

February 1963

50 Cents

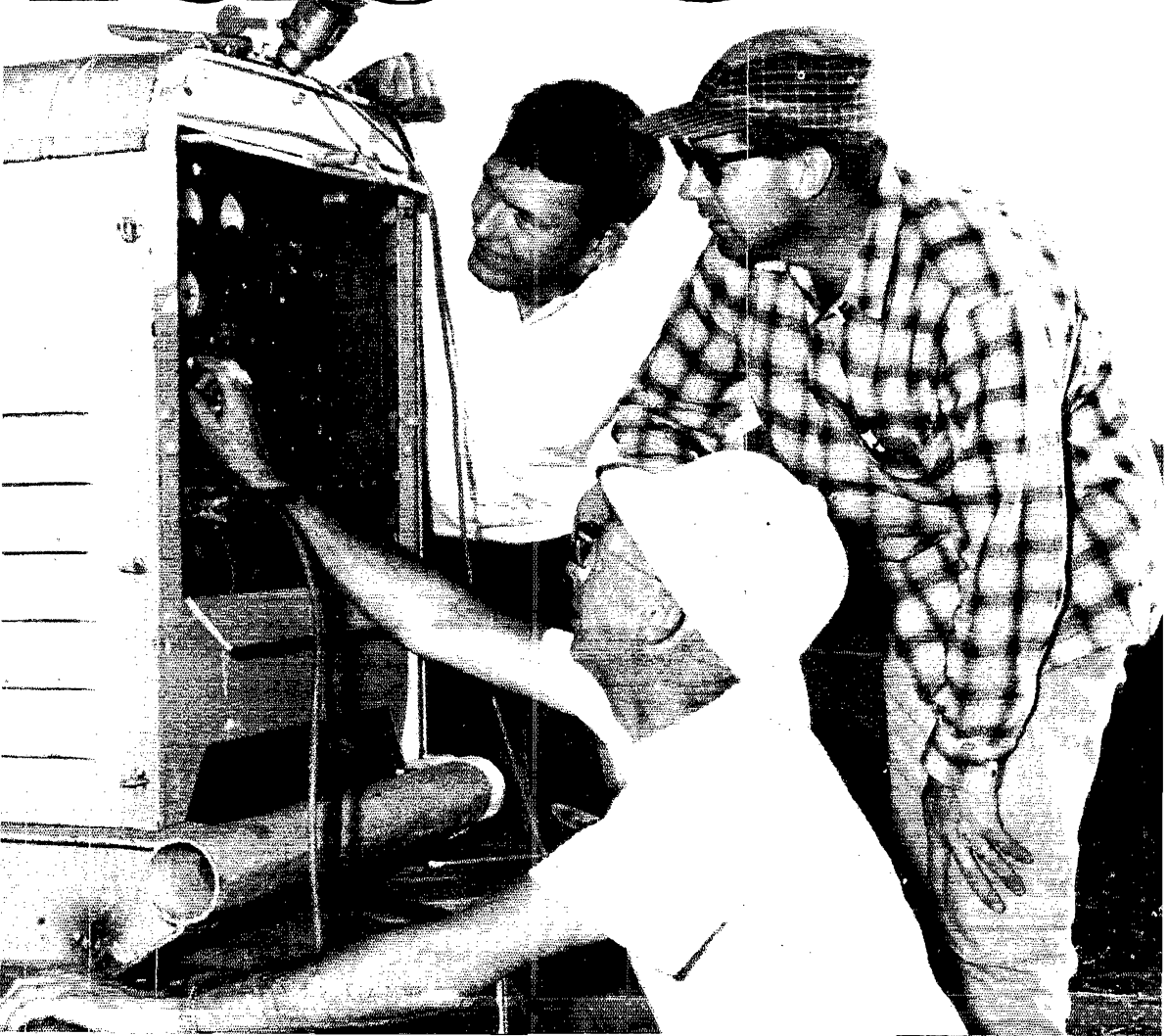
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QST

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amateur

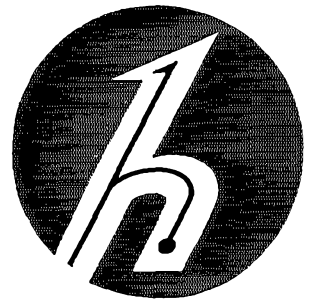
radio





SR-150

Amateur Band
Fixed/Mobile Transceiver by



hallicrafters .

5th and Kostner Aves., Chicago 24, Illinois

All this performance

for only \$650⁰⁰

- ← Full amateur band coverage—
80 through 10 meters
- ← Receiver AF Gain and
RF Gain controls.
- ← SSB operation—VOX or PTT; CW
operation—manual or break-in.
- ← R.I.T. (Receiver Incremental
Tuning)— ± 2 kc adjustment of
receiver freq., independent
of transmitter.*
- ← AALC. Hallicrafters' new,
exclusive AALC (amplified
automatic level control):
- ← 1650 kc crystal filter.

*Pat. applied for

SPECIFICATIONS

Frequency coverage: Eight-band capability—full coverage provided for 80, 40, 20, 15 meters plus one segment of 10M (add'l. crystals may be added). Available for operation on non-amateur frequencies by special order.

Front panel controls: Tuning; Band Selector; Final Tuning; R.F. Level; Mic. Gain; Pre-Selector; R.I.T.; Rec. RF Gain; AF Gain; Operation (Off/Standby/MOX/VOX.); Function (CW/USB/LSB); Cal.

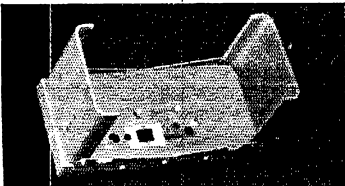
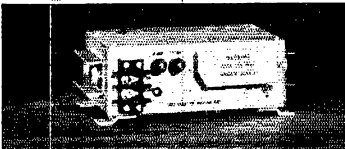
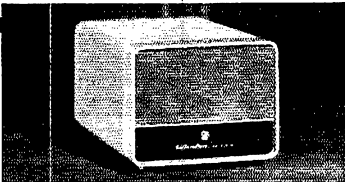
General: Dial cal., 5 kc; 100 kc crystal cal.; VFO tunes 500 kc; 18 tubes plus volt. reg., 10 diodes, one varicap. Rugged, lightweight aluminum construction (only 17½ lb.); size—6½" x 15" x 13".

Transmitter Section

(2) 12DQ6B output tubes. Fixed, 50-ohm Pi network. Power input—150W P.E.P. SSB; 125W CW. Carrier and unwanted SSB suppression 50 db; distortion prod., 30 db. Audio: 400-2800 c.p.s. @ 3 db.

Receiver Section

Sensitivity less than 1 μ v for 20 db. signal-to-noise ratio. Audio output 2W; overall gain, 1 μ v for ½ W output. 6.0-6.5 1st I.F. (tunes with VFO). 1650 kc 2nd I.F.



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P-150 AC Styled to match SR-150 Transceiver. Five silicon diode rectifiers, 4" x 6". PM speaker. 22 lb. Size: 6¼" x 7½" x 10". \$99.50

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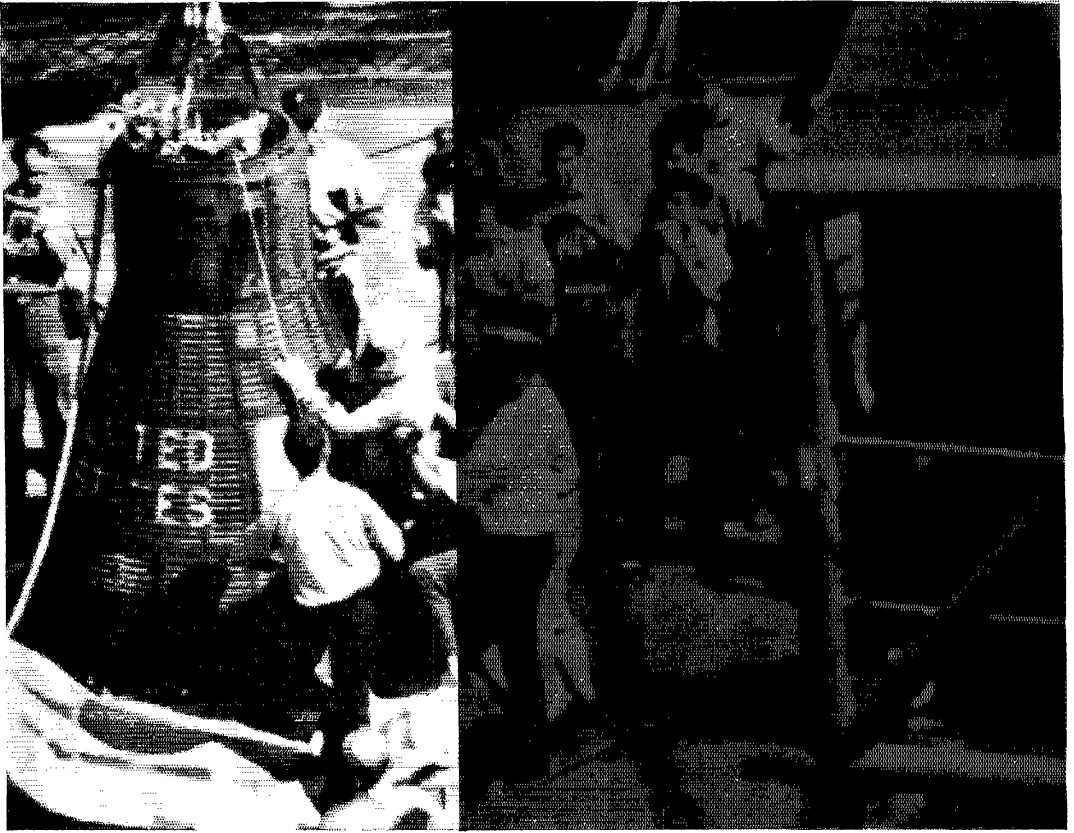
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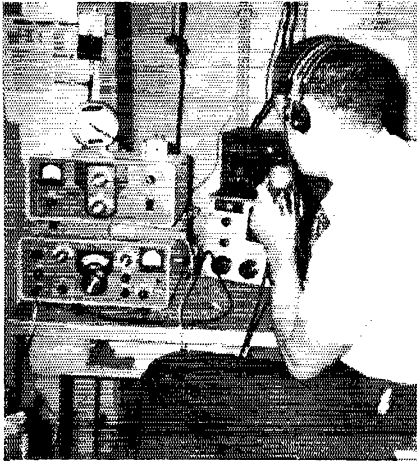
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TEL.: 236-2535
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3-400Z	B	3000	.100	—	0	32	—	.12	655	5.0
	SSB		.333 ⁽³⁾							14.5
3-1000Z	B	3000	.240	—	0	65	—	.30	1360	7.5
	SSB		.670 ⁽³⁾							21.3
4CX250B ⁽¹⁾	AB1/SSB	2000	.1 .25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.005 ⁽³⁾	0	300	6.0
	C/CW	2000	.25	250	-90	2.9	.019	.026	390	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	2.5
4CX300A	AB1/SSB	2500 ⁽⁶⁾	.1 .25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.004	0	400	6.0
	C/CW	2500 ⁽⁶⁾	.25	250	-90	2.8	.016	.025	500	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	2.5
4CX1000A	AB1/SSB	3000	.25/.90 ⁽³⁾	325	-60 ⁽⁵⁾	0	.002/.035	0	1680	6.0
4-65A	AB1/SSB	3000	.015/.065 ⁽³⁾	360	-85 ⁽⁵⁾	0	0/.006	0	130	6.0
	C/CW	3000	.112	250	-105	1.6	.022	.009	270	
	C/AM	2500	.102	250	-150	3.1	.026	.013	210	3.5
4-125A	AB1/SSB	3000	.03/.105 ⁽³⁾	510	-95 ⁽⁵⁾	0	0/.006	0	200	5.0
	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	6.5
	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
	C/CW	3000	.345	500	-180	2.6	.06	.01	800	
	C/AM	3000	.225	400	-310	3.2	.03	.009	510	14.5
4-400A	AB1/SSB	3000	.09/.30 ⁽³⁾	810	-140 ⁽⁵⁾	0	0/.018	0	500	5.0
	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	14.5
	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
	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	21.0
	C/AM	4000	.60	500	-200	11	.132	.033	1910	
3CX100A5	C/CW ⁽⁷⁾	800	.08	—	-20	6	—	.03	27	6.3
2C39A	C/AM ⁽⁷⁾	600	.065	—	-16	5	—	.035	16	1.0

(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.

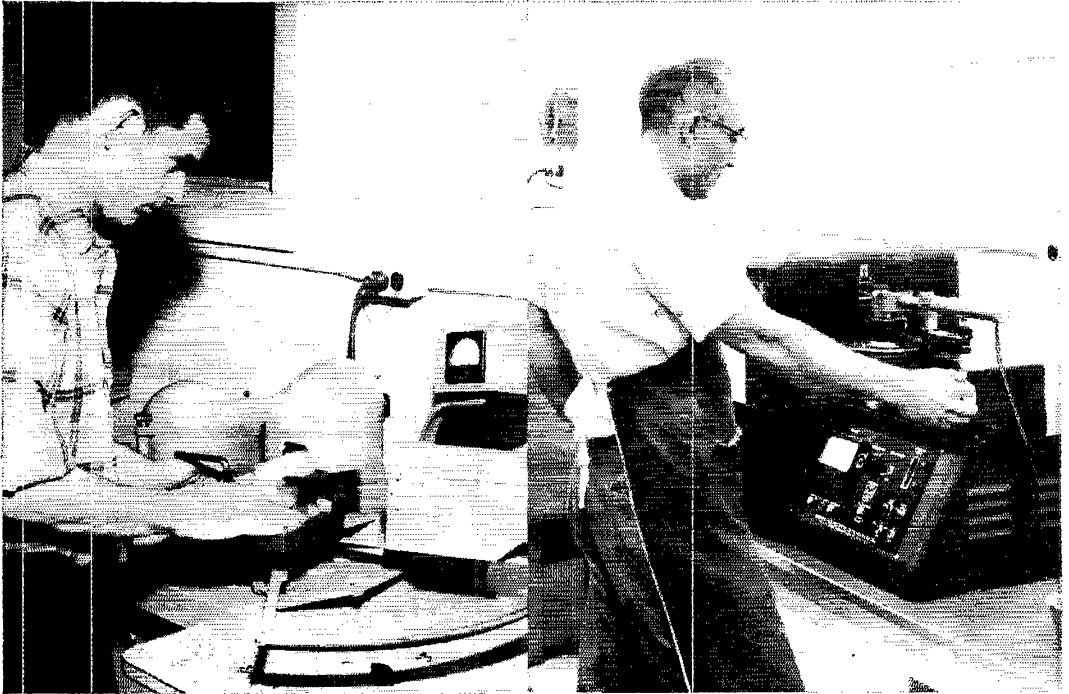
(6) For operation below 250 Mc only.

(7) At 500 Mc.

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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 (or 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 holding Canadian or FCC amateur license, General or Conditional Class or above. These include ORS, OES, OPS, OO and OBS. SCMs desire applications for SEC, EC, RM and PAM where vacancies exist. OES, v.h.f. bands appointment, is available to Technicians and Novice, as well as to full-privilege amateur licensees.

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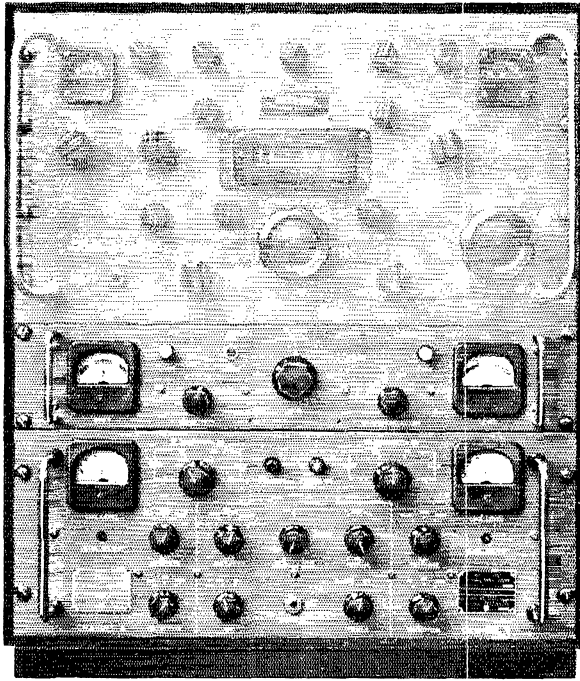
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. 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.

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3711 McKinley St., N.W., Washington 15, D.C.

Central Division

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4331 N. Willwood Ave., Milwaukee 11, Wis.
- Vice-Director: Phillip F. Haller W9HPG
6000 S. Tripp Ave., Chicago 29, Ill.

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1011 Fairmount Ave., St. Paul 5, Minn.
- Vice-Director: Martha J. Shirley W0ZWL
Box 78, Black Hawk, S. C.

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2469 Paden, Jackson 4, Miss.
- Vice-Director: Graham H. Hicks W5IHP
100 Magnolia Place, Natchez, Miss.

Great Lakes Division

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2979 Observatory Ave., Cincinnati 8, Ohio
- Vice-Director: Robert B. Cooper W8AQA
132 Guild St., N.E., Grand Rapids 5, Mich.

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Box 631, Newton, Iowa
- Vice-Director: Sumner H. Foster W0GQ
2315 Linden Dr., S.E., Cedar Rapids, Iowa

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28 Reusser Rd., Southington, Conn.
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236 Marlboro St., Boston 16, Mass.

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37 Park Hill Drive, Billings, Mont.
- Vice-Director: Robert B. Thurston W7PGY
7700 31st Ave., N.E., Seattle 15, Wash.

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770 Chapman, San Jose 26, Calif.
- Vice-Director: Ronald G. Martin W6ZF
1573 Baywood Lane, Napa, Calif.

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- Vice-Director: Joseph F. Abernethy W4AKC
768 Colonial Drive, Rock Hill, S. C.

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- Vice-Director: John H. Sampson, Jr. W7OCX
3618 Mount Ogden Drive, Ogden, Utah

Southeastern Division

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25 First Ave., N.E., Atlanta 17, Ga.
- Vice-Director: Thomas M. Moss W4HYW
P.O. Box 20644, Municipal Airport Branch,
Atlanta 20, Ga.

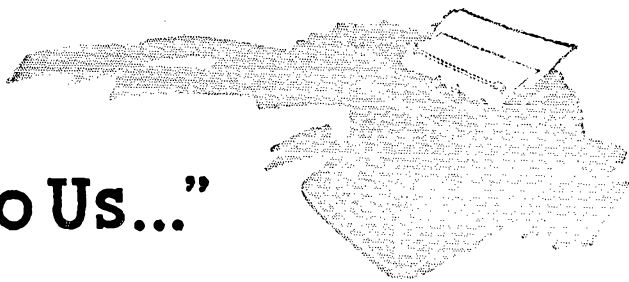
Southwestern Division

- RAYMOND E. MEYERS W6MLZ
Box R, San Gabriel, Calif.
- Vice-Director: Virgil Talbot W6GTE
1175 Loughill Way, Monterey Park, Calif.

West Gulf Division

- ROEMER O. BEST W5QKP
P.O. Box 1656, Corpus Christi, Texas
- Vice-Director: Ray K. Bryan W5UYQ
2117 S.W. 61st Terrace, Oklahoma City 18, Okla.

"It Seems to Us..."



Restricted Voice Bands Again?

IN 1932 — just thirty years ago — the amateur regulations were revised to provide for a special class of license as a prerequisite to operation on newly-established voice bands at 75 and 20 meters. This change originated with the League, largely at the request of serious phone men who were distressed at the low standards and poor techniques too often employed by some operators at the time. They felt, and the League concurred, that the standards of amateur radio would be upgraded by reserving use of certain voice bands to those who had demonstrated special technical qualifications.

Amateur radio developed under this basic "incentive" system for twenty years; approximately 40% of all amateurs progressed to the higher grade of license (Class A, or Advanced Class). Then, in 1952, the Federal Communications Commission abolished the special license requirement and, with the exception of limitations on Novices and Technicians, opened all bands and privileges to all amateurs without restriction.

We have now had ten years of experience under the present arrangement. What conclusions can we draw?

One is inescapable: most amateurs want a return to the incentive system of licensing. They feel that the 1952 action was a step backwards. They argue that because there is no longer a target beyond the standard amateur license (at least none with practical incentives), the U. S. licensing system has bred mediocrity and resulted in deterioration of the general level of our technical knowledge. They say too many of today's amateurs are "plug-in-appliance" operators. They want a return to the principle of special privileges after proof of special ability, a reinstatement of some form of the earlier system — perhaps a modern version of the old Class A examination, bringing it in line with current requirements and techniques.

We have encountered these comments at every turn — in correspondence, at club meetings and conventions, in on-the-air discussions. We feel we can safely affirm that a majority

of amateurs favors the *principle* of incentive licensing.

A *practical* solution, however, turns out to be another matter — a real problem because of the way the die was cast in 1952. There are all sorts of ideas. Numerous alternative suggestions have been put forth from time to time by individual amateurs and clubs. The ARRL Board of Directors has undertaken several studies of the problem. But walk around it as many times as we may, there is no way to avoid the stark fact that to now provide special privileges for a special license requires that these privileges be withdrawn from persons who currently have them under the basic amateur license. There follows, naturally, a reluctance on the part of officialdom to promote an action adversely affecting even a minority.

The incentive-licensing question has thus simmered for some years — most everyone in favor of the principle, yet concerned over some possible unfavorable reaction in its practical application. We feel it is time for a settlement of the matter. We should decide that the advantages substantially outweigh the negative arguments, and proceed with a proposal to the Commission, prepared to withstand a certain amount of weeping and wailing from some of our number. Or we should decide the opposite and drop the subject.

Which shall it be?

Would a return to restricted phone bands act as a suitable incentive for amateurs to advance technical proficiency? Would it improve the quality of our signals and thus conditions in our bands? Would this upgrading of amateur standards outweigh the inconvenience to Conditional and General licensees who would temporarily be limited to lesser privileges while they study for the additional test? Would the incentive system operate in the best over-all interests of amateur radio, transcending the initial injustices it would certainly work upon some of us?

We feel the answer in all cases is a definite *yes*.

How do *you* feel?

QST

Sixth Guam Legislature

1962 (Second) Special Session

Resolution No. 457(2-S)

BE IT RESOLVED BY THE LEGISLATURE OF THE TERRITORY OF GUAM:

WHEREAS, as a result of the awesome force of Typhoon Karen, almost all radio communication between Guam and the outside world was cut off; those outside of Guam being unable to communicate with their relatives and friends here and the people of Guam being unable to reassure their loved ones of their safety; and

WHEREAS, in this drastic communication emergency, the ham operators of the world — those dedicated amateur radio operators who maintain world-wide contact with each other — throughout the storm and its aftermath kept open channels of communication between Guam and the outside world, and in doing so they generously enabled both those in Guam and those outside of Guam to establish contact with each other and to pass messages of inquiry and reassurance, thus contributing in a large extent to the high morale of the people of Guam throughout the Typhoon Karen crisis since by virtue of the ham operators, the people of Guam knew that the outside world was aware of their plight and that communications were still possible; now therefore be it

RESOLVED, that the Sixth Guam Legislature does hereby on behalf of the people of Guam express deep appreciation and warm gratitude to those ham operators in Guam and elsewhere, who unselfishly and generously devoted their skills throughout the Typhoon Karen emergency to keeping open the lines of communications between Guam and the outside world; and be it further

RESOLVED, that the Speaker certify to and the legislative Secretary attest the adoption hereof and that copies of the same be thereafter transmitted to the American Radio Relay League, Inc., West Hartford, Connecticut, for transmission to those ham operators who maintained contact with Guam during Typhoon Karen, and to the Governor of Guam.

DULY ADOPTED ON THE 9TH DAY OF DECEMBER, 1962.

V. B. BAMBA

Legislative Secretary

A. B. WON PAT

Speaker

Strays

Two Hundred Meters and Down, by the late Clinton B. DeSoto, is a 184-page history of early amateur radio (to 1936) which has been out of print for about ten years. The League arranged for reproduction, through a photographic process, of a limited number of copies of this book and has a few still in stock at a price of \$2.00, approximately our cost. Address ARRL Hq., West Hartford, Conn.

COMING A.R.R.L. CONVENTIONS

January 19-20 — Southeastern Division, Miami, Florida.

March 15-17 — Michigan State, Saginaw, Michigan

April 26-28 — New England Division, Swampscott, Mass.

June 7-9* — West Gulf Division, McAllen, Texas

July 5-7 — Rocky Mountain Division, Albuquerque, N. Mex.

October 4-6 — ARRL National, Cleveland, Ohio

October 11-13 — Southwestern Division, San Diego, Calif.

* Changed from June 21-23 to avoid conflict with ARRL Field Day.

Hamfest Calendar

New Jersey — The fifth annual dinner and hamfest of the East Coast VHF Society will be held at 7:30 P.M. on Feb. 23 at the Swiss Chalet, Passaic St., Rochelle Park, N. J. Tickets (\$6 per person) must be purchased in advance from Jack Tompkins, K2HHS, 135 Herbert Terrace, Saddle Brook, N. J. Jan. 31 deadline. Awards, contests, speaker, dancing, etc.

New York — The Crystal Radio Club of Valley Cottage, N. Y. is holding its 32nd anniversary dinner on February 2. Interested amateurs may contact WA2WAM, Dr. Lawrence M. Halpern, Gateway, Valley Cottage, N. Y., for further information.

Oklahoma — The Lawton-Ft. Sil Amateur Radio Club will hold its annual Founders Day Hamfest on February 3, at the National Guard Armory on the north side of Lawton, Okla. The club normally hosts 300 amateurs and their wives, making this the largest hamfest in the state. For further info contact Bill Pierce, K5DLP, Box 892, Lawton, Okla.

OUR COVER

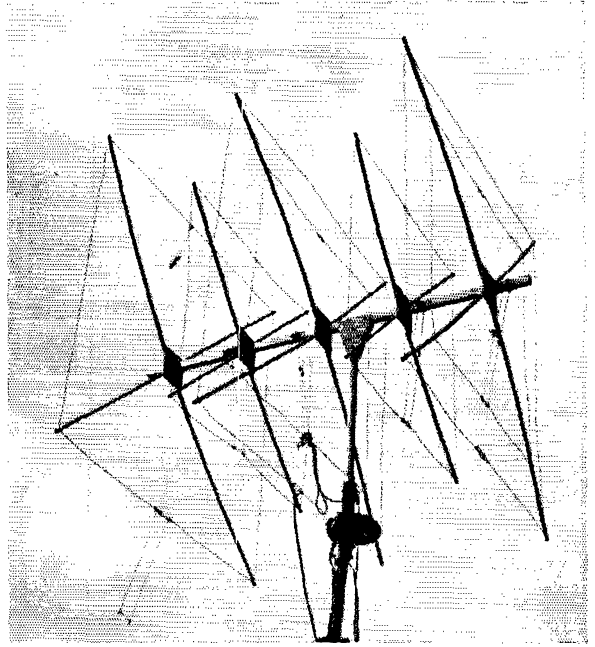
When we sent this photo off to the engraver, to get the plates made for this issue, we had in mind the June Field Day, advance preparations, and all that sort of thing. But then the worst storm in many a month hit the east coast, depositing as much as three feet of snow in some parts of Maine. Below-zero cold and high winds accompanied the snow, causing considerable distress wherever power lines went down and roads were blocked. The moral? Your emergency power and portable gear should be ready to go at all times — not just for June Field Day. Are you ready?

In this photo at K6CLZ, the Acrojet General Radio Amateur Club, are WA6LXX, WA6HUB, and W6TQH.

FEEDBACK

In the W4JWV S.S.B. Exciter in the January issue, there should be a 100-pf. grid blocking capacitor in the lead from Pin 1 of V7.

The interlaced quad for 50 and 144 Mc. is a v.h.f. version of multiband quads more often used on 28, 21 and 14 Mc. With the array in this position, the forward lobes of the antenna are toward the right. The array is light enough to be handled by a TV rotator.



An Interlaced Quad Array for 50 and 144 Mc.

V. H. F. Adaptation of a Popular H. F. Beam Design

BY ERNEST H. ADOLPH,* K8WYU

THE quad antenna, in various forms, has long been popular on 10, 15 and 20 meters, but it has been little used in v.h.f. circles. Just why this is so is not entirely clear, though presumably economics has something to do with it. Arrays of the yagi type for lower bands may be fairly expensive to buy or build, whereas the quad lends itself readily to low-cost improvisation. On the v.h.f. bands the cost difference is probably less.

The quad idea seemed to have attractive features for v.h.f. service, particularly where more than one band is involved. Quads would be cumbersome in a stacked system, but if they could be interlaced effectively it appeared that quite good performance would be possible on 50 and 144 Mc., with a structure no larger or more difficult to rotate than stacked yagis of comparable gain. An outstanding feature of the quad, for any band, is the ease with which it can be tuned up for maximum performance, by means of adjustable stubs. The quad also has a lower radiation angle than a single yagi at the same height. These points made an interlaced quad for 6 and 2 meters worth a try, so the project described here was

* 377 Franklin Court, Worthington, Ohio.

undertaken. The results may be of interest to other v.h.f. men who like to build and tune their own antennas.

Types of Quads

For those unfamiliar with quad literature, there are two versions in common use. These are shown schematically in Fig. 1, with dimensions for the v.h.f. model. At the left is the type most often employed on lower bands, a continuous loop of wire a quarter wavelength on a side, fed at the low-impedance point at the middle of one side. The other is a half wavelength on a side, broken at the top, and fed at the bottom, at a high-impedance point. This is often called the "X-Q quad."

At first, some thought was given to interlacing two quads of the former type, in order to standardize on feed methods, but mechanical considerations and the need for as high gain as possible on 144 Mc. suggested the conventional quad for the 6-meter portion and the X-Q for the 2-meter one. A practical combination worked out to be three elements for 50 Mc. and four for 144. Previous experience with quads and published

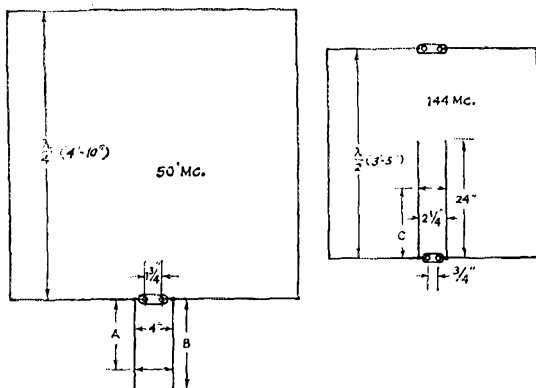


Fig. 1—Details of the interlaced quads for 50 and 144 Mc. The tuning stubs on the 6-meter elements hang free, while those on the 2-meter elements are brought up to the center of the array and taped to the boom, as shown in one of the photographs. Approximate dimensions in inches for the various elements are as follows: Director 1—A not used, stub open, B 13 inches, C 11 inches. Director 2—C 12½ inches. Driven element—A and B not used, C 13¼ inches. Reflector—A 18 inches, B 20 inches, C 18¾ inches. All stub dimensions are approximate. Final position of each short is determined with the antenna installed.

information indicated that substantial gains should be possible on both bands with this configuration. With a good deal of optimism, plus curiosity, we started surveying available materials for such an array.

Construction

The two quads have their driven elements mounted on one crossarm assembly, placing the feed points adjacent to each other. Five crossarm assemblies are needed. Two of these carry 2-meter elements only, and one is used for the 6-meter reflector. This is seen at the left side of the first photograph. The driven elements (center crossarm) and the 6-meter director and 2-meter forward director are mounted on the two other spiders. The 6-meter director is tuned by means of an open stub, trimmed to length, and the re-

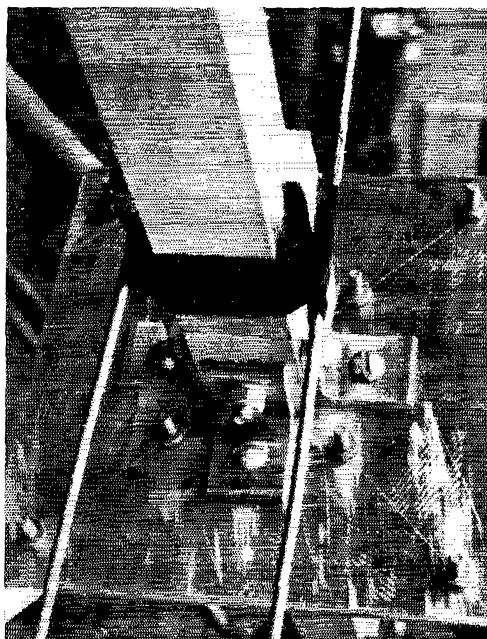
flector by means of a shorted stub. All elements of the 2-meter portion are tuned with long shorted stubs.

The boom is a 6-foot piece of 1¼-inch square extruded aluminum tubing (6063TS), with 0.125-inch wall thickness. Five spiders spaced 15 inches apart to support the elements are made as shown in Fig. 2. The square aluminum plates are fastened to the boom with four brackets each, cut from 1¼-inch aluminum angle, ⅜-inch thick. It will be noted that these are drilled in two different ways, to permit mounting to the boom with a single ¼-20 bolt and nut per bracket. This bolt goes completely through the boom. A shorter bolt fastens the bracket to the plate. All bolts, nuts and lockwashers are aluminum. The boom is fastened to the vertical support with gusset plates of ⅜-inch sheet aluminum.

Pieces of ⅝-inch o.d. aluminum tubing are bolted radially to the square plates to take the wood-dowel arms which support the wire elements. Dowel stock of ¾-inch round hardwood is available in 3-foot lengths from many hardware stores and nearly all lumber dealers. The pieces of dowel left after making the 29-inch arms for the 2-meter elements are cut 5 inches long and inserted in the mounting ends of the tubes that support the 6-meter elements. The arms of these three assemblies are 41 inches long, so the 5-inch extensions are needed if the dowelling is purchased in 3-foot lengths. The wood should extend the full length of the aluminum mounting tube, in any case, to prevent flattening of the tubes when they are bolted in place. The wood is painted with several coats of Val Oil to provide a water-resistant coating.

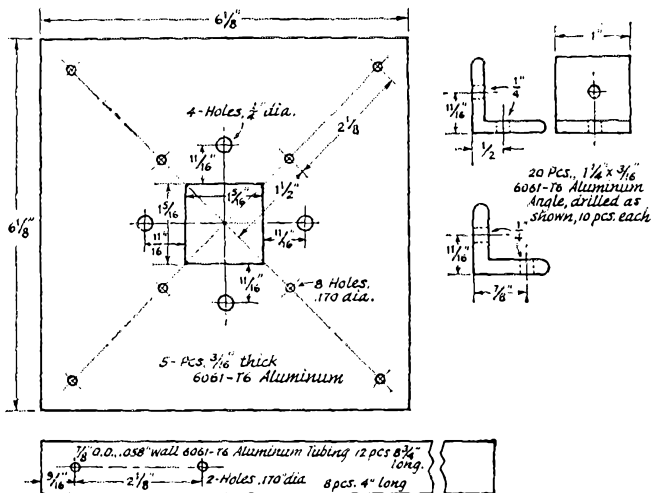
Fabrication of the spiders in this way is tedious, and it may well be that a simpler method of building the antenna could be found. However, the construction described results in a rugged array that has stood up well, yet it is light and well-enough balanced so that it can be handled with a TV rotator.

When the spiders are assembled, holes can be drilled in the arms at the proper points to give the antenna dimensions shown in Fig. 1. Dimensions are not particularly critical here, as each parasitic element is made adjustable through its stub. The 50-Mc. stubs hang free. The 144-Mc.



Detail view of one of the 144-Mc. stubs, showing insulating blocks and stub taped in place. One of the square plates for the spider assembly is seen directly in back of the stub.

Fig. 2—Details of the metalwork for the spiders used to support the elements of the 2-band quad. The square plate fits over the boom, and is held in place by means of four brackets. Pieces of aluminum tubing, below, placed radially on the plate, serve as sockets for the wood-dowel arms which support the wire elements. Those involving the 6-meter elements are 8¼ inches long, while those for the 2-meter elements are 4 inches.



stubs are brought up to the boom and taped to blocks of polystyrene or plexiglas, which are taped to the boom, as shown in one of the close-up photographs. Another detail picture shows one of the polystyrene insulators and the soldering of the elements and stubs. Once the proper point for the short is found, the sides of the stub can be cut off, or grounded electrically to the boom. This was tried originally, but it was found that locating the proper short position, with the aid of a grid-dip meter, was easier with the ends of the stub insulated from the boom.

The insulators in the latter photo are made in two pieces, and are not assembled around the wires until after the soldering is done. Once the wires have cooled, the insulator can be assembled and the two portions cemented together with epoxy. Clamp them in place until the cement is completely hardened. The joint so made is as strong as the material from which the blocks are cut.

Several different types of solder were tried, but two seemed outstanding: Chemalloy (Allied Radio) and Alcoa type 804, with No. 64 flux, both available from Alcoa distributors. All hardware throughout was aluminum, except for the transmission line. The copper of the latter, in direct contact with aluminum, would result in harmful chemical action, so a plated cable lug was soldered to the transmission line, and this, in turn, to the aluminum, using ordinary 60/40 solder. Zinc-dipped lugs adhere to the aluminum solder very well.

Feed Methods

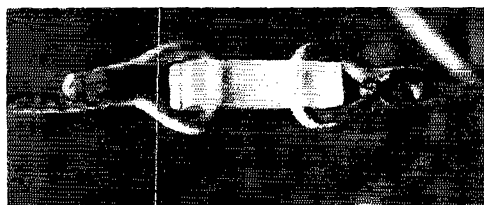
Different types of baluns are needed for the two bands. The X-Q quad is voltage fed, so a balun with an impedance step-up is required. This is the conventional half-wave-loop type (left, in Fig. 3) commonly used in v.h.f. antenna work. The impedance of the X-Q quad alone would be quite high, but use of large-sized wire and three parasitic elements brings the feed impedance down to the vicinity of 200 ohms. The balun used with this array was made of RG-58/

CU cable, cut for 145 Mc. It was wrapped with electrical tape to make it more rigid and durable. The balun loop is 27¼ inches long. If high power is to be used, the balun should be made of larger coax, such as RG-8/U.

The feed impedance of the 50-Mc. antenna is near 50 ohms, so a 1-to-1 balun is required. This is made as shown at the right in Fig. 3. A piece of the same 50-ohm cable as is used for the main transmission line is cut to 57 inches over-all, and taped to the line. At the end away from the antenna the outer conductor of the stub is shorted to the outer conductor of the transmission line with a piece of braid, as shown in the sketch. The inner conductor of the stub is severed at 38¾ inches from the antenna end, by drilling through the coax. Use care to prevent shorting the inner and outer conductors together in doing this, and be sure that the inner conductor is broken. Check on these points with a continuity meter of some sort, before connecting the balun to the antenna. Note that in its completed form the inner conductors of the stub and the coaxial line are connected together, and the driven-element ends are connected to the outer conductors. Like the 2-meter balun, this one is wrapped with plastic tape to maintain electrical and mechanical characteristics. The need for larger cable for high-power operation also applies.

Tuning

The quads were tuned up at 51 and 145 Mc., in



Close-up of one of the element-and-stub assemblies, showing the aluminum soldering. The insulator is made in two pieces and cemented around the wire loops, after soldering is completed and the elements have cooled.

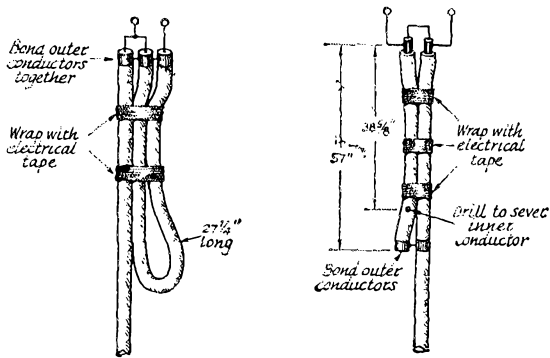


Fig. 3—The balun used for the 2-meter quad, left, is the conventional half-wave loop, giving a 4-to-1 impedance step-up. The 50-Mc. balun, right, is the 1-to-1 variety. The inner conductor of the stub is severed at the point indicated, by drilling carefully.

order to cover the portions of the bands most used locally. Adjustment procedure would be the same for other parts of the bands, if local usage so dictates. For convenience, a preliminary adjustment was made in the basement, by suspending the array about a foot below the ceiling beams and about the same distance above the floor. The arrays seemed to change only slightly when suspended out of doors, so getting them nearly to the right point indoors paid off.

A grid-dip meter was used to check the resonant frequency of the parasitic elements. The meter coil is placed alongside the vertical portion of the 50-Mc. element to be adjusted. It is a good idea to check the actual frequency of the g.d.o. by means of a calibrated receiver, as the close coupling needed to get a dip may shift the g.d.o. frequency appreciably. The director is resonated at 54 Mc. by trimming the stub to length, and the reflector to 48 Mc. by adjusting the position of the short.

Tuning of the 144-Mc. antenna is more of a problem in this respect. The meter coil should be held near the short on the stub, and monitoring of the frequency with a receiver is nearly a necessity. It may be possible to observe two dips, one the correct one and the other resulting from resonance in the open portion of the stub beyond the short. If this occurs, put a temporary short across the open portion of the stub to detune it from the region of the band. A pair of alligator clips connected back-to-back makes a good temporary short. The forward director is tuned to 150 Mc., the second to 149 Mc., the driven element to 145 Mc., and the reflector to 140 Mc.

If the array cannot be adjusted in the position in which it will be used, the next best thing is to put it about 10 feet above ground. The height will be more critical for the 50-Mc. portion than for the higher frequency, and a height above ground of a half wavelength at 50 Mc. will cause the least reaction on the antenna impedance. At this height the stubs can be reached with a stepladder.

Final adjustment is made for maximum front-to-back ratio, using received signals from fairly distant stations. The results with the 50-Mc. portion were fine this way, but the 144-Mc. work turned out to be somewhat confusing, and a recheck was made at the final height of 30 feet.

Even at this height, there was a considerable variation in observed front-to-back ratio. This is a result of various factors. Nearby stations generally give lower ratios than more distant ones, probably because of scattering of strong signals from trees, buildings and wires. It also may be related to the polarization discrimination of the antenna and the one at the other end. S.w.r. readings were under 1.5 to 1 from 50 to 52 Mc., and 144 to 146 Mc.

The completed antenna may be sprayed with Krylon as a protection against weather and corrosive gases. The points of connection of the baluns to the antennas should be wrapped carefully with plastic tape, and this wrap may be lacquer sprayed.

Results

Many hams have accused the quad of having both vertical and horizontal polarization. This is certainly not true in the forward direction, though its polarization may not be as discrete as that of some other arrays. This is not necessarily a disadvantage in v.h.f. communication, as there may be considerable polarization shift in work over rough terrain. On the other hand, if both polarizations are desirable, the quad makes this possible more readily than most other arrays, by virtue of its symmetrical shape about the boom. To change to vertical it is merely necessary to rotate the boom 90 degrees in either direction.

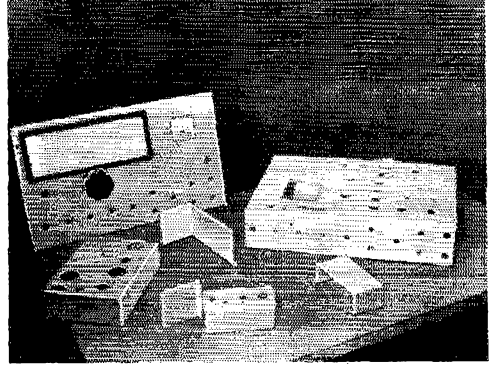
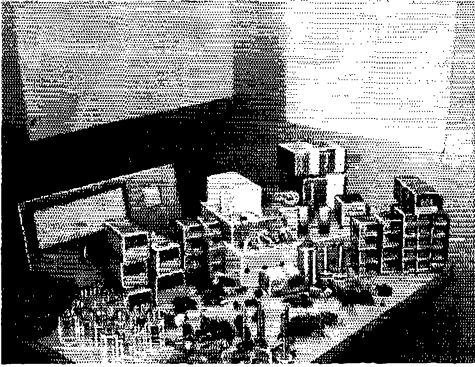
Construction may seem difficult, but the array is built to last. The use of aluminum throughout is a factor in this, and the successful use of aluminum solder was particularly gratifying. Behavior of the quads on the air has been excellent, and signal reports have been consistently good, despite the modest height of 30 feet.

Tests with the antennas on the "wrong" band have shown that the 2-meter antenna has practically no response on 6, while the 6-meter antenna response on 2 is 20 db. below that of the 2-meter quad. These results indicated that a single feed line might be used without switching, so the two antennas were connected through a coaxial T fitting to a single line. No deterioration was noted.

