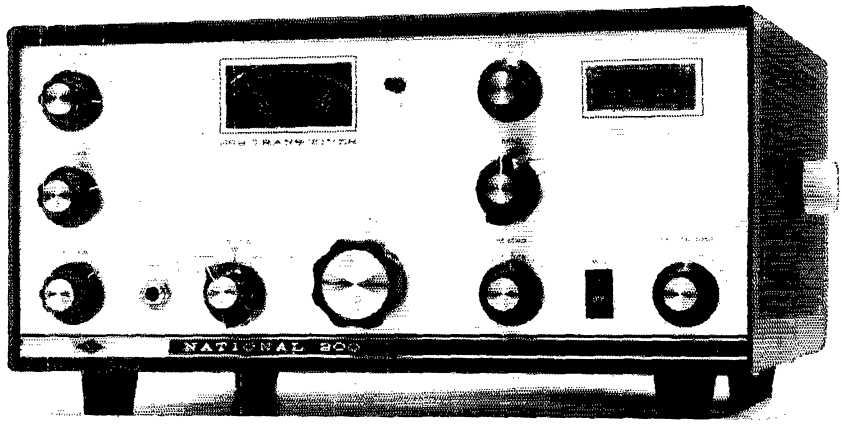

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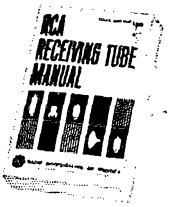

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