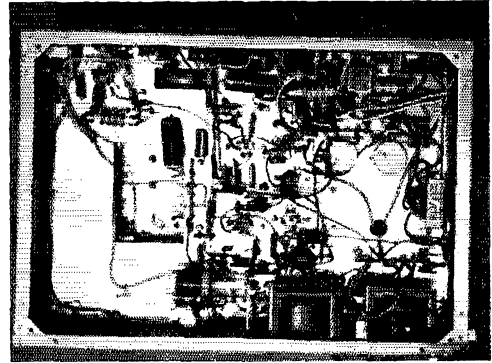
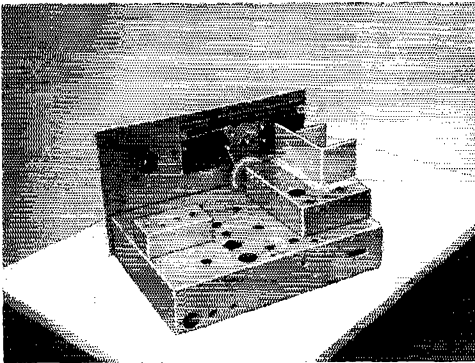
It is recommended that cable larger than the

(Continued on page 152)

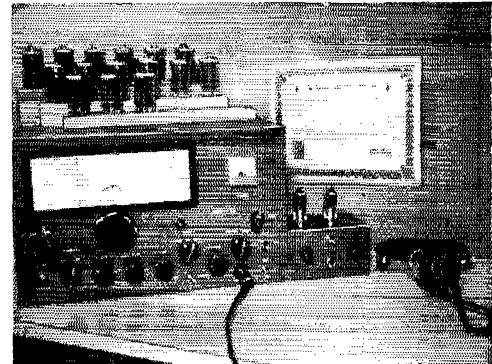
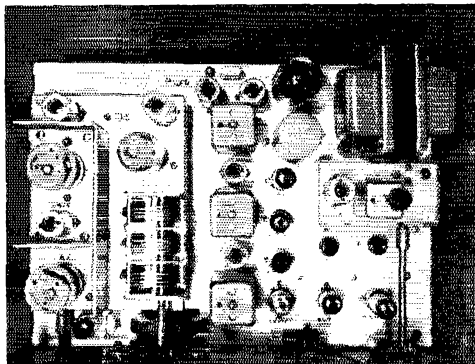
The Ubiquitous HBR



When Charles Hemenway of South Bend, Indiana, decided to build one of W6TC's HBR-16s, he made a photographic record of his construction progress. The quotes that follow are his. Above, left, "You mean *all* this stuff goes in that tiny little chassis?" Above, right, "One week, and about 20 skinned fingers later."



Above, left, "Maybe all that stuff *will* go in here!" Right, the underneath side of another HBR-16, with all the parts safely located and the wiring completed.



Above, left, a top view of Mr. Hemenway's completed HBR ("all those parts *did* fit in the chassis"), and to the right is an "in-use" view of the receiver. The coils are neatly mounted in racks atop the receiver, and at the right is one of the "Golden Goose" Q Multipliers.

All you HBR fans will be happy to know that we have two more articles by Ted Crosby, W6TC, in the works, and scheduled for an early issue. Two new HBRs will be described—an 8-tube version and an 11-tube version.

Here's a simple solution to that hardy perennial — what's the inductance of that junk-box filter choke? Short of taking the choke apart to find out the wire size, you'll still have to make a guess on the other question — how much current will it carry safely? But with the inductance, resistance, size and weight determined, this shouldn't be too hard if you have a catalog handy.

Measuring Inductance of D. C.-Loaded Chokes

Solving a Junk-Box Problem

BY J. H. ELLISON,* W6AO1

PRACTICALLY every ham has a collection of chokes acquired from a variety of sources — surplus, salvaged from former equipment, won in raffles, and the like. If you are a real ham at heart you never throw anything away, and as a consequence the pile of "boat-anchors" gets bigger and dustier.

When you need a choke for a power supply there are three courses of action open to you: (1) buy one with the right specifications, (2) grab the nearest one in the pile, and (3) try to match the size you need with one in the junk pile. (1) is the comfortable approach — the work is done for you. (2) is the nonchalant approach, and frequently leads right back to (1), including the replacement of those "defective components"

* 1720 Holly Ave., Menlo Park, Calif.

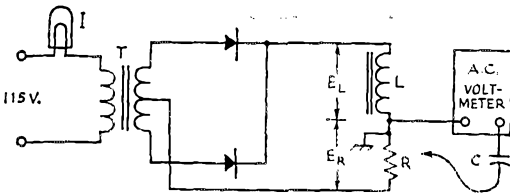


Fig. 1—Test setup for measuring ripple voltage drops. The voltmeter must be one that responds to the average value of the a.c. voltage, such as the bridge-rectifier type instruments found in the ordinary volt-ohm-milliammeter. A vacuum-tube voltmeter is not suitable because of the "turnover" effect associated with peak-reading instruments.

L is the choke under test. See text for discussion of values for R ; an adjustable resistor may be used here for regulating the value of direct current. An alternative way of adjusting the d.c. is to use 115-volt lamps (I) of the proper size, determined by trial, to reduce the voltage applied to the primary of transformer T , which may be any receiving-type power transformer.

Capacitor C isolates the d.c. voltage; it should be a paper capacitor having a suitable voltage range. A capacitance of 1 $\mu\text{f.}$ is sufficient for every case, but as little as 0.05 $\mu\text{f.}$ can be used if the voltmeter resistance is 0.5 megohm or more (e.g., a 1000-ohms-per-volt instrument on its 500-volt scale).

which went up in the same cloud of smoke. (3) is the naive approach — nothing in the junk pile is properly marked and there is nothing in the handbooks or reference books that tells you how to measure what you have on hand. This also usually leads back to (1) by way of (2).

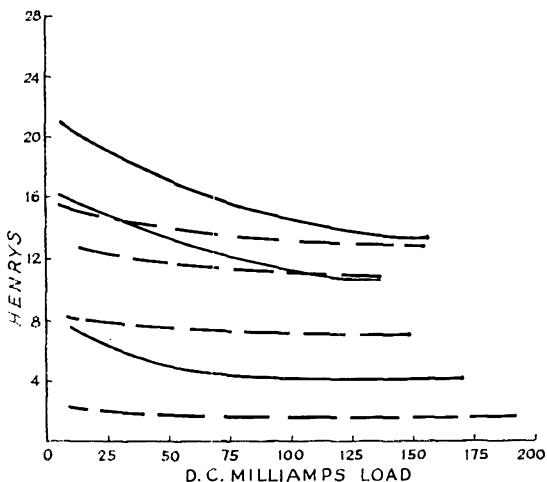
However, all is not lost, if you are the type that opens the door to (3), even though measurement methods for iron-cored chokes carrying direct current are usually ignored by the handbooks. The obvious method of inductance measurement, using an impedance bridge, is just about as useless as it is obvious, not only because most amateurs do not possess impedance bridges but also because this method does not indicate the rather drastic drop in inductance which occurs when appreciable direct current is carried by the choke.

There is an extremely simple, direct way of making such measurements with no more equipment than is readily available in the average amateur station. The requirements for this test are:

- 1) An adjustable direct current through the choke,
- 2) an alternating current at the proper frequency through the choke, and
- 3) a method of measuring a.c. voltage.

(1) and (2) are readily fulfilled by any full-wave rectifier circuit without a filter. The rectifier output consists of d.c. with superimposed 120-cycle a.c., which is the frequency at which the choke is usually operated and at which we desire to measure the inductance. (There may be a small 60-cycle component of current because of small differences between the two halves of the rectifier, along with small percentages of third and fourth harmonics of 120 cycles, but they can all be disregarded for our purpose.) Across the rectifier output we should connect the unknown choke in series with a resistance whose value we will specify later. Now, let's tie the junction of the choke and resistor to a physical ground, first for safety's sake and second to provide an electrical ground point for our measuring equipment, and we are ready to go. See Fig. 1.

Fig. 2--These curves are typical of measurements made by the method described. Solid lines represent regular commercial chokes; dashed lines, chokes (surplus) made to military specifications.



We have a series circuit in the secondary in which both the d.c. and a.c. are the same throughout. There are phase differences but these need not concern us. With any known resistance R , we can connect a d.c. voltmeter across R and from the voltage drop determine the d.c. current in the circuit as we adjust the primary voltage. Alternatively, we could use a d.c. milliammeter in series. The a.c. component of the rectified voltage can be measured entirely separately from the d.c., by using an a.c. voltmeter with a blocking capacitor.

The a.c. voltage drops across L and R will be proportional to the reactance and resistance, respectively. Actually, we are measuring the impedance rather than the reactance of the choke, but for almost any practical case the error in assuming that the two are equal will be negligible. The absolute accuracy of the voltmeter is not very important since we use the readings in a ratio. The most accurate observations result when the two voltage drops are approximately equal. However, in some cases this would require very high output voltage from the rectifier to get the desired d.c., so we can make a slight sacrifice of accuracy in the interests of expediency. If we then take the relation

$$X_L = \frac{E_L R}{E_R}$$

and solve for X_L we get the reactance at 120 cycles at the set d.c. current through the choke. This value of X_L divided by $2\pi f$ (or 754) gives us the choke inductance under load.

Any ordinary replacement transformer will suffice for this test, even though we greatly exceed its normal current rating for the period of the test. Suggested values of R for testing through a wide range of load currents might be as follows:

Load Current (ma.)	R	Wattage Rating
15-30	10,000	9
30-60	5000	18
60-120	2500	36
120-240	1250	72

For each of the above, the d.c. voltage drop across R would be set at 150-300 volts. Other values of R could, of course, be chosen. In most cases, checking at only two values of d.c. load current will be adequate to indicate the character of the choke in question: 25 ma. and 150 ma. are suitable points to indicate the performance.

Fig. 2 indicates, in general, what may be expected in the way of measurements. The solid curves indicate the variations in inductance under different load conditions of several competitively-priced commercial chokes. The dashed lines indicate the performance of several military types. None of the commercial types was designated as a "swinging" choke although it can be seen that the inductance varies over a considerable range. The military types indicate a more conservative design with fairly constant inductance over a wide range of load currents. Except from the viewpoint of stricter specifications and inspection in the product intended for military end use, the commercially-available product may suit our purposes better in the way of weight, size, cost and performance.

GET

(A somewhat similar method is described in *Electronic Measurements*, by Terman and Pettit, McGraw-Hill Book Co., but requires more auxiliary equipment than the method described by the author. Comparison of the two methods shows the results to be in good agreement. — Editor.)



The Federal Communications Commission, through a Report and Order in Docket 14,349, has amended Section 12.231 (a) (2) to make the frequencies 7245-7255 and 14,220-14,230 kc. available for RACES use in Alaska, Hawaii, Puerto Rico and the Virgin Islands, effective February 1, 1963. These frequencies have previously been available to RACES stations in the continental U. S.

K3KMO sends in a UPI clipping about a fellow who confessed to stealing telephone poles and selling them to hams.

Double-Conversion V.H.F. Converter with a Single Oscillator

Improved Stability and Image Rejection in V.H.F. Reception

BY NATHANIEL BISHOP,* WIEYM

THE increasing use of c.w. and s.s.b. for maximum-range communication in the v.h.f. bands has focused considerable attention on receiver performance characteristics. For best possible results, the noise factor, frequency stability, and freedom from spurious responses such as images and "birdies" must be optimized. The usual procedure of using a single-conversion v.h.f. converter working into a communications receiver as a tunable i.f. system does not always produce optimum performance in all of the above-mentioned respects. In general, choice of a relatively low-frequency range for the tunable i.f. favors over-all frequency stability and ease of tuning but does not permit an acceptable image ratio. Image ratio suffers further if antenna coupling to the first stage in the converter is adjusted for best noise factor. If, however, a high-frequency tuning range is chosen, the image ratio is improved at the expense of frequency stability. This is especially true if the communications receiver uses a tunable first oscillator.

In the light of the situation described above, it was the author's feeling that double conversion prior to the tunable i.f. system would allow a choice of receiver tuning range favoring frequency stability and ease of tuning, and at the same time permit the attainment of the best possible noise factor, image ratio, and freedom from other spurious responses. Furthermore, it was found that one crystal oscillator was all that was needed to provide the desired injection frequency for both mixers in a double-conversion v.h.f. converter. This simplifies circuitry and reduces the

chance of birdies caused by oscillator harmonics.

This scheme was applied to the author's 2-meter receiving setup. An early-model Super-Pro was used as the tunable i.f. system. A tuning range of 6 to 10 Mc. was chosen to give full 4-Mc. coverage on one receiver band. Redesign of the first oscillator in the Super-Pro provided adequate frequency stability over this range for effective c.w. and s.s.b. reception. The original 2-meter v.h.f. converter used single conversion with an injection frequency of 138 Mc. as shown in Fig. 1A. Strong aircraft signals produced bothersome image interference since they ranged only 12 to 20 Mc. lower than the desired 144- to 148-Mc. range.

The obvious answer to retaining the frequency stability of the 6- to 10-Mc. tuning range and getting a marked improvement in image rejection was double conversion in the 2-meter converter. Fig. 1B indicates the mixer arrangement used. Note in particular the use of a single crystal oscillator and the same injection frequency for both mixers. Injecting 69-Mc. energy into the first mixer converts the 144-148-Mc. range to 75-79 Mc. This high first i.f. allows the attainment of excellent image rejection. Injecting the same 69 Mc. into the second mixer results in the 6-10-Mc. range originally obtained with single conversion and an injection frequency of 138 Mc. A single tuned circuit between the first and the second mixers was found sufficient for rejection of signals outside the 75-79-Mc. range.

This same technique may be applied for any combination of converter input and output

* 415 Mine Hill Road, Fairfield, Conn.

(Continued on page 150)

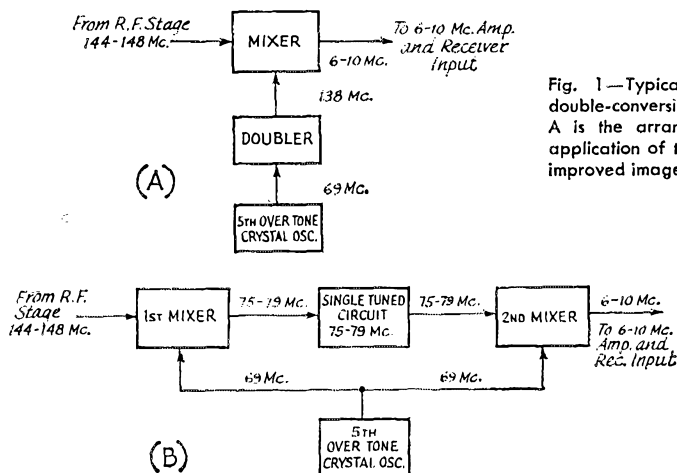


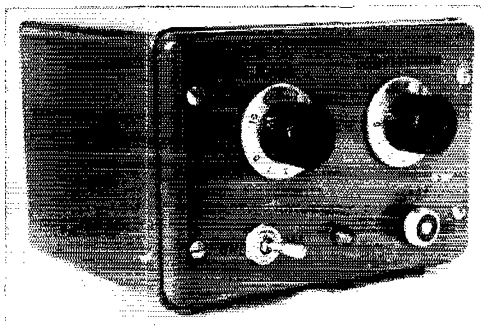
Fig. 1—Typical examples of single- and double-conversion v.h.f. receiving devices. At A is the arrangement commonly used. The application of the injection to two mixers, for improved image rejection, is illustrated at B.

High-Quality Speech Compressor

More Average Power for S. S. B. or A. M.

BY NICHOLAS G. RICHARDS,* W3ZVN,
AND WALTER PAINTER**

The compressor amplifier, complete with power supply, is housed in a cabinet approximately 4 by 5 by 6 inches in size. The power switch and microphone connector are under the gain and compression controls, respectively.



THE use of speech compression in transmitter audio systems has become increasingly popular with radio amateurs in recent years. While low-cost speech compressors are not as yet widely available on the ham market, many of the higher-priced amateur transmitters have built-in compressors as an added feature.

The speech compressor, like the speech clipper, provides a high average level of audio output, while at the same time keeping the peak percentage of modulation within the legal limit. The advantage of a speech compressor over a speech clipper is the extremely low distortion. This results from the use of automatic volume control in contrast to peak signal clipping in clipper circuits.

The use of speech compression with s.s.b. is particularly rewarding. By increasing the average audio input to the transmitter, the average r.f. output is proportionally increased within the limits of the transmitter.

The speech compressor described in this article provides for adjustable compression to 27 db. for 4-db. output variation (see Fig. 1). Any high-impedance microphone with an r.m.s. output of 0.05 volt will drive this unit to full compression.

Circuit

The circuit of the compressor is shown in Fig. 2. The microphone input stage, V_1 , is a resistance-coupled pentode amplifier. The 5879 was chosen

because of its relatively high gain and low noise figure. To realize the full compression capabilities of this unit, an r.m.s. input voltage of 0.05 volt is required on the grid of the 5879. A microphone preamplifier is recommended when the station microphone output is well below this figure.

The output of the microphone amplifier is split and fed into V_2 , a 6AB4 a.g.c. amplifier, and V_3 , a 6BA6 variable-compressor amplifier. Tube V_2 amplifies the signal, and its output is rectified as a negative d.c. voltage by diode CR_1 . The filter network consisting of R_4 , R_5 , R_6 and C_5 , C_6 , C_7 , smooths out this pulsating d.c., and it is then applied through R_7 to the grid of V_3 . The d.c. level on the grid of V_3 is directly proportional to the audio level from V_1 . This, in turn, is proportional to the audio level from the microphone.

The compression amplifier, V_3 , receives audio from V_1 (by coupling capacitor C_4) in addition to the a.g.c. bias previously mentioned. The gain of V_3 depends on the d.c. level (a.g.c. bias) on its control grid, and varies inversely at this level over the compression range of 27 db. Therefore, the output of V_3 is held constant (within 4 db.) with a microphone input variation of 27 db.

The depth of compression can be varied by the compression control R_1 from 0 to 27 db. As the depth of compression is decreased, this decrease in db. becomes, in effect, db. of limiting, until at zero-db. compression you have 27 db. of limiting. With limiting of approximately 15 db. or more, it would be impossible to over-modulate the transmitter even by yelling into the microphone.

* 2610 Lindenwood Drive, Bridgeville, Penna.

** 592 Galway Drive, Bethel Park, Penna.

For those who are unfamiliar with the term, a speech compressor is, in effect, a speech amplifier with a.g.c. The gain is automatically greater for weak input signals than for strong. Such a system has considerable advantage in a.m. or s.s.b. operation. It is unnecessary to maintain a critical distance between the operator and the microphone, to hold a constant speaking level, or ride the gain control to avoid under- or over-modulation. Since the weaker voice passages are amplified more than the stronger passages, the average modulation level is higher. In other words, the signal has more "talk power."

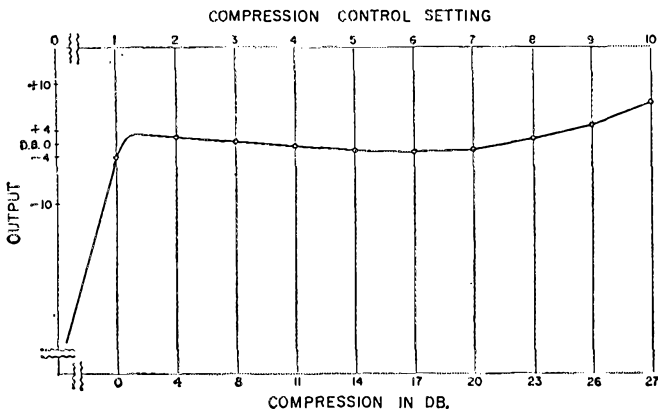


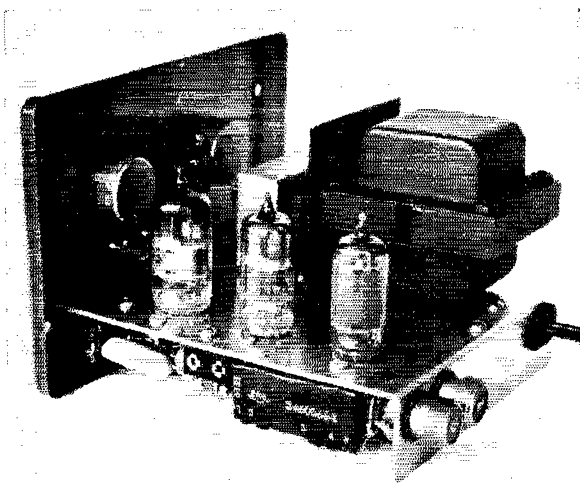
Fig. 1—Compressor characteristics. Curve shows compression in db. for a 4-db. output variation, with a 0.05-volt input signal at 1000 c.p.s.

Adjustment of R_1 controls the signal level into both V_2 and V_3 . However, since the gain of V_3 varies inversely as the a.g.c. bias voltage, if the input signal of V_2 and V_3 is reduced by one half (by adjustment of R_1 or by decreasing the input to V_1), the gain of V_3 increases by a factor of 2 and the output remains the same. This action takes place over an input variation of 27 db. (reference 0.05 volt r.m.s. maximum). While the output does not remain absolutely constant, it varies by only 4 db.

Unlike other forms of limiting, the audio distortion will not run above 3 per cent. The low value of distortion is possible in this circuit because there is no clipping action on the waveform as the signal level is controlled by the 6BA6 variable-gain amplifier. The limiting action mentioned is an inherent characteristic of the compressor circuit and is equal to the difference between the maximum compression available (27 db.) and the actual compression setting (which can be varied in this unit from 0 to 27 db. by adjustment of R_1). For example, if the compression control is set for 14-db. compression, only 14 db. of compression will be realized for a

microphone input of 0.05 volt r.m.s. This voltage is considered the standard for our tests when talking into the microphone at a normal voice level. Now, if the operator should, for some reason, talk closer to the microphone or raise his voice level, there is an additional 13 db. of compression available before the full limit of the unit is reached. Above the full limit (27 db. of compression) the output no longer remains constant, but increases with an increase in microphone output and eventually the 6BA6 becomes over-driven.

While this compression amplifier is basically a simple circuit, it has the advantage of a relatively fast attack time of approximately two milliseconds. This eliminates the very objectional transient change in gain and high transient distortion that a slower attack time gives. The decay time, on the other hand, is relatively slow, approximately 1.5 seconds. This means that the gain of V_3 does not have to vary during short pauses. This also prevents any background noise from appearing during these pauses. The slow decay time is obtained by diode CR_2 , resistor R_3 , and capacitor C_8 . If this network is eliminated,



Components are assembled on a small chassis. The power transformer is mounted on a bracket to make its mounting screws easily accessible. Tubes from left to right are V_1 , V_2 and V_3 . The extra output connector provides connection to a scope monitor.

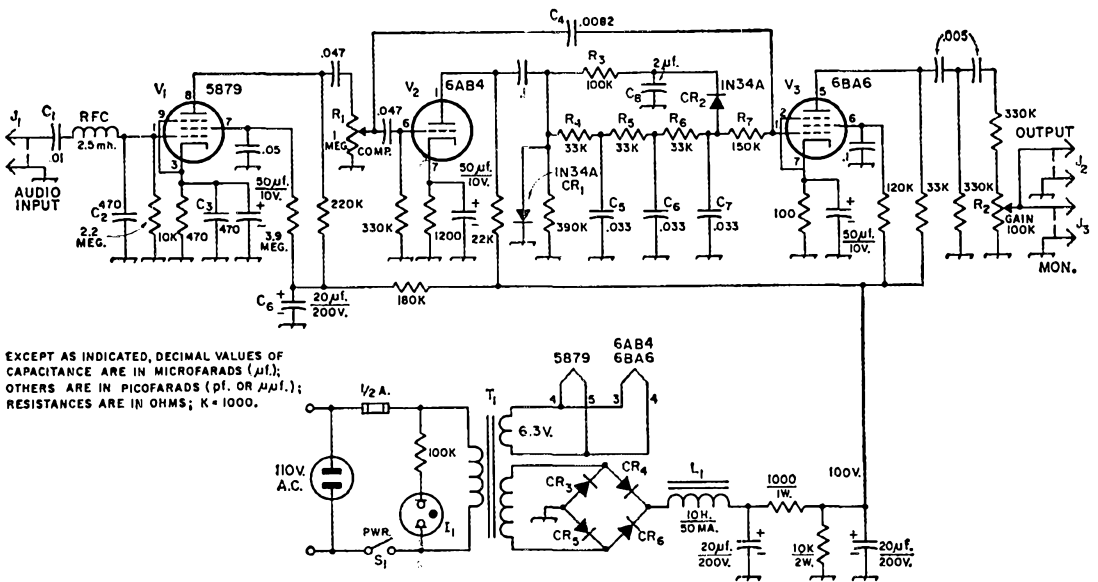


Fig. 2—Circuit of the W3ZVN speech compressor and power supply. Capacitors marked with polarity are electrolytic; others not listed below are 200-volt tubular paper, or mylar. Fixed resistors are 1/2 watt unless indicated otherwise. Components labeled, but not listed below, are identified for text-reference purposes.

- C₁, C₂, C₃—Disk ceramic.
 C₄—Tubular, 10-per-cent tolerance.
 CR₃, CR₄, CR₅, CR₆—Silicon diode, 50 ma. 300 p.i.v. or higher.
 I₁—NE-2 neon lamp.
 J₁, J₂, J₃—Microphone connector (Amphenol 75-PC1M).

- L₁—Filter choke (Triad C-3X).
 R₁—Linear control.
 R₂—Audio-taper control.
 S₁—S.p.s.t. toggle switch.
 T₁—Power transformer: 125 volts, 15 ma.; 6.3 volts, 0.6 amp.

the attack and decay times will be approximately the same (2 milliseconds). No difficulty has been experienced with "thump" as a result of the fast attack time. This is probably because of the a.g.c. filtering, its associated roll-off, and the restricted frequency response of the compressor.

The frequency response of the circuit is 300-3000 c.p.s. with reference to 1 kc. The response could be extended, but this unit was intended for the best possible voice communication and any increase in response would detract from this purpose.

Power Supply

The power supply consists of a full-wave bridge circuit followed by two stages of filtering, and furnishes 100 volts at 15 ma. Any well-filtered power supply delivering 100 to 150 volts at 15 ma. can be used. Good regulation is absolutely necessary for proper circuit operation.

Construction

The unit is constructed in a 4 $\frac{1}{2}$ × 6 $\frac{1}{2}$ × 5 $\frac{1}{4}$ -inch cabinet (Bud CU465). Less expensive cabinets are available for those who wish to keep the cost at a minimum. The chassis was made from a piece of aluminum sheet, and bent after punching. The front lip of the chassis is secured to the front panel by the toggle switch, neon lamp and microphone connector. Both the compression and gain controls are mounted on the front panel for easy access. An additional

output connector was installed on the rear chassis flange for connecting a scope or 1-kc. oscillator for a two-tone test.

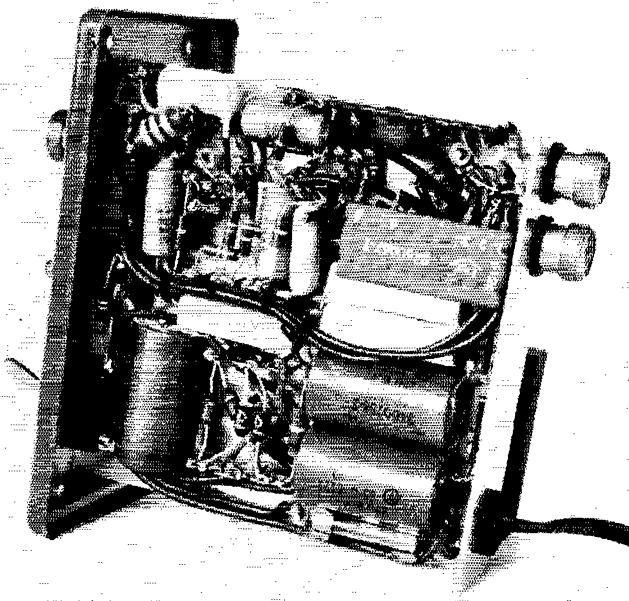
The general layout of the circuit is not critical, but lead lengths in the audio section should be kept to a minimum, especially those to the grids of V₂ and V₃. Shielded cable should be used for connections to and from controls R₁ and R₂.

Two module packs containing several of the necessary components were used to conserve space. Ample space will be available for individual components if the sizes of the components are kept to a minimum. Many capacitors larger than needed were used in this layout simply because they were on hand. A last note of caution: Be careful not to damage the 1N34A diodes when soldering.

Adjustment

Adjustment of the unit is relatively simple, since it involves only two controls — for compression and output levels. Amateurs with access to laboratory test equipment can plot a compression curve for their unit similar to the one shown in Fig. 1. This is accomplished by feeding a 1-kc. signal at 0.05 volt into the input connections and measuring the output with a high-impedance audio voltmeter for all positions of the compression control. The output voltage scale is arbitrary, since it is dependent on the gain-control setting.

If desired, a complete set of output vs. input



Although close spacing of components is required, "layer" construction has been avoided so that all are accessible. As mentioned in the text, some of the components used in this model are of larger physical size than necessary.

voltage curves may be plotted for each compression-control setting. This is accomplished by setting the compression control to maximum and feeding a 0.05-volt 1-ke. signal into the microphone input and measuring the input and output voltage levels. The input signal should then be decreased in convenient increments and the corresponding output voltages measured until a complete curve is plotted. This procedure is then repeated for each compression-control setting. Once the complete set of curves has been plotted, the operation of the compressor can readily be determined for any compression-control setting and input-voltage level variation.

If test equipment is not available, the circuit can be checked with a tape recorder, or "on the air." Turn the compression to maximum and adjust the gain control for 100 per cent modula-

tion while talking into the microphone. The modulation level should remain high as you back away from the microphone while talking at the same level. With the compression level turned down, the level of modulation will drop rapidly as you move away from the microphone, just as though the compressor were not used. During an "on-the-air" test with 14 db. of compression, good modulation was reported when talking 10 feet from the microphone. With the compression at zero, no modulation was reported under the same conditions.

Since the compression is adjustable, it should be possible to obtain the best operating conditions under any noise conditions. For example, the minimum compression would be normally used where the background noise is abnormally high.

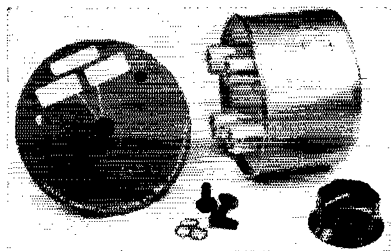
QST

● *New Apparatus*

New Coaxial Switches

Waters Manufacturing, Inc., Wayland, Massachusetts has a new line of rotary coaxial switches. Three models are available: single-pole, six-position (Model 335), double-pole double-throw (Model 336), and single-pole double-throw (Model 341). The accompanying photograph shows the d.p.d.t. unit. There's no need to worry if you lose the instruction sheet that comes with the switches -- a schematic diagram of the switch is printed right on the switch case.

All of the models use silver-plated and ceramic-insulated switches and come with u.h.f. connectors (SO-239). They have a power rating of 1000 watts, and have a v.s.w.r. of less than 1.1 : 1 through 150 Mc. Included with the switches are an escutcheon plate, knob, and three mounting

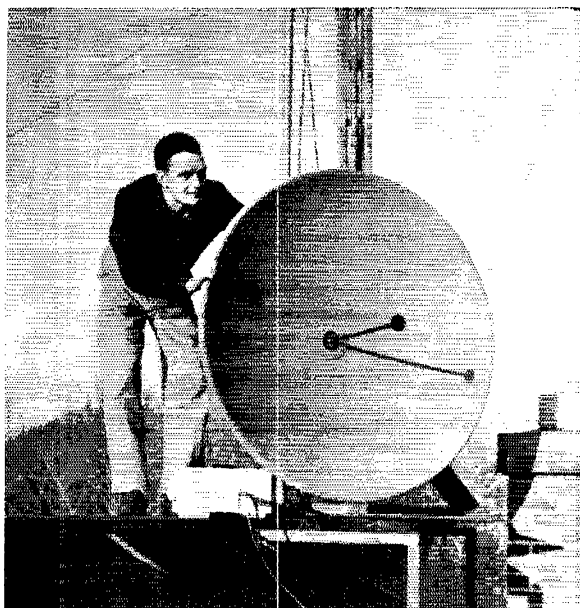


screws and washers. The white blanks on the escutcheon plate may be used to indicate the switch functions.

The switches can be mounted behind a panel up to 1/4-inch thick. The machine screws thread into holes on the front of the switch case.

— E. L. C.

We tend to think of microwave gear in terms of portable stations, to be taken out to mountaintops and operated during a contest weekend. The pulse system here described should do much to bring 2300-Mc. gear into the home-station category, as its results at the home station of W2BVU-K1JIX indicate that its range is comparable to that obtainable on 1.44 Mc. Here W2BVU lines up his rooftop dish for a test far beyond the visual horizon. Transmitter is in the weatherproof box at his feet.



Pulse: A Practical Technique for Amateur Microwave Work

Part I—How Pulse Works

BY ROBERT F. GUBA,* W1QMN AND JOHN T. ZIMMER,** W2BVU

VALUABLE contributions have been made to the radio art by radio amateurs as a result of their interest in exploring and developing higher frequencies for communication purposes. This began with pioneering work in the early 1920s, that showed frequencies above 1.5 megacycles to be the ones best suited for long-range, world-wide communication. More recently, the v.h.f. and u.h.f. bands have been developed with unexpected results.

At the present time, the microwave bands are the frontier. The Massachusetts-California moon-bounce contact of W1BU and W6HB on 1296 Mc. dramatically illustrated the possibilities of this band, and stations using stable transmitters and narrow-band receivers at this frequency are now

becoming numerous. There has been only scattered amateur work done to date, however, on the higher-frequency amateur allocations, at 2300, 3300, 5650 and 10,000 Mc. These microwave bands are in a portion of the spectrum already heavily used by military and commercial radar and communications equipment; but more important, they are the space-age bands. This range is the one best suited for tracking, controlling, and communicating with space vehicles. As space ventures become more numerous, these frequencies will become more prominent in the world of radio. It is important that amateurs use these bands and learn more about microwaves.

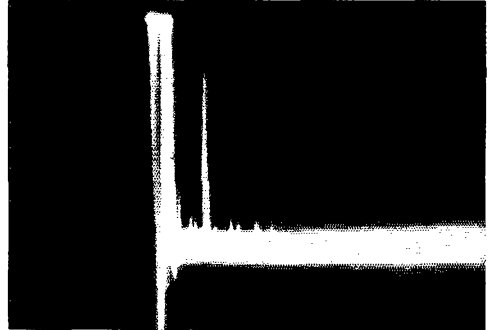
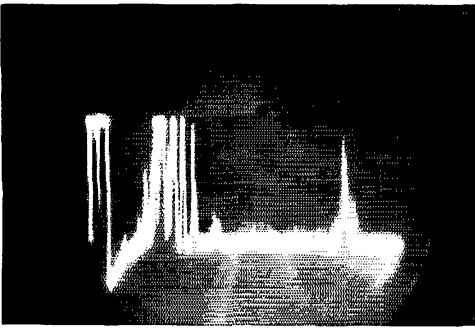
Wide-Band vs. Narrow-Band Techniques

It might seem reasonable to expect that, in time, narrow-band techniques similar to those

*376 Central St., West Acton, Mass.

**Slough Road, Harvard, Mass.

Almost anyone who has observed the effectiveness of pulse emission in a radar system must have speculated on its use for amateur communications purposes. The main deterrent has been that pulse, being inherently a wideband mode, is restricted to microwave bands, and most of us brush these frequencies off as being useful only for short distances and line-of-sight paths. This is not necessarily so, however. The pulse system described here is capable of providing communication over distances that compare favorably with those regularly worked on our v.h.f. bands. Best of all, you can build it. Don't pass this series up because it has "microwave" in the title!



Scope patterns obtained when the 2300-Mc. pulse gear is operated radar-style. The full-height returns at the left side of the expanded sweep presentation (left view) are from hills within the first few miles. The single large return near the right end is a large hill at approximately 12 miles. This appears near the start of the longer sweep (right view), and is followed by several small returns at distances out to about 30 miles. These smaller pips are from small elevated targets such as water towers, which are below line of sight from the 2300-Mc. antennas.

used at 1296 Mc. would be used by amateurs for all serious work at 2300 Mc. and still higher frequencies. However, the problems involved in designing and building crystal-controlled transmitters and narrow-band receivers for these frequencies indicate that their cost and complexity may be so great as to limit drastically the number of amateurs who can participate. This might not be in the best interests of amateur radio, for it is mainly through sheer numbers that amateurs are able to make worthwhile contributions to the art, in this age of vast, government-sponsored research and development programs.

It would be unfortunate if there were no straightforward, inexpensive approach available to amateurs, which would permit them to work effectively in the fascinating microwave bands. Happily, this is not the case, for pulse emission offers the means by which the microwave world can be unlocked for worthwhile use by the average amateur. Pulse is a type of emission which has the distinction of not being permitted for amateur use below 2300 Mc., principally because it is inherently a wide-band mode. This is probably the main reason why it has never been used to any notable extent by amateurs at any frequency.

Pulse emission consists of a series of short bursts of r.f. carrier, just as the dots of Morse code, but much shorter in length. It is used mainly for radar and it was this application which first focused widespread attention on the microwave frequencies during World War II.

Pulse has characteristics which make it well adapted to amateur use. It is a wide-band emission, but this should not be taken to mean that it is necessarily an inefficient means of communication. Indeed, the main advantage of pulse is that it permits amateurs to attain communication-system sensitivities in the microwave bands comparable to those obtained with c.w. techniques in the v.h.f. bands. In order to appreciate why this is so, it is helpful to review some of the commonly accepted requirements for efficient, long-haul communication in our v.h.f. bands. After this, we shall look at the unusual characteristics of pulse and compare a simple pulse system with a

typical c.w. system to see what the possibilities of pulse are for efficient communication at microwave frequencies.

Effect of Noise on a Communications System

The thing which ultimately determines the sensitivity of a receiver in any type of communications system is noise. Noise is a natural phenomenon which is everywhere and is inescapable. If it were not for this fact, there would be no limit to how weak a signal a radio receiver could amplify and detect, and there would be no need for using transmitter powers of more than a few watts. In the v.h.f. and microwave bands, practically all the hiss in the output of the receiver is thermal noise originating within the receiver. This receiver noise is produced mostly by the input stages and is minimized by using circuits having a good noise figure. However, even if we managed to build a perfect zero-db.-noise-figure receiver, we would still hear thermal noise from the antenna system and its surroundings, so the problem is still to distinguish the signal we desire from the noise in which it is immersed.

Signal-to-noise ratio is commonly used as a way of expressing how well a signal manages to override its noise background in the output of a receiver. An efficient communication system is one which produces the most readable, highest signal-to-noise-ratio signal for some fixed amount of transmitter average power. Another way of looking at it is that the most efficient system is the one that requires the least amount of transmitter power to produce a given signal-to-noise ratio in the receiver output. Thus, lowering the receiver noise figure is one way to improve the signal-to-noise ratio and improve the efficiency of the system.

An effective and sometimes easy way to obtain good signal-to-noise ratio is to use a receiver bandwidth as narrow as possible for the type of signal being received. This is because thermal noise, whether it be produced within the receiver, the antenna, or elsewhere, is a broadband thing; it exists simultaneously at all frequencies. This

means that if we increase the bandwidth of a receiver, the noise power in its output will be increased. The optimum bandwidth for receiving c.w. code is only a few hundred cycles, while that for voice (amplitude-modulated radiotelephone) is three to four kilocycles. The important moral to the story is that the narrower the receiver bandwidth can be made and yet still pass all of the signal information, the better the signal-to-noise ratio and readability will be. In many v.h.f. stations, the loss in signal readability due to not using the optimum bandwidth may outweigh the difference between using a good-noise-figure front end or a poor one. But in many cases, there are strong practical reasons why this is so, as we shall next see.

The Problem of Optimum Bandwidth

The optimum bandwidths for c.w. and phone signals are the same regardless of the band being used. As we go to higher and higher frequencies, however, the optimum bandwidth for a given type of transmission becomes a smaller and smaller percentage of the carrier frequency. A 1-kc. bandwidth at 50 Mc. is 0.002 per cent, but the same bandwidth at 500 Mc. is 0.0002 per cent. It becomes harder to use a narrow optimum bandwidth as we go to progressively higher frequencies, because it becomes increasingly difficult to build transmitters and receivers having sufficient frequency stability to keep the signal from drifting rapidly out of the passband. Crystal-controlled transmitters and converters are necessary for narrow-band work in the u.h.f. bands, but the construction of such exciters and local oscillators is expensive and involved for the bands above 1000 Mc. Even a crystal-controlled oscillator is hard-pressed to provide the percentage stability needed to use a 1-kc. bandwidth at frequencies in the microwave region. Since using the optimum bandwidth for conventional c.w. and phone transmissions is of no value unless the signal can be kept tuned in long enough to receive meaningful information, the approach frequently taken is to broaden the receiver bandwidth and accept the loss in sensitivity.

Almost all amateur microwave work to date has been done with simple gear using a.m. or f.m., with receiver bandwidths many times wider than optimum. The large penalty thus imposed on signal-to-noise ratio has limited the distances which have been worked with this equipment. To do otherwise would have involved construction of long chains of frequency multipliers for the exciter and local oscillator, driven by highly stable oscillators, as has been done in moon-bounce equipment used at 1296 Mc. Here it was found very helpful to bury a battery-powered crystal-controlled transistor oscillator deep in the ground, to achieve the stability required for the narrow receiver bandwidth needed to detect a weak c.w. signal. In going to 2300 Mc., the problems involved in narrow-band transmission and reception become still more severe. Not only must the percentage stability be almost

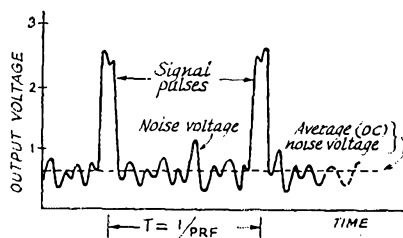


Fig. 1—Series of signal pulses in noise as they would appear over a short period of time at the output of the second detector of an a.m. receiver. T is the time between pulses.

twice as good, but still more complex frequency multipliers and power amplifiers must be built. But microwave prospects need not look so grim, for when we reach 2300 Mc. we are able to use pulse. This mode of emission, not permitted at lower frequencies, provides a means of efficient communication using relatively simple gear.

How Pulse Works

As we have already mentioned, pulse emission consists of short bursts of r.f. carrier. The length of each burst, or *pulse length*, is ordinarily measured in millionths of a second (microseconds). Don't be concerned with the thought of how to generate such minute pulse lengths; this involves nothing more difficult or unusual than a circuit having a bandwidth of a few megacycles. The pulses are transmitted in a steady stream or series, the short pulses being generated repeatedly, over and over again. The number of pulses in one second is called the *pulse repetition frequency*, commonly abbreviated p.r.f. A p.r.f. of several thousand pulses per second is typical. Fig. 1 shows how a pulse transmission would appear at the output of a receiver's a.m. detector. Between pulses there is no output except for noise.

The optimum bandwidth required to receive a pulse transmission is quite wide. An easy rule of thumb is that the optimum bandwidth is equal to the reciprocal of the pulse length. For a 1-microsecond pulse length this is 1 Mc. With such wide receiver bandwidths, transmitter or receiver local oscillator drifts as great as 100 kc. have little effect on the receiver output.

The most unusual characteristic of pulse emission is the high power of the r.f. carrier during the time the pulses are being generated. This is the *peak power*, and the average power is simply the peak power multiplied by the fraction of the time that the carrier is actually on the air. This fraction of the time is called the *duty cycle*. In order to be more specific and to compare a simple pulse system with a narrow-band c.w. system, let us choose a pulse length of one microsecond and a p.r.f. of 1000 pulses per second. For this combination, the duty cycle is 0.001, and we could run one million watts peak power before attaining the maximum amateur average power of one kilowatt.

But the really important question is how the

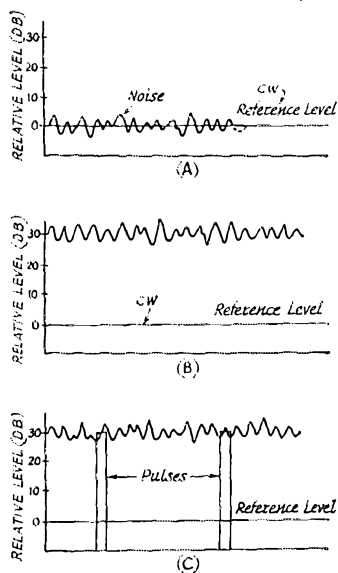


Fig. 2—Pictorial representation of signal-to-noise ratios in the i.f. amplifier of a receiver for pulsed and c.w. signals having the same average power. (a) C.w. signal and noise level in one-kilocycle bandwidth both equal to reference level. (b) Noise bandwidth increased to one megacycle. (c) One-microsecond pulse signal having duty cycle of 0.001, with noise, in one-megacycle bandwidth.

signal-to-noise ratio which can be achieved at the receiving end of a pulse system compares with that of a typical c.w. system running the same average power. This can be determined accurately in a straightforward manner by considering what we already know about noise and bandwidth. For our standard c.w. system, let us assume that we are able to use an i.f. bandwidth of one kilocycle in the receiver and that, with the help of the b.f.o., we are just able to detect a carrier when the i.f. signal-to-noise ratio is unity (zero db.). This is about the normal situation in actual practice. Using greater selectivity makes it difficult to find a signal unless its exact position within the receiver tuning range is known. Some operators are capable of detecting signals 10 db. or so below the noise level when the signal is tuned to produce the best beat frequency, but, once again, it is difficult to initially find this signal unless very accurate frequency calibration is possible. Even so, detecting signals much weaker than the i.f. noise level requires either a well-trained ear or the use of audio filters. Such selectivity coming after the receiver second detector is called post-detection integration.

We need not get involved any further in detection theory, because the fact is that the i.f. signal-to-noise ratio required for detecting pulses is essentially the same as for c.w. That is, by using appropriate techniques, pulsed signals much weaker than the noise can be detected, but for an average operator using

conventional circuits, the i.f. signal-to-noise ratio required for detecting pulses is about unity. The problem in comparing the detectability of pulses vs. c.w. is therefore simply to compare the i.f. signal-to-noise ratios of each for the same average transmitter power.

In considering i.f. signal and noise levels, it helps to picture them as in Fig. 2A. Here we show the noise as a waveform which randomly fluctuates with time about some average level. Let us choose this average level as our reference level such that if we have a c.w. carrier also at this level, it will be just barely detectable. This is therefore our unity signal-to-noise ratio c.w. case shown pictorially. Now, getting ready to switch over to receive pulse, we must first use a wider receiver bandwidth. Since the optimum bandwidth for receiving our 1-microsecond-long pulses is 1 megacycle, and the bandwidth we have been using for c.w. was assumed to be 1 kilocycle, this means that we must broaden our receiver bandwidth by 1000 times. This increases the noise power as shown in Fig. 2B and leaves the c.w. carrier buried in the noise. But now let us switch the transmitter over to pulse operation, using the same average power and 1000 pulses per second. Our power during the time that the transmitter is actually on the air is now 1000 times greater than before, so the pulses will reach the same level as the noise in the wide-band receiver. Once again we have a unity signal-to-noise ratio, as illustrated in Fig. 2C, and can just detect the signal by using special but uncomplicated audio circuitry, suited to the pulsed form of the signal. The big difference is that, with pulse and some simple receiving tricks to be described later, we are now detecting the same amount of average power without requiring the use of a crystal-controlled transmitter and a narrow-band, high-stability receiver.

It may seem odd in the preceding example that the same average power for both systems gave the same signal-to-noise ratio in the receiver. This is not just a coincidence, for if we had chosen a different receiver bandwidth for the c.w. system in comparing it with our pulse system, things would turn out differently. If we used an i.f. bandwidth of 100 cycles for the c.w. case, it would surpass the pulse in signal-to-noise ratio. But such a narrow bandwidth is impractical for amateur work at 2300 Mc., and even a one-kilocycle bandwidth is not easy. The proper conclusion is that until amateurs can approach i.f. bandwidths of one kilocycle on the bands above 2300 Mc., the pulse system will give superior performance. It is possible to use combinations of pulse length and p.r.f. which are even still more effective; however, the one-microsecond and 1000-p.r.f. one is probably the most convenient and easiest to build. Notice that we are not claiming that pulse can surpass the best c.w. techniques; it is simply a matter of pulse being able to do as well as the best practical amateur narrow-band equipment and with much less complexity.

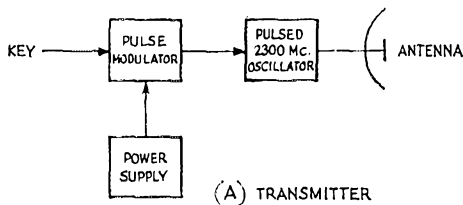
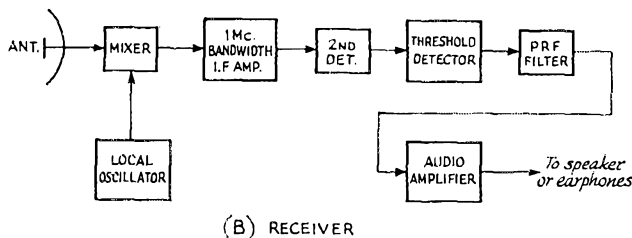


Fig. 3—Block diagram of a complete pulse system for the 2300-Mc. band.



Practical Pulse Equipment for 2300 Mc.

So far, we have said very little about circuit details, other than that they are relatively uncomplicated when compared with conventional v.h.f. gear. Actually, it is safe to say that any ham capable of putting 50 watts on 420 Mc. would have little trouble in putting an effective pulse system on 2300 Mc. Fig. 3 shows a block diagram of a complete pulse communication link for 2300 Mc. which has been built and used to confirm the effectiveness of pulse in spanning relatively long distances. The r.f. section of the transmitter consists of a type 2C43 lighthouse tube, in an oscillator circuit operating directly at the output frequency. The tuned circuit is a re-entrant cavity made from common copper plumbing tubing, requiring no machine tools for its construction other than a hand drill. A peak power output of two kilowatts is obtained with a pulse length of one microsecond and 1000 pulses per second, or an average output power of two watts.

The remainder of the transmitter is the power supply, and a modulator which acts as a switch to apply high voltage to the oscillator only during the time when a pulse is to be transmitted. The modulator uses three tubes which draw about 10 ma. at 1300 volts and 20 ma. at 300 volts from the power supply, to produce a peak pulse power input to the oscillator of 6 kw. The method used to convey information is to key the modulator on and off, just as a c.w. transmitter is keyed to transmit Morse code. In this case, the series of pulses at a p.r.f. of 1000 pulses per second is transmitted only when the key is down. The effect in the receiver output is to produce an interrupted tone which sounds the same as an m.c.w. transmission. There are a number of ways of adapting the system to phone transmission; however, just as in narrow-band c.w. work, keyed pulse is simpler and is capable of greater ranges than telephony.

The pulsed transmitter is very efficient compared to a crystal-controlled transmitter of the same average power. Not only is the over-all efficiency high, because no exciter chain is required, but the efficiency of the oscillator itself is greater, since the use of a high plate voltage during the pulse reduces tube transit-time losses. The simple r.f. section makes it easy to locate the oscillator at the antenna and so reduce transmission line losses to a minimum, an important factor in the microwave bands. The only connection required between the oscillator and the rest of the transmitter is a coaxial cable which carries the d.c. pulses from the modulator to the plate of the oscillator.

There is not much to be said about the antenna system or the receiver front end—they are essentially the same as would be used for a narrow-band system at this frequency. The first big difference in the receiver is that an easily-made, two-tube oscillator is all that's required for injection, and this is used to convert to a broad-band i.f. of 30 Mc., where the signal is detected without requiring a communications receiver.

The threshold device following the detector is a one-tube circuit which produces an output pulse only when the output of the second detector is greater than a level slightly above the average noise voltage. Since noise peaks will often exceed this level, there is always some noise appearing in the output, but the amount of noise is much less than at the threshold input. When real pulses are received, they cause an abrupt increase in the threshold output, and the effect is to make it much easier to tell when a weak signal is tuned in. This circuit does for our ear what our eye would do if we were able to watch the second detector output, as shown in Fig. 1, and look for signal pulses slightly exceeding the average noise level.

The finishing touch is the audio filter, which is

tuned to the p.r.f. and can be made very narrow since the p.r.f. can be made very constant. This filter helps to detect weak signals in the noise output of the threshold, and produces a pure tone at the p.r.f. for stronger signals.

The system as described above is capable of covering long distances even by v.h.f. standards. Assuming a rather poor receiver noise figure of 15 db., and using 4-foot-diameter parabolic dishes at each end, the theoretical over-the-horizon range is close to 200 miles. There has been no opportunity to attempt such a hop as yet, but distances beyond line of sight, up to 65 miles, have been covered with very good results.

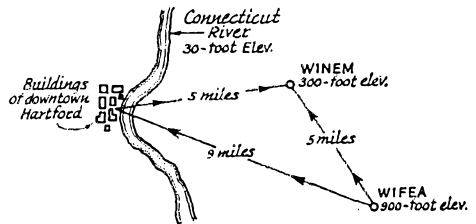
One of the unique features of the pulse system is that two-way checks can be made without contacting another station. This is done by operating the transmitter and receiver simultaneously with separate antennas and connecting the output of the receiver second detector to an oscilloscope, which is synchronized to the p.r.f. When the antennas are pointed at the same point on the horizon, the transmitted pulses will be seen in the receiver output as they are reflected back to the receiver from obstacles in their path, and we have our own radar set. The system to be described, when used with 4-foot dishes, produces good radar echoes from hills over 30 miles away. Besides being very entertaining when there is nobody else on the band to work, this provides the perfect means of optimizing both the transmitter and receiver for best communication results.

By now we hope it is clear that pulse has many advantages which make it possible for large numbers of amateurs to enjoy the microwave bands. Future articles are planned to

describe in detail the construction of the 2300-Mc. station outlined here. In the meantime, don't give away any more surplus radar i.f. strips or modulators — you'll want to use them to join the fun on the space-age microwave bands!

Part II will follow in an early issue. QST

Editor's note: Not long ago the authors demonstrated their 2300-Mc. pulse communications system at a meeting of the Hartford County Amateur Radio Association. As shown in the adjacent sketch, the transmitter was set up at the hilltop home of W1FEA in Glastonbury, Conn., the receiver at the club room on a hill in East Hartford. Both locations have a view of the skyline of downtown Hartford. Two-meter gear was used for liaison.



At a word given on 144 Mc., the 2300-Mc. transmitter was turned on, and immediately a strong tone was heard by the audience at the club. Orienting antennas for maximum signal produced excellent signal-to-noise ratio. The antennas were then turned on the buildings of Hartford, and at least as strong signals were received over the 14-mile rebound route. The transmitter was then brought to the club site and the setup operated radar style, as described in the preceding text. Strong echoes were obtained from the Hartford skyline, and from hills 20 to 30 miles away, on the far side of the Connecticut Valley.

The demonstration had the desired effect. HCARA members were mightily impressed, and they wanted detailed how-to-do-it information. They, and you, will be having it shortly, thanks to W1QMN and W2BVU. — E. P. T.

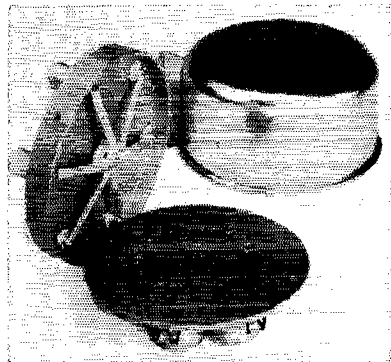
● New Apparatus

Remote-Operated Coaxial Switch

The Dow DKC-71 coaxial relay shown in the photograph is a single-pole six-throw switch designed for mounting on a tower, pole or mast. The switch shown in the photograph has been partially disassembled to show how the switching is accomplished.

The circular assembly standing on edge at the left of the photograph fits over the plate beside it. It consists of a casting with seven coax connectors, six contact leaves, and a power connector. The weather-protector hood at the top of the photograph covers the entire assembly. The connectors point downwards when the switch is installed. A bracket is attached to the hood to facilitate mounting the switch to a vertical mast.

Solenoids are mounted in a circle on the plate with their plungers protruding through. When a solenoid is energized, the plunger advances and pushes the corresponding contact leaf, which then makes contact with the disc mounted in the center.



Although the relay is designated as a single-pole six-throw switch, more than one solenoid can be energized at one time for paralleling several connectors.

The DKC-71 is available with UHF, N, BNC, TNC or C connectors. A mating power connector is furnished. The rated v.s.w.r. at 100 Mc. is less than 1.1 : 1 and the unit has a power rating of 1000 watts. It is manufactured by the Dow-Key Co., Thief River Falls, Minnesota.

— E. L. C.

The rotary switch between the two meters is for changing screen voltage. The toggles below control filament and plate power. To the right are the plate tank-tuning and loading controls, with the plate band switch above, and the grid switch below.

The homemade $7 \times 14\frac{1}{2} \times 14\frac{1}{2}$ -inch wrap-around cabinet¹ is made of steel with similar cutouts in both top and bottom covered with expanded metal. Both front and back of the cabinet are open. The sides of the front are fitted with sections of angle stock against which the panel is fastened.



The RCC 230-L Amplifier

*807s in a 230-Watt Linear
for 80 and 40*

BY J. L. COPELAND,* W5SQT

By heavily loading the grid circuit of this amplifier, the author achieves both the stability and broad-band input characteristics of a grounded-grid amplifier, but with a much lower driving-power requirement.

THE cost of an amplifier (in which the power supply is an important factor) runs approximately in proportion to the power level. In cases where economy is essential, it is well to remember that, other things being equal, the signal from a 250-watt transmitter will be down only one S point (6 db.) from the signal level of an amplifier operating at the maximum legal input of 1 kw. While the single S point may sometimes spell the difference between copy and no copy when working DX at low signal levels, it may serve merely to cause the receiving operator to turn his gain control down a bit in rag-chew operating over moderate distances where the average signal level is ordinarily relatively high. At the same time, the kilowatt job will cost about four times as much and will be approximately four times as large and heavy. With s.s.b. and c.w. rag-chew operating in mind, and minimum cost being essential, these considerations led to the 250-watt two-band unit shown in the photographs. The 80- and 40-meter bands were chosen as most appropriate for the purpose.

Within the last few years, the grounded-grid mode of operation has become popular because an amplifier of this type is simple to build and stabilize, and also because commercial s.s.b. transmitters in the 50- to 100-watt range required to drive the grounded-grid brutes have become widely distributed. Possibly for this reason, not as many articles on high-gain tetrode and pentode linears have appeared in the amateur journals. Although the amplifier described here is of the grounded cathode-type, it is also simple to build, is extremely stable, and has no tuning controls for the input circuit. It uses cheap tubes and can be driven to 230 watts input in Class AB₁ mode of operation. It uses two 807W beam power

tubes (but 1625s and regular 807s can be used equally well) with 1100 volts on the plate and 408 volts on the screens. L networks are used in the grid circuit, and $2\frac{1}{2}$ watts will drive the amplifier to 230 watts or more. The input presents a constant load of 50 ohms to the exciter. This amplifier was designed as a companion unit to an s.s.b. exciter delivering from 10 watts p.e.p. output down to one watt or less. The circuit of the amplifier is shown in Fig. 1.

Circuit

The grid circuit consists of an L network for each of the two bands. This network is designed to look like 50 ohms from the exciter input side when the grid side is loaded with a resistance of 500 ohms. These circuits have a Q of 3.² The fixed-tuned networks are switched into the grid of the amplifier by a band switch. Once the value of L is set for the band in use, no further adjustment is required. The networks are easily set up by adjusting for a minimum s.w.r., using an s.w.r. bridge in the coaxial line between the exciter and the transmitter input, with the exciter set at a frequency in the middle of the desired band. All power to the amplifier, including filament supply, is turned off while making this adjustment. This arrangement for feeding grids makes it almost impossible for the amplifier to become unstable. No neutralization is required, and no tuning controls are necessary. The elimination of neutralization and tuning makes the amplifier as simple as a grounded-grid stage, but with the advantage that the power gain is several times greater, and the input impedance as seen by the exciter is constant. The latter is a very desirable feature.

The output circuit is the conventional pi network designed to operate into a 50- to 70-ohm

* Box 7, Wolfe City, Texas.

¹ See Peck, "Homebrew Custom Designing," QST, April, 1961.

² See Grammer, "Simplified Design of Impedance-Matching Networks," QST, March, April, May, 1957.

AMPLIFIER

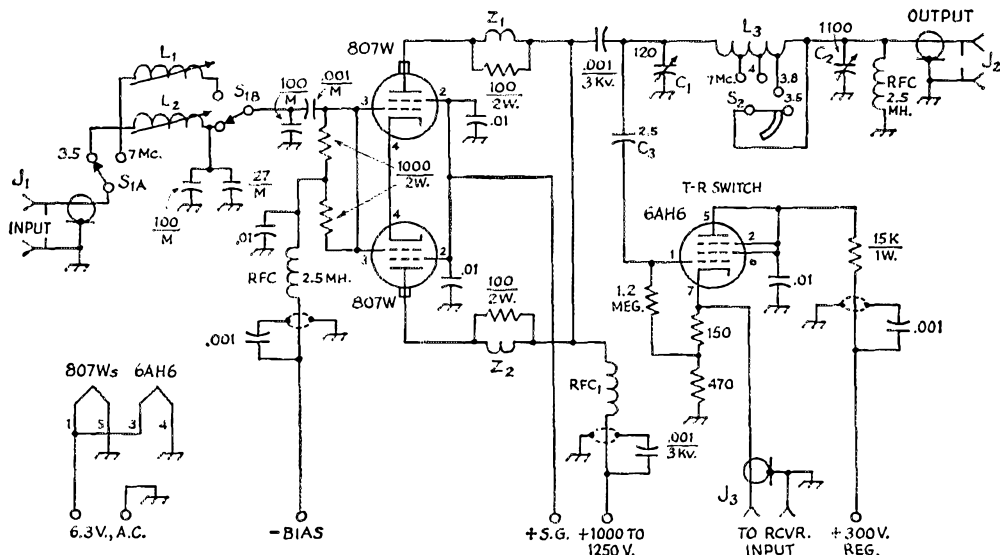


Fig. 1—Circuit of the RCC 230-L amplifier, including t.r. switch. Fixed capacitors are disk ceramic, except those marked M indicating mica. Resistances are in ohms and resistors are $\frac{1}{2}$ watt unless indicated otherwise. Decimal values of capacitance are in $\mu\text{f.}$; others are in pf. ($\mu\text{mf.}$) unless indicated otherwise.

C_1 —120- to 150-pf. 1500-volt air variable (Johnson 150F20/155-5 or equivalent).

C_2 —Three-section variable, 365-pf. per section, sections in parallel (broadcast-replacement type).

C_3 —See text.

J_1, J_2, J_3 —Chassis-mounting coaxial receptacle (SO-239).

L_1 —14 turns No. 24 enam. close-wound on $\frac{1}{2}$ -inch iron-core form (National XR-50 form).

L_2 —30 turns No. 24 enam. close-wound on form similar to L_1 .

L_3 —30 turns No. 14, $1\frac{3}{4}$ -inch diam., $2\frac{1}{2}$ inches long (Pi Dux 1411A).

S_1 —D.p.d.t. ceramic rotary.

S_2 —Single-pole four-position progressively-shorting ceramic rotary switch (CRL P-270 index, one type PSD switch section).

RFC $_1$ — $2\frac{3}{16}$ -inch winding length No. 26 cotton-enamel wire on 1-inch ceramic insulator (Raypar RL-102 may be used).

Z_1, Z_2 —5 turns No. 26 enam. wound on associated resistor.

line. A single tap on the coil is sufficient for the 40-meter band, but two tap positions, in addition to the full coil, are provided to permit maintaining a more or less constant Q across the wider 80-meter band.

T.R. Switch

The t.r. switch uses a 6A6 tube connected as

a triode cathode follower to couple the receiver to the plate end of the final tank circuit of the amplifier. In this way, "suck-out" of the signal is avoided. The t.r. switch is built into the final, and all outlets for the filament and plate voltages are well bypassed. As a result of these precautions, no TVI has been observed. The coupling capacitor (C_2) to the grid of the t.r. switch tube is made of one inch of RG-59/U. The braid acts as one capacitor plate and the inner conductor acts as the other. The approximate capacitance is 2.5 pf.

The amplifier is metered by a grid-current meter, the full scale of which is 10 ma., and a plate meter of 300 ma., full scale. The grid meter is useful in tuning up and also acts as a modulation monitor.

The Power Supply

The circuit of the power supply is shown in Fig. 2. The cost factor indicates the use of bridge rectification so as to keep the cost of the power transformer down. After a look through current catalogs for transformers in the 1200- to 1500-volt class at 200 to 300 ma., a Merit P-3157 was

Bottom view showing the filter capacitors and two additional filament transformers in the power-supply chassis. The bottom of the amplifier chassis is perforated in the area of the 807Ws for ventilation.

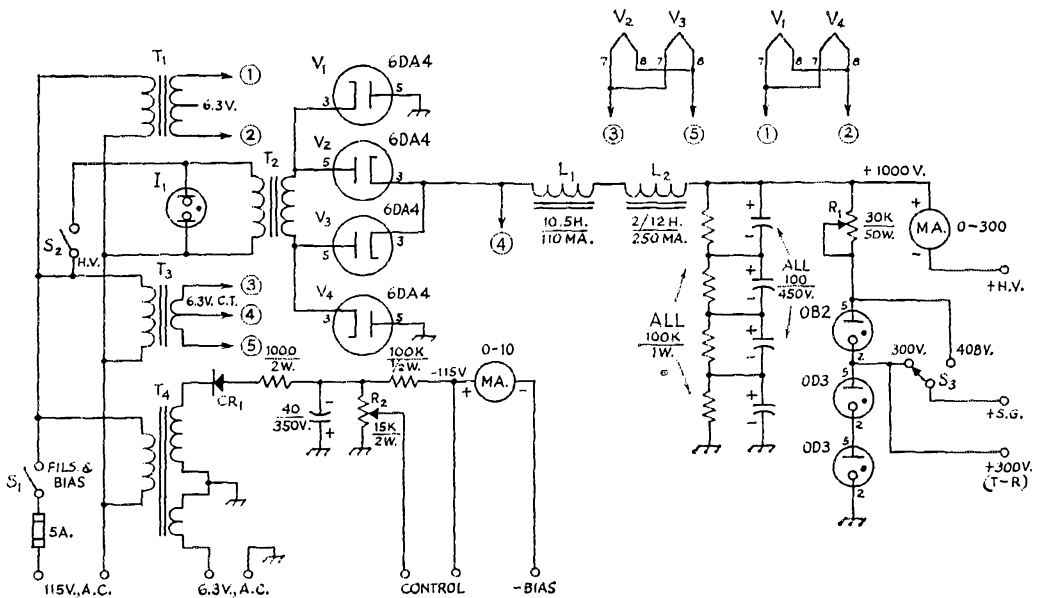


Fig. 2—Power and metering circuits. Capacitances are in μf . and capacitors are electrolytic. Resistances are in ohms. CR₁—Silicon diode, 400 p.i.v. (Texas Inst. 1N2070 or equiv.).

I₁—NE-57 neon lamp.

L₁—Filter choke (Stancor C-1001).

L₂—Swinging filter choke (Stancor C-1402).

R₁—Slider adjustable.

R₂—Wire-wound control.

S₁, S₂—S.p.s.t. toggle switch.

S₃—S.p.d.t. rotary.

T₁, T₃—6.3-volt 3-amp. filament transformer (Stancor P-6466).

T₂—Plate transformer, 1320 volts, 250 ma. (Merit P-3157, center tap not used).

T₄—Power transformer, 120 volts, 50 ma.; 6.3 volts, 2 amp. (Merit P-3045).

selected. The transformer delivers 660 volts each side of the center tap, and is rated at 250 ma. By dropping the center tap and using bridge rectification and a choke-input filter, about 1100 volts at 250 ma. can be obtained for s.s.b. operation.³ Past experience with this transformer has shown it to hold up well under these conditions, and it fits within the limited available space. By using heater-type rectifier tubes that have been developed for high-voltage service in TV work, we can build a bridge rectifier using only two filament transformers instead of the three usually required. Four 6DA4s were used here as they are small in size and have ample current and voltage ratings.⁴

Regulated screen voltage is obtained from VR

³ On the same basis as used by the manufacturer, the current rating would be reduced to 125 ma. when a bridge rectifier is used. However, because of the short duty cycle in c.w. and s.s.b. operation, a rating of 250 ma. for these services appears to be reasonable. The basic limiting factor is transformer temperature rise. — Editor.

⁴ The 6DA4 has a maximum cathode-voltage rating of 300 volts negative in respect to heater. In the bridge circuit, the cathode-heater capacitances of V₁ and V₄ are in series across the transformer-secondary voltage (approximately 1850 volts peak in this case). This voltage divides equally across the two capacitances if the capacitances are equal; if they are not equal, a higher voltage appears across the smaller of the two capacitances. In this instance, the minimum peak cathode voltage, negative in respect to heater, will be 925 volts. Although the author has experienced no failures, it would seem advisable to operate V₁ and V₄ from separate heater transformers. — Editor.

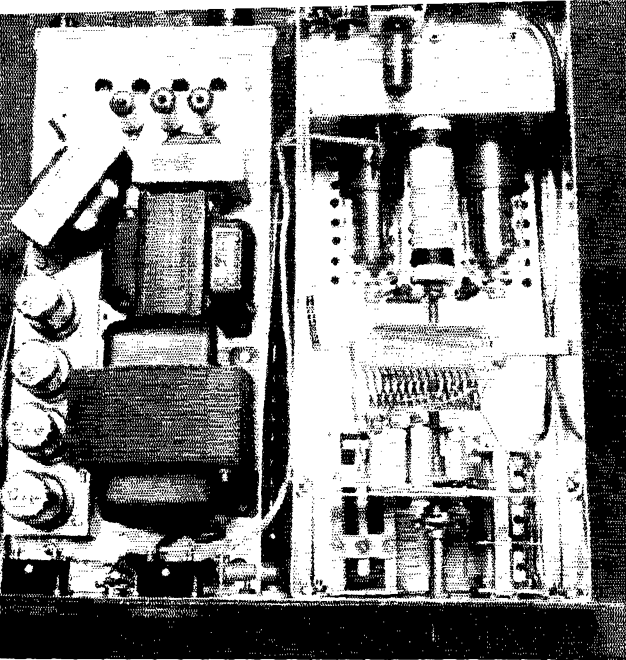
tubes across the power supply, and a switch is used to change the screen voltage from 300 to 408 volts. Don't be afraid to operate with screens at 408 volts on s.s.b., because, when the amplifier is properly loaded, the screens are within their rated dissipation.

A separate supply provides operating and stand-by blocking bias, and also filament power for the amplifier. With the control terminals open, full supply voltage is applied to the grids of the 807s, which reduces the plate current to a negligible value. When the terminals are closed for transmission, the operating bias may be set by adjustment of the potentiometer.

Putting the Amplifier into Operation

With all voltages, including filament, removed from the amplifier and the band switch in the 80-meter position, feed a 3.8-Mc. signal from an exciter capable of supplying about 3 watts of output to the input of the amplifier through an s.w.r. bridge. Adjust the slug in L₂ for minimum s.w.r. With the band switch in the 40-meter position, repeat the process with a signal at 7.15 Mc. Adjust the slug of L₁ for the same indication. The grid circuit is now adjusted and can be forgotten.

Remove excitation and turn on the filament and plate supplies with the screen-voltage switch set for 300 volts. Close the bias-control terminals and adjust the grid bias with the potentiometer until the plate current is just zero. Now switch the



Amplifier components are mounted inside an inverted $6 \times 6 \times 1\frac{1}{2}$ -inch homemade chassis of 0.051-inch aluminum sheet. The 807Ws and homemade plate r.f. choke are mounted on a standard $3 \times 4 \times 6$ -inch chassis which houses the grid-circuit components. The adjusting screws of the two grid coils may be seen to the right of the t.r. switch tube mounted on a bracket. The plate switch is mounted on an aluminum strip spanning the chassis below the plate coil. The grid band-switch shaft runs between the output and tuning capacitors and thence between the two amplifier tubes to the switch mounted inside the small chassis. This chassis is fitted with a cover of perforated aluminum.

Power-supply components are mounted on a homemade chassis of the same material, measuring 6 by $1\frac{1}{2}$ by 2 inches. The chassis is fastened to the panel with side brackets. The rectifier tubes are mounted on a narrow inverted-U-shaped subchassis made sufficiently high that the sockets clear the main chassis. The center portion of the chassis is occupied by the high-voltage transformer, filter chokes and one of the filament transformers.

screen voltage to 408 volts and adjust the potentiometer until the plate current is 40 to 45 ma. With no load on the output and no drive, rotate the plate tank and loading capacitors through their ranges. There should be no variation in plate current, and no grid current should show.

Now, with a dummy load such as a 100- to 150-watt lamp or a doublet antenna connected to the output, and the exciter connected to the input, insert carrier and tune for resonance with the plate tank capacitor, and load with the loading capacitor for maximum output as indicated on an output indicator such as the lamp or an r.f. voltmeter. When the input is such that the grid meter begins to show a very slight amount of grid current, the plate current should be in the neighborhood of 220 ma. when the amplifier is properly loaded, and the output should make a 150-watt lamp glow brightly. Now balance out the carrier. A sustained "ohhhh" into the microphone should cause a plate current of about 125 ma. when the grid meter shows a very slight flicker. Adjust the audio gain until the above conditions exist.

At this point it might be well to reinsert carrier and, with the same plate current as indicated previously (220 ma.) and the loading adjusted for maximum output, the output should fall off instantly as the excitation is lowered. If the fall-off is sluggish, slightly decrease the loading until the output falls instantly as the excitation is decreased. Again remove the carrier, and the amplifier is ready to operate on s.s.b. phone. When the p.e.p. power input is about 230 watts (1050 volts at 220 ma.), the output should be about 150 watts p.e.p. — a very respectable amount of power.

C.W. Operation

Switch the screen to 300 volts. Insert carrier

until the grid draws a current of about 4 to 5 ma. when the plate current at resonance is about 150 ma. and the r.f. indicator shows maximum output. Key the exciter and you're on c.w.

Good results should be obtained with this rig and tube life should be reasonably long with the ventilation afforded in this construction. In a similar rig using 1625s, the first pair of tubes lasted four years when operated about 10 hours a week — a total of more than 2000 hours. Tube cost was 50 cents.

I wish to thank K5BFT (Bob) for the nice decaling of the panels. If you want to hear this amplifier, look for him on the low end of the 75-meter phone band — s.s.b., of course. QST

Strays

The Metropolitan Ragchewers Club of South-eastern Michigan meets the first Sunday afternoon of each month at the Department of Recreation's Lakewood House in Detroit. It was founded three years ago and is dedicated to helping handicapped hams. Of its 100 members, about 10 are handicapped. Code and theory classes are held at the Lakewood House each Tuesday at 1930 EST. On-the-air meetings are held each Wednesday at 2100 EST on 50.250 Mc. A certificate is available through K8PUS (5336 St. Clair Ave., Detroit 13) for working 10 members (25 if you live in Michigan).

— . . . —

If you were ever a KR6 ham on Okinawa, please contact the Okinawa Amateur Radio Club, APO 331, San Francisco, Calif., and supply your current stateside address.

WASP Discontinued New WORM Award Announced

BY JOHN G. TROSTER,* W6ISQ

GET them guys away from the mobyles and let's get this meeting started. Lotsa business tonite."

"Hey Charlie . . . err, Mr. President, how many people applied for our WASP certificate?"

"Exactly why we are here. You gotta do somethin' about WASP."

"Ya mean they want *more* stickers and ribbons and . . ."

"Not exactly. Some guys wrote in and said it was too hard to get. They said they listened for four months and never heard nobody on the air from a State Park."

"Maybe they didn't listen to the right mode! Maybe some guys were on a.m. or even on RITTY or somethin'."

"Not a chance, fella. There's still lotsa guys on a.m. And if any RITTY ever came on from a Park, the boys would a used up his roll of paper in three minutes!"

"No Maritime Mobiles from the Parks like ya said last time, Charlie?"

"None of your lip, fella. Now come on, you guys. Quit foolin' around. You gotta get rid of WASP and make a certificate that guy can get."

"Charlie, maybe we didn't tell everybody all about the colored ribbons and stickers and how the certificate is really a wall mural with pict . . ."

"They know all that. Now come on. In four months nobody's worked nobody in a State Park. Ya gotta get an award so simple anybody can get it."

"That's what you said about WASP, Charlie."

"You're out of order, fella. Now face it, you guys. Ya gotta worm out of WASP."

"Charlie, what do ya mean 'you guys'? WASP was your idea."

"You're out of order, fella. Be quiet."

"Well, Charlie, if WASP is too tough, maybe we ought to make it so's everybody in the world who ever gets on the air can get it. Say an award for working just One Radio Station — W-O-R-S-. How about that one?"

"Ya mean just one QSO gets 'em an award?"

"Sure, Charlie. They're all mad at us now. Let's make everybody happy. Worked One Radio Station Award. Everybody's happy! And we worm our way out of WASP -- like you say."

"Hey wait a minute, fella — w-o-r-m. That's our new certif! Terrif!"

"What do ya mean w-o-r-m?"

"Worked One Radio Man. W-O-R-M. WORM!"

"Hey, Charlie, that's tremendous! Instead of WASP we'll have WORM."

"Right! It's still old mother Nature and we don't have to change the certif at all — only cut

*45 Laurel Street, Atherton, California.



out the picture of the wasp flyin' around and paste on a picture of a worm crawlin' through the grass or somethin'. And we can still use all the yards and yards of colored ribbons and thousands of stickers and . . ."

"Wait a minute, Charlie. Who ever heard of an award for working only one station? That's crazy. We'll be the laughing stock of the whole world again. WASP was bad enough but WORM!!"

"What I tell ya last time, fella? Ya gotta think big. So how about a few stickers for working more than one WORM? Every time they work a hundred guys with worms they get a sticker. What's wrong with that?"

"Worked One Hundred WORMS! Wow, Charlie, there you go again. You're nuts!"

"OK, good idea. That'll be another classification. W-O-W. Worked One Hundred WORMS! Wow, W—O—W—W—O—W! Thanks fella. Next?"

"How about different modes and stuff, Charlie?"

"Sure, all modes, all everything for everything. Just like WASP."

"Charlie, how about an award for them WOW Yayhoos who work a hundred WOWS?"

"Why not — why not? Worked a Hundred Yayhoos — W-H-Y — WHY. Very good award. Now, anything else?"

"Charlie, we're right back to WASP. We were supposed to make it easier for guys to get our award and right away ya got it so tough nobody'll go for it again!"

"Come on, fella. Sure they'll go for it with all them ribbons and stickers and pictures and all that jazz. Besides, what could be any easier? Only one QSO to get a mural . . . alhhh, award. That's all!"

"WORM's OK, Charlie, but the rest o 'em WOW . . . WHY . . ."

"Ya gotta meet the competition, fella. Right? Look, we got it now so's everybody can get in the act. Anybody can be a WORM! Right?"

"Oh, you're absolutely right there, Charlie.

(Continued on page 146)

• *Beginner and Novice*

Putting the ARC-5/T18 on 160 and 80 Meters

A Low-Cost and Simple Surplus Modification

BY LEWIS G. McCOY,* W1ICP

ONE ARC-5 unit that never seems to get much play is the T18, a transmitter that covers the 2.1- to 3.0-Mc. range. These particular units sell for less than the more popular types that cover ham bands; in fact, some surplus ads list them for less than five dollars brand new. One of the T18 units was obtained to see what could be done about making it suitable for ham use. This article treats rather simple modifications for putting the unit on 160 meters, plus a

few more changes to make it also cover the 80-meter band. When modified, you have a two-band rig which can be used for phone or c.w., run at 100 watts or so input, and also can be put to work as a v.f.o. with either 160- or 80-meter output. This makes quite a package for a small outlay of cash.

For the benefit of the newcomer to ham radio, the ARC-5 units (also designated SCR-274N equipment) are a series of transmitters and receivers that were used by the military, primarily in airplanes. The transmitters, at least those that operate up through the 9-Mc. region, consist of a 1626 variable-frequency oscillator which drives a pair of 1625s. The 1625s are a 12-volt version of the 807. Also included in the transmitter is a 1629 tuning indicator and a crystal that is used for calibration purposes. In normal operation the transmitter operates on 24 volts with the heaters of the tubes connected in series. The customary procedure in modifying these units for ham use is to convert the heater wiring for 12.6 volts. Before actually taking up the wiring changes, let's see what modifications are required on the T18 to make it suitable for our purpose.

Modifications Required

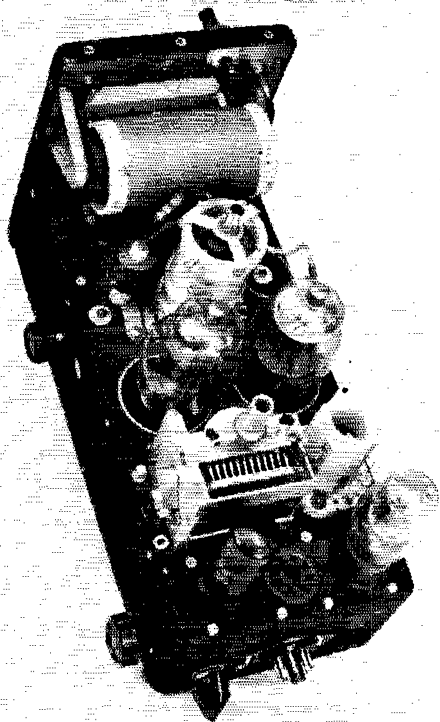
As stated above, the normal operation of the units is for 24 volts, but it is much easier for a ham to get 12.6 volts for the heaters. Also, there are several control circuits and relays built into the unit that are designed to work off the 24-volt d.c. source. These are of no use for our purpose so they can all be removed.

Whenever a v.f.o. tube is followed by a stage connected to the antenna there is always a danger of the output stage "pulling" the oscillator, causing serious frequency shift of the transmitted signal. This shows up as a bad chirp on the keyed signal. If such an output stage is modulated, then you also run into the problem of the transmitted signal having frequency modulation and unwanted spurious signals. The cure is to install a buffer stage which provides better isolation between the oscillator and output stage.

In the T18 described here, a 12A6 was used for the buffer. The 12A6 is a pentode that is used in the ARC-5 receivers, and is available in the surplus market for about 50 cents.

Besides the isolation problem, the amount of

* Technical Assistant, QST.



In this view the oscillator coil assembly cover is removed. The variable capacitor referred to in the text is adjacent to the oscillator coil. Just to the rear of this capacitor is the 12A6 buffer. Mounted on the rear panel is J_1 and also the knob for S_1 . The knob on the side near the 12A6 is for C_1 and the knob nearer the front of the unit is for the amplifier capacitor mentioned in the text.

Fig. 1—A—The circuit diagram of the buffer stage. B—Connections to the octal plug. Resistors are 1/2-watt.

C₁—100-pf. variable (Hammarlund APC-100-B).

C₂—0.001- μ f. disk ceramic.

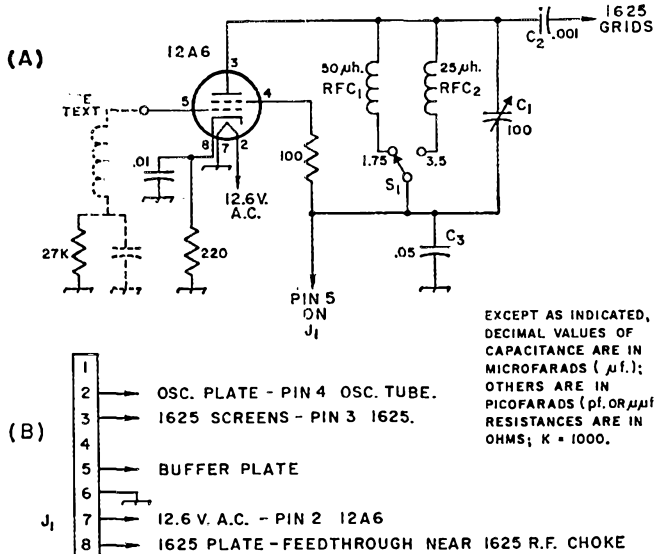
C₃—0.05 μ f. (see text).

J₁—Octal male connector, chassis-mounting type (Amphenol 86-CP8 and adapter ring 12-001-03).

S₁—S.p.d.t. wafer switch (Centralab 1460).

RFC₁—50- μ h. r.f. choke (Millen 34300-50, National R33).

RFC₂—25- μ h. r.f. choke (Millen 34300-25).



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ f.); OTHERS ARE IN PICOFARADS (pf. OR μ mf.); RESISTANCES ARE IN OHMS; K = 1000.

drive provided by the oscillator tube to the 1625s is marginal and, in our case, was actually too low for 100 per cent plate modulation. Adding the buffer stage provided more than enough drive on both 160 and 80 meters.

A logical addition after converting the rig to 160-meter coverage, 1750 kc. to 2000 kc., was to make the unit work on 80, covering 3500 kc. to 4000 kc. All that was required for this was the addition of two switches and an r.f. choke.

Modification Steps

Remove the bottom cover from the transmitter and make the following wiring changes:

1) Remove the wire-wound resistor that is mounted on the back wall of the transmitter.

2) On the electron-eye tube socket (1629) move the lead on Pin 7 to Pin 2 and ground Pin 7 to chassis ground.

3) On the 1625s, one has Pin 7 grounded and the other has Pin 7 ungrounded. The tube with the ungrounded Pin 7 we will call tube 1 and the other tube 2. On tube 1, remove the lead from Pin 7 and connect the lead to Pin 1 on tube 2. Ground Pin 7 on tube 1.

4) There is a relay mounted on the side of the chassis. Remove the relay and the two leads that are connected to the terminal plug on the rear of the transmitter.

5) Remove the top cover from the transmitter and then remove the relay mounted on the front wall. Also remove the leads attached to the relay. This completes the heater modifications.

If you happen to have one of the transmitter mounts, all power connections can be made to the receptacle on the mount. However, the mounts are scarce items, so the best procedure is to remove the power socket on the rear of the transmitter and substitute an octal chassis-mounting plug, J₁, Fig. 1.

Carefully unsolder all the leads connected to the rear power socket and remove the socket. Mount the octal plug in its place. Fig. 1B shows the connections to the new plug.

For c.w. and metering purposes, a key jack should be connected in the 1625 cathode circuit. Mount a closed-circuit jack on the front panel in the lower left-hand corner. Run a lead from the key jack to the cathodes, Pin 8 on either of the 1625 sockets.

Power Requirements and Modulator

At this point, the transmitter should be capable of operating on its normal range, 2.1 to 3.0 Mc. Before taking up the 160- and 80-meter modifications, let's see about a power supply and modulator. Power requirements for the oscillator are 250 volts at 20 ma. The buffer also takes about 20 ma. at 250 volts. The 1625 screens need 300 volts at 5 ma. and the plates of the 1625s from 500 to 750 volts for c.w. and about 600 volts maximum for plate modulation. In either mode the plate-current maximum is 200 ma. The heaters are 12.6 volts at 2.5 amp.

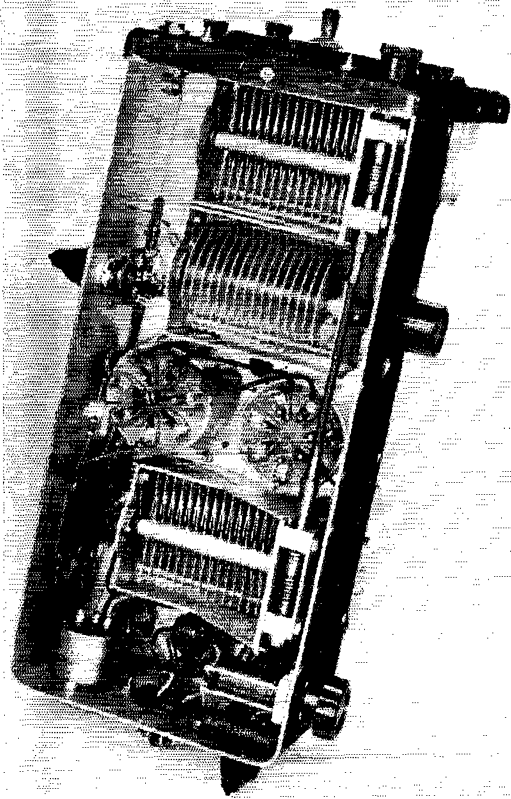
A past issue¹ of *QST* carried the description of a modulator that made use of an MD-7/ARC-5 modulator, the modulation transformer in this particular unit being specifically designed for the ARC-5 series. This same article also carried the description of a power supply capable of running both the modulator and a transmitter similar to the T18. The power supply was low cost because it made use of a power transformer and other parts taken from a junk TV set. In the event you don't want to use the MD-7 modulator, another suitable one was described in a recent issue of *QST*.² In this case, a commercially available modulation transformer was used. Either modulator would be suitable. In fact, any modulator that will give from 40 to 60 watts output is okay. Still another source for a modulator is the ARRL *Radio Amateur's Handbook*, which describes several units that will do the job.

When the power supply is made up and con-

¹ McCoy, "Plate Modulation for the TV-Set/Surplus Transmitter," *QST*, July, 1961.

² McCoy, "Plate Modulation for the 150-Watt," *QST*, July, 1962.

160- and 80-Meter Modifications



At the lower right corner are grouped the components for the tank circuit of the 12A6 buffer. The unit against the back wall covered by insulation is RFC. The insulation is to prevent accidental shorting of the choke. At the lower left corner is the potted capacitor, one section of which is C₃.

Just above the 1625 sockets is the variable capacitor that has the added shaft extender. On the other side of this capacitor mounted on the transmitter wall is the switch for changing the amplifier tank coil from 160 to 80 meters.

needed to the T18, you are ready to test the transmitter. Use a dummy load; a 100-watt light bulb is suitable. Connect the load between the antenna output terminal and chassis ground. Be sure to connect the output arm that is connected to the roller coil assembly to the output terminal. Insert a key in the key jack, leaving the key open, and turn on the power supply. Tune the transmitter to 2.1 Mc., and listen for a signal from the oscillator with your receiver. If you don't hear a signal, check your wiring for any errors. Of course, the tubes should light up; if they don't, then you can be sure there is a wiring error. If the oscillator is working, you can close the key and see if the dummy load lights up. You may have to run the roller coil shorting wheel down to where there is little if any of the coil in the circuit. Also, be sure that the "antenna coupling" knob is set for maximum coupling, at 9 or 10.

If you are only interested in 160 meters, there are only two things you need to do to put the rig on that band. The first thing is to remove the cover over the oscillator coil (just to the rear of the 1625s). Note that there is a variable capacitor with the arm locked in place by a screw. Remove this screw. Set your receiver to 1750 kc. and the transmitter to 2.1 Mc., turn on the power for the transmitter but leave the key open. Next, swing the arm on the capacitor rotor around until you hear the oscillator signal in your receiver. The 2.1-Mc. setting now is actually 1.75 Mc. When you put the oscillator cover back on the setting will change so you will have to experiment to get the correct setting.

The other step is to adjust the amplifier band-set capacitor so that the oscillator and amplifier tuning still track (stay in tune as you move the frequency knob on the front panel).

If you look at the bottom of the transmitter, the variable capacitor to be changed is the second one back from the front panel. The rotor arm of this capacitor is also locked in place by a screw. Remove the screw to free the arm. With the light-bulb dummy load on the rig, close the key and adjust the rotor arm for maximum brilliance in the load. This indicates resonance in the final amplifier. We found the tracking held with a single setting of the capacitor when the transmitter was tuned from 1.75 Mc. to 2.0 Mc. Another way to check the correct setting of the amplifier capacitor is to insert a 0-300-ma. meter in series with the key lead. This will give you an indication of the cathode current for the 1625s and the capacitor can be tuned for a meter "dip."

You can operate the T18 on 160 with these two changes but, as we pointed out earlier, there is not enough grid drive to the amplifiers to do the job right. What is worse, there is pulling of the oscillator resulting in chirp on c.w. and f.m. on phone. Anyone who takes pride in his signal should not settle for anything but the best. The addition of the buffer will take care of the problem.

Buffer Addition

The 12A6 buffer tube is installed in the socket that was used for the electron-eye tube. Remove all the wiring from this socket with the exception of the connections to Pins 2 and 7 (heater wires). There are a couple of resistors mounted on this socket but they can be removed along with all the other wires. On the crystal socket there is a 15,000-ohm resistor between Pins 8 and 3. Remove this resistor and in its place put a 27,000-ohm, $\frac{1}{2}$ -watt resistor. This new resistor will be the grid leak for the 12A6. Fig 1A is the schematic of the buffer stage.

Note that the grids of the 1625s are connected together and to a lead coming up out of the oscillator coil compartment. Unsolder the lead that comes up from the compartment where it joins the 1625 grid leads. Connect a lead from Pin 5 of the 12A6 socket to the lead that comes up

from the oscillator compartment. This lead should be insulated and in our modification the lead was run around the back near the oscillator tube socket.

On the 1625s, mount a 10,000-ohm, 1-watt resistor between the grids and ground. This is the new grid leak for the tubes. Pin 2 on the 1625 sockets is not used, so it can be used as a tie point. Connect a 0.001- μ f. disk ceramic capacitor between Pin 2 and the grids, Pin 4. From Pin 2 on the 1625, run a lead to Pin 3 on the 12A6. If you are only interested in 160, you can eliminate the switch, S_1 , and RFC_2 . However, we'll assume you want coverage on both bands, either as a transmitter or for using the rig for a v.f.o. S_1 , C_1 , and RFC_1 and RFC_2 are mounted in the corner of the chassis directly below the 12A6 socket. The switch is mounted on the rear wall and the variable on the side. C_1 must be insulated from ground, so be sure to allow enough clearance around the rotor shaft when installing it. The type capacitor specified in the parts list has two insulated mounting feet. The only remaining step is to connect the buffer plus-B line to Pin 5 on the octal power socket. The plate and screen bypass, C_3 , is one section of the potted capacitor on the rear wall of the unit.

The amplifier modification consists of adding another switch of the same type as S_1 , to short out part of the amplifier coil, and putting an extension on the tuning shaft of the amplifier handset capacitor. The switch is mounted on the chassis side (see bottom view) and two leads run up from the switch to the amplifier coil. If you examine the amplifier coil assembly you'll see that it is wound in three sections, a lower winding, then a gap, another winding and another gap, and then the top section. Fortunately, the middle winding can be shorted out for 80-meter operation. We say fortunately because there is space to solder coil taps on the winding. Without the space it would be quite a chore to remove the coil assembly to get at the winding. There is a total of 17 turns shorted out when going on 80 meters.

The last step consists of adding a shaft extender to the amplifier handset capacitor. The locking arm is held in place by two small Allen set screws. In our unit the screws had been painted over and no amount of paint remover or thinner could get the screws clean enough to be removed easily with an Allen wrench. Finally, the capacitor was removed from the unit in order to get enough leverage on the wrench and this did the trick. Also, in our unit, the rotor of the capacitor was rather loose and wouldn't stay in one place when tuned. On the rear bearing support for the rotor is a screw which, when tightened, stiffened the rotor bearing enough to remove the sloppiness.

Tuning Up

With the addition of the buffer stage the plate circuits of both the buffer and amplifier must be tuned independently of the front panel control.

As there is no arrangement for metering grid current, the simplest method is to measure the cathode current as outlined previously. Switch the transmitter for 160-meter operation, insert a meter in series with the key, leave the plate and screen voltage off the 1625s and close the key. Tune C_1 for a maximum cathode-current reading which should be about 8 to 10 ma. With a dummy load on the output, turn on the plate and screen voltages of the 1625s and close the key again. Tune the 1625 handset capacitor for a current dip, which will indicate resonance of the amplifier. You can adjust the roller inductor for increased loading but don't run more than 200-ma. cathode current on the 1625s.

Some amateurs will prefer to change the antenna terminal to a coax fitting and there is no reason why this cannot be done. Such a change would probably be worthwhile if the unit is to be used as a v.f.o. or with a coax-fed antenna. Incidentally, as a v.f.o., the plate and screen voltages for the 1625s should be about 250 volts, as the unit will provide adequate output at this voltage.

With random length, end-fed wires for antennas, be sure to use a good earth ground on the transmitter. The antenna coupling network in the transmitter consists of a variable link inside the tank-coil form. One side of the link is grounded and the other side is connected to the roller wheel on the rotary inductor. If a transmatch is used with the unit it would probably provide a great deal more flexibility of adjustment if the transmatch has a variable capacitor in series with its link.

QST

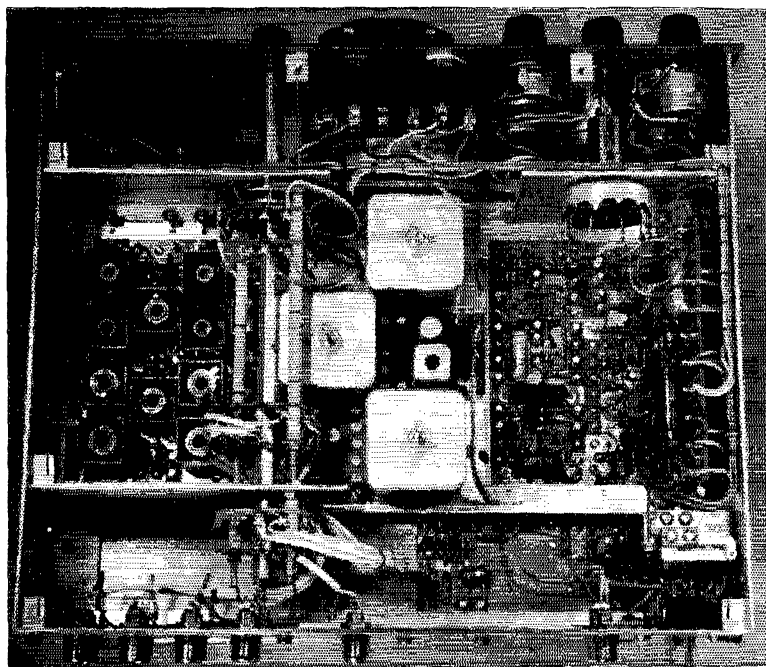
Strays

It's time for a reminder about those new domestic postal rates that went into effect on January 7. First-class letters are 5¢ for the first ounce. First-class cards are 4¢, provided the card is not more than $3\frac{3}{16}$ by $5\frac{9}{16}$ inches — if it exceeds either of these dimensions, the letter rate will be charged. In addition, any piece less than 3 inches high (wide) or $4\frac{1}{4}$ inches long is non-mailable. Any odd shape (other than square or rectangular) is non-mailable.

Airmail letters go at 8¢ for the first ounce, and airmail cards are 6¢.

— . . . —

Now that new postal rates are in effect, here's the cost of returning the average package of 100 DXCC cards, weighing 15 oz., first-class registered mail, to amateurs in the U. S., Canada, and Mexico — \$1.35 (or 14 IRC). Elsewhere in the world the cost would be \$1.69 (17 IRC). (IRC are redeemed here at 11¢ each.) If you send in more than 100 cards, adjust those figures accordingly. The new postal rates for foreign first-class mail are 11¢ for the first ounce and 7¢ each additional ounce. The domestic rates (including Canada and Mexico) are 5¢ for the first ounce and 5¢ for each additional ounce. The registry fee for all mail is 60¢.



Bottom view of the complete transistor receiver. Two lateral crossbraces of aluminum angle support (from left to right) two h.f. converters, (to be described in the concluding article) the i.f. tuner subassembly, audio section, and detector/a.g.c. section. The tuning capacitor is mounted above deck, back-to-back with the tuner assembly. The band switch (also discussed in the concluding article) is mounted on aluminum plates attached to the crossbraces and to one side plate of the chassis. S_{1C} (12 v.) is closest to the panel, followed by S_{1B} (a.g.c.), S_{1D} (converter output) and S_{1A} (antenna input). A shorter plate on the right-hand side supports the a.g.c. time-constant switch. The muting relay and the perforated board containing power-distributing components (of Fig. 2A) are fastened against the right-hand chassis side plate. Phono jacks at the rear of the chassis are for antenna, speaker, muting control, and external-converter connections to the band switch.

A Transistor Audio System with Squelch Control

Compact 400-mw. Class B Unit

BY B. E. HARRIS,* W6ANU/4

This is the third of a series of four articles^{1, 2} on transistor application to a communications receiver. Included in this article is general information on the assembly of the various units described in the series to form a complete multiband all-transistor communications receiver and power supply.

ALTHOUGH squelch control of an audio amplifier in a ham-band receiver is not usually considered too important, it is a convenience under any circumstance which requires a receiver to be run for long periods of time on stand-by

with the gain controls turned up, especially in noisy locations. It is particularly useful in net or emergency operation. Mobile operators, who usually find it necessary to run the gain well up to overcome ear noises, find that a squelch system removes the annoying rise in hash between signals as they tune across a band. Since the added cost and complexity is slight, it seems worthwhile, even if it is used only occasionally.

The circuit shown in Fig. 1 was designed primarily to serve as the final section of a communications receiver, preceding sections having been described in earlier articles as indicated in the footnotes. For this reason, the input stage (Q_1) is an emitter follower, used as a means of transforming the relatively high output impedance of a detector² to the low impedance of

* Chief Engineer, Polaris Project Office, Patrick AFB, Fla.

¹ Harris, "A Tunable I.F. Amplifier Using Transistors," *QST*, December 1962.

² Harris, "Selective Transistor I.F. Strip and Dual Detector System," *QST*, January, 1963.

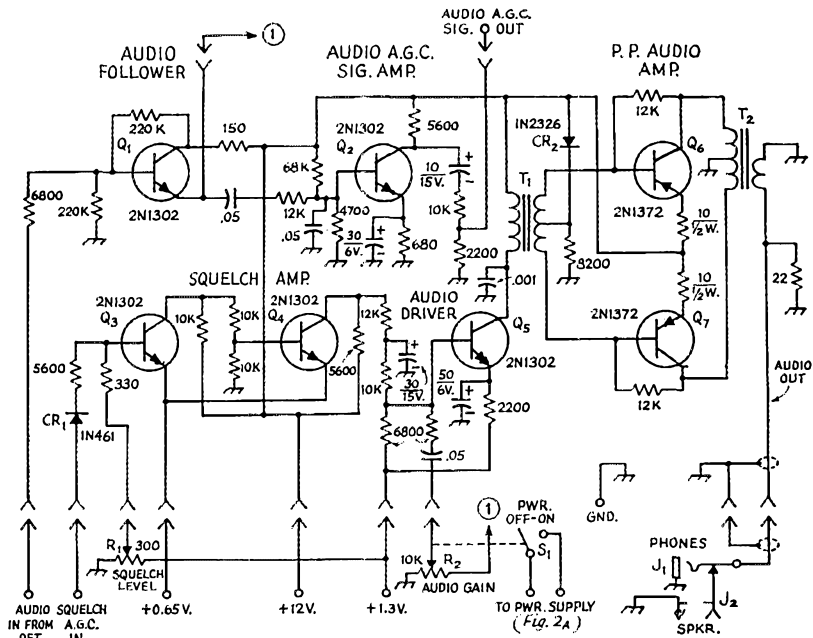


Fig. 1—Audio and squelch circuits. Circuitry shown connected by the line of plugs and jacks is external to the unit. Capacitances are in μf . Capacitors marked with polarity are electrolytic; others are disk ceramic or mylar. Resistances are in ohms and resistors are $\frac{1}{4}$ watt unless indicated otherwise. All plugs and jacks indicated, but not listed below, are single-circuit miniature (CTC 2379-1 and 2378-2). Other components not listed below are identified for text-reference purposes.

- J₁—Miniature closed-circuit phone jack.
- J₂—Phono jack.
- R₁—Linear-taper control.
- R₂—Audio-taper control.

- S₁—S.p.s.t. attached to R₂.
- T₁—Transistor driver transformer, 10,000 ohms to 2000 ohms (Lafayette TR96).
- T₂—Transistor audio-output transformer, 400 ohms to 11 ohms (Lafayette TR109).

two common-emitter stages in parallel. One of these (Q₅) is the driver for the Class B output stage. From a voltage divider in its collector circuit, the other amplifier (Q₂) supplies an audio signal source for an audio-operated a.g.c. system.² The 0.05- μf . capacitor in the input circuit of Q₂ attenuates high-frequency components in the audio signal. This makes the a.g.c. less sensitive to noise and more sensitive to voice-frequency signals.

Audio from the input follower is fed to the driver through the gain control, R₂. The power switch, S₁, is ganged to this control.

Squelch System

The emitter and base bias resistors of Q₅ are returned to a positive 1.3-volt reference level, rather than to ground. This causes the emitter-base diode of Q₅ to be reverse-biased when the output stage of the squelch amplifier (Q₄) is turned off. In this condition, the driver stage is gated off, and there is no audio output. The squelch control, R₁, controls the bias on the input stage of the squelch amplifier (Q₃). With R₁ in the maximum-resistance position, Q₃ is on, Q₄ is off, and the audio driver stage is biased normally. In this condition, the squelch has no effect. To use the squelch, the arm of R₁ is adjusted toward ground until the audio is just

gated off under the existing noise-level condition. Q₂ is then off and Q₄ is on. A.g.c. voltage is applied in parallel to the base of Q₃ and, when a signal is received, the positive-going a.g.c. voltage switches Q₃ on and Q₄ off, thus gating the audio on.

The gain in the squelch amplifier is such that positive switching will occur with only a few millivolts change in the base bias on Q₃. The squelch will work on signals only slightly above the noise level, provided that the noise level itself is fairly constant. The 5600-ohm resistor between CR₁ and the base of Q₃ prevents reaction from the squelch bias on the S meter and a.g.c. system. The forward drop across CR₁ and diode CR₄ in the a.g.c. system² in series insures that there will be sufficient range of control in the squelch potentiometer to allow turning the audio off even under very noisy conditions. The emitters of Q₃ and Q₄ are returned to a plus 0.65-volt reference level to insure that these stages stay fully cut off when they are supposed to be. The high gain of the two stages gives the "snap" action required in a good squelch system. The 30 μf . capacitor delays the action slightly to give a more pleasing sound.

Output Stage

The output audio stage is a conventional Class

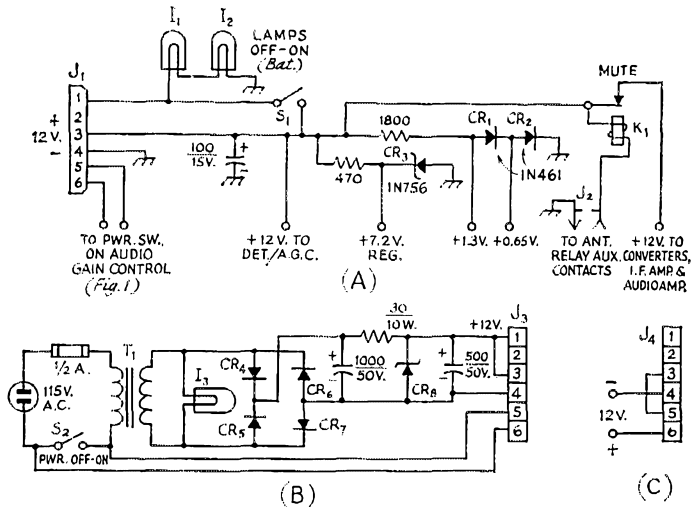


Fig. 2—Circuit of the power-supply system for the complete receiver. (A) shows the voltage control and distribution circuits for use with either a.c.-operated or battery supply. (B) shows the circuit of a suitable a.c. supply delivering 12 volts, while (C) shows the input-connector terminations when battery supply is used. Capacitances are in μf , and resistances are in ohms, and resistors are $\frac{1}{4}$ watt unless indicated otherwise. Components not listed below are identified for text-reference purposes.

CR3—Zener diode.

CR4—CR7, inc.—100-volt 500- to 750-ma. silicon diode (1N537, 1N1692, 1N2069, 1N2610).

CR8—12-volt 10-watt zener diode (1N1354, 10EZ12T10).

L1, L2—6.3-volt 1 c.p. dial lamp (G.E. No. 51).

L3—28-volt dial lamp.

J1—6-prong male connector (Cinch-Jones P-306-AB; use female S-306-CCT on cable).

J2—Phono connector.

J3, J4—6-prong female connector (Cinch-Jones S-306-AB; use male P-306-CCT on cable).

K1—12-volt low-current d.c. relay.

S1, S2—S.p.s.t. toggle switch.

T1—24- to 28-volt 0.75- to 1-amp. transformer (Stanco-P6469).

B amplifier. T_1 and T_2 are small inexpensive Japanese-made transformers available from Lafayette and other supply houses. The frequency response falls off rapidly below 200 cycles.

The maximum output is about 400 mw., which is adequate to drive a 6-inch speaker for fixed-station use. However, an auxiliary amplifier of several watts output would probably be desirable for mobile operation. The 22-ohm resistor loads the output when high-impedance phones are used, or when the speaker is accidentally disconnected. Diode CR2 provides bias temperature compensation and reduces the possibility of thermal runaway of the output transistors.

This section is also built on a $4\frac{1}{4} \times 17\frac{1}{16}$ -inch piece of copper-coated phenolic board.

Power Supply

Fig. 2A shows the arrangement for obtaining the various voltages required for operation of the complete receiver. Fig. 2B is the circuit of an external a.c.-operated supply delivering 12 volts, while Fig. 2C shows the connections that are used for battery supply. When J_1 and J_3 are connected with a matching cable, the switch on the audio gain control (Fig. 1) controls the a.c. power supply (when S_2 is open). Panel lamps L_2 and L_3 light when the supply is turned on. With J_2 and J_4 connected by the same cable, the 12-volt battery input is controlled by the switch on the audio gain control, but the panel lamps are lighted only when S_1 (Fig. 2A) is closed. As

mentioned earlier in the series,¹ the lamps consume about five times as much power as the receiver, so with battery operation it pays to turn the lamps off when they are not needed.

The drop across the zener diode, CR3, supplies a regulated 7.2 volts. It also serves as an effective decoupling filter. A convincing test consisted of substituting a 100- μf . capacitor for the zener diode. Under this condition, there was sufficient coupling from the b.f.o. through the common power-supply impedance to completely saturate the a.g.c. when it was being fed from the r.f. source.

The two required lower voltages are obtained from the drops across CR1 and CR2. The forward drop across a silicon diode is reasonably constant with variations in current.

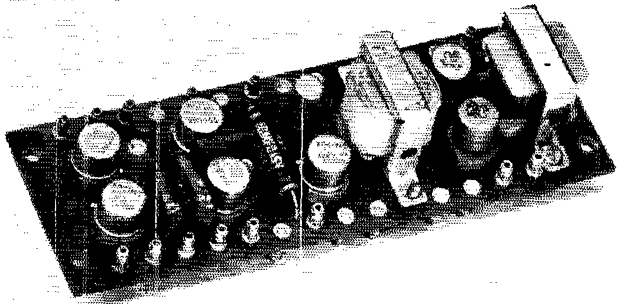
Relay K1 is included to provide a means of muting the receiver from auxiliary contacts on the antenna relay. When the circuit across J_2 is closed, the relay opens up the +12-volt lead to all sections of the receiver except the detector/a.g.c. unit.

With the exception of J_1 , J_2 , L_1 , L_2 , S_1 and K_1 , the components of Fig. 2A are mounted as a sub-assembly on a piece of perforated insulating board. Also included in this subassembly are the time-constant capacitors for the a.g.c. system.²

Receiver Assembly

The general plan of construction of the complete receiver may be seen in the photographs

A complete 400-mw. audio system with squelch control. Components are mounted on a $2\frac{1}{4} \times 1\frac{1}{16}$ -inch strip of copper-coated phenol.



which have appeared thus far with this series of articles. The panel is 7 inches high and 10 inches wide. The chassis is a U-shaped affair $4\frac{1}{16}$ inches deep. The two sides are cut from 0.048-inch aluminum sheet. The front ends of these side pieces are cut to a height of 7 inches and bent to form support brackets for the panel and the Eddystone dial. The panel is fastened to the front faces of the angles so formed. Tubular spacers are used between the dial plate and the rear face of the angle to provide the necessary clearance between panel and dial. Pieces of $\frac{1}{2}$ -inch dural angle form the rear corners of the chassis. The two angle pieces are joined by a sheet of 0.064-inch 24ST dural sheet to form the rear side of the chassis. This same material is used for the panel. Dural is much better than aluminum for areas where drilling and tapping are required. However, it cannot be bent on the short radius required in forming the side pieces.

It will be noted that the chassis is divided into two levels, each level having a similar arrangement of openings for mounting standard-size ($4\frac{1}{4}$ - by $1\frac{1}{16}$ -inches) subassemblies. The lower level will accommodate six of these subassemblies. Five subassemblies may be mounted on the upper level. (The shield can of the b.f.o., mounted on the lower level, interferes with mounting a sixth unit above it.) The lower level is at $2\frac{13}{16}$ -inches above the bottom of the chassis.

Three-quarters-inch aluminum angle $\frac{1}{8}$ -inch thick is run inside along the top edges of the sides and back. Crossbraces of the same material are run as required to support the various units. One such crossbrace transverse the chassis, toward the rear, supports one side of an aluminum plate with cutouts to accept the standard subassembly dimensions. Two other angle crossbraces are

spaced to accommodate the longest dimension of the subassembly plates. These are placed at such a level that when the plate carrying the tuning capacitor is mounted across them, the capacitor shaft will line up with the dial shaft. The capacitor mounting plate, with a cutout for the flywheel of the dial, extends to the panel to which it is attached by means of tapped blocks of square dural. This construction not only provides a rigid mounting for the tuning capacitor but it also stiffens the panel in the area of the tuning knob.

The tuner subassembly plate is placed back-to-back with the capacitor mounting plate, but on the under side of the angle, with the thickness of the angle material separating them. This pair of angles also provides a mounting for the detector/a.g.c. and audio subassemblies.

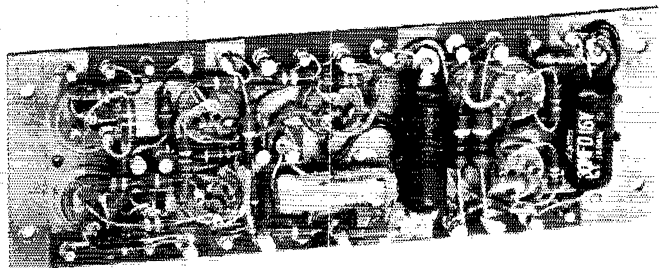
The rearmost of the two crossbraces just mentioned, in conjunction with an additional angle running at the same level across the back of the chassis, supports a pair of small lateral aluminum strips on which the i.f. strip is mounted. The shield cover for the tuning capacitor is made from a piece of 0.04-inch anodized soft aluminum sheet.

The angle-assembly holes are drilled and tapped for 4-40 screws, and the holes in the angles for mounting the subchassis are drilled and tapped 2-56. Very few nuts are required, and this facilitates assembly. Where interferences occur, the faces of the angle stock are trimmed as necessary.

D.c. wiring within the main chassis is done with No. 22 solid-conductor plastic-insulated wire, while r.f. circuits are wired with No. 24 stranded-conductor shielded wire. The wiring is

(Continued on page 98)

Bottom view of the audio strip.



The October 28, 1962 issue of This Week Sunday Supplement Magazine featured "Fabulous Little Oscar," a popularized version of the Oscar I and II satellite story. Mentioned in this article was the breadboard version of Oscar III, a translator device designed to permit beyond-horizon v.h.f. communication between radio amateurs via satellite. Ground-based, the prototype of Oscar III has already demonstrated the capability and opportunities that amateur-band translators will provide in the days ahead. This article discusses the philosophy and the development problems of a v.h.f. translator similar to the one proposed for Oscar III.

The Oscar III V.H.F. Translator Satellite

BY WILLIAM I. ORR,* W6SAI

THE recent orbital flights of Oscar I and Oscar II proved conclusively that radio amateurs could track a radio satellite, compute its orbit and predict future orbits of the satellite, and could recover useful information from the satellite signals.¹ The interest aroused in the world's first radio amateur space experiments showed that a program of this scope and execution had merit, and could contribute to better understanding and cooperation between radio amateurs of the world.

Because amateur radio is a hobby of *communication*, it was only natural that the members of Project Oscar, Inc.² turn their thoughts toward an active satellite that would contribute to two-way communication between radio amateurs. As a result, some time before the launch of Oscar I a small group of Oscar enthusiasts began to explore the possibilities of an amateur communications satellite. As the investigation progressed, gradually the concept of a v.h.f. translator *satellite* began to crystallize. Tentative specifications for a breadboard satellite translator were prepared by Don Norgaard, W6VMH, and presented to the Board of Directors of the Project. In response to this proposal, a timetable to cover design, development and fabrication of a prototype communications satellite was established. A completion date of October, 1962, for the electrical design of the prototype was set and the problem was turned over to the team of Don Norgaard, W6VMH, and Ed Hilton, W6VKP. Theirs was the fascinating and formidable task of designing and building the Oscar III prototype test package. Their success in this venture was indicated on the evening of October 10, 1962, when the breadboard translator package went on the air from W6VMH, repeating a 50-kilocycle segment of the 144-Mc. amateur band at a somewhat higher frequency in the same band. During that evening several simultaneous 2-meter QSOs were made through the translator, proving the ability of Oscar III to retransmit amateur signals on a

spectrum basis. A new story in the history of amateur radio was unfolding!

The Spectrum Translator

Two-meter *repeaters* have been in use for some time, relaying v.h.f. signals over otherwise impassable routes. These units have simply been receiver-transmitter combinations that accepted any *single* signal operating on the receiver frequency channel of the repeater, demodulated it, and then retransmitted the signal on another frequency. Of greater interest to radio amateurs would be a package that would repeat a *segment* of the v.h.f. radio spectrum, permitting simultaneous use of the repeater capability by a number of stations of mixed types of emission—e.w., a.m., f.m., s.s.b., etc. This is the purpose of the Oscar III spectrum translator.

The Oscar III "black box," regardless of the electronic configuration within, has some rather severe environmental limitations placed upon it. First of all, it must be rugged enough for space flight. It must be compact and light, and it must meet an absolute primary power level. In addition, if it is an active device, some means must be provided for reliable ground control of the transmitting section. Shown in the drawing is a block diagram of Oscar III, which has been successfully tested in land-based breadboard service. In brief, it is a compact, transistorized v.h.f. spectrum translator, operating within the internationally assigned 2-meter band (144–146 megacycles). The receiver portion of the translator covers a 50-kilocycle frequency range of 144.075–144.125 Mc. (centered about 144.1 Mc.) which is translated to the transmitter portion in the range of 145.875 to 145.925 Mc. (centered about 145.9 Mc.). In practical terms, this means that amateurs separated by hundreds or thousands of miles could communicate with each other by transmitting to the Oscar III satellite on a frequency in the reception portion of the satellite operating spectrum, and by listening to the respective satellite-translated signals in the transmitting portion of the satellite spectrum.

To understand the translator function, assume that Oscar III picks up an amateur signal on

* c/o Project Oscar, Inc., Box 183, Sunnyvale, Calif.

¹ Orr, "Oscar I: A Summary of the World's First Radio-Amateur Satellite," *QST*, September, 1962.

² Formerly, The Oscar Association. See *QST*, October, 1962, p. 63.

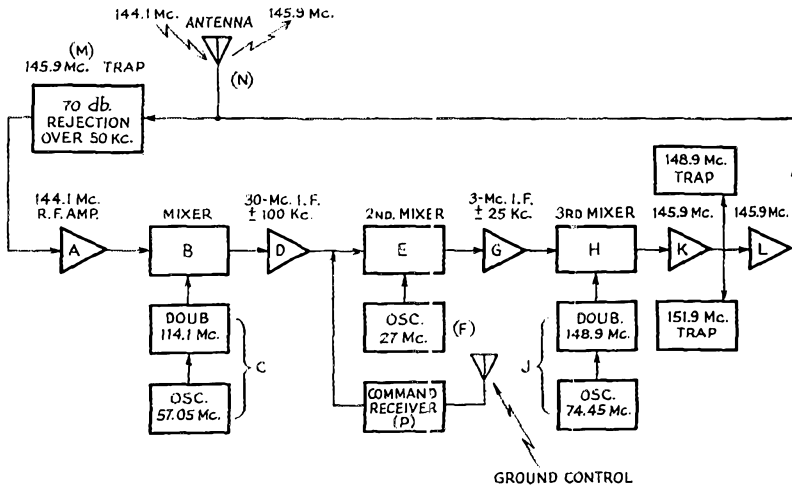


Fig. 1—Breadboard prototype of Oscar III designed by W6VJAH and W6VKP. The incoming and outgoing frequencies (144.1 Mc. and 145.9 Mc., respectively) are the center frequencies of 50-kc. bands. The lower band is received, translated to the higher one, and retransmitted.

144.105 Mc., near the center of the satellite receiver passband (Fig. 1). The signal passes through the rejection filter (M), about which more will be said later, is impressed upon an r.f. amplifier stage (A) and converted to the first intermediate amplifier frequency by the mixer (B). The input signal of 144.105 Mc. is now one of 30.005 Mc. A 57.050-Mc. crystal oscillator and doubler (C) supply a 114.100-Mc. local injection signal to accomplish this conversion. A broad-band, low-gain 30-Mc. first i.f. amplifier (D) drives a second mixer (E) which converts the signal to the second intermediate frequency of 3.005 Mc. by virtue of mixing with the second local oscillator (F) working on 27 Mc. The high-gain, 3-Mc. i.f. strip (G) has a total passband of 50 kilocycles (Fig. 2) which determines the operational passband of the translator. From here, the signal is mixed higher in frequency (H) by a beating signal of 148.900 Mc. supplied by a 74.450-Mc. oscillator-doubler chain (J). Successive linear amplifier stages (K and L) further amplify the resulting 145.895-Mc. signal to a one-watt peak-envelope power level and feed it back to the translator antenna (N). The signal transmitted by the translator on 145.895 Mc. is a replica of the signal received on 144.105 Mc., except for a frequency inversion. In like fashion, other signals within the receiver passband are translated from one spectrum to the other, all with inversion about 145.0 Mc. This inversion, incidentally, converts upper sideband signals to lower sideband and *vice versa*.

Command Control

Since the satellite is capable of occupying a chunk of frequency 50 kilocycles wide and because it could be abused by thoughtless ground operators ("lids"), it is imperative that the transmitting portion of the equipment be readily controlled from the ground by a coded, or

"keyed" signal. A command receiver (P) picks up a coded control signal from Oscar Hq., which is used to block or unblock the output system. The normal equipment state will be "on," and it is not the intent to employ command control to "police" use of the translator.

Beacon

A 30-milliwatt output beacon signal is planned for Oscar III. Tentatively, its frequency will be 145.850 Mc. Operation of this beacon will be independent of the translator function.

Circuit Isolation and "Birdies"

Mechanical limitations restrict the Oscar package to a single, simple whip antenna which serves for both reception of incoming signals and retransmission of the translated signal. Because reception and transmission are simultaneous and not time sequenced, the usual forms of antenna relays or t.r. switches could not be used. The difficult task of designing a compact, light, rela-

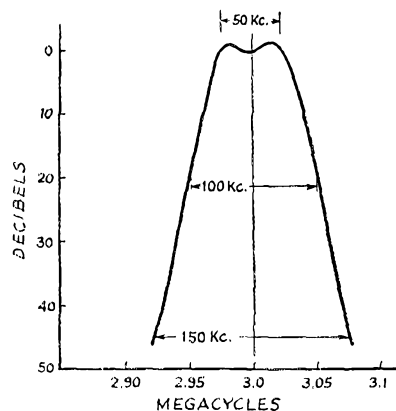


Fig. 2—Passband of the 3-Mc. i.f. amplifier in the prototype translator.

ble rejection trap that would provide over 70 decibels of protection for the receiver from the transmitter output over the 50-ke. passband was left to the tender mercies of Don Norgaard, W6VMH. When it is realized that this degree of rejection is obtained between two frequencies only 1.8 Mc. apart at 144 Mc. (slightly over 1% frequency separation!), the excellence of this portion of the Oscar "black box" can be appreciated by circuitry connoisseurs. In fact, the whole fate of the Oscar III proposal hung upon the operation of this trap, and a few anxious days passed until the problem was solved.

Various "birdie" traps are incorporated in the design, such as the traps tuned to 148.9 Mc. and 151.9 Mc. and placed in the linear amplifier circuits of the transmitter section. Thus, by the judicious choice of frequencies and the trapping of unwanted signal energy, the complete translator is satisfactorily free of "birdies" and spurious signal responses.

Much Remains to be Done

Although a breadboard version of Oscar III is functioning atop a 30-foot mast at W6VMH, it does not mean that the package is ready for an early launch. The circuits are being proven by use, but the complete translator unit must be repackaged for environmental tests and necessary changes (if any) must be incorporated in the unit to insure its survival of the rigors of rocket launch and space environment.

The power source for Oscar III remains a formidable problem that must be solved. The total power consumption of the prototype translator package is of the order of 5 watts. At first thought, this amount of power seems minute, but when it is remembered that the supply must be contained within the satellite and that no power cord exists connecting Oscar III to an unlimited land-based supply, the problem assumes gigantic proportions. Any battery capable of delivering

5 watts over a period of weeks would weigh hundreds of pounds. On the other hand, solar cells mounted on the container capable of delivering an average output of 5 watts would occupy a surface larger than that of the present Oscar package. The conversion efficiency of available solar cells runs about 8%, and it must be remembered that all sides of the container cannot be illuminated by the sun at one time. On the average, it would require at least 18 watts of cell output capacity to deliver 5 watts of power (day and night) as Oscar III tumbles in its orbit. A sufficient quantity of cells would require a surface area approximately six times the area of the Oscar I and II packages.

A large percentage of the 5 watts primary power is dissipated in the form of heat, for the translator consumption is about four watts with no signal input, and delivers only one watt at full output. Thus, four to five watts of heat must be continually dissipated by the Oscar III package. How is this heat to be dissipated if the whole surface is covered with solar cells? Power dissipation is equally important as power generation, if the package is not to burn itself up in orbit!

The power supply problems are under study at the present time and several novel and unusual solutions hold promise. At the same time, the breadboard version of the translator circuitry is being repackaged for space environment. The launch of Oscar III will depend upon the successful conclusion of these parallel undertakings.

A late spring or early summer launch is the target date for the Oscar III flight. The Project Oscar group is working toward this date, and progress of the first radio amateur 2-meter translator satellite program will be reported in the pages of *QST*.

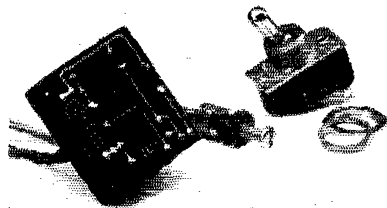
Thanks to Ed Hilton, W6VKP, and Don Norgaard, W6VMH, for the necessary background material for this review and for their help in preparing this article. QST

● *New Apparatus*

Miniature Noise Limiter

The use of semiconductors as noise limiters often has been disappointing because of the difficulty of finding a semiconductor diode with a high back resistance — one comparable to a thermionic diode. The noise limiter shown in the photograph uses a semiconductor diode in a self-adjusting series gate circuit, but overcomes the leakage problem by using a silicon computer diode with extremely high back resistance.

Since the diode requires no heater, the circuit can be very small. This one measures only about $1\frac{1}{4} \times 1\frac{3}{8} \times \frac{7}{16}$ inches. The whole assembly is encapsulated in epoxy. A hole in the center of the block facilitates mounting the limiter in any convenient spot in the receiver. Only three connections are required to the companion receiver, which can be



either a tube or hybrid type. No power is required for the limiter; it can be turned on or off by way of a remote toggle switch connected to the limiter through a shielded cable.

The noise limiter, model NL-1, is manufactured by Kolin Engineering Co., Box 357, Bronxville, New York. Another model, NL-2, which will work with all-transistor receivers, will be available soon.

— E. L. C.

Second European Foxhunt

It's All Done On Foot:

THE Second European Championship in Fox-hunt was held on August 10th and 11th 1962 in Yugoslavia at Ankaran on the northern border of Adriatic. These competitions were organized by Savez Radioamatera Jugoslavije (SRJ).

On the fox-hunt on 3.5 Mc. there were 4 foxes and on 144 Mc. 3 foxes respectively. The competitions were held according to the International Regulations adopted for the first fox-hunt which was organized by SSA the previous year in Sweden.

At the Championship competitors from Austria, Norway, Poland, Sweden, USSR and Yugoslavia took part. It ought to be emphasized that the USSR team was managed by the well-known amateur Ernest Krenkelj, RAEM, president of Federation for Radio Sport.

On behalf of Swedish amateurs at the competitions was present Carl-Erik Tottie, SM5AZO, president SSA. The International Committee I Region was represented by its member Janez Žnidaršič, YU1AA.

On behalf of I Region IARU the Championship was open by SRJ's president, ing. Slobodan Nakičnovič, YU1A. He welcomed all the competitors and guests wishing them much success in competitions and comely sojourn. The president SRJ emphasized that hundreds of thousands amateurs in the world play an important role in international events bringing by their activities to a closer friendship and cooperation between all amateurs from all countries around the world, disregarding to racial, national or religious prejudices.

Heinz Kratochwill, OE1CV, Jan Vojcikovski, SP9DR, Ernest Krenkelj, RAEM and Carl-Erik Tottie, SM5AZO, addressed their best wishes to all competitors and guests conveying the friendly regards of their societies to Yugoslav amateurs. All of them pointed out the interest and importance of such new discipline in international ham competitions in fox-hunting which enters very interesting elements in amateurs activities enabling thus many personal contacts and contributing to the popularization of amateur radio in general.

On the first session to which presided YU1AA where representatives of all societies were present an International Jury was elected with YU1AG as chairman and SM5AZO, RAEM, and SP9DR as members. The representative of Austria was not eligible for the OEV team did not arrive by this time.

In the fox-hunt on 3.5 Mc. 4 teams from Austria, Norway, USSR and Yugoslavia with 2 competitors each took part. Besides that there started another 16 countries for individual competitions. In total there were 24 competitors as follows: 13-YU, 4-UA, 3-OE, 2-LA, 1-SP and 1-SM amateurs.

After the International jury checked the logs the following results were announced.

Teams Results

1. UA-Team	8 foxes	2.30' 30"
2. YU-Team	8 foxes	3.51' 00"
3. LA-Team	8 foxes	5.39' 00"
4. OE-Team	7 foxes	5.23' 00"

Place	Name and call sign	Total time
1	Anatolij Grečlin, UA3TZ	0.58' 00"
2	Ivan Martinov, UA3KBW	1.25' 00"
3	Igor Saljiminov, UA3AEF	1.32' 30"
4	Aleksandar Tosić, YU1FC	1.35' 00"
5	Babić Veselin, YU6BLM	1.36' 30"
6	Darko Muc, YU3APR	1.49' 00"
7	Ivo Primac, YU3DL	1.49' 00"
8	Jakob Klun, YU3BK	2.16' 00"
9	Gunnar Svensson	2.46' 30"
10	Heinz Kratochwill, OE1CV	2.48' 30"
11	Ole Holdhe, LA3QG	2.48' 30"
12	Sverre Bjørndal, LA1KG	2.51' 00"
13	Nikola Perković, YU6BLM	2.54' 00"
14	Milorad Brajović, YU6BLM	3.02' 30"
15	Stanko Kulidžan, YU4GR	2.32' 00" (3 foxes)
16	Alois Krisehke, OE8AK	2.34' 30" (3 foxes)
17	Tomislav Laco, YU4CFG	1.32' 30" (2 foxes)
18	Helmut Kropp, OE3UK	1.34' 00" (2 foxes)
19	Aleksander Akimov, UA3AG	2.08' 00" (2 foxes)
20	Djemal Sijerica, YU4LL	2.14' 00" (2 foxes)
21	Boguslaw Przeworski, SP5BP	2.58' 30" (1 fox)

On August 11th 06.58 MEZ a signal for start in fox hunting on 144 Mc. was given. The competitors were bound by regulations to hunt down 3 foxes. 21 competitors started but only two teams from USSR and Yugoslavia. (15 competitors from YU, 4-UA, 1-SP and 1-SM)

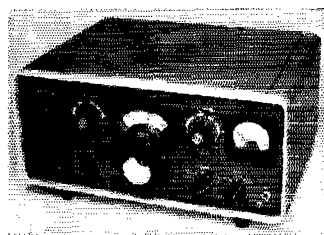
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In the photo to the left is a group of competitors before the start of the Second European Foxhunt, on 3.5 Mc., and in the photo to the right a group before the start on 144 Mc.



• Recent Equipment —

Collins 32S-3 Transmitter



THE lead paragraph in a column last year describing the Collins 75S-3¹ receiver reflected on the light weight of that new receiver. Looking over the specifications for the Collins 32S-3, the transmitter companion to the 75S-3 receiver, one can't help but notice immediately that the same virtue is exhibited by the transmitter. In fact, it weighs less than the receiver — only 16 pounds.

A separate power supply is necessary for the transmitter, a return to an old idea of years ago, when it was not uncommon to have a separate power supply even for the receiver. This was probably done in the case of the 32S-3 in order to keep the physical size of the package in accordance with that of the mating 75S-3 receiver. There is no question that the transmitter was designed specifically for use with the Collins receiver, since most of the jacks, plugs, interconnecting cable, etc., are compatible to the two units. When the 32S-3 is used with the 75S-3 receiver, the operator has the choice of frequency control either by the transmitter or the receiver. However, with a little time spent going over the instruction manual and schematic diagram, the

transmitter can be integrated with most other "brand" station components.

Most of the specifications of the 32S-3 transmitter are similar to those of its predecessor, the 32S-1 (the 32S-2 is a military model). It has a frequency range of 3.4 to 5.0 Mc., and 6.5 to 30.0 Mc. Crystals are furnished so that the following segments in the amateur bands can be covered: 3.4 to 3.6 Mc., 3.6 to 3.8 Mc., 3.8 to 4.0 Mc., 7.0 to 7.2 Mc., 7.2 to 7.4 Mc., 14.0 to 14.2 Mc., 14.2 to 14.4 Mc., 21.0 to 21.2 Mc., 21.2 to 21.4 Mc., 21.4 to 21.6 Mc., and 28.5 to 28.7 Mc. Transmitting modes include either upper or lower single sideband, and c.w. There is no provision for a.m.

A look at the front panel of the 32S-3 shows only one additional control over the previous model, a c.w. calibrate control. Inside the cabinet, however, there is quite a difference in the circuitry of the 32S-3. The method of generating c.w. is altogether changed. In the 32S-1, and the KWM series, c.w. was generated simply by feeding a keyed audio tone into the single sideband portion of the transmitter. This process generated a weak "satellite" signal in the unwanted sideband and created some operator problems with zero beating. Now the c.w. system is more conventional with the signal formed by

¹ Recent Equipment, *QST*, February 1962.

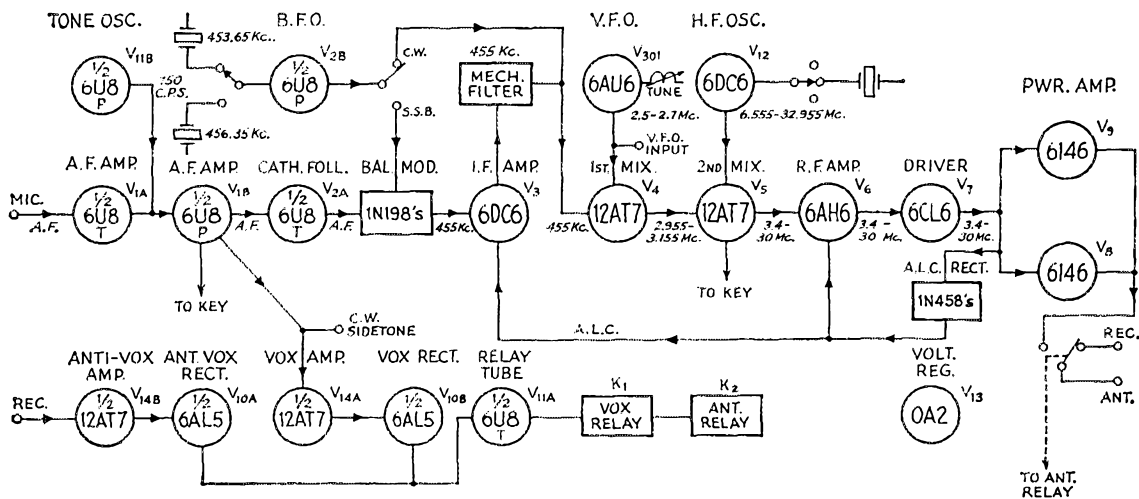


Fig. 1—Block diagram of the Collins 32S-3 transmitter.

skirting the carrier oscillator signal around the balanced modulator and filter sections of the transmitter.

A block diagram of the 32S-3 is shown in Fig. 1. When the transmitter is set up for s.s.b. transmission, audio from a high-impedance microphone or a low-impedance audio line is amplified and applied to the semiconductor balanced modulator. Also, output from the b.f.o., V_{2B} , feeds to the balanced modulator. Upper and lower sidebands from the modulator are amplified in V_3 and applied to the mechanical filter where either the upper or lower sidebands pass through. The filter passband is centered at 455 kc. and the desired sideband is selected by a panel EMISSION switch, which switches in either of the two crystal controlled b.f.o. frequencies, 453.65 or 456.35 kc. This places the sidebands in the proper position in the filter bandpass for either rejection or acceptance.

In the c.w. emission, the balanced modulator and filter are sidestepped and the b.f.o. signal is fed directly to the first mixer, V_4 .

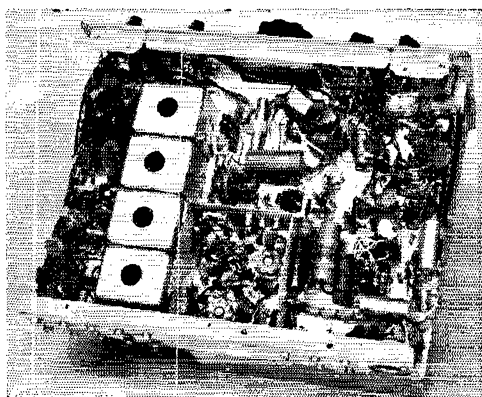
Signals arriving at the first mixer are combined with the output of the built-in v.f.o. and converted to a frequency somewhere between 2.955 and 3.155 Mc. The v.f.o. frequency ranges from 2.5 to 2.7 Mc. and the v.f.o. has the same permeability-tuned oscillator used in other Collins equipment. In fact, the dial (calibration accuracy is rated at 1 kc.), tuning rate, calibrations, knob, etc., are identical to those of the 75S-3 receiver. When changing sidebands, diode switching is used in the v.f.o. for automatic shifting of the oscillator frequency an amount equal to the frequency separation of the two b.f.o. crystals. This solves the dial calibration problem.

Provisions are made for introducing excitation from an external v.f.o., such as that provided by the 75S-3 receiver, as long as it is in the 2.5 to 2.7 Mc. range. A phono jack at the rear apron of the transmitter is for attaching the external v.f.o. The rated stability after warm-up of the built-in v.f.o. is less than 100 cycles.

After leaving the first mixer, V_4 , signals are heterodyned to the desired amateur band frequency in the second mixer, V_5 . Injection is furnished by a crystal controlled h.f. oscillator, V_{12} . The frequency of this oscillator is always 3.155 Mc. higher than the lower edge of the desired band segment. (For instance, the h.f. oscillator would be on 17.155 Mc. for 14.000-Mc. operation). The necessary crystal is placed in the h.f. oscillator circuit by the panel BAND switch.

The second mixer, V_5 , is the keyed r.f. stage in the c.w. mode. Grid-block keying is used and the time constants are adjustable in the circuit for "hard" or "soft" keying. The KEYING SHAPE control is located inside the transmitter's cabinet and is accessible by lifting up the cabinet lid.

A 6AH6, V_6 , straight-through r.f. amplifier and 6CL6 driver, V_7 , provide the necessary amplification to drive the parallel 6146 r.f. linear amplifiers, V_8 and V_9 . All of the tuned circuits that couple V_5 to V_6 , V_6 to V_7 , and V_7 to the

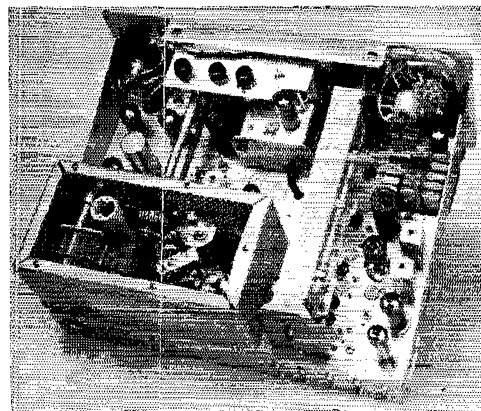


Bottom view of the 32S-3 transmitter. The four shield cans at the left of the photograph house bandswitch wafers and exciter tuned circuits. The 455 kc. mechanical filter is attached to the chassis with a plastic cable clamp and is visible at the top center of the chassis, just above the large tubular capacitor.

amplifiers are ganged to the panel EXCITER TUNING control. The dial for this control is calibrated in frequency (3.5 to 28 Mc.) and has a relative scale for logging purposes (1 to 10).

A pi-network couples the output of the amplifier to the antenna load and the circuit is designed for a 50 ohm load with not more than a 2 to 1 s.w.r. Output from the transmitter is rated at 100 watts p.e.p. into 50 ohms on 80, 40, and 20 meters, 90 watts on 15 meters, and 80 watts on 10 meters.

Automatic load control (a.l.c.) is used in the 32S-3 to prevent overdriving the r.f. amplifier. A fast-attack slow-release time constant is used to hold the gain more or less constant between words in s.s.b. Audio is detected in the p.a. grid circuit and rectified by the a.l.c. rectifiers. This



The cabinet and a cover plate have been removed in this view of the 32S-3 transmitter. The r.f. final amplifier stage is contained in the perforated compartment. Vox controls and the Keying Shape control are on the plate just behind the front panel at the top of the photograph. Except for the power connector at the left rear of the chassis, all 15 connectors along the chassis rear apron are phono connectors.

d.c. bias is applied to V_6 and to V_3 and controls their gain.

Vox and anti-vox circuits in the 32S-3 are conventional and control a vox relay (K_1 in Fig. 1), which in turn actuates the antenna relay, K_2 , and controls the p.a. and driver screens, receiver muting circuits, oscillator plate voltages, a high voltage relay in the external d.c. power supply, and the "key" line. The usual gain controls for anti-vox and vox and the vox time constant are available inside the cabinet.

A c.w. sidetone is provided in the 32S-3. The tone oscillator, V_{11B} , is an RC phase-shift oscillator operating at about 750 c.p.s. which supplies the sidetone output terminated at a phono fitting at the rear of the cabinet. The tone also feeds into the vox amplifier, V_{14A} , and activates the vox circuitry for c.w. break-in. The VOX TIME CONSTANT inside the cabinet can be adjusted for the desired release time of the vox circuitry.

A sample r.f. signal can be obtained for calibration purposes or when it is desired to zero beat the transmitter with a signal tuned in on the receiver. The CW CAL knob on the front panel is pushed in toward the panel for the beat note. The knob can also be rotated for adjusting out-

put level. The switch is a spring-return type and automatically disconnects the calibrate circuit when the knob is released.

As mentioned earlier, the 32S-3 styling is similar to the other S-line components -- a gray perforated cabinet and darker gray vinyl panel. Accessory items for the equipment include its power supply (516F-2), linear amplifiers (30L-1, 30S-1), and a station control unit (312B-4) and speaker. -- E. L. C.

Height: $6\frac{9}{16}$ inches.

Width: $11\frac{3}{4}$ inches.

Depth: $11\frac{1}{2}$ inches.

Weight: 16 pounds.

Power requirements: 800 volts d.c. at 230 ma.; 275 volts d.c. at 190 ma.; -60 and -80 volts d.c.; 6.3 volts a.c. or d.c. at 6 amps. or 12 to 14 volts d.c. at 3.0 amps. or 24 to 28 volts d.c. at 1.5 amps.

Price class: \$750.

Manufacturer: Collins Radio Company, Cedar Rapids, Iowa.

Eico Model 722 V.F.O.



AMATEURS looking for a v.f.o. with power output sufficient to drive a 5763, 6AG7 or similar following stage will be interested in the new Eico v.f.o. model 722. This unit, which seems especially designed to drive the Eico 720¹ or 723² transmitters but is equally adaptable to other exciter units, comes in kit or wired form and is readily assembled using ordinary tools from a step-by-step construction manual furnished. When completely assembled, tuned and calibrated according to instructions provided, the unit delivers 10 to 20 volts of r.f. output on 80 or 40 meters. The dial is calibrated for the 80 through 10-meter bands.

There are two stages in the v.f.o., a 6AU6 Clapp oscillator and a 6CB6 output stage which serves as a straight buffer for 80 meters and as a doubler for 40-meter output. Output frequency ranges cover the entire 3.5 to 4.0 Mc. band, the entire 7.0 to 7.3 Mc. band, and also 7.25 to 7.64 Mc. to cover the upper half of the 10-meter band with suitable external multiplier stages.

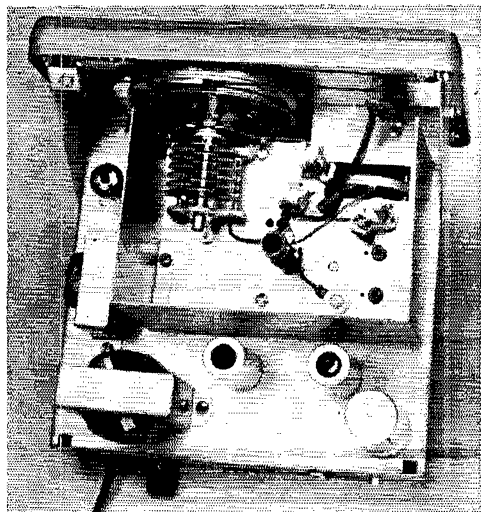
A key can be inserted in a closed circuit jack in the cathode of the oscillator for full break-in c.w.; or, keying can be accomplished in a subsequent stage of the transmitter being driven; or, by a multi-pole relay which keys both the v.f.o. and driven transmitter simultaneously.

The v.f.o. is powered by a self-contained power supply. The voltage-doubling rectifier circuit uses a pair of silicon diodes, and delivers about 240 volts d.c. A third tube in the unit is an 0A2 regulator, used to control the screen voltage of the 6AU6 oscillator to a constant 150 volts, thus enhancing its stability.

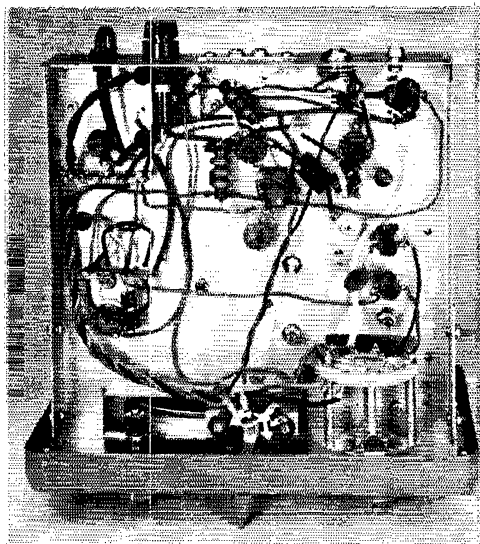
The front of the v.f.o. cabinet is mostly occupied by a large slide-rule dial by means of which, after proper calibration, frequencies can be selected to within a couple of kc. on 80 meters. Calibration scales are included for the 80, 40, 20, 15 and 10-meter bands. Below the large dial to the left is a combination ON-OFF and BAND selector switch for 80, 40-20-15-10 and a separate position for 40-meter output to cover the rest of the 10-meter band. In the center of the panel is a FUNCTION switch with three positions, marked

¹ Recent Equipment, *QST*, July 1959.

² Recent Equipment, *QST*, March, 1961.



Top view of the Eico Model 722 v.f.o. with its top shield removed shows main tuning capacitor and dial mechanism, 0A2 regulator tube at left, choke, power transformer at the lower left and the 6AU6 oscillator, 6CB6 buffer-multiplier, filter capacitor at the lower right. Along the rear apron are the power cord, fuse, relay terminal block, key jack and output jack. Trimmers for calibration are in the shielded compartment at the upper right.



Under-chassis view of the Eico v.f.o. shows the arrangement of components. The FUNCTION switch is at the bottom center, the BAND switch is at the bottom right and just above it are the slug-tuned coils for output peaking.

SPOT, STAND BY and TRANSMIT. On STAND BY, the switch simply breaks the lead to the output receptacle, thus removing output. There is no difference between SPOT and TRANSMIT positions on this switch unless a multi-pole relay is used to key the v.f.o. and driven transmitter simultaneously.

Output of the v.f.o. comes from a phono jack in the rear, and a short piece of coax with two phono plugs is supplied so that the v.f.o. can conveniently be coupled to transmitters having this type of connector; or, a different type of connector can easily be attached to one end of the

coax. Fuse, terminal board for connecting a keying relay, if used, and the key jack are also located along the rear of the chassis. — G. H.

EICO MODEL 722 V.F.O.

Height: 6 inches.
 Width: 8½ inches.
 Depth: 9 inches.
 Power requirements: 115 volts a.c.
 Price class: \$45 kit, \$60 wired.
 Manufacturer: Electronic Instrument Co., Inc., 33-00 Northern Blvd., Long Island City 1, New York.

Strays

While WA6HAI was in the vicinity of Pueblo on a motor trip with wife and mother, his mother suffered a stroke. He subsequently chartered an ambulance to return her to Los Angeles, and used the mobile ham rig in his own car to establish contact with W6LK and WB6AEK to facilitate hospital arrangements. As a result, there was no delay upon his arrival in Los Angeles.

A Hallicrafters SX-14C receiver was stolen from the Grand Valley High School Radio Club (K8VNP), Orwell, Ohio (near Cleveland). Any info on this receiver should be sent to Richard Fry, K8RHR, 132 Peniman Ave., East Orwell, Ohio.

One thing you ought to think about on these winter evenings is whether or not your Field Day

generator is ready to go. Howard Sams has recently published (available through Technical Publications, Inc., 1014 Wyandotte St., Kansas City 5, Mo., at \$4.95) the sixth edition of *Small Engines Service Manual* which covers some 1250 models of 42 popular makes of small gasoline engines. A wealth of information in 352 pages, 8 × 11 inches, photographs, diagrams, exploded drawings, detailed service instructions.

The Antique Wireless Association, which has a fabulous collection of old-time ham gear (see *QST* for May, 1959, "History in the Making") would like to hear from amateurs who are interested in the history of ham radio or collecting and restoring early equipment. Write to Bruce Kelley, W2ICE, Main Street, Holcomb, N. Y., for information on the AWA.

Second World-Wide RTTY Sweepstakes Results

Over 250 Stations Active

A CHECK of the logs received shows that upwards of 250 RTTY stations throughout the world participated in the Oct. 20-22, 1962, RTTY SS. Of this number only about 25 per cent submitted logs to the committee. Many stations with excellent scores failed to file their results.

Most of the comments received were quite favorable regarding rules and scoring. Complaints were generally few and far between and when received were based principally on poor operating practices noted during the competition. Several suggested that a total operating time limit be set for the period to enable contestants to "budget" their time in order to get some sleep and a good meal or two. One suggestion was to limit actual operations to a period of 32 hours out of the total 48-hour contest. The operating hours could be broken down into segments of not less than 4 hours to simplify checking the hours spent as shown on the final logs. Others are still asking for a "DX only" type contest. All suggestions will receive consideration by the committee before next year's contest.

A suitable trophy will be awarded to the top worldwide winner by the DX Committee of the RTTY Society of Southern California.

The listing to follow shows exchange points, number of states worked, countries and continents followed by the final score. Conterminous U. S. stations are shown first.

Scores

W1BGW	68-9-10-4	8612
W1AW	110-22-6-2	4820
W1TLZ	98-23-4-3	4654
K5JCL/1	84-23-4-3	4332
W1FGL	48-15-4-4	3920
W2NSD/1	58-23-4-3	3734
W2RUI	254-25-23-5	29350
W2JAV	212-31-18-4	20972
W2UGM	90-22-7-4	7580
K2SDR	24-6-4-3	2544
K3GIF	204-25-24-5	29500
W3CRO	52-16-6-4	5632
W3WGC	124-25-4-1	3900
K3RZX	58-23-2-2	2134
W4BOC	76-16-12-4	10816
W4EGY	108-26-10-4	10808
W4KZF	106-21-6-3	5826
K4SCP	24-9-2-2	1016
W5CME	348-33-22-5	33484
K5QBU	120-25-8-2	6200
W6ECP	180-31-11-5	16580
W6CG	76-20-14-5	16520
W6CQL	56-15-12-5	12840
W6TPJ	64-18-10-5	11152
W6NRM	154-20-8-4	10020

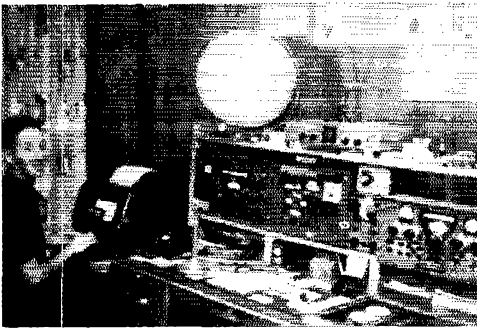
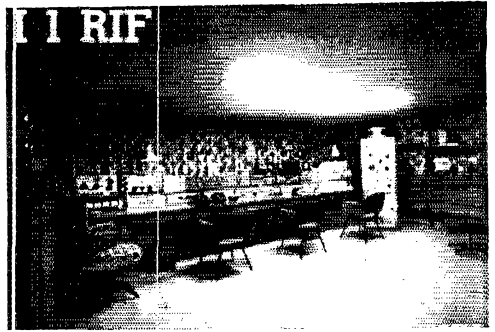
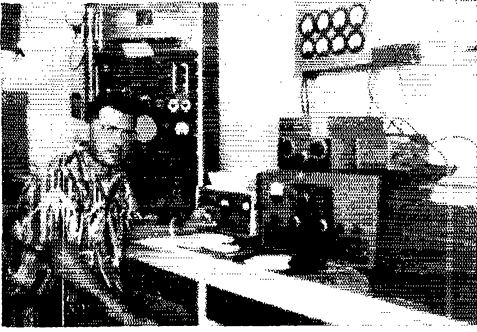
Top Ten

11RIF	41,600	K8DOM	27,152
W5CME	33,484	W8CLX	23,930
K3GIF	29,500	G3BXT	23,000
W2RUI	29,350	K8MYF	22,824
ZS6UR	27,520	W7ESN	22,322

K6IBE	48-16-7-5	7768
K6MTX	64-23-5-4	5472
W6AEE	76-25-5-3	4900
W6WLI	126-27-4-1	4202
K6OWQ	14-1-6-3	3614
W6MTJ	69-16-4-3	3504
W7ESN	218-29-16-5	22322
W7PHG	190-28-11-4	14120
W7FEN	108-23-12-4	12084
W7C8Y	90-24-4-2	3760
W7MCU	24-10-2-2	640
W8CLX	170-29-19-5	23930
K8MYF	208-28-17-5	22824
W8VMP	110-23-14-5	16530
K8TJP	138-29-10-5	14002
K8BIT	30-6-9-5	9180
K8JTT	44-14-6-4	5416
W9RDJ	86-18-3-2	2748
K9BJM	36-8-2-2	1088
W9ZQT	50-17-1-1	850
W9LFK	24-10-1-1	240
K8DOM	364-32-18-5	27152
W8NFA	68-13-11-5	11884
W8HSC	104-27-1-1	3008
DL8EQ	280-6-7-3	5880
DL4IA	200-6-5-3	4200
DJ8EK	110-3-5-2	1368
DJ4KW	120-6-1-1	1320
G3BXT	500-16-15-5	23000
GMR3QL	210-10-6-3	5600
11RIF	830-20-25-5	41600
KH6ANR	76-16-7-2	4016
KL7DTR	28-6-3-2	1368
KP4GN	112-20-9-4	9440
KH6COY/KW6	320-15-10-4	12800
LA6J	540-3-9-4	7740
LA1TE	40-2-2-2	840
OA4BR	98-25-9-4	9400
VE4BJ	134-20-12-5	15484
VK3KF	220-8-9-4	8960
XE1YJ	162-26-12-3	11412
XE1BI	18-7-6-1	726
YV1EM	122-28-10-3	9416
ZS6UR	660-22-13-5	27520
ZS1FD	270-16-5-4	7720

Soapbox

"Enjoyed the contest very much and hope you will continue to have them in future years." - W3IFGC . . .
"This was my first RTTY contest and enjoyed it. I'd like to see a limitation on operating time in future contests



Top left finds the leading scorer from the Pacific, KH6COY/KW6. Arnold gave many stations a new country during the contest. Top right needs little introduction; IIRIF, world-wide winner of the SS with 20 states, 25 countries in 5 continents. Middle left, W5CME from New Orleans, the highest scoring "W" station, over 33K points. Middle right, ZS6UR, leader for his continent. This interesting angle shows up the heart of the station, 75A-4, HT-32, RTTY gear: Creed 7B page printer and reperforator, perforator model 14, Creed TD and homebrew TU. Antenna a TA-36 up 66 ft. Bottom right, KP4GN making an excellent showing with 20 states, 9 countries in 4 continents.



giving a guy a chance to get a little sleep. If I wasn't fortunate enough to have my NYL W5DVV relinquish the rig for the weekend and also bring food, etc., into the operating room, I'd never have been able to last. Sorry I didn't hear Asia for my RTTY WAC." — W5CME. . . . "The number of stations on 15 was astonishing and I'd like to know where all these boys hang out during the rest of the year." — ZS1FD. . . . "The points had little relation to the fun I had operating. I really had a ball!" — K5QBU. . . . "Enjoyed the contest very much although the conditions could have been better. The only new one here was VK3KF." — LA6J. . . . "Such bedlam and QRM was enough to force me off Sunday afternoon — whew!" — W9RDM. . . . "I would prefer two 24-hour periods on different weekends for those of us who can't go 48 hours straight." — K4SCB. . . . "I'll be in there fighting next time." — K17DTR. . . . "Not a good score but lots of fun, 73." — W3CRO. . . . "Swell time and a lot of good operators on the air." — W4KZF. . . . "I still don't know my score, honestly I have 3 big rolls of RTTY paper and haven't had time to go through it." — G3CQE. . . . "The 2nd RTTY SS is now only an echo but some of those fantastic signals still remain. IIRIF had a very tremendous signal all the way through here, as did KH6COY/KW6." — ZL1WB. . . . "My finger tips are still sore but had a lot of fun and a lot of new U. S. A. stations but little DX. It was probably under the pile up on 20!" — VE4BJ. . . . "The contest was great and enjoyed every minute of it.

I noticed that all the stations were orderly and caused no excessive QRM." — W2UGM. . . . "What happened to all the stateside activity. No QRM problem this year to speak of." — W8CLY. . . . "Now that my tape head and converter have cooled down I'm ready for the third slindig. I had a fine time again this year and would have given a mark and spare filter (plus maybe a toroid or two) for Asia!" — K8BIT. . . . "All in all a good time but quite exasperating when the mainland QRM just buried my peanut whistle!" — KH6COY/KW6. . . . "I received the parts just in time to put on the machine before the contest — and what a contest!" — XE1RI. . . . "Haven't been on much since the contest, I was worn to a frazzle when it was over." — VE4BJ. . . . "A real first-class brawl. Congratulations and keep 'em up!" — K6MTX. . . . "Had no luck with the Europeans, sat on them for hours but could not break them. Did manage to work LA6J and G3BXI and added three new countries — LA, KW6 and YV, so it was worthwhile after all." — VK3KF.

TENTH ANNIVERSARY RTTY SS

Feb. 15-17, 1963

(See rules Jan. '62 RTTY)

A Survey of Communications Practice on Our High-Frequency Bands

Part I—Population Distribution and Channel Loading

BY DANA A. GRIFFIN,* W2AOE

EVERY old timer who operates on our popular DX bands is aware of the tremendous increase in QRM in the past decade. Despite the expanding use of sideband emission, our tiny band segments in the radio spectrum from 10 meters through 80 meters are being used or abused by ever-increasing numbers of amateurs.

The purpose of this survey is to disclose the statistical facts on amateur populations in the United States and the rest of the world, to examine our present allocation practices which hark back to 1927, to analyze our operating practices in a new manner, and to disclose some new allocation concepts which can be used to increase the amount of domestic and world-wide communication on our crowded medium-frequency bands.

Amateur Population

The statistics in Table I were developed from several sources, including call-letter counts by U. S. districts and foreign countries, as listed in the *Radio Amateur Call Book Magazine*, and figures furnished ARRL Hq. by member-societies of IARU. Those for foreign countries contain a greater proportion of estimates. The numbers are not accurate enough to satisfy an accountant, perhaps, but will serve our purpose.

There are many useful and interesting facts which may be drawn from the statistics in Table I. Of first importance is the size of our U. S. population in relation to that of the rest of the world and our tremendous growth in comparison with that of our fellow amateurs in all other countries. In numbers, we are increasing twice as fast as the rest of the world combined.

The relative size of the population of any foreign country to that of one of our U. S. districts is astonishing. There are more W7s than there are Gs, and five times as many W7s as Zs. There are more W2s than the combined populations of the last six countries on the most-populous countries list in Table I.

There is a tremendous variation in our geographical distribution. Less than 10% of our

amateur population lives south of the equator. Twelve of the world's 24 time zones have no population, or only miniscule amounts. Major population densities are (a) London zone plus two zones east; (b) Tokyo zone plus two zones east; (c) Los Angeles zone plus five zones east. These factors will become pertinent in our later analyses.

Allocation Practices

In talking to a considerable number of mature amateurs on the subject of frequency allocation, there appear to be two commonly held views that are disturbing, to say the least. First, that the principles employed in our present allocation planning came from heaven via the FCC and therefore are not subject to question or change. Second, that all allocations approved by FCC are based upon the same foundations as ours, regardless of the type of service involved.

Both these views are completely erroneous. The FCC has developed and established a number of allocation plans that bear little resemblance to each other. Of necessity, they must be fitted to the available spectrum space with care, in order to provide the least possible interference with other radio services. They also provide for a minimum of interference between stations using the allocation in question. Our v.h.f.-u.h.f. television plan is a notable example of a unique plan of great complexity unlike any other. This allocation plan uses one type of probability mathematics in that it provides interference-free TV reception to millions of extra people 100% of the time than could possibly obtain interference-free reception 100% of the time on the 12 v.h.f. channels. Probability mathematics can be used to great advantage in the analysis of the best methods to use a band to provide the greatest good for the greatest number of amateurs *most of the time*. We will return to this topic in Part II.

Our present allocation plan harks back to about 1927 when the first international conference was held to allocate the short-wave spectrum to various services on a world-wide basis. Of major

*139 Beckman Road, Summit, N.J.

W2AOE's interesting collection of pertinent statistics, and their assembly into a package, furnish the opportunity for a fresh look at some of our problems of congestion. QST takes no sides on the author's conclusions, but feels that publication can be useful in providing considerable food for thought by every serious amateur. If it stimulates on-the-air discussions and fills our correspondence pages with pros and cons, it will have well served its purpose.

interest to all governments was the trans-oceanic traffic-handling potential of the newly discovered (by amateurs) shortwave spectrum. Spectrum segments from 2 to 30 megacycles were assigned to this service. Our amateur band assignments were made on the same basis. In fact, ARRL sponsored the use of band segments in harmonic relations.

There is one extremely important difference between the two services. A specific frequency assignment was allotted to each commercial station; this was done to assure rapid handling of commercial traffic 24 hours a day without the delays that would be caused by QRM. Idle commercial channels are prevalent much of the time, but the traffic must be relayed as it arrives at the transmitting station. As amateur communication is conducted on a random basis, frequency wise, amateurs were granted permission to operate on any frequency within their bands, if the legal mode of transmission is employed in its subdivision allotted to c.w. or phone.

It should be remembered that very little was known about the short-wave spectrum in 1927. The allocation planners did an excellent job under the circumstances. We know much more today about the effects of the sunspot cycle, seasonal changes and the earth's daily rotation on its axis. They all affect communication in a number of ways. The basic fault in our amateur allocation system is that we have never taken advantage of this knowledge. We operate under a plan that ignores these effects to a substantial degree. It is high time we used this knowledge to our mutual advantage by establishing a flexible allocation plan which will provide optimum communication most of the time to the greatest possible number of amateurs.

Our original shortwave allocation plan has been maintained in its basic form for the past 35 years. We have grown in numbers in the United States from approximately 25,000 to 250,000; yet our original 40- and 20-meter bands are reduced in size. We have increased our ability to communicate with each other, in spite of an enormous increase in interference levels, by a steady reduction in transmitter and receiver bandwidths and improvements in the control of transmitter and receiver frequency and frequency stability. We are essentially at the end of our rope in reducing bands widths for c.w. and phone communication. Improvement in our ability to operate on a spot frequency and stay there can be expected, although known techniques to do this are quite costly in practice.

We cannot take the extreme step of assigning spot frequencies within our bands. The investment for equipment would be so large that only the very rich could afford to remain, or become amateurs. However, it is most illuminating to look at the potential "communication capability" of such an Utopian scheme for three reasons. First, we are going to approach it with the continued refinement of our transmitters, as the accuracy of frequency determination and stability increase. Second, it provides us with an excel-

TABLE I

1. Estimated amateur stations, January 1, 1963:

United States	252,000
All others	120,000
Grand total	372,000

2. Estimated net growth, 1962:

United States	15,000
All others	8,000
	23,000

3. Average annual rate of growth, 1957-1962:

United States	8%
All others	(unknown, but about the same)

4. Estimated population, at current growth rate, by 1972:

United States	500,000
All others	240,000
Grand total	740,000

5. Major geographical population distributions:

<i>U. S. Call Areas</i>	<i>Ten next largest countries</i>	
1 19,300	United Kingdom	10,500
2 34,500	U.S.S.R.	10,500
3 18,900	Canada	9,300
4 32,800	Brazil	9,000
5 23,400	Germany	9,000
6 31,600	Japan	9,000
7 16,700	Argentina	7,000
8 24,800	Australia	4,200
9 23,900	France	2,800
0 22,100	S. Africa	2,550
248,000		73,350

(There are approximately 4,000 in Alaska, Hawaii and other U. S. overseas areas.)

6. Distribution by hemispheres:

	<i>Northern Hemisphere</i>	<i>Southern Hemisphere</i>
World total	372,000	So. America 23,000
Less		Africa 3,000
So. Hem.	33,000	Oceania 7,000
	339,000	33,000

lent view of the apportionment of our c.w. and phone subdivisions. Third, we will obtain a far better over-all picture of our actual communication capability when we relate this information to the statistics on the size, geographical distribution and operating habits of the world's amateur population.

Band Loading Capacities

If we assume every amateur could get on an assigned frequency within 25 cycles and only c.w. and sideband transmissions were permitted, we can look at a commercial type of allocation plan. Spot frequencies 500 cycles apart are allotted for c.w. use and spot frequencies 2,000 cycles apart for s.s.b. transmission. The number of channels for each mode of transmission by U. S. amateurs is listed in Table II.

TABLE II

Band	C.w. Channels	S.s.b. Phone Channels
3.5-4 Mc.	600	100
7.0-7.3 Mc.	400	50
14.0-14.35 Mc.	400	75
21.0-21.45 Mc.	500	100
28.0-29.7 Mc.	1000	600

Is this listing of any practical use, knowing full well amateurs cannot set their transmitters within 25 or 50 cycles of a spot frequency and keep it there? The answer is an emphatic yes, as you will soon see. First, stop and think how we get into a QSO when our pet band is really crowded. The least probable way is to call CQ on a frequency without listening. This generally results in some unprintable thoughts on the part of those using the frequency, and no QSO. What the vast majority does is to scan the band "looking for a hole" in the QRM where we have the best chance of getting a response to our call, or we respond to a CQ from a station that stands out above the general QRM level.

As thousands of amateurs communicate — or attempt to communicate — with each other on 20 meters, for example, the frequencies where "holes" in the QRM appear are constantly shifting position. The pattern is never the same in two different areas: is the variations in skip distance and ionospheric reflection efficiency and many other factors prevent this. What can be said is that inasmuch as the holes shift position in the band constantly, we are confronted with an integrated level of QRM throughout the band. Further, that this level rises or falls dependent upon how many hams are on the band, on the average.

Our receiver a.g.c. circuits are arranged to feed a d.c. voltage from the detector back to the r.f. and i.f. tubes to control the receiver sensitivity and at the same time give us a higher S-meter reading as the receiver gain decreases. The S-meter therefore presents a broad means to measure the integrated power input to the receiver whether this input is from a single powerful signal or a jumble of QRM. If we sweep the band rapidly and watch the meter reading, we can soon determine the average amount of power being received on the band at any one time. In short, our receivers are integrators as well as spectrum analyzers. They provide a means to measure the effective QRM power level.

The difference between the ideal situation depicted in Table II and the realities we face today

are not as great as one might imagine at first. If you scan any voice band rapidly, you will find stations "in the clear" at approximately 5-ke. intervals. Five minutes later the pattern will change position. This constant shift in position of the holes in the band is what degrades our capability to complete QSOs on a crowded band in comparison with the ideal situation set forth in Table II. In a given QRM situation, if we apply a rating of 100 to the ideal set of conditions, where everyone would use a specific spot frequency, it is doubtful that we have more than 20% of this level of communication capability on voice today. It is unquestionably much higher on c.w., as the bandwidth required for 60 w.p.m. telegraphy is but 240 cycles (admittedly under ideal conditions). Thus the allowance of 500 cycles for a c.w. channel is generous.

Channel Loading

Most amateurs, including the writer, are not very knowledgeable in the field of probability mathematics. With a bow to experts, we will take a small dip into this esoteric pond. If we set our 2-ke. wide spectrum analyzer on a phone frequency and hear nothing but undecipherable gibberish, we are listening to the integrated signal input from a number of transmitting stations. This input is commonly called "layers of QRM." Actually it is comprised of the signals from an unknown number of amateurs adding and subtracting algebraically.

What we would like to know is how many amateurs are creating this mess, with a given number of amateurs on the air on one band. The probability of a successful QSO rises as this number decreases (a better hole) and vice versa.

This can be determined by the use of a simple formula:

Let the number of amateurs transmitting = N

The number of channels available = C

The average number of amateurs on each channel = Q

$$\text{Then } \frac{N}{C} = Q$$

Example: 20-meter phone band (s.s.b. only)

If $N = 15,000$, we have: $Q = \frac{15,000}{75} = 200$

Example: 20-meter c.w.

If $N = 12,000$, we have: $Q = \frac{12,000}{400} = 30$

Example: 20-meter phone (a.m. only: Channel width 6 kc., number of channels, 25)

If $N = 15,000$ we have $Q = \frac{15,000}{25} = 600$

Fortunately, variations in skip distance, ionospheric reflection efficiency, beam directivity and transmitter power make it impossible for one amateur to receive 200 signal inputs to one receiver with 15,000 amateurs on 20-meter sideband. However, the formula can be used to determine the communication capability assigned to

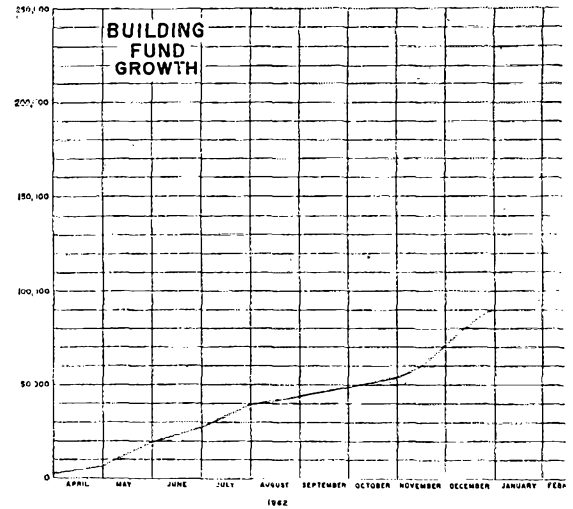
(Continued on page 144)

Building Fund Progress

THE slope of our Building Fund curve has taken a pleasing upturn the past couple of months, and if we can keep it headed in that direction, our goal will be in sight by the time of occupancy in early summer. This won't happen automatically, however. It will take continuing effort by all League officials and appointees, by affiliated clubs and by every individual amateur and member — first, in becoming a Building Fund drive participant, and then in spreading the word and encouraging others to take part. Some 6000 have already participated. This is gratifying, but still leaves a good many thousands of potential donors. The League is anxious that every member, and indeed every amateur, should make a contribution, no matter how large or small. How about *you*? Send in your check or money order today!

— . . . —

The breakdown by divisions, with percentage of quota achieved, is as follows as of the end of the year:



Hudson	51.6%	Dakota	32.6%
Southwestern	50.4	Atlantic	27.1
Northwestern	40.5	West Gulf	26.1
Central	38.7	Delta	24.1
Pacific	38.3	Rocky Mt.	23.9
Roanoke	34.9	Canada	23.1
New England	34.4	Great Lakes	20.4
Midwest	33.8	Southeastern	17.4

Members Are Saying . . .

Enclosed is a check for approximately 10% of the sales made at the Toronto convention. How many loads of bricks for the new building does it buy? Hope we can continue to send similar checks during the 1963 convention season. — *W9ACE, K9TVA Enterprises.*

Some time ago I needed legal assistance regarding a possible court action against me. Your legal staff gave some very valuable help to my attorney, and consequently the action was never started. I wanted to mail a check for your building fund, and when I asked the XYL she told me I was not going to send you any money unless she got in on it too. So here is a check from us both. — *K0JFN, K0JFO.*

I notice by recent QNT's that the fund is not going too well, so thought I would toss in another contribution. Hope you can figure out some way to make the boys realize that they *must* support ARRL in all ways, including a suitable Hq. building from which to operate, if they hope to keep their favorite hobby. — *VE2BHC.*

Already have one document with a name of Herbert Hoover on it — my 1922 ham license, 9CCE. I'm looking forward to another document (building fund certificate) with the same name plus Jr. — *W0AMN.*

Enclosed is our check. As an affiliated club, we are proud to support such a worthy undertaking and wish you every success in the early attainment of the goal. — *Broward Amateur Radio Club (Fla.)*

I have been crying in my beer so long about my lowly Technician license that it is too salty to drink, so I am sending my monthly beer money to buy

more bricks for the new building. I liked your November issue comment on Technicians — thanks for setting me straight. — *W4BMX.*

All of us in the northwest — and I am certain it reflects the feelings of all who attended the convention — are most pleased to present the enclosed check for our building fund. We are proud of our League, and from the plans and descriptions, will have satisfaction in the years to come from the fact that we all contributed in this manner toward our new building. — *K7BHI, Executive Chairman, 1962 ARRL National Convention.*

We, perhaps more than any other amateur club, are in a position to evaluate the need for a strong League. With this thought in mind, the members of the club feel that they can best express, through the enclosed contribution to the building fund, their earnest desire for a strong and virile League to represent internationally the interests of all amateurs everywhere. — *Maritime Mobile Amateur Radio Club.*

I am a newcomer to the ham ranks and have found the League very helpful and encouraging to me in many ways. I feel the League represents a very worthwhile organization both for the hobby and for the nation as well. Enclosed is a check. — *K0JRU/4.*

Since its inception in 1929, our club has endeavored, through its members, to foster and increase the spirit of ham radio as shown in the Amateur's Code. We feel that it is through active support of and participation in the organization and activities of ARRL that amateurs can hope best to observe and

(Continued on page 164)

Resistive Impedance Matching with Quarter-Wave Lines

BY DAVID T. GEISER,* WA2ANU

A QUARTER-WAVE line of a specified impedance will match two resistances at the frequency where $\frac{1}{4}$ wave (or *odd* multiples of $\frac{1}{4}$ wave) exists. The two resistances and the characteristic impedance of the transmission line are related by the expression $R_1 R_0 = Z^2$, where R_0 is the resistance that terminates one end of the line, R_1 is the impedance that appears at the other end of the line, and Z is the characteristic impedance of the line.

This kind of arrangement is sometimes called the "quarter-wave transformer." There are limited useful ratios that can be matched with a single section of available cable. The outstanding examples are, perhaps, the use of 50-ohm line to match the 36 ohms of a quarter-wave antenna to a 72-ohm line, and the use of a 72- to 78-ohm line to match 130 ohms or so of a helix antenna to a 50-ohm transmission line.

Sometimes circumstances make it desirable to make the transformation in two steps, from R_0 to an intermediate resistance, and from the intermediate resistance to R_1 . The most efficient value of the intermediate resistance is equal to $\sqrt{R_1 R_0}$, but sometimes this just doesn't work. Transmission lines are available in only certain impedances, and mismatches usually represent either very high or low impedances.

Even when this occurs, sections of $\frac{1}{4}$ -wave line may be used to match a wide range of impedances, and the line impedances used no longer bear a relation to the actual resistances to be matched. Two sections each $\frac{1}{4}$ wave long of different-impedance transmission line will act as a true transformer, with an input/output

* Light Military Electronics Dept., General Electric Company, Utica, N. Y. This is a portion of a paper given October 6, 1962, at the Syracuse V.H.F. Roundup, Syracuse, New York.

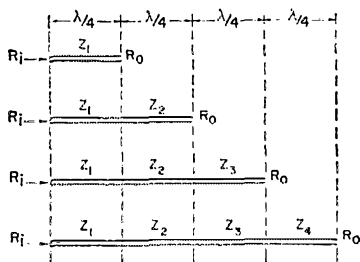


Fig. 1—Physical arrangement and nomenclature of the series-connected quarter-wave transmission-line sections. R_0 is the resistance of the termination (such as an antenna); R_1 is the resistance seen looking into the system when the termination is R_0 . Multiple-section arrangements can be inverted— R_0 and R_1 interchanged—for the inverse transformation.

Table I

Transformer Ratios with Two Quarter-Wave Sections Using Typical Lines

Z_1	Z_2	R_1/R_0	R_0/R_1
52	75	0.48	2.08
53.5	73	0.54	1.86
53.5	93	0.33	3.02
73	93	0.62	1.62
75	300	0.063	16.
300	450	0.44	2.25

Double sections can be combined with other double sections to obtain transformer ratios equal to the product of the ratios of the individual sections; e.g., a 53.5-93 section following a 53.5-73 section will have a ratio of 1.86×3.02 , or 5.62; two 53.5-93 sections in series will have a ratio of $(3.02)^2$, or 9 to 1, and so on.

impedance ratio.¹ For instance, if this ratio is 2:1, the double section can be used to match a 100-ohm line to 50 ohms, or 20 ohms to 10 ohms, *without any change*. The bandwidths of the transformer will change somewhat, but the transformation will still be exact at the resonant frequency.

There is a simple series of equations that permit calculating any number of sections. These are:

For 1 section: $R_1 R_0 = Z_1^2$

2 sections: $\frac{R_1}{R_0} = \left(\frac{Z_1}{Z_2}\right)^2$

3 sections: $R_1 R_0 = \left(\frac{Z_1 Z_3}{Z_2}\right)^2$

4 sections: $\frac{R_1}{R_0} = \left(\frac{Z_1 Z_3}{Z_2 Z_4}\right)^2$

5 sections: $R_1 R_0 = \left(\frac{Z_1 Z_3 Z_5}{Z_2 Z_4}\right)^2$

and so on. Note that for odd numbers of sections, the input and output resistances are multiplied by each other, and for even numbers of sections they form a fraction. Similarly, on the right-hand side of the equations the characteristic impedances of the odd sections are in the numerator and multiplied together and the impedances of the even sections are in the denominator and likewise multiplied together. Thus, for example, a 12-section equation would have R_1/R_0 with $Z_1, Z_3, Z_5, Z_7, Z_9,$ and Z_{11} in the numerator on the right and $Z_2, Z_4, Z_6, Z_8, Z_{10},$ and Z_{12} in the denominator.

There are several reasons why not too much advantage is gained by using a large number of

¹ This is also true of any *even* number of series-connected sections. The operating frequency must, of course, be that for which the sections represent a quarter wavelength.

sections. The ratios deviate from the calculations when the attenuation of the cable becomes significant (a good fraction of a decibel). There are only a limited number of cable impedances on the market. Note that if the same Z appears in numerator and denominator, as a pair, for instance, those sections do not serve any useful impedance-matching purpose.

Occasionally, a tentatively-chosen arrangement will step impedance up, when it is desired to step impedance down. Remember that a step-up transformer, as two and other even numbers of sections are, when turned around is a step-down transformer. Thus a two-section 50- and 72-ohm transformer will show either a 2.08 step-up or a 0.48 step-down.

A common question is, "What happens when

the load isn't a pure resistance?" If the load isn't purely resistive, shunt inductance or capacitance, perhaps in the form of a transmission-line stub, can make it purely resistive. This is admittedly a brute-force method, but certainly is the simplest to understand.

One interesting arrangement is the use of alternating sections, a 50-ohm, a 72-ohm, a 50-ohm, a 72-ohm, and so on. Quite high ratios can be achieved while having the real advantage of being able to connect sections with common connectors. Thus, use of a number of $\frac{1}{4}$ wave sections is the same as having a variable-ratio r.f. transformer. This probably is not attractive to the low-frequency amateur, but is almost the simplest approach for the v.h.f. man. QST

NEW BOOKS

Forty Years of Radio Research, by George C. Southworth. Bell Telephone Laboratories, Retired. Published by Gordon and Breach Science Publishers, Inc., 150 Fifth Ave., New York 11, N. Y. 270 pages, 6 by 9 inches, hard cover. Price, \$6.50.

A noted physicist who played a major role in communications pioneering, from the coherer period to the days of radar and the microwave relay, Dr. Southworth writes with skill and insight of the first half century of radio. From earning his way as a repairman in the shop of an electrical machinery plant in Erie, Pa. (\$5.50 for a 55-hour week) to a position of importance in one of the world's largest research organizations, was a long road, but it will be obvious to the reader of this book that George Southworth enjoyed the whole trip. Legendary figures and events come alive in these pages, as the story is told with clear detail and quiet humor.

They were great and wondrous years. Oldtimers in the game will relive them pleasantly, and the neophyte will gain a new feeling for radio's first generation and early events from the Southworth narrative. Ham radio comes in for its share of the story, for the author was a pioneer member of ARRL. With his mentor, Professor Harmon of tiny Grove City College, he was listed as operator of "G.C., one-kw, rotary gap, 30-mile range, 20-wpm code speed," in the March, 1915, issue of *ARRL Stations*.

Perhaps Southworth's greatest contribution was the waveguide concept. How this idea developed from early Lecher-wire experiments in a water-filled trough to the microwave plumbing that made American radar of World War II outstandingly sensitive and successful is a principal feature of this book. But it is by no means all, for the author is one of those rare personalities who finds the interesting side sights along the roadway of life, no matter how urgent the business of the moment. — E. P. T.

Radio-Electronic Transmission Fundamentals, by B. Whitfield Griffith, Jr. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. 612 pages, including index, 6 $\frac{1}{4}$ by 9 $\frac{1}{4}$ inches. Cloth cover. Price, \$10.75.

This is a book that can be appreciated by the amateur who wants to dig below the surface coating of radio knowledge that most hams acquire. The author is an amateur himself (W5CSU) and a QST author ("The Truth About Vertical Antenna", May, 1952), and has written the text with the amateur, as well as others, in mind. It is done in informal style, and is far easier to read than many other

books of the same general scope.

But don't misunderstand — the subject matter is not for the casual reader who is looking for a way to become an expert in a few easy lessons. Like all serious technical material, it will require study. There are four main divisions — electrical networks, transmission lines, antennas, and transmitters. These are broken down into 68 chapters, each covering a single topic under its appropriate heading. The network section covers the basic electrical constants — resistance, inductance, capacitance — their properties, and the laws governing their combination in circuits. Complex numbers are used (and explained). Graphical methods using impedance and admittance loci are given special prominence. The treatment of transmission lines is on a similar level.

The antenna and transmitter sections are treated essentially from the viewpoint of the broadcast-station engineer. The higher-frequency aspects are not neglected, and of course the basic principles apply anywhere in the spectrum. However, you will find here discussions of practical problems in the broadcast field that are rarely mentioned in other texts. Many of them bear on amateur problems as well.

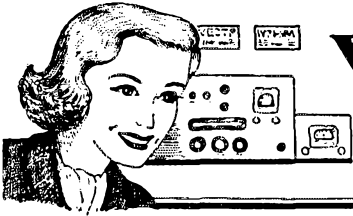
Altogether, we suspect that a ham who thumbs through this book will find a great deal in it to interest him. In doing so, he's likely to be trapped into some serious study of phenomena he *thought* were pretty familiar. — G. G.

Modern Communications Course, Vol. 1, Radio-Frequency Systems, by Edward M. Noll. Published by Howard W. Sams & Co., Inc., 1720 East 38th St., Indianapolis 6, Indiana. 256 pages, including index, 5 $\frac{1}{2}$ by 8 $\frac{1}{2}$ inches, paper cover. Price, \$4.95.

This book, the first in a series, presents a practical coverage of oscillator and r.f. amplifier circuits, including the modern tube-type as well as transistorized designs. Antennas, transmission lines, and matching sections are also covered. Experiments are included at the end of each chapter. The chapter on transistor r.f. circuits has some practical information on transistor oscillators, transistor Class C amplifiers and multiplier circuits.

GE Transistor Manual, 6th edition, compiled by Semiconductor Products Dept., Electronics Park, Syracuse, New York. 440 pages, 5 $\frac{1}{2}$ by 8 $\frac{1}{2}$ inches, paper cover. Price, \$2.00.

The sixth edition of this manual has been brought up-to-date and includes five new chapters. Some of the new information covers data on transistor measurements, regulated d.c. supply and inverter circuits, silicon signal diodes, semiconductor reliability and silicon controlled switches.



YL NEWS AND VIEWS

CONDUCTED BY ELEANOR WILSON,* W1QON

The Human Interest Element

NEWSPAPERS are quick to play up that universal attention-getter — the human-interest element. Ham radio offers plenty of that element, hence our hobby often provides an interesting story for the reading public.

Such a story was printed in the *Washington Post* Nov. 13, 1962. Ham-radio romances are not news to hams — happily there are countless cases that could easily have been publicized, but occasionally an article like the one in the *Post* is good press for ham radio, and who knows how many newcomers may be aroused to learn more about a hobby that sometimes enables ordinary people to do some extraordinary things.

The article entitled "Lady Radio Ham Swept Off Her Feet By Divine Beeps of Geographic Aide" was written by Lon B. Tuck, staff reporter of the *Washington Post*.

Science can do wonderful things these days.

Take the case of Peter Bianchi and his new wife Dorothy, who live at 9201 Daleview Court, Silver Spring.

The Bianchis were married Sept. 29 after a 13-month

courtship, most of it conducted over ham radio. She was in Ecuador, he in Washington.

The radio friendship that became a romance sparked when Dorothy Nelson, an AID employee stationed in Ecuador, began a conversation one evening in August, 1961, with Peter Bianchi, a National Geographic artist here. She had heard him on her receiver talking to other operators and made a note of his call letters.

Once they had met over the radio things took a natural course. Both were unmarried, about the same age, shared the same interests and — most important to ham operators — both were in the same time zone.

They started calling each other at noon, which was her siesta time and his lunch hour.

Before long it was two, then three times a day. And, finally, after Peter proposed to Dorothy on the radio, she left Ecuador and came to Washington to meet him personally.

The great problem of their courtship was privacy, they recall. Anyone who wished could hook into their frequency and follow it, as one woman wrote them, like a radio serial or an old-fashioned party phone line.

One grateful Idaho parent wrote them that their son, who never before could get up in time to make his school bus, started getting up before the crack of dawn just to tune in on the early morning talks between Bianchis.

The wife of a Puerto Rican ham operator made her husband bring his radio receiver to the breakfast table every morning, so that she could keep up with the romance.

*YL Editor, QST: Please send all news notes to W1QON's home address: 318 Fisher St., Walpole, Mass.



Another instance of a newspaper playing up the human interest aspect of ham radio came from the West Coast with this photo (with accompanying article) that appeared in an Oxnard, California, newspaper. Mrs. Betty Sted, WA6YMC, a ham since last January, was delighted when fellow members of the Ventura County ARC set up a transmitter and receiver by her hospital bed to buoy her spirits during confinement. The hospital staff, including Sister Mary Redempta shown in the photo, gave official nod to the proceedings and was keen to learn more about the "unusual" hobby.

For a second time Clara Reger, W2RUF (right in photo) has been a major factor in the recovery of a young man from very serious illness. In 1957 when Lynn Nichols lost both arms in a power line accident, Clara threw all her energies into helping to rehabilitate the boy, primarily with the aid of ham radio. When Clara heard of the serious cancer



They're pulling hard for Bill

illness of 17-year-old Bill Putnam of Lockport, N. Y., she again offered her spirited aid, once more applying ham radio as therapy. As WN2DYQ, Bill is studying hard for his General Class license, and Clara expects he'll make the grade soon. Shown with Bill and Clara in the photo is Sister Mary Raymond of Sisters' Hospital, Lockport, N. Y., who initially gave Bill a small radio kit to work on.

We're sure the best wishes of all hamdom go out to Bill in his courageous fight against cancer.

One of our top YL BPL traffic-handlers, Clara Reger has been devoting herself unselfishly to helping other people for years — she is an inspiring example of what one woman can do with an amateur license and station.

Anniversary Party Results

COMBINED SCORES

K1NST.....7170	K2JYZ.....3341	W5DVV.....6720	K8MZT.....\$700	K9IWR.....806
W1YPH.....7003	K3HZY.....5251	K5TXQ.....5617	K8HLL.....6915	K0IKL.....14,807
K1UOR.....6826	K4AOH.....5793	WA6PQI.....5794	K8MQB.....6016	K0GIC.....8470
K1LCI.....5082	K4ZNK.....5273	WA6AOE.....3932	W8WUT.....5208	VE3BBL.....1096
K1OLM.....4974	W4HWR 4.....3892	K6VFE.....2530	W8HWX.....4995	VE7BBB.....3814
W1RLQ.....4681	K4VDO.....3064	K7CPB.....2617	K8ITF.....1978	
K1IJV.....2004	K5YIB.....13,773	K7OFX.....2013	K8ONV.....4308	

PHONE:

K1UZT.....7461	WA4FJF.....6521	K6DLL.....3690	K8MZT.....7350	K50PS/0.....5635
K1EKO.....6812	K4AOH.....4623	WA6KLP.....3600	K8HLL.....4778	K0EPE.....5499
K1OYM.....5600	WA4FEY.....4140	WA6AOE.....3325	K8ITF.....4228	W0ZWL.....5003
W1YPH.....5288	K4ZNK.....3864	W6YZV.....2438	K8MQB.....3950	K0JFO.....3588
K1NST.....4992	W4HWR/4.....3559	K6VFE.....2030	W8HWX.....3420	K0BOF.....2025
W1ZEN.....1700	K4CZP.....3040	K6UHI.....984	W8WUT.....3187	K0LQS.....1994
K1UOR.....4613	K4VDO.....2596	W6DXL.....808	K8ONV.....3160	K0ITP.....1704
K1OLM.....4365	W4ZDK.....2286	W7GCV.....5625	W8EFB.....1925	K0BTV/M.....1384
W1RLQ.....4192	WA4RVE.....2250	K7RAM.....5022	K8PXX.....1740	K0RAW.....469
K1LCI.....3631	K4EAM.....1740	K7MIX.....4246	K9AXS.....6613	KP4CL.....6728
K1ADY.....3120	K5YIB.....10,733	K7CHA.....3948	K9LLK.....1830	Z1ILD.....45
K1DWH.....2083	K5OPT.....7975	K7SKR.....3500	K9CQE.....4561	KH6CKO.....1316
K1IJV.....553	K5BNQ.....7800	K7IVK.....2507	W9AXV.....3456	G2YL.....60
K1GSF.....213	W5DVV.....6720	K7CPB.....2142	K9TRP.....3315	VE3BBL.....760
K2JYZ.....2448	K5TXQ.....3237	K7PVG.....1700	K1SL8/9.....3011	VE3DDA.....120
W2OWL.....265	K5VXP.....531	W7HHH.....1596	K9IWR.....805	VE6ABP.....2220
K3HZY.....3563	W5RZJ.....100	K7RLW.....1553	K0IKL.....11,200	VE7BBB.....2720
K3NVF.....1590	W6KCL.....6480	K7OFX.....1538	K0HEU.....6958	
K4RNS.....7040	WA6PQI.....4676	K7ADI.....175	K0GIC.....6160	

C.W.

K1UOR.....2213	K3HZY.....1688	K5TXQ.....2380	K7CPB.....475	K9BWJ.....761
K1NST.....2178	W3TSC.....1519	W5DCB.....2170	K8HLL.....2138	K9IWR.....1
W1YPH.....1715	K4RIU.....1595	K5FXX.....2040	K8MQB.....2066	VE7BBL.....336
K1LCI.....1451	K4ZNK.....1409	W5DVV.....1050	W8WUT.....2021	VE6ABV.....1470
K1IJV.....1451	K4AOH.....1170	K6OWQ.....1188	W8HWX.....1575	VE7ADR.....1250
K8MZT/1.....1350	WA2BWA/4.....875	WA6PQI.....1118	K8ONV.....1148	VE7BBB.....1094
K1OLM.....609	W4HLF.....518	WA6OET.....978	W8WQE.....1414	VK1YL.....1
W1RLQ.....489	K4VDO.....468	WA6AOE.....607	K8ITF.....750	
K2JYZ.....893	W4HWR/4.....332	K6VFE.....500	K8MIK.....220	
W2EBW.....510	K5YIB.....3040	K7OFX.....960	W9MLE.....2325	



HIGH PHONE

Joyce Polley, K0IKL	11,200
Barbara Houston, K5YIB	10,733
Ruth Jank, K5OPT	7,975

HIGH C.W.

Joyce Polley, K0IKL	3,607
Barbara Houston, K5YIB	3,040
Evalyn Ewing, K5TXQ	2,380

CORCORAN AWARD

Joyce Polley, K0IKL	14,807
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Winner of the Corcoran Award in the 23rd YLRL Anniversary Party, conducted Oct. 24 and 25 and Nov. 7 and 8, was Joyce Polley, K0IKL, of Minnesota. Joyce placed first in both the phone and c.w. sections of the contest, reaping a total of 14,807 points.

Other high scorers were second-place phone and c.w., Barbara Houston, K5YIB; third-place phone, Ruth Jank, K5OPT; and third-place c.w., Evalyn Ewing, K5TXQ. Congratulations to all top winners.

(Continued on page 142)



Strays



Investigation by the FCC's Chillicothe monitoring station of interference on an amateur band ended at a golf course where several persons covering a tournament were illegally using walkie-talkies loaned by a local marine reserve unit. The operation ceased on notice.

As a contribution to the government's effort to attract and favorably impress visitors from abroad, the West Palm Beach (Florida) Radio Club is offering "Friendship to Foreign Amateurs." When in or near Palm Beach, ham tourists should contact the project chairman, Mrs. Eleanor Hope, W4CIL, P. O. Box 96, Loxahatchee, Fla., telephone OV 3-2652.

Interference to an amateur frequency was traced by the FCC Los Angeles office to a Navy station near San Diego. There it was found that a mistuned transmitter had invaded the ham domain. The technical explanation was that "the teletype keyer stage of the transmitter had been accidentally bypassed and that the oscillator frequency was multiplied in the latter stages and transmitted with full power on an unauthorized frequency." Anyhow, the mistake was easily rectified by the Navy.

Achtung. Alles Lookenspeepers — Das Transmitten Machine ist nich fur gefingerpoken und mitten grabben. Ist easy schnappen der springerwerk blown fusen und poppencorken mit spitzensparken. Ist nicht fur gewerken by das dummkopfen. Das rubbernecken sightseeren keepen hands in das pockets. Relaxen and watch das blinken lights. — W9MFD

Nuclear Propulsion for Merchant Ships is the title of a recent 600-page book by Andrew W. Kramer, W9CPV. Copies are available from the Government Printing Office for \$2.25.

The West Virginia Centennial Award, sponsored by the West Virginia State Radio Council and administered by the Mountain State Transmitters, Inc., will be issued for working 35 West Virginia stations (including at least 10 different counties) during the Centennial Year beginning January 1, 1963, and ending January 1, 1964. For DX stations and those west of the Mississippi, the requirements are only 15 West Virginia stations in 5 different counties. Send a certified list to Mountain State Transmitters, Inc., Box 441, Elkins, W. Va.

The Glassboro State College Radio Club would like to publish a call book listing college radio stations. College ham stations are asked to write to Box 328, Glassboro State College, Glassboro, N. J., giving call letters, bands usually operated, names of officers, etc.

ARRL's VES QSL Manager, VESRX, requests that the following VESs contact him for DX cards held there since early 1961. Unclaimed cards will be eventually destroyed. VES's PH, PQ, RC, RW, SP, SW, YJ, CO, DX, and LG. VESRX's address is George T. Kondo, c/o Department of Transport, P.O. Box 339, Fort Smith, N.W.T., Canada.

Former ARRL President George Bailey, W2KII, executive secretary of the Institute of Radio Engineers, has been presented with a Distinguished Service Award by the IRE's Board of Directors as an expression of their "personal esteem and official approval of his unusual and valuable accomplishments and of his major and lasting contributions to the welfare of the Institute."

W6MLZ and K1NEU had a QSO which permitted a lady 103 years young to speak with her kid brother (he was a mere 102 years of age!).

Are you a Kiwanian? If so, please contact R. L. Fleming, K0GLS, 1007 West Summit Ave., Fergus Falls, Minn. He wants to form a Kiwanian net.



How about that! W0KOZ rigged up this antenna switch so there would be less confusion when his YF WN0BGK wanted to put her rig on the air.

The World Above 50 Mc.

215-1500

2300-2450

3300-3300

5650-5925

10,000-10,500

21,000-22,000

50,000-?

CONDUCTED BY SAM HARRIS,* W1FZJ

THE new power limit on 420 Mc. has stirred up a considerable flurry of interest in equipment for use on this band. Probably the most interesting sidelight on this subject is the sudden realization that an antenna which was large enough to use when the power limit was 50 watts is suddenly much too small to use with a kilowatt transmitter. Unfortunately, the problems of making a larger antenna on 420 are not as simple as they would at first seem. For instance, on this band antenna temperature is determined primarily by the amount of ground coupling which the antenna pattern allows. Therefore, an antenna which does justice to the low-noise capabilities of the band must have a very narrow vertical angle of radiation with essentially no minor lobes. Unfortunately, if the aperture of the antenna is sufficiently large to give results comparable with the 220- and 144-Mc. bands, the directivity in the horizontal plane will restrict the coverage to an almost non-usable angle.

Now it is obvious that you can't have high gain and still achieve wide beam width. The only reasonable solution would appear to lie in an antenna which allowed switching out some of the gain in favor of a wider beam width for general coverage work and signal locating. For point-to-point schedule work or bringing up a weak signal once it has been discovered, the whole array could be switched into operation providing maximum gain when it is needed. One thing is certain. The 420 antenna department is due for a real shake-up in the near future. So far, under construction are parabolic reflectors, flat-sheet reflectors, square-corner reflectors, arrays of dipoles, yagis, helices and square corners. Anticipated gains are ranging from 18 db. to 36 db.

Granting the possibility that someone will come up with a nice high-gain antenna having sufficiently low ground coupling to provide a horizon-aimed antenna temperature of, say, 150 degrees Kelvin, our next worry is — what will they do with it now? If the antenna is sufficiently high to provide this low horizon-aimed temperature, it will of necessity require a feed line to transfer the signal from the antenna to the receiver. Unfortunately, feed line losses at 420 Mc. are high. RG-8/U, for example, will lose almost 5 db. per hundred foot of feed line. 50 feet of this feedline would more than double your system temperature before the signal reaches your receiver. As an example, this means that a signal which arrived at your antenna even with the noise will arrive at your receiver almost 3 db. below the noise. Now on two meters a similar situation would be much less aggravated by the

same amount of feedline loss. This is because the antenna temperature at two meters is considerably higher so that a good two-meter antenna might have a horizon-aimed temperature of 1000 degrees Kelvin. The addition of 150 degrees more from the feedline would be negligible.

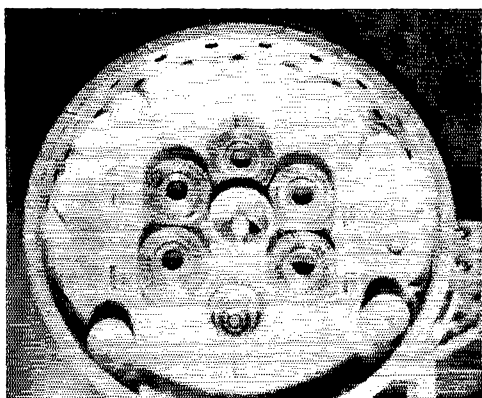
If one is to take advantage of the low-noise potentialities of the 420-Mc. band he must count his degrees with care. With more modern types of feedline the over-all temperature increase for a 50-foot feedline could (by using Federal K-200) be reduced to approximately 30 degrees Kelvin. Now while a 30-degree increase in system temperature is not desirable, it is small compared to the antenna temperature (approximately $\frac{1}{5}$) and will not contribute too greatly to the deterioration of the signal-to-noise ratio. I must admit that I am not in a position to recommend a practical feedline for 420. Commercial installations use waveguide and hold their losses to such ridiculous figures as 0.1 db per 100 feet and feel that they are not really achieving the optimum.

Open-wire feedlines are obviously, if insulated by air and not too thickly populated with spreaders, capable of very low losses because of dielectric. However, how much extra loss is incurred because of radiation from the open-wire line is dependent upon a number of variables and is generally excluded from charts purporting to give information concerning feedline loss at various frequencies. Naturally, if the radiation loss of an open-wire line is neglected, it is the obvious



144-Mc. notables at the VHF Roundup. Rare New Hampshire is W1AZK back from the sea. Canadian representative is Rae Lancaster, VE3BPR.

*P.O. Box 334, Medfield, Mass.



Business end of a 1296 ring amplifier. Part of the UPX-4 converted by K2HAC.

choice. I have a feeling however, that radiation losses *cannot* be neglected and as a result open-wire lines are not nearly as attractive as the charts would make them appear. If anyone has any concrete information on this subject we would surely appreciate receiving it.

The third flurry of experimentation incurred by the new power limit is in the field of signal reception. If we take the case of the good antenna with a 150° temperature and a feedline contributing another 30°, our signal which starts off even with the noise at the antenna (a signal temperature of 150° K) arrives at the receiver terminals with only a very small degradation in signal to noise. However, if the receiver is not perfect we have still to hear this signal. Let us take the case of the average converter for 420 Mc. which, if a reasonable job has been accomplished, should have a noise figure not in excess of 7 db. Such a receiver might have an equivalent noise of approximately 500° K. This temperature added to our 150° K temperature and our 30° K feedline temperature gives us a system temperature of approximately 880° K. The poor little signal which arrived at our antenna with an equivalent temperature of 150° will now be buried 6 db. below the noise by the time it comes out of our speaker terminals.

Once you have buried a signal in noise it is extremely difficult to retrieve it. The only practical approach is to lower the equivalent temperature of your receiver. Practical receivers in the 420-Mc. range have been constructed with equivalent temperatures as low as 30° K. A reasonable approach using a parametric amplifier should yield an equivalent temperature of 70°. Such a receiver would only degrade the signal by approximately 1 db. over antenna signal-to-noise ratio. To put it another way, you can receive a signal with a good parametric amplifier which is ten times as weak as what you can receive with an average converter.

Naturally, the power increase has also added considerable fuel to the old cry of "What kind of tubes can you use to get a thousand-watt transmitter on 420 Mc.?" Truthfully, the tubes which

are capable of handling a kilowatt input on 420 are quite expensive and are not generally available on the surplus market. We have managed to acquire some second-hand 6181s which were retired from a u.h.f. TV station. These tubes are somewhat large for the purpose but at least do have ratings which allow a kilowatt input at 420. Unfortunately the term "retired from service" can mean almost anything and we have not as yet determined why they were retired.

Miniature-type kilowatts can, of course, be constructed using 4X150's or 4X250's or 4CX250's, but if you're looking for a good old-fashioned derated-kilowatt-type final we cannot recommend anything that fits the description of "practical." Anyone having any information on the availability of such tubes please don't hesitate to write.

50 Mc.

DX for the month of November on 50 Mc. improved quite a bit over the past few months, and the "rare" one was Harold, VP7CX/W8LIM. Harold writes: "Thought I'd let you know that the island of San Salvador in the Bahamas is now represented on v.h.f. The equipment here is a Johnson 6N2 transmitter. Johnson 6-2 converter ahead of a Pierson KE-93. Antenna is a Finco 6 and 2. Am having my Collins 75A-2 shipped down to improve the receiving situation. Caught a nice band opening this evening, mostly into the East coast. First station worked was K3KEO (Delaware! Isn't that cheating!) followed by 9 other QSOs with six other states in the 3 and 4 call areas. First heard stations at 2345Z and lasted until 8:30 local time. Heard some 5s at about 8:10. Heard many, many stations I could have worked if they had tuned for me. My frequency is 50.046 a.m. and c.w. Note that this is *outside* the U.S. phone band! I will continue to operate this frequency, so hope the boys watch for me. I am completely set up for 2 meters also, although I am unable to operate that band yet as my authorization has not come through from Nassau. Power limitations here are 100 watts. Will do my best to give everyone possible a VP7 contact during band openings. Incidentally, QSL cards for me should be sent via W9ZDI." From what we've heard on the band and from letters received it looks like W9ZDI is very busy now.

Among those working Harold were W3BWU and W5PVT. Ed, W3BWU sez: "Worked VP7CX and understand he made 94 contacts yesterday (Dec. 1) afternoon and evening. Band conditions poor to fair lately. Es opening on November 7 to Texas. Ground wave below normal." Clear and concise, what. From the western part of Texas and W5PVT we learn that six meters opened up on December 1 into the fourth call area and also into other than "local" fifth call areas. The band was open for approximately three hours and during this time Whitey worked VP7CX, W5JJW, WA4JMS, K4RVM, WA4ESE, WA5ANI, K5TYP, W4ACT, W5HYV, W5QW, K5LEP, K5AKY and W5EUB. The closest of the 5th call area stations worked was in Houston, about 475 miles.

K8WUZ in Napoleon, Ohio makes some observations: "It is interesting to note that on days which only seem average on phone, if a c.w. or s.s.b. station is to be heard it comes from at least as far as three times the distance of the phone rigs on the band at the time. Most c.w. stations monitored here have excellent lists and notes, but many s.s.b. set-ups leave room for improvement. It is hard to tune in some on my 11Q-170 as they are so narrow. Possibly d.s.b. is a solution to this problem." Mike has a point there, but all over the country the s.s.b. signals are improving on v.h.f. Most interesting QSO during November for Mike was one with K8CIX who gave him a very good modulation report and whose QTH is Napoleon, Michigan.

W2COT reports hearing VP7CX on November 30 at 1940 EST when Harold announced that the band had been open for four and a half hours to the East Coast, New York to Florida and inland to W8 land. And, in Needham, Mass., K1WTK reported hearing VP7CX and YV stations. We've received no other reports on YV stations being heard or worked in the U. S. so wonder if and who did the work.

K4RNG and WA4GDC both heard 1's, 2's and 3's working VP7CX but did not hear Harold themselves (this on November 30); and K3PRN in Baltimore, K4KYL and K4PZT (both of Knoxville, Tennessee) heard him on December 1 and 5.

Les, K4RNG mentions openings on November 17, 20, 27, 29, with stations in Michigan, New York, Indiana, Georgia, Pennsylvania, Texas, Alabama, New Mexico, Kentucky, Illinois, Ohio, Virginia, Tennessee, Kansas, Louisiana, Missouri and Oklahoma coming through during these four openings. Both Les and WA4GDC report openings of only a few minutes several times during the month when 5's from Texas were coming through. WA4GDC heard the same openings as K4RNG with additional states heard being Maryland, West Virginia, New Jersey, Connecticut, Massachusetts, New York, Arkansas and Arizona being heard on the 30th.

In Knoxville, Tennessee K4KYL observed "Skip" on November 8, 9, 17, 21, 30 and December 1. Jim heard some of those rare states during these openings, states such as Utah, Wyoming, South Dakota and New Mexico.

Also located in Knoxville is K4PZT who sez: "During the recent six meter band opening of December 5, I happened to be tuning the A-1 portion of six meters for possible c.w. contacts when I heard a faint A-3 station at about 50.05. I figured the guy must be out of the A-3 portion but upon hearing VP7CX I soon changed my mind. Since his signal was about a 3 x 5, I decided to try A-1. However, my relentless attempt from 0115 to 0133 GMT was fruitless." (We heard from several sources that a large number of U.S. phone stations were calling VP7CX on his frequency. You take it from there.) Equipment at K4PZT consists of an 8X-25, FCV-2 converter and a 40-watt homebrew 6146 with v.f.o. Antenna is a six-element wide-spaced beam up 40 feet.

Out in La Mesa, California, W6IEY reports no openings during November but two good openings on December 1 and 3 when the band opened to Texas. WA6KOU reported working an Arizona station during the opening of the first. W4WGI in Huntsville, Alabama reports openings to Texas and Oklahoma on November 17 and December 1; and WA4BAW sez that there was a good band opening into 8 land on November 26. Larry, K8JWN heard Florida and Texas coming into his QTH on November 29 and 30 respectively; while W8PPF heard openings of one sort or another on November 2, 8, 10, 13, 17 and 18. On the 2nd, Jim (W8PPF) heard a few weak aurora signals; on the 8th, 10th, 13th, 17th and 18th he heard skip signals from Alabama, Oklahoma, Louisiana and Massachusetts; and on the 17th and 18th he worked WA8AUZ in Akron, Ohio on scatter. Jim sez: "Wish more stations would be listening for non-skid scatter contacts. I hear many stations but seldom are they looking for random scatter QSOs."

Several openings were observed by K5ERQ also; Larry worked Ohio, Michigan and Indiana in the November 8 opening and heard 2's and 4's which he did not work. One Florida station was heard, and that for about 15 minutes only on the 24th; and on the 25th Arizona was getting into Larry's QTH in Rhome, Texas. Final opening of the month for Larry was the last day of the month when he heard a number of 4's but worked none. He also mentions that interest in the u.h.f. frequencies is gaining in his area and that the cubical quad is gaining popularity in the area with several now in use and several more on the way up.

A note from Bob, K5VKJ sez that although his activities have been limited he did catch the opening of December 5 when he worked South and North Carolina and Georgia, but missed Alabama. He is running a Lincoln six-meter transceiver; 7 watts to a 3-element homebrew beam 35 feet high. For those needing Oklahoma on six, Bob's frequency is 50.2.

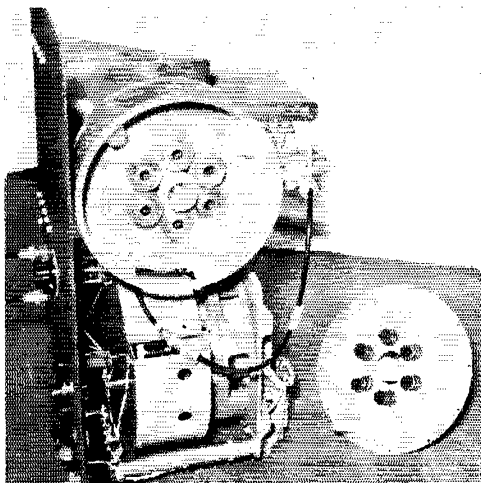
An interesting note from WA4CQG in Kentucky who reports best opening of the month for him was that of November 16 when he worked W4VKJ in Pennsylvania and K5VCO; New Mexico, Alabama, Florida and 1's and 2's were also heard but too weak to work. First openings of that day were observed by Dale at 0910 EST and the last were late in the evening when Texas came in for the second time that day. Most unusual day for the middle of November sez Dale. In Memphis, Tennessee W4RIX heard West Texas on November 8 along with W6DPG and K8BNP in Denver, Colorado; on the 29th he heard WA5BXN in Oklahoma on f.m. and the following day heard a number of 4's in Florida.

WA4GBM and WA4ILQ say that band openings were more numerous during the end of the month with the band

220- and 420-Mc. STANDINGS

220 Mc.			K8DGU.....5 3 425			K8ITF.....6 3 515		
W1AJR.....11	4	480	W1AZK.....9	3	412	KH6UK.....1	1	2540
W1EDQ.....11	5	450	W1AZX.....9	3	412	VE3AB.....7	4	450
W1AZB.....10	4	450	W1AZY.....9	3	412	VE3BPL.....3	3	300
W1OOP.....12	4	400	W1AZZ.....9	3	412			
W1RUF.....15	5	480	W2AOC.....13	5	450	W1AJR.....11	4	410
W1UHE.....11	4	385	K2AXQ.....9	3	240	W1HDC.....8	3	210
			W2AZB.....10	4	450	W1MFT.....8	3	170
			K2CBA.....13	6	650	W1OOP.....11	3	390
			K2DIG.....1	3	140	W1QWJ.....10	3	
			W2DWJ.....15	6	740	W1RUF.....7	4	410
			W2DZA.....12	5	410	W1UHE.....6	4	430
			K2TFP.....10	5	285			
			K2TQ.....11	5	295	W2AOD.....6	4	290
			K2JVT.....6	3	244	W2BLV.....12	5	360
			K2KJB.....12	4	300	K2CBA.....7	4	225
			W2LRJ.....10	4	250	W2DITZ.....6	3	200
			W2LW1.....12	4	400	W2DWJ.....10	4	196
			W2NPF.....12	5	300	W2DZA.....5	3	130
			K2PFW.....11	4	430	W2HQB.....4	1	280
			K2QJG.....13	5	540	W2HQB.....4	2	100
			W2SEU.....9	3	225	W2N7Y.....3	2	100
			K2UUR.....4	3	105	W2OTA.....10	4	300
						K2UR.....9	3	280
						W2VCG.....9	1	280
			W3AHQ.....4	3	180			
			W3FEY.....11	5	350	K3CLK.....9	4	
			W3GJG.....8	3	310	K3EOE.....8	3	250
			W3IYY.....8	4	295	W3FEY.....8	4	296
			W3JZI.....4	3	250	K3IUF.....7	3	310
			W3KKN.....10	4	255	W3LCC.....2	2	
			W3LCC.....10	5	300	W3RUF.....2	2	270
			W3LZD.....15	5	425	W3UJG.....2	4	350
			W3RUF.....10	5	480			
			W3UJG.....13	5	400	W4HHK.....8	4	550
			W3ZRF.....5	4	112	W4VVE.....7	4	430
						W4TLV.....3	2	225
			K4TFU.....5	4	400			
			W4TLC.....5	1	315	W5AJG.....5	1	425
			W4UYV.....7	5	320	W5HTZ.....5	3	440
			W5AJG.....3	2	1050	W5RCL.....12	3	660
			W5RCL.....8	5	700	W58WV.....7	3	525
			K6GTG.....2	1	240	W6GTG.....1	1	180
			W6MIU.....2	2	225			
			W6NIZ.....3	2	2540	W7LHL.....2	1	180
			K7ICW.....1	1	250	W8HCC.....3	2	355
						W8HRC.....3	2	250
			K8AXU.....10	5	1050	W8JLQ.....4	4	275
			W8IJG.....9	5	475	W8NRM.....3	2	390
			W8LPD.....6	1	480	W8PFL.....6	3	310
			W8RNM.....8	4	390	W8RQL.....4	2	270
			W8PTV.....10	5	680	W8PYV.....9	5	580
			W8SIV.....6	4	520	K8XAU.....3	3	660
						W888T.....3	25	
			W9AAG.....9	1	660			
			W9EQC.....11	5	740	W9AAG.....8	4	525
			W9JCS.....6	2	340	K9AAJ.....3	3	425
			W9JEL.....9	4	540	W9GAB.....9	4	608
			W9OVL.....6	3	475	W9OJT.....6	3	330
			W9VED.....4	4	605	K9ITF.....6	3	240
			W9ZTH.....10	5	500	K9ITF.....3	2	158

The figures after each call refer to states, call areas and mileage of best DX.



1296-Mc. final amplifier converted by John Linse, K2HAC. Six 2C39A's in parallel produce up to 400 watts output.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Wheeee:

We're still on that darned toboggan, gang. As anyone with a receiver is well aware, our supply of sunspots, the presence or absence of which profoundly affects short-wave propagation characteristics, is running low.

Almost every facet of ham radio gets a shake-out when Old Sol's complexion clears up. U.h.f. and s.h.f. men may well be unconcerned, but our lower-frequency rag-chewers, contest fans, traffic-handlers and DX chasers — at least those whose ham careers go back to better days — experience a changed way of life. QSB and QRJ in all varieties and magnitudes now cast menacing shadows on the communications scene.

"Conditions" roughly repeat themselves every ten or eleven years, so old-timers with 1952-'53 DX logs can thumb through their records and see just what we're up against. But let's not merely mope and moan. We can even make a little game about the subject. Here's a chance to test your ionospheric awareness and establish your sunspot status. Choose the most correct insertion for each statement among the choices given:

1) Our ionosphere is apparently caused by the (ultraviolet, infrared, supergreen, idiotic blue) radiations of sunspots.

2) Sunspot observations are known to have been recorded as early as (50, 500, 2000, 10,000) years ago.

3) The highest amount of sunspot activity ever recorded took place in (August, 1936; June, 1942; March, 1958; December, 1947).

4) Accurate data on hand for recorded sunspot cycles goes back to (1823, 1755, 1927, 1865).

5) The influence of sunspot activity on high-frequency radio communication was generally recognized by the (1920s, 16th century, World War I, 1930s).

6) The amount of 3-30-Mc. spectrum usable during the coming sunspot minimum probably will be only about (three-quarters, half, one-tenth, twice) that usable during the 1957-'60 maximum.

7) On the basis of available data the next three sunspot cycles probably will have maxima not exceeding a smoothed sunspot number of (125, 100, 150, 75) as compared to the most recent maximum of 201.

8) This seems to indicate that we can look forward to roughly (40, 22, 66, 4000) years of relatively disgusting h.f. DX conditions.

9) The coming sunspot minimum should occur sometime between (1963-'64, 1967-'68, 1962-'67, 1967-'72).

10) H.f. propagation paths usually least affected by sunspot behavior are (east-west, north-south, rare-DX, QRM-reception).

The proper selections, we hope, appear near the end of this column. If you got half of 'em right, you've been keeping reasonably well informed. If you missed only a couple, you're right on the CRPL ball. If you scored 10 out of 10 you must have read "The Dwindling High-Frequency

*7862-B West Lawrence Ave., Chicago 31, Ill.

Spectrum" by G. Jacobs, W3ASK, and E. T. Martin in *IRE Transactions on Communications Systems* for December, 1961, from which much of the preceding material is drawn.

What:

Oyez, oyez! — the 1963 ARRL DX Contest is at hand. In days of yore a determined participant could center his best preparations on 20 meters, hang up a 40-meter Zepp for extra multipliers, and zero in on his ARRL Section title with little fuss and bother. Not so simple today. Will 10 come through with a precious productive opening or two? Will 15 be worth two-banding the quad? Does the 40-meter ground-plane need more radials to help it crash the east-coast curtain? Will some key multipliers be missed without an 80-meter long-wire? Are they *really* working decent DX on 160? In this year of weird propagation possibilities snap decisions in such formerly minor matters as these can well mean the difference between top banana and also-ran. Yes, conditions surely aren't the greatest, but they were never more interesting — and challenging! Good luck and good fishin', lads, and let the empty coffee cups fall where they may.

We thank the following "How's" contributors for recent reports of DX activity on these respective bands:

160 c.w. — WA2MUA.

80 c.w. — W3s GQF WZL, K0JPL.

75 phone — K0s AXU JPL.

40 c.w. — Ws 3GQF 3WZL 8YGR, Ks 2YFE 5JVF 6TZX 0GVA 0JPL 0VSH, WAs 21LH 2RUB 4ARE, WN5EEM, 11ER.

20 c.w. — Ws 3GQF 3WZL 5WW 8YGR, Ks 6MIQ 6TZX 7RVI 8UJK 0GVA 0JPL 0VSH, WAs 21LH 2RQZ 2RUB 4ARE 6DHJ, 11ER, ZS2U.

20 phone — W3s GQF WZL, Ks 2TDI 7RVI, WA2RQZ, VK5KC.

15 c.w. — Ws 1HEZ 3GQF 3WZL 5WW 8YGR, Ks 1TIM 2YFE 4ZNJ 6TZX 7RVI 0GVA 0VSH.

15 phone — W1BPM, Ks 2YFE 4ZNJ 5FSU 6TZX 7RVI, WA2MUA.

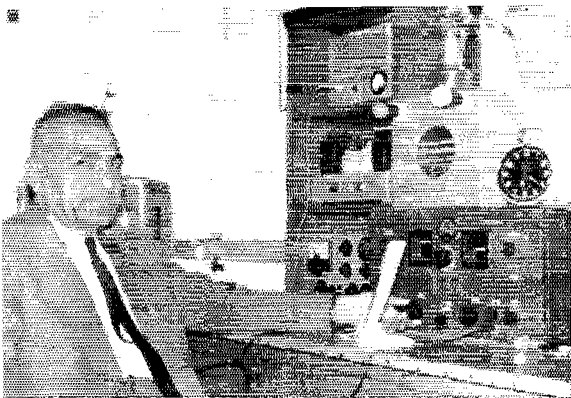
15 Novice — KN1VWL, WN5CBQ.

10 phone — W3s GQF WZL, Ks 2YFE 3BEQ 5FSU 7RVI 9YDY, WA2RUB.

10 c.w. — W3s GQF WZL, WA2RUB.

Next month we expect to record the usual band-by-band cross-sectional spot check of DX stations reported heard worked, heard called or heard worked among "How's" clientele. Kindly keep Jeeves posted! . . .





SUIIM's new look includes a c.w. and phone 100-watter constructed for Ibrahim by W9DRS. W9s DSO and YFV contributed components for the rig, and W8DUS volunteered the mike. (Photo via W9DRS)

Where:

Africa — A letter from ET3RC (ex-ET2US) concerns the brightening ham picture in Eritrea-Ethiopia: "Along with increased amateur activity has come the somewhat undesirable side effect that QSLs addressed to personnel here at Kagnev Station may possibly be sent via the bureau at Addis Ababa, about 450 difficult miles away. I suggest that cards destined for Kagnev ET3s be addressed to APO 843, New York, N. Y." The ET2 prefix no longer will be used in the Eritrea-Ethiopia union. ET3JK (W3MCB) adds that International Reply Coupons are much appreciated by non-APO ET3s. . . . OM Cone of Holy Cross Mission writes re EL6E QSL discrepancies: "This call was originally assigned to me in 1958. When I went on furlough in 1960 one G. Nicholson, who calls himself Philip, began operating the station under my call and license. At present he is barred from the airwaves here, including use of the commercial network we run each morning with other Liberian missions. I would appreciate published notice to the effect that he is no longer operating EL6E and that he was never licensed to do so. His logs are very sketchy, so amateurs awaiting cards from him most likely will be disappointed. I have applied for renewal of my previous license with assignment of a new call sign. Meanwhile I regret there is little that can be done about QSLs for those working EL6E since June, 1960." . . . W5WW informs, "5A3RC dispensed some 8000 QSOs during his year in Libya, a substantial percentage going to the W/K contingent. Bing now goes home to England for leave pending possible reassignment to another DX location." . . .

"I can still verify ZS3LW contacts dating before May of '61," states WIBPM, requesting s.a.s.e. from W/Ks. "ZS3LW now is ZS6LW. I am also QSL manager for ZS2GF." . . . "When ZD3P logs come through we will be pleased to honor any outstanding cards." G2BVN is quoted in the NCDXC organ. . . . FDXC's *DX Report* has it that IRCs or 915 mint postage will bring fast direct response from 9U5AS, reachable through ON4HK.

Asia — W4CXQ writes from his new post in Japan: "Prior to my arrival at KA2KS there were hundreds of W/K QSLs stacked up here unanswered. Those who have been unsuccessful in obtaining cards from this station over the past two years should re-submit requests to me at [the address in the list to follow]." . . . "As of now, I'm W.K. VE7YO QSL manager for 4X4DH," confirms W5VSO. "Hope to have his logs soon. Tell the boys to send along large self-addressed stamped envelopes, or just postage, because Bruno's cards are king-size." . . . VK5RC (GM3HOM) worked MP4QBB on 20 sideband, then called CQ on another frequency and raised MP4QBB's QSL manager, KATJL, *Small world*. . . . "I've kept a few Ceylon QSLs in case anyone still needs 4N7GE confirmations," pens GRITG to Roy Waite of Newark News Radio Club. "My logs go back to December, 1951." . . . NCDXC's *DXer* credits 9M2s AD CR DQ FS FZ and MG with 100-per-cent QSL policies, and notes that the V81 gang also has a good rep in this respect. . . . The WGDXC *DX Bulletin* records VE4OX's disclaimer of JT1 QSL connections.

Oceania — Ex-KC6U7-KX6UZ protests that "QSL bureaus are still sending cards via my former Truk address. These are rerouted to me here near Washington, D. C. I have plenty on hand for KC6s BA BD HH BI CG JG and KR. It would be nice if someone out there would establish a KC6 QSL bureau, contact the other bureaus, and advise them accordingly. I'd like to bundle up the cards on hand and send them to someone in the Carolines who would distribute them. It's little trouble or bother to me to keep receiving them but I think it would be fair to the KC6 lads and the people they work to pass the word along." . . . "Right now I'm up to my ears in QSLs," declares W9EXE, ex-VR5AR. "Hoped to get them all out by Christmas." . . . WB2DSG understands that any KJ6 can be reached via USCC Loran Stn., APO 105, San Francisco, Calif. . . . W9ADN was willing to assist VR5AA with

QSL chores but Herb failed to come through with the necessary QSO info. Hence all cards on hand had to be forwarded to Nukunolo for VR5AA's personal attention. This from WGDXC's *DX Bulletin*. . . . According to the *DXpress* of VERON, Papuan VK9BM1 sends out QSLs on receipt, air mail for four IRCs. Contrary to earlier info, K8RTW is not Ben's QSL aide. . . . Via FDXC, VK4SS testifies that VK5XK/p of Lord Howe isle usually QSLs 100 per cent via bureaus. . . . DXcerpt re Cocos's VK9LA from NCDXC's worthy *DXer*: "I can be reached direct at Box 5, P.O., Cocos (Keeling) Islands, or via the VK6 bureau. I do QSL 100 per cent, requesting that those who desire direct reply include self-addressed envelope." Lionel welcomes IRCs, too.

Europe — "I would suggest that any further QSLs for CT2AI go direct," writes W2GBB, erstwhile QSL manager for that station. "I made arrangements with Francisco to handle his cards but have received no logs. Sorry." . . . Hans W. Wieringa, P.O. Box 152, Gronigen, Netherlands, offers mint Dutch postage to DXers so inclined. Check with him for terms. . . . OE1FF would appreciate 100-per-cent QSL for his recent Albania DX work, according to K7LUZ. If he doesn't hit it close we'll be mighty surprised. . . . Polar Bears Radio Club (SL3ZO) still has a flock of U.S.S.R. callbooks, other interesting DX literature, and a variety of QSL-chasing aids for sale. Sven Elfving, Solgardsgatan 15, Ornskoldsvik, Sweden, can catalog 'em for you.

South America — W4BJ invites petitions for HK8ZU San Andres QSLs, s.a.s.e. as usual. . . . WGDXC notes that W4DQS now holds logs for 1961's historic Malpelo HK8TU eruption. . . . W3ZQ commenced QSLing his October-November Sint Maarten PJ5MC contacts in December on the s.a.s.e. basis. . . . K1MEM, who can assist with FP8BR and SP3DG confirmations, disclaims connection with FM7 QSL matters. . . . K9YDY established that W2FXA, not W2CTN, is QSL manager for FY7YF, s.a.s.e., of course.

Hereabouts — Our "QSLers of the Month" this month are CP5EZ, DL9KP, HL9KH, KJ6BZ, TG9AD, VK2AXK, VP8GB, VR3O, ZK1BY, ZL1ARY, ZM16A and ZP9AY, plus QSL managers Ws 2CTN 3AYD 5QK 8EWS and 9VZP. Nominations come from Ws 8YGR 9WCE, Ks 2YFF 3MYI 6TZX 0GVA and WA2RUB. Got some candidates for recognition in *your* log? . . . Help! W8AFN wants a line on operator Bert of VR3S; W9KWC desires some clues on reaching CN8s FU HX, LU2ZR and SV8WN worked in 1961; K3BNS needs a lead on the '61 KJ6BR; and WA2WCB seeks tracers on FD4BD, '56, III3L '56, TA3AA '54, VP21A '56 and VQ2AB '53. . . . CO2JL hints to WA2MUA that many Cuba-bound QSLs may have gotten log-jammed with other mail in last year's blockade fracas. . . . "Stations not in receipt of QSLs for KG4AO contacts from January 15, 1960, through October 21, 1962, should reapply to my home QTH," advises W5ZHI. "I have my Guantanamo logs and plenty of QSLs; s.a.s.e., please." . . . Budding DX hound WA4ZM reminds us that we should occasionally point out to newcomers that a two-way QSL exchange via bureaus can take several months or longer because bureau managers necessarily make their mailings on a periodic basis. Everybody seems to be in a compulsive rush for direct QSLs these days but the ARRL QSL Bureau still moves great stacks of confirmations on reliable schedule. The new hike in postal rates doubtless will add to this volume. . . . Now comes our usual rundown of specific QTH data, none of which is necessarily "official," accurate or complete in each instance. Worth a try, though. . . .

AP2AD, A. Ibrahim, Box 65, Lahore, W. Pakistan
DU1s (FV Q) via W6ZJY
EL2K, P.O. Box 465, Monrovia, Liberia
EL6K (see preceding text)
EL6NB, W. Brown, % Holy Cross Mission, Kailahun, Sierra Leone
EP2AC, L. de Witt, P.O. Box 1199, Teheran, Iran
ET3FW, F. Woltmar, LWFBS, P.O. Box 651, Addis Ababa, Ethiopia
ET3JK, J. Kear (W3MCB), LWFBS, P.O. Box 654, Addis Ababa, Ethiopia (or via K3I1QJ)
ex-ET3LM (to W7KMF)
ET3PP (via K4QDC)
ET3RS, APO 319, New York, N. Y.

FA8AY (via FA9RW)
FB8WW (via 5R8BC)
FO8AI (via W9UCL)
 ex-FU8AC (to FK8AZ)
FY7YF (via W2FXA)
ex-HA8S-HA8Z, P. Somasiel, 1120 Hokendauqua St.,
 Conlay, Penna.
HC5EJ, Box 779, Cuenca, Ecuador
HI12J, J. Salgado, P.O. Box 405, Port-au-Prince, Haiti
HI8GA, Box 99, Ciudad Trujillo, D.R.
HI8MV, Dr. L. Manon, Box 1157, Santo Domingo, D.R.
HI8NSF, Santo Domingo Radio Club, Box 1157, Santo
 Domingo, D.R.
HK0AI (via W9VHM)
HK0ZU (via W4BJ)
HL5X (via W6ZY)
HL9KP (via W4OSL)
HL9KW (via KARL)
K1Y00/KP6 (via WJMV)
KA2KS, W. Cotten (W4CXQ), Box 12, Navy 830, FPO,
 San Francisco, Calif.
KC6BO, Page Engrs., Koror, Palau, W. Carolines
 ex-KC6UZ-KH6UZ-KX6UZ, C. J. Kunz, 1730 E. Ave-
 nue, Washington 25, D.C.
ex-KG8AO, R. Lambert, W5ZHL, USNAD, McAlester,
 Okla.
KG6ALG/KB6, % FAA, Canton Island
KH6EWA, 2215 Alawai Blvd., Honolulu 15, Hawaii
KL7ECO, C. Kuespert, Town & Co. Mobile Home Dt.,
 Lot 4, Star Rte., Fairbanks, Alaska
ex-KM6BJ, T. Woods, 1435 N.E. Buffalo, Portland, Ore.
KP6AX (via W1AIV)
LU1s ZAG ZG (via RCA)
OA8J, Box 216, Iquitos, Peru
OK1s ABY AFC AIH AI DK EJ GT KMX KPA NE
NR ZL (via OK1KCL)
OK1KCI, J. Reitmayer, Kollarova 1283, Pardubice 3,
 Czechoslovakia
PY7NJ, J. Souto, Box 1043, Recife, Brazil
UA2AW, P.O. Box 17, Kaliningradsk, U.S.S.R.
UP2NCH (via UA2AW)
VE8MG, % RCA, Trenton, Ontario, Canada
 ex-VP1AM (to VP1MM)
VP1MM, P.O. Box 411, Belize, Br. Honduras
VP2s DA DU (via W3AYD)
VP2s LA LS ML (via K8ONV)
VP2SY, P.O. Box 80, St. Vincent, W.I. (or via K2MRB)
 ex-VP3RS (to W4CAA)
VP5BB (to W4IOI)
VP5DB (via WA2IFY)
VPs 5TK 7CU 7CW, Nav.Fac, Navy 141, FPO, New York,
 N. Y.
VP5XG, A. Windle, P.O. Box 628, Kingston, Jamaica
VP7CX (via W9ZDI)
VP7NT (via K0BLT)
VP8AI (via W2CTN)
VP8GR, R. Lewis, Deception Island, via Port Stanley,
 Falkland Islands
VP8HD (via G3PEK)
VR2HD (via VR2AS)
VU2NR (via W0ZSZ or G3MVV)
 ex-VU2XG-4S7XG (to VP5XG)
W2GLM/KW6 (via WA2RAU)
XF1A, P.O. Box 339, Mexico, D.F., Mexico

YN3KM, J. Murphy, Box 11, Leon, Nicaragua
Z31KFF, Box 77, Tirana, Albania
Z4ZSP (via SP8HH)
ZI1AD (via W3AYD)
 ex-ZC4BC-GW3NMQ (to ex-5A3RC)
 ex-ZC5AE (to G1I3LQZ)
ZD7SE, via R. Donovan, W0GDJX, 3025 Garland Terr.,
 Colorado Springs, Colo.
ZI1AO (via W9JEA1)
ZI46AW (via W8EWS)
Z31NI, V. Nilson, 2 St. Denis Mansions, Av. St. Denis,
 Sea Point, Cape Town, S. Afr.
Z3ZGF (via W1BPM)
Z3ZMI, G. Coetzee, % Sig. Sectn., Air Force Stn., Yster-
 plaat, Cape Town, S. Afr.
 ex-ZS3LW (via W1BPM or to ZS6LW)
ZS6LW, A. v.d. Watt, 126 Windsor St., Gerdeview, Germ-
 iston, Tvl., S. Afr.
3I4A (via ZL3IA)
 ex-4S7GE (to G3JTG)
4X4DH (W/K/V/E/VOS via W5VSO)
4X9HQ (via IARC)
 ex-5A3BC, Bing Crosbie, G3NMQ, 73 Clyde St., E. Croy-
 don, Surrey, England
5B4LB, Cpl/Tech L. Boomer, 264th Sigs. Unit, RAF,
 BFPO 53, Cyprus
5R8CM (via W1YDQ)
5U7AC (via W9RKP)
9U5DR (via W8BF)

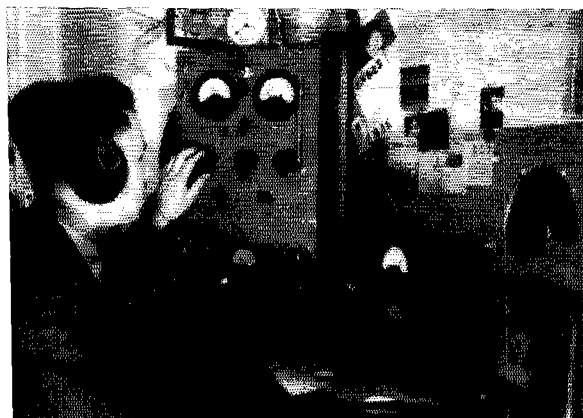
Our benefactors for the preceding QTH catalog are **W5**
1BPM 1N1M 3CQF 3WZL 5WW 7DJU 7UVR 8YGR
9WCE, **Ks** 1LFW 1MEM 2TDI 2UTC 2YFE 4ZNJ 6TZX
7IUZ 9YDY 9AXU 0CVA 0JPL 0VSH, **WAs** 21LH
2VUA 6VAT, **WB2DSC**, **KH6DVD**, **ZS2U**, L. Waite,
 American SWL Club 511, DARC DX-17B (DLs 3RK
 9PF), Florida DX Club DX Report (W1CKB), Interna-
 tional Short Wave League Monitor, Japan DX Radio Club
Bulletin (JA1DM), Kanawha (W. Va.) Radio Club *Splatter*
 (K8BIT), Long Island DX Association *DX Bulletin*
 (W2MPS), North Eastern DX Association *DX Bulletin*
 (W2DGW), Northern California DX Club *Dxer* (K0CQM),
 Okinawa Amateur Radio Club *Keystone Karrier* (KR6ID),
 Polar Bears Radio Club *Dxer Bulletin* (SL3ZO), **VERON**
DXpress (PA0s FX LOU VDV WWP) and West Gulf DX
 Club *DX Bulletin* (K5ADQ). Thanks, indeed!!

Whence:

Asia — "I'll be quite happy to be at KA2KS for the
 next two years," writes W4CXQ, a 200-country man with a
 yen for 80-meter DX chasing. "Till the boys I'll be working
 4-Mc. c.w. and s.s.b. daily. I find that KAs still are much
 in demand, especially from the awards point of view. It's
 nice to be on the other side of the DX fence for a change, and
 I've found that proper timing of calls is much more impor-
 tant than signal strength here at the DX end."
Ex-4S7GE tells s.w.l. LeRoy Waite he's now active as
 G3JTG on 80 through 10, c.w. and a.m. with 120 watts, a
 beam and SP-600 receiver. "Fifteen is the band I prefer and
 I'm to be found there most days at 1300-1340 GMT, my
 lunch time. I must say that working DX from G-land is a
 much harder job than from 4S7!" AP5CP of Tiger
 Amateur Radio Club reminds us of the Pakistan Day DX

HB9JB has a photogenic location in the Alpine region, as any reader can plainly see. These photos were taken by guest
W2DTE who regularly swaps QSOs and personal visits with Heinz. You also may have worked
HB9JB under his previous calls, **VK2AIC**, **VK4JS** and **VU2HW**.





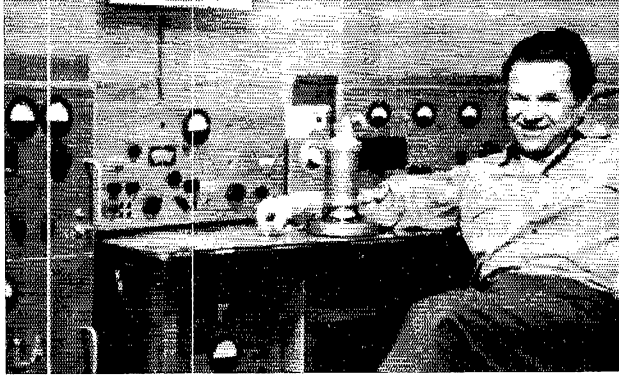
Poland's radio amateurs long have been outstanding performers on the DX stage. These pictures, representative of SP-type QMs and their effective equipments, include (clockwise from lower left) SPs 2PI 5AR 7HX 3PL 7LA and 4JF. (Photos via Ws 1WPO 7DJU 8EMZ and WA2KQG)

Contest scheduled for the 22nd-23rd of next month. A golden opportunity to connect with APs—details in our next column. . . . IA3ADX/mm, who works many W/Ks on 14- and 21-Mc. phone, makes four trips a year from Japan to our east coast on the *MS Tacoma Maru*," observes W3HPO/K3UWD. "He's on the air in the afternoons and, when docked, he invites all contacts to come aboard for visits. *Tacoma Maru* is a brand new ship and her radio room is out of this world." . . . Asian items via aforementioned club periodicals: W1HGT hears that some Yanks can get a TA ticket for DXpeditionary purposes, all right, but no equipment can be brought in, only parts. Fast kit assembly job on site? . . . 5B4s PC and TC keep Cyprus workable, the former with sideband on 14,265-14,275 kc., 1300-1330 GMT. . . . Turns out that 4X9HQ is merely a club call in Tel Aviv—relax. . . . UD6s BR and K4C cause s.s.b. commotion near 14,277 kc. . . . VS1s BU and DO occasionally manage to tire up ZC5s BU and DO, while ZC5FF gads about on 3.5 Mc., 7005 and 14,095 kc., mostly around 1000 GMT. . . . VS1s AU JH KR and 9M2MC are sideband enthusiasts. . . . VU2NR has been scheduling W0NFA on 14,138 kc. at 1330 GMT and can often stir up UML8 sideband activity for interested parties.

Africa — As indicated in "Where," there are fast-breaking DX developments in ET3 and ex-ET2 territory. An ET3RC (ex-ET2US) communicant apprises, "During the past two years parliament has prohibited amateur radio activities in Eritrea except for ET2US of the Amateur Radio Club, Kagnew Station, Asmara. This station has been permitted to operate as a favor to U. S. Army and Navy personnel, a gesture greatly appreciated. In late 1962 the first ET3 calls were issued to individuals at Kagnew Station for inputs up to 100 watts. Our licensed amateur radio community has increased to about eight, and we are hearing many other new calls from the rest of Ethiopia." W3MCP, now ET3JK, confirms this news in another letter: "I have a joint hamshack in operation with ET3FW who is also from Pittsburgh, my home town. We have an SSB-100, 2B receiver, BC-348Q and a 16-foot vertical on 20 meters with an 8K beam in the works for 20 and 15, plus a 40-meter array. Both of us work in the transmitter department of Lutheran World Federation Broadcasting Service and are installing a large short-wave BC station about the size of a typical VOA job. There will be two 100-kw. rigs feeding 300 acres of curtain-type arrays, some with gains of 20 or 22 db. ET3JK will be active into mid-1964. ET3FW till 1965." Neighbor ET3LM is returning to W7KMF shortly. . . . KSJVF is jarred by apparent lack of interest in the tempting

7016-kc. CQs of ZE7JC. . . . EL6E, the first and true one, remarks, "EL6NE is operated by Ken Waters, an Englishman working at a near-by coffee mill. When he graduates from the novice category he will drop the 'N' and become EL6E. EL6NB is a member of our mission staff. Liberian novices, like those in the U. S., are limited to 75 watts maximum input, rockbound. I will have a KWS-1 back on 15 and 20 meters as soon as I receive my new call." . . . W1BPM understands that ZS2ML, operated by Z81XU, sticks close to 14,150 kc. now but will be roaming 20 and 15 c.w. and phone as soon as Ray gets his own rig going on Marion. . . . W5WW writes, "Ex-5A3BC-ZC4BC hopes to be on as G3NMQ after slaking the cobwebs out of his DX-40. Bing already has an offer to work in Germany but he hopes to rustle up something with a rarer DX flavor." . . . Club sources add African dispatches: ZS6APL/Antarctica lurks on 14,010-kc. c.w., 1900 GMT. . . . CR6CY seeks to finish WAS on week days, 14,175 kc. or so, a.m. and s.s.b., usually tuning 14,230-14,240 kc. . . . ZD8JP seems to like 14,063 kc. at 2200 GMT, Mondays. . . . Crozet isle's FB8WW should be available on 14,018- and 14,040-kc. c.w., 14,200-kc. a.m., till the middle of this month. . . . 5R8CM is thinking about more Comoros DXcitement. . . . SU1KX helps make Egypt less rare on 14,301-kc. sideband, 1300 GMT. . . . LH4C (W4BPD) scored 3.8 kiloQSOs during his four-day Bouvet engagement after amassing over 7000 ZD9AM contacts. Wow!

Oceania — VK5XK's commentary on his late-'62 DXcursion to Lord Howe Island as VK5XK/p: "I had with me a 20-watt Mark II Type 3 transceiver. Four antennas were erected for W/K work but none produced the results desired. Normal 7- and 14-Mc. conditions seemed to prevail except toward the U. S. A. Makes me wonder if iron ore deposits could be responsible. It was disheartening to hear ZLs and other VKs exchanging RST579 reports with W/Ks whom I could not even hear. It was a new experience to call 'CQ WK ONLY' from such a rare QTH and receive no replies. On 20 I did manage to work Ws 2JT 3JW 4HIG 4BZ and K4TML; on 40, Ws 4BZ 5OZR 6BVM 6HYB 6LN 6JF 6UJ 6ULS 7AD 7LZF 8FGX 8JIN and 9CEA. Next year, with enough encouragement, another visit may be arranged. Meanwhile, I share the disappointment of the many W/Ks who couldn't raise me." W8s FGX and JIN had the outstanding American 7-Mc. signals on L. H. . . . KG6ALG/KB6 tells W1BPM he and KB6BZ represent the total Canton Island ham population at this writing. KG6ALG/KB6 expects to tackle DXing with renewed vigor next month after concluding a Stateside stay. . . . "Heard 3L4A open up with a first CQ without



results," remarks W7DJU. "But what a terrific swamp on 14.075 kc. later in the morning! Perry is located at a geophysical test site on British Phoenix. . . . KH6DV1, via radiogram through W1NJI and K1LFW, mentions the fresh c.w. and single-sideband activity of KC6BO, Koror . . .

Ex-KM6BJ notifies, "I closed down on Midway in early December after six years on the island. I'll operate as KM6BJ/7 with a KW1M-1 in Portland, Oregon, for a spell until reassignment to Kodiak, Alaska. . . . "During my short stay on Tonga as VR5AR I certainly enjoyed being a piece of rare DX," declares W9EXE. "I was active there intermittently beginning in June. I now lead a normal W9-type life again with no answers to my 'Qs—hi!" Orlando used a 328-1, 308-1, R-390 receiver and 3-element spinner on various bands and modes. . . . More Pacific pickin's via club journalists: ZL1ABZ, on from the Kermadecs since mid-November, likes 14,290-kc. s.s.b. at 0330 and 0730 GMT, also 14,120 and 14,130 kc. at times. . . . One John Washer reactivates ZL4JF on the Canbells, mainly c.w. around 14,050 kc. ZL4OG is there, too, but licensed only for 80-meter work at this time. . . . Write W6GN and/or WA6TGY if you're interested in cultivating a budding ham radio interest displayed by native ZM6 folk. They've got the bug but no apparatus source, according to ZM6AW (VP2YB/mm). Danny, by the way, stashed away 2.5 kiloQSOs and 80 countries in 16 days as ZK1BY, Manihiki. . . . FK8AZ haunts 14,130 and 21,150 kc. on s.s.b., shooting for Europeans at 0800-0900 GMT. . . . K4LPM/KG6 hears that the Marianas are off-limits to DXpeditionary enterprises at this time. . . . ZK2AY evidently goes for 3525-kc. 1X at 1800 GMT. . . . KC6BK favors 14,010 and 14,050-kc. c.w. and 14,293-14,296-kc. single-sideband of late.

Europe — "DXers waiting schedules with the Channel Islands should get in touch with me," urges G2CNC. "W/Ks are coming through very well these days on 14 and 21 Mc. from 1500 to 1700 GMT. Only one snag—fellow Europeans hear my GC call and promptly break in with 'PSE PSE QSO FOR WAE,' International Reply Coupons will be appreciated with sked inquiries." . . . K7IUZ mentions a new Czech certification, P-75-P, of possible interest to wallpaper hunters. Consult CRC, P.O. Box 69, Praha 1, Czechoslovakia, for details. . . . Radar engineer IIPPI announces his XYL's licensing as IIMAIL, and both soon will be trying out the OM's new s.s.b. rig now under construction. . . . LA4NI writes of recent LJ2S military-amateur action with colleagues LA5 2DI and 4TI in north Norway. "We've been on 20 c.w., week ends, with a Canadian 100-watt rig. So far LJ2S has 35 states but no U. S. Fives. Broadcast interference almost makes us QRT. Nearly everybody in the Signal Company protests! Perhaps we'll have to pass out filters. LA2DI and myself are novice hams and we would very much like to work other newcomer DXers." . . . Ex-HA8S-HA8Z now verges on becoming a full-fledged U. S. citizen as well as a K3. . . . Club notes from the Continent: SM13P specializes in arranging QSOs with SL3s and SM1s for certificate chasers. . . . Polar Bears Radio Club (SL3ZO) offers six interesting certifications for accumulating such things as Scandinavian prefixes, Swedish cities, QSLs from SL stations, etc. . . . Spitzbergen's LA9RG/p often is found Fridays and Saturdays with a KW1M-1 on 14,252 kc., G3DO assisting. Colleague LA5FI/p prefers 14,340 kc. around 1300 GMT. . . . Prominent DXers DL9PF and UA1CK underwent recent hospitalization. . . . Dutch amateurs are newly authorized 10 watts input on 1825-1835 kc., a welcome addition to 160-meter DX possibilities.

South America — Mid-April is the tentative target date for the San Ambrosio/Felix islands DXtravaganza contemplated by HK1QQ & Co. . . . K2UTC discovers that ex-OA4HK and her OM are hitting the books for their masters' at Austin's U. of T. . . . W3ZQ stacked up some 900 single-sideband and c.w. contacts in 20 hours of PJ5MC Sint Maarten DX work last autumn.

Hereabouts — Ex-KG4AO, now back at WSZHI, gives us a timely discourse on Guantanamo Bay goings on during

last year's Cuban crisis: "I arrived in Guantanamo in January, 1960, and was president of GBARC until my rather sudden departure from the place last October 22nd. For two years our amateur activities were the usual ones found anywhere. FCC has no jurisdiction in KG4-land; local regulations for the amateur service normally provide that one must have a Stateside ticket before he can gain transmitting privileges. Code and theory classes were held, however, and at least eight KG4 tickets resulted. A DXpedition to Navassa island was recently planned but a landing permit was denied. Heavy traffic schedules with the U. S. and possessions were carried on. Most of us in Guantanamo felt right up to the hour we left that life would remain relatively undisturbed as events passed by with little change in the local scene. October 22nd arrived on a business-as-usual basis but by 1100 word was out that all amateur stations were to cease operation, and by 1400 all dependents were removed from the area. All our ham gear was left as is, my Marander and Drake, KG4AB's 8X-100 and Viking II, KG4BK's DX-60 and Knight receiver, KG4BB's twin Hallikits, etc. Amateurs remaining behind were back on the air five days later, however, including KG4s BA BH and BJ. At present KG4s AA AE AN BM and BQ also are active. Incidentally, GBARC sponsors a Guantanamo Bay certification for those showing evidence of five phone and two c.w. KG4 QSOs. Awards manager KG4BH handles this." . . . If you wonder why west coast QRM was conspicuous by its absence on the 26th-27th of last month, 'twas a result of a gala joint meeting of the Northern and Southern California DX Clubs at Paso Robles. . . . YL VE7BBB, with a new WAS diploma and half-DXCC, yet finds time to build her own stand-by rigs, v.h.f. equipment, test sets, etc., as well as to participate in a slew of local social and administrative ham shenanigans. . . . K2YFF and others want to see more DX stick-to-it-iveness on 28 Mc. "The only reason 10 doesn't seem to be open is lack of activity, especially on c.w. How about a 28-Mc. c.w. contest each year?" . . . K5TJV feels there's still plenty of room on the low edge of 40 for shrewd c.w. DX chasers. I've readies an 813 final and half-wave vertical to prove his surmise. . . . "It takes only a rare one like Gus to bring a dormant 21-Mc. band to life with a bang," opines W5WW. . . . K6BX designates May 31st through June 3rd as time for the 1963 Annual Certificate Hunters Club QSO Party. All amateurs will be invited to participate in this one. . . . American Shortwave Listeners Club fosters a weekly DX program over SWBC juggernaut WRUL. Early editions featured W0AEQ's taped "Sounds of the Satellites." Give a tune Saturdays on 19, 25, 31 or 49 meters and you'll probably

(Continued on page 152)



Hints and Kinks

For the Experimenter



V.H.F. PANORAMIC RECEIVER

By using a couple of test gear items and a surplus ARC-5 receiver, a v.h.f. panoramic receiver can be included in an existing v.h.f. receiving setup. All that is required is a TV alignment sweep generator (I use the Heath TS-4A),

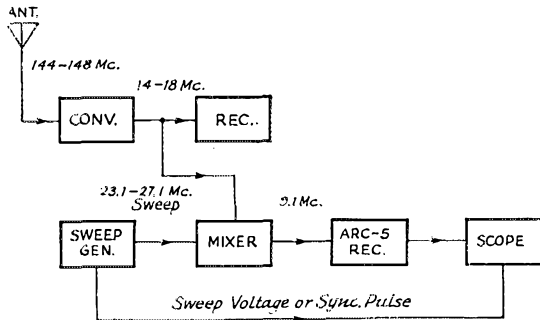


Fig. 1—Block diagram of the panoramic receiver.

oscilloscope, a 6- to 9.1-Mc. ARC-5 receiver and the station broad-band converter and receiver.

Also necessary is a mixer, shown in Fig. 3. The mixer circuit includes a grounded-grid amplifier that provides some isolation between the sweep oscillator and the station receiver. Power

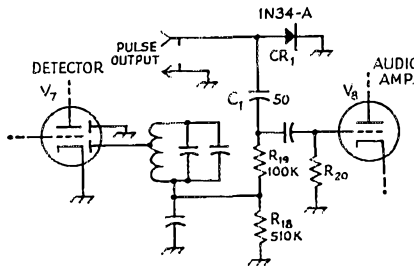


Fig. 2—Modification to the ARC-5 receiver includes the addition of CR₁ and C₁.

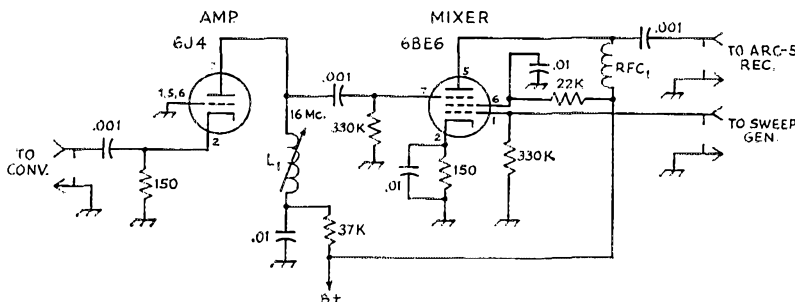


Fig. 3—The mixer for the panoramic receiver. A 6J4 grounded-grid amplifier is included for isolation.

L₁—Slug-tuned inductance.
RFC₁—2.5-mh. choke.

for the mixer can be picked up from the receiver, or a separate power supply can be constructed for the purpose.

Fig. 2 shows the modification that is necessary to the ARC-5 receiver. Components CR₁ and C₁ are the only additions to the circuit. The pulse output from the ARC-5 receiver connects to the vertical amplifier input on the oscilloscope.

—F. T. Swift, W6CMQ

ANOTHER NUT STARTER

A tool that I have found handy for starting nuts in hard-to-get-at places comes from an Erector set. The gadget is nothing more than a 6-inch aluminum strip about 1/4-inch wide with sides of about 1/16-inch. At one end, cut two slits near the edges and depress the center piece as shown in the

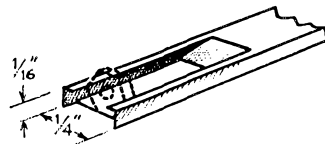


Fig. 4—WA2PIV's nut starter.

sketch. The resulting tong is depressed and the nut is inserted where it is held. Of course, the tool is restricted to only a few different-sized nuts, but other tools can be made for whatever sizes are most used around the shack.

—Jerrold Grochow, W1ZPIV

BEESWAX FROM CHURCH CANDLES

I HUNTED diligently for pure beeswax to boil my 600-ohm wooden transmission line spacers. Suddenly I realized that many churches use beeswax candles. I suggest that those needing beeswax contact their local church.

—Rev. Paul Rittner, W0AIIH

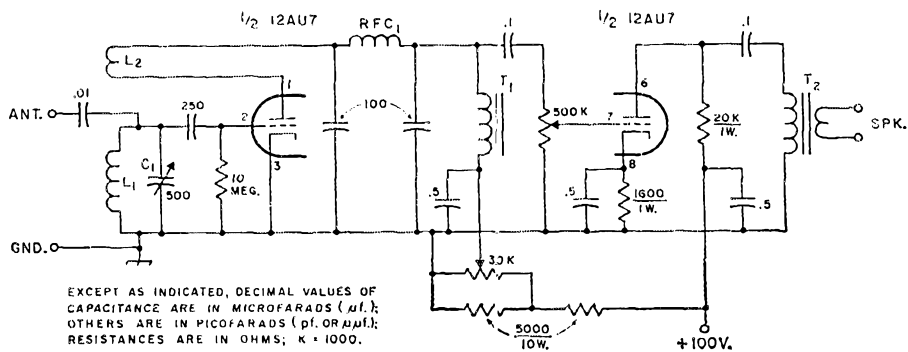


Fig. 5—W8PA's regenerative v.l.f. receiver

C₁—500-pf. variable capacitor.
L_{1,2}—TV flyback transformer.
RFC₁—See text.

T₁—See text.
T₂—Output transformer (Stancor A3328).

FLYBACK TO THE PAST

I ENJOYED W3QY's article in October, 1962 *QST* on the NAA receiver, especially since I had built a receiver for the v.l.f. bands. My approach to the honeycomb coil problem was different, however. I used a television horizontal circuit flyback transformer. The primary winding, *L*₂, serves as the tickler coil in the plate circuit while the secondary winding, *L*₁, becomes the tuned grid coil. The ferrite core must be removed from the flyback transformer and is discarded.

The diagram in Fig. 5 shows the circuit of my v.l.f. regenerative receiver. The r.f. choke, *RFC*₁, is made from two or three old i.f. transformer windings connected in series. The regeneration is not at all critical and threshold operation of feedback is unnecessary. However, it is advisable to have some control of regeneration by means of the potentiometer to control the detector plate voltage. The 12AU7 will oscillate with about 11 volts on its plate, but reception is improved with 20 volts and becomes degraded again at 45 volts.

The 500-hy. transformer, *T*₁, can be any audio interstage transformer with its primary and secondary windings connected in series. Of course, they must be connected in the proper phase.

With a 500-pf. tuning capacitor and my particular antenna, the receiver tunes approximately 15 to 23 kc. The output volume is sufficient for speaker output.

— Floyd Donbar, W8PA

CENTER-TAPPED CHOKES

THE power-supply article by W3FQB in *QST*, October, 1962, was most interesting, especially his solution to the perplexing problem of achieving a choke input filter on a voltage-doubler-type power supply. The use of a center-tapped choke certainly solves the problem. However, as W3FQB mentions, the center-tapped choke is not a common item but a satisfactory substitute can be found among those "older transformers still on hand that are designed for 110-volt operation."

I found that the high-voltage winding of any old power transformer with sufficient current-carrying capacity can be used. It is just a matter of removing all of the windings except the high-voltage secondary and restacking the core laminations to provide a butt joint.

Experimenting with two transformers, I found the inductance at zero-current d.c. measured about 3 henrys for one half the winding. In using them in a power supply with an old television transformer whose total secondary voltage is 660 volts, the d.c. voltage under a 40-ma. bleeder load is 1180 volts. This is pretty close to the value of 1.8 times the r.m.s. a.c. voltage value mentioned in the subject article. The voltage drops about 100 volts under full load of 200 ma.

— A. O. Phares, W5ACV/g

MOUNTING MOBILE EQUIPMENT

A CONVENIENT place to mount mobile equipment is below the instrument panel, as shown in Fig. 6. The mount is constructed from aluminum

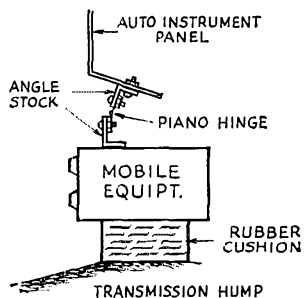
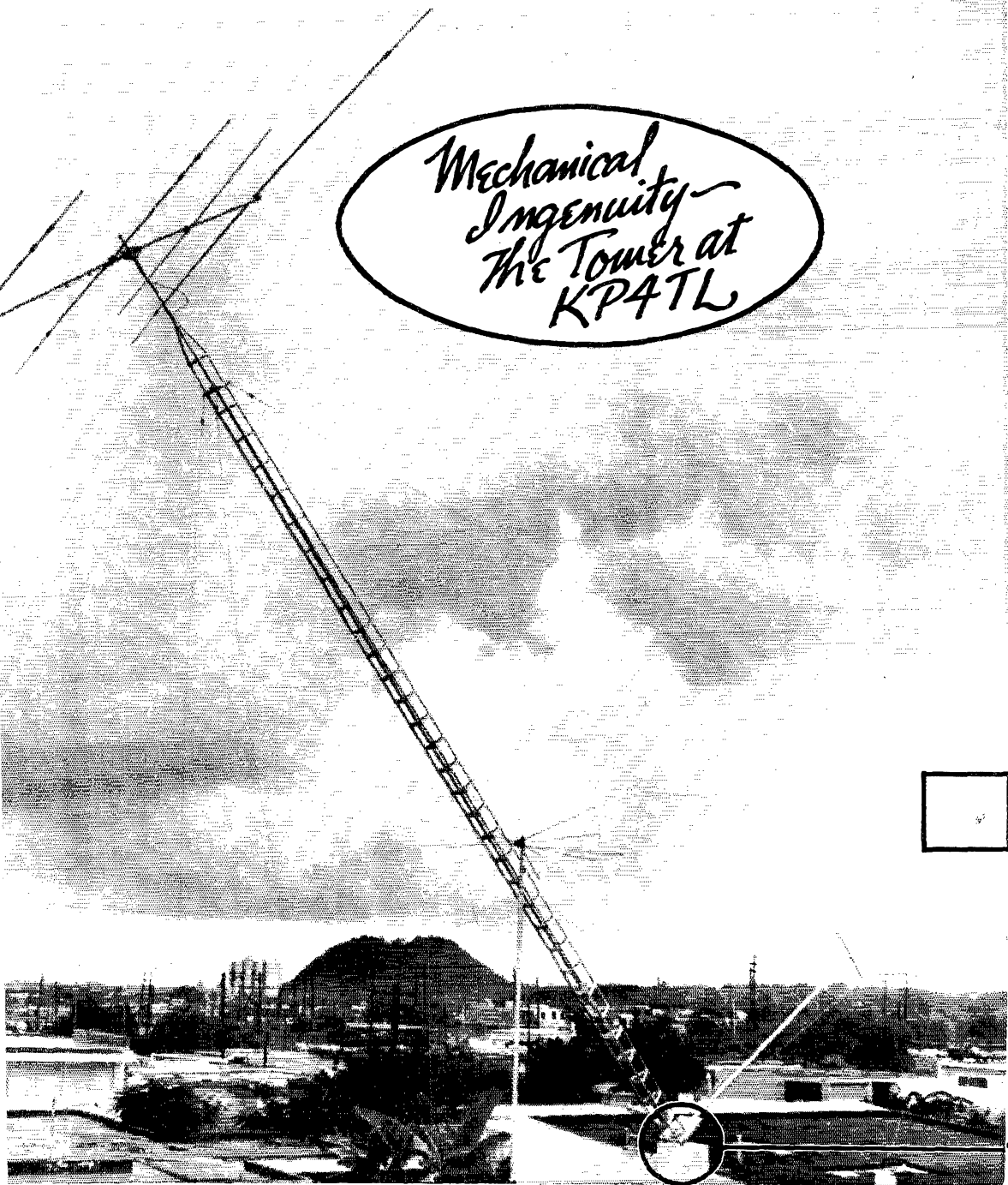


Fig. 6—W5TBC's mobile mount.

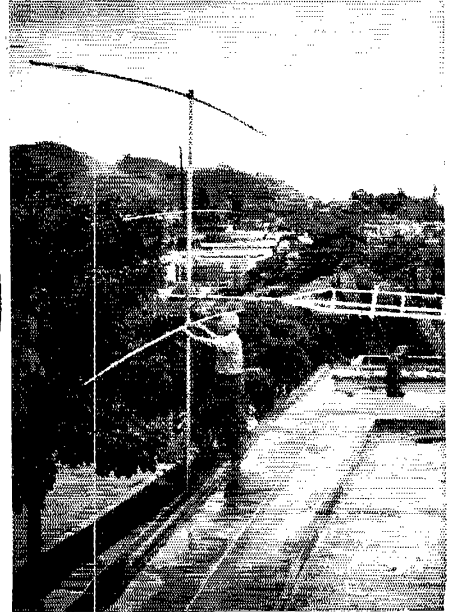
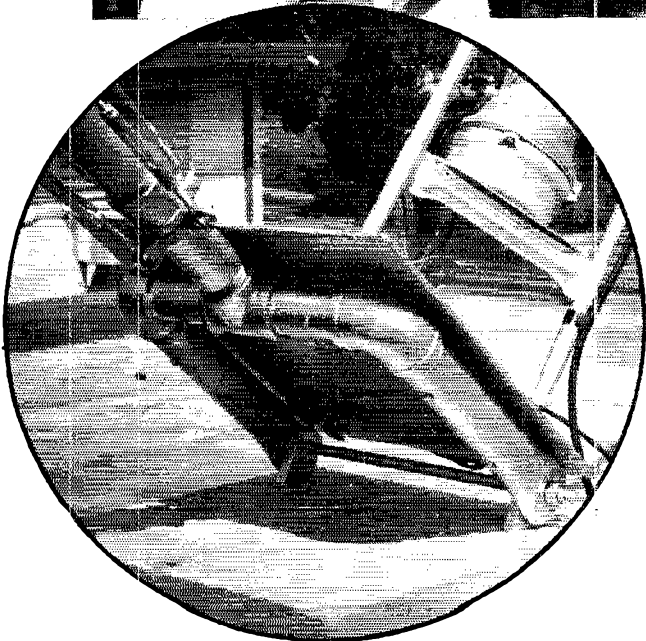
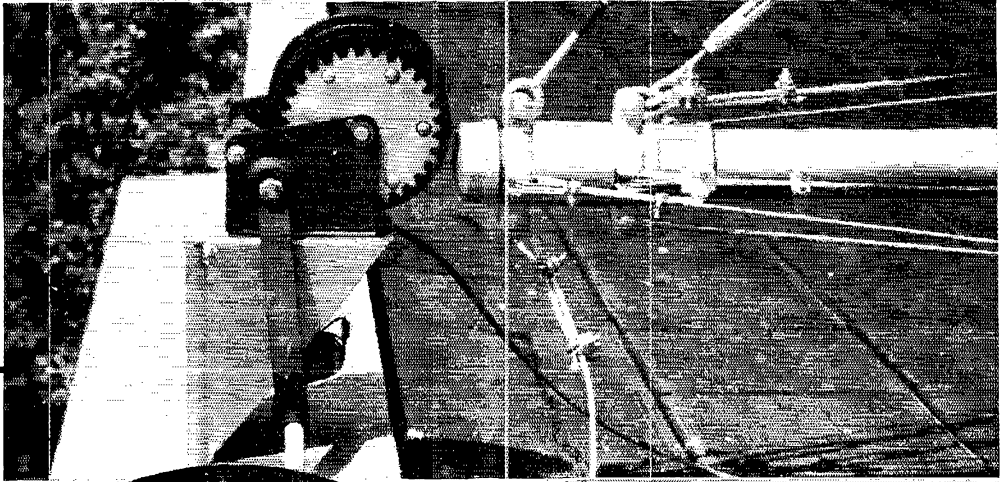
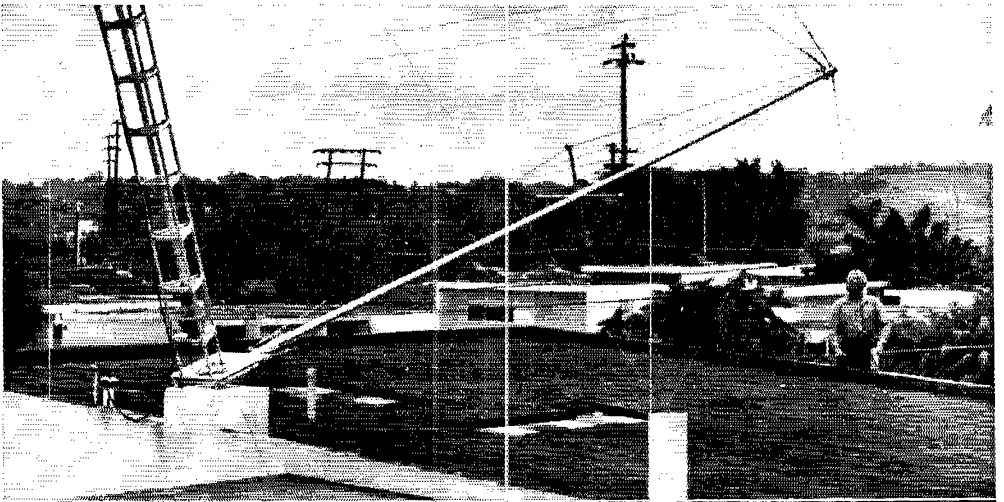
angle stock and a piano hinge, both of which should be available from the do-it-yourself counter at most hardware stores. This scheme makes a rigid mount, yet equipment may be removed easily by pulling out the pin in the piano hinge.

— Robert T. Paige, W5TBC

*Mechanical
Ingenuity—
The Tower at
KP4TL*



KP4TL wanted a tower which could be easily lowered to a horizontal position, so that he could work on the beam and tower without climbing and so that adequate hurricane protection could be afforded the tower. These photos (all taken by KP4AWV) show the details of a very neat and well-engineered solution. A guyed gin pole at the base, making a right angle with the tower, is controlled by a small winch, making it possible for KP4TL to lower his 47-foot tower all by himself in only four minutes. When he gets it to the horizontal, it is a simple matter to remove the beam, stretch it out on the roof slat, and lash it down. A study of these photos will reveal some of the interesting details. Note the guys off to the sides, which prevent the tower from getting out of control while being lowered by KP4TL; the king-post stays of the gin pole, to give it adequate strength; and pipes and service entrance caps to feed the coax into the house. Not shown in these photos are such items as the cleats fastened to the roof and to which the beam is lashed when lowered, and the excellent finish and attention to detail on all the various portions of the installation. That's KP4TL himself operating the winch and working on the beam in these photos.





Correspondence From Members-

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

ON CONTESTS —

☐ I feel there is no legitimate reason why some portion of the band cannot be set aside for other operation during contests. Under present conditions any type of emergency communications would be next to impossible during a contest. If I sent QRRR and signed my call, I think I would be deluged with guys wanting a serial number and signal report.

I have been a member of ARRL on and off for the last 25 or so years and to my knowledge you have always stressed moderation, courtesy, and fairness in amateur radio. Being the sponsor of these contests, I think it's your responsibility to create a situation which is fair to all hams, not just one immoderate group. — *Ricker J. Bodholdt, K3QOK, Phoenix, Maryland*

☐ Thank you very much for sending me a copy of the rules for the DX competition with a log form. However, as I do not approve of these DX contests, I will not be participating. Such contests do nothing but make it impossible for DX stations in particular to have a reasonable conversation with people at home, and interfere even with priority traffic. They are somewhat analogous to a person sitting in front of a telephone and seeing how many numbers he can dial in one hour. You would render hams overseas a great service, I think, if you would keep at least one DX hand free during such contests so as to give a chance for some serious traffic to get through. — *William J. Porter, FA2VX, Algiers, Algeria*

☐ I want to thank the League for the terrific time I had during Sweepstakes. As a Novice and Technician operator, I do not always have the time or effort to build up my code speed and go for the *real* *exam*. However, thanks to the Sweepstakes, I now can take my General with just a little brushing up on the theory. During Sweepstakes my code speed went up considerably, and I worked many new states. — *Steve Schwartz, WY2YDN/WA2YDN, New York, New York*

☐ It must be clear that the great increase in the number of contests (there is hardly a week end from September to March which is not occupied by a contest, sometimes even more than one) is the major cause of QRM especially at week ends.

Surely the League must realize that the contest-mania which has swept the world is the biggest single cause of weekend QRM . . . If ARRL as the largest amateur radio organization in the world would voluntarily give up contests, the smaller fry might follow suit. At least ARRL might offer to do so if other contest organizers reduce their number of contests. One contest per national radio club per year would fill the winter week ends twice times over.

One organized in each continent each year should be plenty. This would avoid blocking every week end and so depriving the vast majority, who are not contest enthusiasts, of their pleasure. — *E. M. Wagner, G3BID, London, England*

BACK TO THE DRAWING BOARDS

☐ Isn't it time for the fraternity to go back to fundamentals so that hams will not only understand their equipment, but will also be able to build it from their own designs? To soap-box a bit, in this era of plentiful money, acres of commercially designed gear (including kits) and cheap and easy licenses, the pressures are pushing ham radio in the direction of CB.

When the day comes (and it will, unless the trend is reversed) that the ham's technical skill is limited to following a manufacturer's installation instructions, amateur radio will have lost its function for the public good, and it will die on the vine. — *R. M. Forster, W2DVG, Long Island, New York*

A CHALLENGE

☐ In addition to the suggestion of W2ZGB in Nov. *QST* I would add emphasis on A-1 Operators, a certificate which is far more difficult to obtain and live up to than to elbow your way through the mess to attain DXCC. — *Geo. D. Hansen, W3FFD, Chicago, Ill.*

WHOA THERE!

☐ Last evening, close to the witching hour, out of the wild blue yonder, there came a faint call from a K5. He was calling at all of three or four words per minute. This call was answered by a W at a snappy 20-25 w.p.m. After the W had signed, there was a short silence followed by a string of dots that came like bullets from a burp gun. I'm not sure, but I think the K5 replied in turn at least at 35 and possibly 40 w.p.m. After which, the W dropped back to maybe 15.

Moral: Always reply to a call at the speed given and QRQ only when requested to do so. — *L. A. Coward, VE3FGV, Trenton, Ontario*

HW?

Dear hirth:

I find tsat I am not alone in 5aving trouble copyng tse letter "h". Many ot5er samh heem to save tse hame trouble, si ! 5i !! Hometimeh I t5ink "h" ih "s", hometimeh I t5ink "h" ih "5", hometimeh I t5ink "h" ih ---!

Do you t5ink Mr. Hamuel Morhe would mind if we csanged 5ih csaracter for "h", from didididit to homet5ing lehh sard to copy? Sow about dididas-das or homet5ing like tsat? W5y tse om muht 5ave been dit-zy or homet5ing. Si! Ho let'h give 5amh a 5elping sand (or fih) and csange t5ih 5orrrible csaracter. — *Senry "5ank" Rogerh, K1P1T, Orange, Mahhac5uhethh.*

OLD RELIABLE

☐ I would like to reply to WA6DUW, Eugene Cope, who protests in December's "Correspondence From Members" that c.w. operation should be banned from amateur phone bands by FCC regulation.

I agree that c.w. is often a troublesome factor in the conduct of a.m. phone QSO's. But so are s.s.b.

and other modes of communication. The problem is not one of banning c.w. from phone bands, but of encouraging better over-all operating habits to minimize interference and better shack habits so an operator can learn to copy a.m. or s.s.b. traffic through c.w. which may be present on the frequency.

C.w. is the one universal mode of communication common to all hams. It is sometimes the only way a QRP station can break for recognition to pass important traffic or information. It enables a station to continue communicating when modulators blow up or mikes go sour. To bar c.w. from the phone bands would be cutting off the right hand of amateur radio communications just because some operators dislike the mode of communication for personal reasons. — *Frank T. Moss, K2TMI, Montauk Point, New York*

CQ — YES CQ DX — NO

¶ I would like to suggest an additional rule for operating in DX contests. That is, to forbid the calling of CQ DX by a stateside station. This practice contributes greatly to QRM and generally results in no contact for the caller. Here in W6 land this din can be heard even if there is no contest. After all, a California station is no "rare" one for a foreign station, but the way the boys go "see que dawg exray" you would think there were only two hams in the entire country.

Let's put a stop to this waste of wattage. — *John Oliver, W6LZS, Granada Hills, California*

I-II-63

¶ Don Walmsby, G3HZL (page 95, Dec. *QST*) has a good point in noting the confusion between the European and American systems of numerical date notation. A refinement of this idea which would end the confusion is the use of Roman numerals to designate the month, placed between Arabic numerals denoting the day on the left and the year on the right. Thus the 8th of June would be 8 VI 62 and the 6th of August would show up as 6 VIII 62. This would also integrate well with military date notation which provides for the day of the month first, month second, year third. — *Bob Forman, W9RJI, Monmouth, Illinois*

FB OM

¶ After reading Dr. McMahon's article in October *QST* (Phasing Filter S.S.B. Generator, page 38) I'm writing to let you and VK2AC know how much I enjoyed an article written by a real ham.

We tend to get a little stiff and apply engineering practice with its oh-so close tolerances and its school solution circuits.

Dr. McMahon's easy style and "ham talking to another ham" manner in his article is most refreshing! He has found, no doubt, by the true ham method (try it and see if it smokes) that 500 ohms is not sacred for the ratio pot — and I for one never thought of selecting capacitors by the simple method he used to match the .02s used to tune L₁. There are many more bits of wisdom passed on in that article and I hope the good doctor continues to come up with many more "true ham" articles. Thanks for printing it. — *R. M. Stevens, W4GKI, Columbus, Ga.*

BEWARE OF BANDITS!

¶ How many of us know the fellow we are working is a ham? This never entered my mind until I

went to a local radio club meeting. As I walked in I saw a Technician on 80 c.w. (with a rig which was known to have harmonics) using the club's ex-call which expired over two years ago. I think we all should look out for this type of thing and try to stop it. The call you save may be your own. — *Ron De Leo, WA2BSV, Plainfield, New Jersey*

OLD BOOKS?

¶ As a volunteer worker in various mental hospitals I have been asked if I could obtain books or magazines on radio, electronics, and similar subjects. It seems that quite a few male patients are interested in those subjects.

So, may I suggest that you ask your members that if they have any old books or magazines they wish to dispose of that they donate them to their local mental hospital. Most patients have a "patients' library" and I'm sure that they'll appreciate any donations made to them. — *M. J. Figley, Athens, Ohio*

THE TEMPLETON CASE

¶ I feel that you owe the fraternity an explanation in connection with "The Templeton Case" in the January issue of *QST*. If this had appeared in the April issue, I could grasp its meaning a little more clearly.

Was this, as alleged, an accurate recital of the facts? If not, what was the cotton-pickin' purpose of the article? — *Ralph H. Turner, W8HXC, Oberlin, Ohio*

¶ If it were in the April issue I would not say anything but page 68 of the January issue, because it has no identifying note from you, is, in my view, irresponsible journalism. — *Robert H. Bushnell, W8AIM, Boulder, Colorado*

¶ It started out being interesting reading, but the discrepancies kept creeping in . . .

White's Radio Log lists no a.m., f.m., or TV station in any Templeton. This one has to be in California, tho it is nowhere identified by state, as Smith was Assemblyman and Senator from California, bought WKOO as Godfrey Smith Associates of San Francisco, and maintained an interest in politics. Templeton is in San Luis Obispo County, population 655, and no newspaper. All California TV stations start with the letter K . . .

"Approved by principals involved, with the exception of the late Godfrey Smith." — How was Jerry Barnes' OK obtained? *Broadcasting Yearbook* lists no "Hadley Consulting Service." There's no Senator Rockford Smithers, either.

Shades of Mr. Rapp! — *Ross Hansch, W9RBI, Madison Wisconsin*

¶ Congrats on the . . . piece by Jack Najork of GE here locally. That's the kind of stuff that livens up a magazine . . . — *Ero Erickson, W9IIPJ, Chicago, Illinois*

¶ When I saw the "Templeton Case," p. 68 January 1963, *QST*, I felt compelled to check that the copy of *QST* was not dated April. I notice Mr. Rapp's name does not appear in the article.

If the contents of the article are true, I suggest that the file on "Gaussian Abstractions" be reviewed by military authorities to determine whether the study has become more practical since 1942. — *C. E. Hooker, VE3CQH, Kingston, Ontario*

(Continued on page 168)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
GEORGE HART, WINJM, Natl. Emerg. Coordinator
ELLEN WHITE, WIYYM, Ass't. Comm. Mgr., Phone

ROBERT L. WHITE, WIWPO, DXCC Awards
LILLIAN M. SALTER, WIZJE, Administrative Aide.

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We have coming up in February three quite different operating activities, each a challenge and opportunity in its field. Each has been covered by full announcement in *QST*.

The Novice Round-Up. This annual 15-day station test for all *Novice operators* starts Feb. 2, about the time you receive this *QST*. As shown in the Activities Calendar and announcement (page 41, Jan. *QST*) the contest period ends Feb. 17. Operating work in the NR extends over a considerable period, so your operating can fit job or school requirements. It still provides time enough to give your station and operating ability a boost. Page 6 of this *QST* can be used to make a check-off list, as you work the different ARRL Sections. All other operators can give Novices a hand by working some of them in this test period. Many OTs like the NR. We suggest, however, that they adjust to frequencies in the 25 kc. above or below the Novice bands, if possible, so as not to congest them. This is a get-together party for all concerned. All scores will be reported but only Novices are eligible for certificates.

ARRL's 28th DX Competition. The DX contest rules (page 55, Jan. *QST*) give separate phone and c.w. contest sections. This major activity starts February 8. There are designated periods in both February and March so that any short washout of conditions in any one area will be the least detriment to your results. It's not safe to make predictions at this stage of the sun-spot cycle — but we can hope. Looking for countries is a continuing activity for many. We have air mailed special announcements to many of the rare ones and hope they will be on for all to work.

(1) Observe closely any instructions the DX gives to work up-10, down-8 etc., please. (2) Always use short calls, intensive listening, then more short calls, if needed. (3) Abbreviate your state or province as per the exact abbreviation in the contest announcement. This often avoids the need for repeating.

Have fun! This should help many to build to the 100-country level for DXCC; others can qualify for their next 10-level endorsement sticker.

The Frequency Measuring Test, Feb. 15. Details will be found elsewhere in these columns. This is an invitation to each amateur to improve his ability to measure his own or other's frequencies. If you have a 100-ke. standard or any type equipment specifically for frequency measuring, you should get in this. ARRL sends individual reports to all who take part. These are released when all data have been worked out in p.p.m., to show the parts per million error. This is usually five to six weeks after FMT runs; it takes us time to do all that arithmetic, and we release all copies at the same time. A further aim in holding an FMT is to qualify Observers who, to hold SCM appointment, must be active in work helping other amateurs, and in addition they have to complete two annual check-ups of their measurement capability to hold their OO rating.

Code Program Certificate Issuances Continue. "Tune us in to get full use of WIAW services. Runs are nightly." To make it as easy as can be for you to get this code practice and our Bulletins to All Radio Amateurs, WIAW sends to you simultaneously on *eight* different bands. The tape-sent bulletins at 18 w.p.m. can be just as useful practice as the hour of transmission at speeds 5 to 35 w.p.m. Whatever your limit, you gain speed if you will put to paper faithfully such letters as you recognize. Check your copy and get the characters you miss on a subsequent WIAW schedule when we repeat the message. More and more amateurs are displaying their CP rating along with their other certificate listings on their QSLs.

We have a list of other additional code practice sources for interested amateurs and all prospective amateurs too. A postal card or amateur radiogram asking ARRL for CD-139 will bring this information. Once every month instead of just practice tapes, WIAW and also W6OWP

schedule *Qualifying Runs*. Our CP certificates are issued by the League based on these monthly runs, if from your copy we can find one full minute of copy without error or omission. 10 w.p.m. is the lowest speed rating to earn a certificate. Endorsement stickers are given subsequently, whenever you can show a 5 w.p.m. improvement over your initial speed, and up to the full 35 w.p.m.

Certificate Issuances August through November '62. Until the end of the year we will not know the total number of copies ARRL has checked for proficiency during 1962. There's every indication, however, that it will be upward of 3000 papers checked!

The greater number of certifications are at the ten- to twenty-word speeds, of course. Very special credit is due those individuals who go on to achieve 30- and 35-w.p.m. Here below are the calls of those in the smaller but elite group that qualified for 30 and 35 w.p.m. ARRL certificates in the four months indicated.

ARRL certified at 35 w.p.m.:

K1KCN*, K1KCO*, K1NEF*, K1SDX, K1VKO, K2IF*, W2MLO, WA2PDU*, WA2QCL*, K4DNW*, K4HPR*, K4GSP*, W4KXI, W4WDZ*, K5FRW, K5HDU, W5IRM, K5LSD*, W5TLL, K5UYL, K6EIE*, K7LTV*, K7MRP*, K8MTI*, K8JFJ, Peter Veijgen (Neth.)

ARRL certified at 30 w.p.m.:

K1CXP, K1KCN*, K1KCO*, K1MBM*, WA2KSD*, WA2OMR*, WA2QJU*, WA2VBW*, W3ATQ, W4AQP*, W4LUV, W4OBA*, K4QCQ, W4UHO*, K4YUD*, KP4BEA, K6LKD*, K7JCA*, K7NHV*, K8MFO, K8SQK*, K8YJV*, K9GIC, W9SO*, VE3FBQ, VE3PE*, A. R. Brown — SJ (P.R.), Karl Cadwell, J. C. Wynn — SJ (P.R.)

Clubs: Time Approaches to Form Mid-Season Class Groups. Dozens of clubs have written the League in the last few months for our outlined Suggestions For Conducting a Radio Course. Lists of over-the-air code practice stations also have been provided to such groups to pass out to their class members. Some clubs with Novice groups have completed work and their students are on the air and singing the club's praises. Plans for an 18-session, three-nights-a-

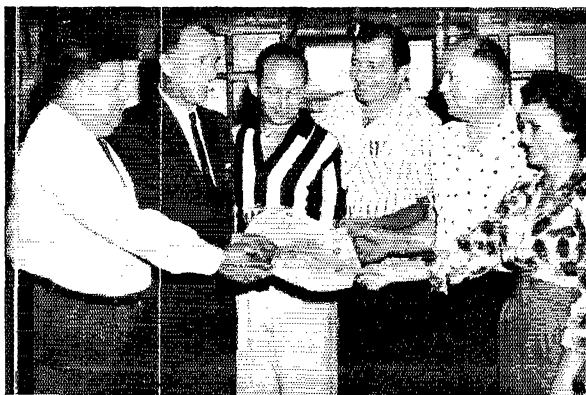
week study, aimed at Novice tickets, were detailed on page 87 of October '62 *QST*. For clubs that have not held such briefing sessions, it is an excellent time to schedule some. For many clubs that could advantageously use some new members, it's time to start an advanced group. Whenever Novices are on the air or any actives are limited to work in part of some bands, you will find gratitude for any group action to help individuals to go after their General Class licences. To assist these worthy efforts, there's now a new limited reprinting of *Licensing Classes*. It lists reference books, suggested training aids and sample questions for a class. The teaching information relates to both code and theory and was compiled by Edison Award winner Bill Welch, W1SAD/WA6VTL. If you have your *QST* from last April, look in it for Bill's article with advice on this subject. Any club starting classes at this time may get in touch with ARRL, so that its designated instructor may have a chance to review the references which Mr. Welch has provided. (This work is not for sale, nor available to other than bona fide amateur radio clubs.)

About the A-1 Operator Club. Frank Campbell, W5IGJ, comments on the state of radio procedures in the hands of some of the newer operators. He notes that amateurs to receive our A-1 Operator Club certification must be *spontaneously* nominated by those in the A-1 Operator group. All nominations are based on critical judgment of radio operating techniques. It takes two separate and independent nominations to make the group. The point system for rating of A-1 Operators is printed in *Operating an Amateur Radio Station* (booklet). Also a nomination form is circulated to this expanding group each year by the ARRL Hq., to solicit fresh prospects among both phone and c.w. operators. The point ratings on unbiased observations of ability and conduct are necessary to keep this certification a meaningful honor, independent of possible fraternal or political implications.

One type of operator who *never* would meet A-1 standards is the fellow, Novice or other, who picks up such fads as using dit di-di-dit-dit (and subsequent dit-dit response) in lieu of a proper legal call-up. Facetious and irregular infractions show lack of common sense, and violation of FCC identification requirements.

* Endorsement Sticker.

Seven members of the Babcock & Wilcox Amateur Radio Club of Barberton, Ohio, recently completed their c.d. communication courses and were presented certificates of merit. Shown in the picture, left to right, are C.D. Director Bill Hunt, County Commissioner John Poda, K8PNR, K8IOH, K8RWG and Mrs. K8RWG. Three others were not present when the picture was taken.



ARRL ENDING SIGNALS

Signal	Meaning	ARRL — Recommended Use
AR	End of transmission	After call to a specific station before contact has been established. Example: W6ABC W6ABC W6ABC DE W9LMN W9LMN AR At the end of transmission of a radiogram, immediately following the signature, preceding identification.
K	Go ahead (any station)	After CQ and at the end of each transmission during QSO when there is no objection to others breaking in. Example: CQ CQ CQ DE W1ABC W1ABC K or WXYZ DE W1ABC K
KN	Go ahead (specific station), all others keep out	At the end of each transmission during a QSO, or after a call, when calls from other stations are not desired and will not be answered. Example: W4FGH DE XUGRL KN
SK	End of QSO	Before signing last transmission at end of a QSO. Example: ... SK W8LMN DE W5BCD
CL	I am closing station	When a station is going off the air, to indicate that it will not listen for any further calls. Example: ... SK W7H1J DE W2JKL CL

ARRL Communications Department
Operating Aid No. 2

5M762

A post-card sized copy of this Operating Aid No. 2 may be obtained on request from ARRL's Communications Department. On page 84 of this department you will see a reproduction of Operating Aid No. 1, the ARRL Phonetic Alphabet. This is also available on request.

Intelligent Use of Ending Signals Marks the Good Operator. A-1 operators, Frank points out, must be persons who are well informed on all general procedures and who are willing to comply with decent and standard operating customs so as to maintain and improve our band conditions. About getting those full 25 point ratings on "procedure," this requires a good knowledge and use of ending signals among other things. W5IGJ reports a number of newer fellows confusing K and KN and showing a lack of sharpness in use of procedures and understanding. He refers to the growing c.w. misuse of N following K (to go ahead). Some newcomers he thinks hear a KN properly used on the air. But to show off, they put it to work excessively on almost every call.

Now about these fine shades of meaning and use, lest you think we rail at improprieties and provide no correct data or enres. A radiogram to ARRL will bring you Operating Aid No. 2 which lists five different, independently used ending signals and gives their proper use in regular amateur work. Among others this proper use of and purposes of KN are detailed. Come to think of it, we wonder too, how many amateurs are aware that AR after a call to a specific station is an indication that this is a call-up before the contact has yet been established — another use, besides an identifier for the end of radiograms. Our Op. Aid card covers such points. While you are about it you can ask us for Operating Aid No. 3, the R-S-T chart, and a reminder to use K for click, and C for chirp, after any RST report in order to be strictly honest and helpful in bettering the conditions in the bands we all must share.

About Harmonic Radiations, Warning! FCC and ARRL Official Observers continue to find instances of amateur signals being heard outside the amateur bands. Some of these, unfortunately, result in monitoring station notices to those concerned. This is a reminder to Novices and others that no amateur transmitter is immune. Every operator owes it to himself to avoid FCC trouble, also a duty toward those who might be subjected to unjustified potential interference to check his transmitter for harmonics. This should be done whenever any previously unchecked equipment arrangement, transmitter-antenna combination, or new adjustments are tried out.

Avoid the radiation of spurious and improper signals. FCC itself has a form 1096. It is sent to new licensees to provide a warning on such matters. Examine the December QST index carefully for the last two or three years. You will find a number of articles dealing in detail with these subjects. A grid-dip meter or even an absorption type wavemeter with an indicating lamp can help discover and cut down the harmonic! Antenna couplers are a recommended means to keep undesired radiations at home. Some precautionary procedures:

- (1) Listen carefully, or have an amateur close by listen, and report if any harmonic can be noted.
- (2) See ARRL writings on the reduction and elimination of harmonics.
- (3) Make sure all your circuits are tuned to the proper amateur frequency band and not to harmonic frequencies.

Cleaning House in our Bands. Bob Welsh, W2PTM, writes, "There is urgent need in our operating practices for strict self-discipline, consideration and impeccable operating habits. With licensing and operation at all-time highs and annual bumper crops of new enthusiastic licensees, we need a drastic overhaul of operating habits if we all may continue to enjoy amateur radio and to keep it from becoming a frustrating operational experience. Let us press vigorously for improved operating practices, as well as better performance and adjustment of our equipment."

W1DF's articles *How to Run Linears* and *Looking at Phone Signals*, Nov. and Dec. QST, go a long way toward helping get better performance from station equipment. See further articles to be scheduled soon. Let's study several points of our operating habits. Observe *strictly* the correct procedures. This will contribute to improved operating conditions in each of our bands. (1) First of all, do away with those steady carriers (tune-ups?) that clutter the band, says W2PTM. Good dummy loads, readily arranged to be switchable, should be used for every transmitter check, then a quickie to the antenna is least bother to others. (2) LISTEN FIRST, then call or send after picking the spot most free of QRM. (3) Time calls well to reach a given station. (4) Short calls and frequent breaks to listen get best results, no waste band use. (5) Trim power down for local work as expected and

required in basic regulations. (6) Monitor your own signal, to know your signal is right. (7) Switch to v.h.f.s or low frequency bands for all cross-town or local rag chewing. — F. E. H.

HIGH CLAIMED SCORES 1962 A.R.R.L. SWEEPSTAKES

Following are the high claimed scores for the 1962 ARRL Sweepstakes Contest held in November. Included are only those claimed c.w. scores over 150,000 points, and those claimed phone scores over 100,000 points received by 12/31/62. QST will carry the full official Sweepstakes Results as soon as checking is completed. Figures below show the score claimed, number of QSOs, and the number of different sections worked.

K3GXI.....172,044- 809-72	K6VGW.....112,710- 564-68
W3ZKH.....153,300- 701-73	W6KK.....112,034- 662-69
K5MVK.....150,960- 761-68	W1FRR.....102,480- 732-70
W4BVF.....141,489- 650-73	K6CYG.....101,640- 408-70
K1PWF.....131,400- 600-73	K5MOJ.....101,505- 509-67
K5ALU.....131,341- 650-69	W6KJS.....101,470- 695-73
K5YVV.....116,127- 657-68	K4WIS.....101,388- 512-63

* Multiple-operator station.



Those who criticize and complain about the way things are being done often are told: "Okay, you do it!" This usually shuts them up, but once in a while a critic will rise to the challenge. In one section, we have heard of an SEC who criticized the SCM so much about not doing anything that the SCM finally did something — he "fired" the SEC. In another, an EC criticized the SCM for the section's emergency policies until the SCM forthwith appointed this EC as SEC, in effect challenging him to "put up or shut up."

Such a thing happened to W4MFK, the newly-appointed SEC for North Carolina (see p. 85, May, 1962, QST). Jim rose to the challenge so forcefully that we would like to paraphrase parts of his letter to his SCM regarding the planned program for the section, because we think his approach is intelligent, realistic and practical.

The SEC's job, as W4MFK sees it, is to (1) provide a workable AREC program for the section and "sell" it to all concerned, (2) recommend suitable ECs to the SCM for appointment, and (3) get the paperwork out on time. Regarding the first point above, any AREC plan for North Carolina (he intends borrowing ideas from other plans, especially the famous Florida Plan), once written and approved by the SCM, would be widely circulated throughout the section to ECs, other ARRL officials, nets and to-be-served agencies. It would provide: (a) voluntary communications effort by AREC personnel on amateur circuits for all who need it, traffic handled in accordance with urgency indicated by the originating station; (b) a priority designation system for the section, following the ARRL standard if one is established; (c) institute a system for coordination of the various nets in existence throughout the section.

A detailed summary of just what is to be expected of each EC and what he can accomplish within his jurisdiction to promote the AREC program will be prepared and distributed. Obviously, the success of the program rests with the EC, but each EC must be made fully aware of the requirements. W4MFK believes there are enough qualified and willing amateurs in North Carolina to fulfill the need of one EC for each of the 100 counties, but realizes that a from-the-ground-up effort is required and the building of a solid AREC group takes time, probably years.

The AREC requires people like W4MFK who are willing, dedicated and practical. From time to time various agencies will step forth with requests for assistance and promises of rewards in one form or another. We AREC amateurs are always ready to offer the former, and we are not loath to accept the latter (within legal limits, of course) provided there are no strings attached. But strings there almost always are. Few agencies these days seem willing to donate facilities, equipment and give recognition to the AREC for the good job it is doing. Most of them expect such facilities and equipment to be used exclusively for their purposes, including the amateurs' time in installing, operating and servicing it.

Somewhere a compromise has to be made. How far can we and should we go in providing specific services for specific agencies? Where does one draw the line in accepting (or soliciting) favors from to-be-served agencies, and under what conditions? What is the proper balance between agencies we should serve and those who are willing to cooperate to obtain our services?

Sooner or later, every successful AREC organization is going to have to cope with this and similar problems.



C.W.	
W5WZO.....291,270-1604-73	
W91OP.....276,396-1520-73	
W6SMV.....246,448-1036-73	
K4LPW.....233,418-1279-73	
W4KPC.....228,884-1559-73	
W4RQR.....219,730-1211-73	
W4DQS.....219,345-1203-73	
K4GSI.....217,920-1223-72	
K5JQU.....214,985-1200-73	
W5PSB.....212,521-1169-73	
W6RQM.....211,781-1181-73	
W3ALB.....210,970-1156-73	
K6CYV.....209,328-1147-73	
K6CTV.....204,278-1182-71	
W4CKB.....204,148-1148-73	
W6BWH.....201,845-1063-73	
K1UAW.....195,860-1088-73	
W4ZVBH.....195,407-1071-73	
W1NJL.....195,074-1099-71	
W80YL.....190,440-1058-72	
K4BAL.....190,074-1042-73	
W4CKD.....187,920-1047-72	
W4ASO.....187,920-1044-72	
K4TEA.....187,063-1026-73	
W4ZAPG.....185,304-1044-71	
W8NBK.....185,055-1014-73	
W4SCBL.....184,889-1042-72	
K5VLN.....184,689-1042-71	
W3KFO.....184,507-1011-73	
W9IRH.....181,400-1008-72	
W8IBX.....179,124- 987-73	
W4YGY.....177,588-1003-71	
K8MTI.....176,660- 968-73	

K1HTV.....175,500- 975-72
W9ZAB.....175,383- 961-73
K9DHH.....174,213-1002-70
W3GRF.....172,736- 950-73
W4PTR.....171,820- 969-71
K1DIR.....170,729- 946-73
W9RCJ.....169,816- 931-73
K9KGA.....167,940- 933-72
W3FYS.....166,500- 925-72
K5OCX.....166,495- 931-72
K4TML.....166,140- 923-72
K3NZV.....164,433- 901-73
W4WZC.....162,413- 921-71
W8NYU.....160,470- 900-72
W1EOB.....158,832-1103-72
W4BJJ.....158,562-1149-69
K6GXR.....158,241- 895-71
K8QJH.....158,040- 878-72
W2BXS.....156,060- 867-72
W2HDW.....154,785- 915-68
W3JTC.....154,550- 840-73
W4JFY.....153,595- 906-68
K6JBV.....152,162- 881-70
W1BHH.....151,760-1087-70
W2QGE.....150,912-1048-72
W4DVT.....150,289- 824-73
W3CTJ.....150,197- 823-73

PHONE

K6EVR.....288,861-1324-73
K5MDD.....285,841-1303-73
W7BSW.....202,575- 925-73
K2IEG.....176,040- 845-72
W5KC.....175,638- 802-73

Often we can help you, not because we are any smarter than you, but because we have wrestled with such problems before and have had experience as to the procedure usually most successful. This does not mean that we can solve a problem in five minutes that you have been wrestling with for years, but it does mean that we are interested in knowing of your problems and their solutions so that both can be aided to the store of knowledge and experience at headquarters for dissemination to others who will inevitably sooner or later be faced with the same or similar problems. — *WINJAI*.

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A storm that struck Carrollton, Ill., left that town without light and power for several hours on April 30. K9UOT maintained contact with W9IFA, who went to the scene of greatest damage for reports. These reports were then made available to a local radio station for broadcast. — *W9IFA*.

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A downed aircraft in Narragansett Bay, Rhode Island, activated the West Warwick AREC Net on Nov. 1. K1RFM was dispatched to the shoreline to ascertain requirements, liaison maintained on ten meters with SEC W1YNE and State RO W1PAZ, assisted by W1OMC and W1ISE. This circuit also supplied communication with East Greenwich C.D. headquarters. A communications post was also established at East Greenwich Fire Dept. headquarters, which was coordinating the search. Mobiles from the West Warwick AREC were dispatched to the search area and K1TPK, EC Portsmouth, took control. Because of difficulty in contacting the mobiles, the Roger Williams V.H.F. Society van was dispatched with K1s QDY KEM and W1LYJ aboard, and took control using the club call K1JFI. Mobiles K1s JED and CPL also responded. Red Cross Comms. Officer W1KPM also responded with his 10-meter control station and provided ten meter hand-carried units for the search group. The aircraft was found early the next morning, with one occupant still alive, and the net was secured at 1500Z. The following additional amateurs were part of this operation: K1s STB VOU ICI PZY SSL VVOUQK KPM HSY CBO OZI, W1s IMY DHM TXL. — *W1YNE, SEC Rhode Island*.

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During an airplane fire at New York International Airport on Nov. 30, WA2TFG/mobile and K2QDE were able to offer communications assistance from the scene to a local radio station and, initially, the police department. WB2DOF assisted in the mobile. Reports from WA2TFG were taped at the radio station and later played on the air, once on a coast-to-coast radio and t.v. network. The work continued from 2:30 to about 0023 local time, after which police communications were established. — *K2KHK*.

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The Cleveland, Ohio, area experienced the worst snowstorm in 12 years on Dec. 6 and 7, precipitating complete mobilization of the Cuyahoga County AREC for emergency operation between 0630 Dec. 7 and 0700 Dec. 8, local time. In the early morning hours of Dec. 7 the six- and ten-meter Road Patrol Nets were activated, but schools were closed and few people tried to get to work so there was little emergency communication necessary. As the snow continued to accumulate, however, damaged power lines, overloaded telephone facilities and stranded motorists created many problems. AREC communications provided the information necessary to decide on a rescue squad route to Brunswick, a community south of Cleveland which was completely isolated. Primary contact with Brunswick was via W8JID on six meters and W8OIS, with some e.d. traffic handled through W8ZJQ. W8VBU and K8KEM provided contact with the Cleveland Police Department, using 2-meter equipment installed there. The Red Cross Disaster Group was "in business" with HQ station W8CRE manned by K8s MBV ZHI LMF and W8NZI. W8ITR and W8OKE headed the two-meter net, while EC W8VFU provided liaison among the ten, six and two-meter activities.

Typical of some of the communications handled during the emergency by the AREC nets was a case in which the well-being of a six-year-old boy at an isolated house in Brunswick was ascertained; preparation for a birth at an isolated home in Columbia Station; and stranded motorists by the score. One group of stranded motorists in Geauga County was reported through the Red Cross nets, and AREC established liaison for a Red Cross Aid Station at a church in North Olmsted to care for over 200 others

stranded near Exit 9 of the Ohio Turnpike. Thirty motorists were sheltered in K8OBB's garage, and he handled welfare traffic for them with W8ECM. Later in the evening, the AREC assisted the Red Cross in delivery of medicine to Brunswick; this was accomplished by K8AOE/mobile as he traveled along a route open only to emergency traffic, with relays provided by W8ACJ and K8s EJII KKO ONA and an escort provided by the Strongsville police. Additional welfare traffic concerned a fire in Bainbridge and many people in the Brunswick area.

On Dec. 8 a family of eight were found unconscious from asphyxiation at Columbia Station. W8DSF established contact on six meters with W8FQC, W8s OIS ACJ and K8STF, and the latter aided in the actual removal of the people to the hospital.

Coverage by the AREC during this emergency included many communities within a 40 mile radius of Cleveland from Avon, Sheffield, Wellington and Amherst on the west, and Medina, Wadsworth and Akron on the south to Ravenna, Mantua and Painesville on the east, with about 90 stations and/or operators participating at one time or another during the emergency. Among them, not already mentioned: W8s ACJ AEU ASA AUM AZO AZW BAH BHR BNT BU BVN BZP C7M EBJ ENB EPM EYZ FQQ GHO JFD JHS KGX NYZ OZB PBZ PZB SJX SQY TGX VAJ WVR ZEP. K8s AGN AOE CCZ ODA DBF DQB ECJ EJH EXL EXK HCU HVH HZI IJG IPS IZL JFE JGQ KKO KTB LXE MXX ORK OBX ONA ONX OZK PIY RUD RQB SEV STF STK SYL TQP UNP USF UXH VIE VPL YWL ZFD. W8s AZO HQG BRD BXQ ECM FQC. — *W8VFU, EC Cuyahoga County, Ohio*.

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On Oct. 20 when a resident of Silver City, Iowa, was killed and his brother and another man critically injured in a highway accident near that city, amateurs were called upon to locate a relative who was driving by truck from New York to Chicago. K6PUI of Silver City contacted K6PDP in Council Bluffs, who put out a call for help on 20 meters. Immediate assistance was forthcoming: K3EUD contacted the Pa. Highway patrol; W8SZF contacted the Ohio Highway Patrol; W8CEM contacted the Interstate Turnpike gate; W8BIO/3 and K3CKD covered the Pa. check-point station; W8CFZ relayed through W8PXC to contact the Ohio check point; K8ULN notified the Atlantic, Iowa, Highway Patrol via teletype; W8HQR notified the owner of the truck; and W9SEF called to check the first stop the truck would make in Chicago. Many others were also in there helping out, and the truck was located the following morning in New York State. — *W8NTB, SCM Iowa*.

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As week passes week, the Cuyahoga County (Ohio) AREC keeps rolling along, performing communications services on a routine basis. With the report of the Cleveland snowstorm emergency above, W8VFU sent along accounts of two alerts and two non-emergency activities of his AREC group during the latter half of 1962. We summarize them herewith:

On Aug. 10, Assistant EC W8SJK provided communication for a parade of the Northeast Ohio Order of De Molay. The AREC had eight mobile units and one hand-carried unit along the route of the parade, with nine members performing the necessary in routine fashion.

On Sept. 13, Net Control Station W8OIS activated the 10 and 6 Meter Thunderhead Nets for possible tornadoes with accompanying heavy rain, wind and hail as forecast by the U.S. Weather Bureau for the area. The alert lasted from 1940 until 2140 local time, fortunately without further incident. But 21 amateurs were standing by on the 6-meter net and nine on the 10-meter net in case they were needed.

For the ninth consecutive year the Cuyahoga County AREC provided communication for the annual Cleveland Press Christmas Parade on Nov. 25. Mobiles spaced in the marshalling area and in the parade itself plus a fixed-portable station in one of the nearby buildings completed the coverage. A crowd of some 300,000 people, a lost child and interruption of the parade to allow passage of fire-fighting equipment to a 3-alarm fire kept the communications from being altogether routine. Twelve amateurs participated.

Late in the afternoon of Nov. 25, a freight train was derailed on about the county line between Cuyahoga and Lake Counties, resulting in two deaths and a fire threatening explosive material. Because of the potential danger and

large crowd of onlookers, K8MBW and K8PYT activated on 50.55 Mc. and W8VFU on 29.160 kc W8SJX/mobile was dispatched to the scene to ascertain the need for communication, but the report was negative and no general alert was necessary.

All this by way of showing that the Cuyahoga County AREC remains among the finest we have.

— —

K5CZV tells us we had his call wrong in the Nov. (1962) QST item about the Cameron, La., disaster. We had it as W5CZV. A check of the original material shows that the mistake wasn't ours, for a change, but we're sorry anyway, OM!

— —

Alabama SEC W4FQQ conducted a surprise emergency test on July 27. A twenty-watt mobile station sent a message alerting all AREC nets throughout the section to the first station to appear on the Alabama Emergency Net "P" frequency. This turned out to be K4FKK in Kentucky. At 00:35Z the message was received by K4PHH in Alabama who was NCS of the AENP in regular session. Thirty-seven stations participated in this test, passing messages. But the test was ruled unsuccessful because many nets in the Alabama Emergency Net system were not alerted. Another test was planned for a later date. — W4FQQ, SEC Ala.

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At the request of the Pikes Peak Auto Hill Climb Assn., members of the Pikes Peak Radio Amateur Assn. and the El Paso County (Colo.) AREC on July 4 provided communication for the 40th Annual Pikes Peak Auto Hill Climb. Three nets were established to provide the functions desired, on 75, 6 and 2 meters. Each net represented a specific function: the 75-meter net was used for safety, reporting road conditions and progress of each entrant, and also to halt racing cars in the event of accidents blocking the roadway. The six-meter net was the "Official's Net," used to keep the head starter in constant touch with the official timer at the head of Pike's Peak; this was the first year "six" was used, and operators had been on the peak for two days prior to the race, in order to find optimum locations. The 2-meter net was used exclusively for the transmission of starting times to the Official Timer atop the peak; this was the second year for "two" and again it proved to be the most reliable. K0YGH masterminded the event, and many stations were on the scene during the week previous in order to get some experience while race drivers were taking their practice runs. The same group hopes to do an even better job next year. — K0YGH, EC El Paso County, Colo.

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We are still riding a high peak in SEC reporting. The number for October was forty SEC reports, representing a total of 16,852 AREC members, an easy record for the month (27-12,262 best previous) but slightly under last month's all-time high. Naturally, we're most pleased at this indication of high AREC interest, but not so far up in the clouds that we can't point out that, after all, 40 reports is only slightly above 50% and there is still plenty of room for improvement. Besides, no new sections checked in for October.

Sections reporting: Mont., S.N.J., Maine, Alberta, E. Mass., NYC-LI, Ont., Nevada, Ohio, E. Fla., Ore., N.C., S.C., S. Texas, Wash., Miss., Mo., S.C.V., Iowa, Tenn., Ind., N. Mex., Wyo., Utah, W. Pa., Colo., Mich., E. Bay, Los A., S. Dak., W. Mass., N.N.J., Kans., W. Va., R.L. Sac.V., E. Pa., La., N. Texas, Ala.

RACES News

We made a mistake last month. We gave Rob Arrow-smith's call at the Office of Civil Defense in Washington as K8DFA. This was dug out of some old records, and we don't know where we got it originally. Anyway, Bob's correct call is K8BFI, and he's using it /3 until he gets a call in the district in which he now resides.

A recent conversation with Bob reveals little new in Washington. Nearly all RACES administrative and operational procedures have been decentralized to the OCD regional offices; the Washington office (Communications and the Washington Office (Communications Branch of Warning and Communications) is now mainly concerned with conducting liaison with FCC and other



federal government agencies. They also have to put up with a monthly telephone call from ARRL headquarters so we can keep a close check on them.

In May, 1961, the then Office of Civil and Defense Mobilization put out a pamphlet entitled "Frequency Allocation Plan for the Radio Amateur Civil Emergency Service (NP-13-1, National Plan Appendix Series), "which provided for modification of all existing RACES plans for utilization of s.s.b. on 80, 40 and 20 meter RACES frequencies by Jan. 1, 1963. New RACES plans have been accepted since May, 1961, only if provision is made for s.s.b. (not carrier-modulated a.m.) in these segments. Effective Jan. 1, 1963, all RACES plans containing a.m. channels (6A3) have been cancelled pending modification to sideband (3A3a). These procedures are being adhered to under the new OCD regime.

MORE ABOUT NET REGISTRATIONS

Every net must be re-registered at least once per year. When your year expires, your net is removed from the "active" file until or unless we get a renewal registration from you on Form CD-85 or facsimile.

We thought this was adequately explained in last Sept. QST, page 90, but guess a lot of net managers and registrants missed it. We are getting some rather unexpected responses to our notification cards being sent to nets whose last registrations were dated a year or more ago. We need more than just your reassurances that your net is "still active." As stated on the card, we need a re-registration on CD-85. Is once a year to renew your registration too much to ask? Shucks, if we just kept all nets on the active file indefinitely without requiring new data, our net directory card file would soon consist about 50% of nets which no longer operated, or operated on different frequencies or had undergone similar changes without our knowing it.

The new net directory consists of all nets in the active file as per Nov. 1, 1962. Next year, we hope to move this date up a month and start compiling the directory on October 1. The year after that, Sept. 1, so the directory will be in distribution by Oct. 1, which is as it should have been years ago. — W1NJM.

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

- Feb. 9-10: DX Competition (phone)
- Feb. 2-17: Novice Roundup
- Feb. 7: CP Qualifying Run — W6OWP
- Feb. 15: Frequency Measuring Test
- Feb. 23-24: DX Competition (c.w.)
- Feb. 21: CP Qualifying Run — W1AW
- Mar. 1: CP Qualifying Run — W6OWP
- Mar. 9-10: DX Competition (phone)
- Mar. 23-24: DX Competition (c.w.)
- Mar. 22: CP Qualifying Run — W1AW
- June 8-9: V.H.F. QSO Party
- June 22-23: Field Day

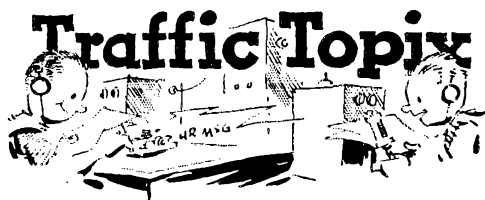
OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

- Feb. 9-11: NYC-LI QSO Party, South Shore Amateur Wireless Assn. (p. 110 this issue).
- Feb. 15-17: QCWA QSO Party, Quarter Century Wireless Assn. (p. 81, this issue).
- Feb. 23-24: Rhode Island QSO Party, Providence Radio Ass'n. (p. 120, this issue).

QCWA QSO PARTY

The Quarter Century Wireless Assn. will hold its 6th annual QSO Party Feb. 15-17, starting at 2200 GMT Friday and ending at 2200 GMT Sunday. This year's party is being sponsored by the Northwest Chapter and all logs should be sent to W7AYO, Stanley J. Belliveau, Box 6144 Riverton Hts., Seattle 68, Washington.



North American SSB 25 530 451
 20 Mtr. Interstate SSB 22 629 1431

* Ordinarily we don't list late reports in this column. These two are exceptions, however, because the reports reached us in time and were lost in the shuffle, through no fault of the net managers.

Year to year statistics show that the number of amateurs handling traffic holds up pretty well while the amount of traffic diminishes — for a while, that is. But when the amount of traffic handled continues to diminish, the number of handlers inevitably starts to drop off too. This is just another manifestation of a principle that can be expressed as follows: "ya gotta keep 'em busy if ya wanna keep 'em happy."

All net organizers know that a net without traffic soon deteriorates. At the time of this writing, traffic is fairly heavy because of the Christmas rush (but nowhere near as heavy as some Christmas rushes we have experienced), but by the time you read this it probably will have dropped off again. Blame bad conditions, if you wish, but the fact remains that in all probability 1962 statistics (we haven't tabulated them yet, so we're just guessing) will show another drop from 1961, as 1961 showed from 1960.

What can be done about it?

Quite some time ago, we put on the ARRL headquarters bulletin board a request that staff members use amateur traffic nets for some of their routine acknowledgements, and other ordinary correspondence in addition to (not instead of) the usual channels used. To say the response was disappointing is a gross understatement. It was zero, except for a few sporadic wise cracks, which we fully expected. In thinking it over, however, the lack of response was not too surprising, because we don't even use the traffic nets for routine matters in our own department very often. We just don't think of it, or we just don't have the time.

Be all this as it might, the solution to diminishing traffic is to originate more traffic; but not any kind of traffic. We traffic men don't want to handle junk. We want to think that what we are doing is worth doing, and as soon as we stop thinking so we'll tend to stop doing it. So you see, there is a delicate balance to be maintained. We are a temperamental bunch of zealots riding on a razor-edge of contentment. If the traffic diminishes, we lose interest. If it increases in quantity but decreases in quality, this is also bad. We're never satisfied.

What can be done about it is to get more people to originate more traffic — good traffic. We don't mean the kind that is generated at fairs, expositions and other public events in which the public is figuratively offered a box of cigars for each message originated, no matter how inane or stereotyped. We also don't mean, at the other extreme, traffic that has a deadline or an urgency requiring special handling. What our traffic nets need is traffic that says something but is not particularly important, traffic that avoids repetition, that is going somewhere beyond the next town, that uses standard procedure, is short but not too short, and is long enough to say what it has to say.

In addition to our striving for efficiency in handling traffic, each of us should take some responsibility to originate some — like the above. Let's not depend entirely on outsiders to originate the traffic we handle. Let's originate some ourselves. — WINJ.M.

— * * * —

National Traffic System. There are many of us who are proud of the NTS and the way it works, and rightly so. It is without doubt the closest thing we have ever had in amateur radio to a thoroughly integrated traffic system operating at all levels.

But the other day a thought dropped by W4MLE in correspondence on a different, though allied, subject, got us thinking. We think that NTS does a good job, most of the time, but what, specifically, does it do and, specifically, for whom? Oh sure, we can draw ourselves up in dignity and say that it handles traffic systematically and efficiently, but what is the traffic for and what good is it? Or we can say that we perform a service for the general public, but what specific public, and does this specific public know about our great service?

In the above paragraph we have already raised enough policy questions to write several books. Let's get back down to earth and what W4MLE said that started us on this task. (In case you don't know it, W4MLE is SEC of Western Florida and one of the co-authors of the Florida AREC Plan.) George said he would like to see some of our regular AREC "customers" begin using NTS as a regular vehicle for some of their routine traffic. This could have the effect of proving and improving our usefulness and at the same time get our "customers" acquainted with their local contacts and with our procedures. These aren't George's exact words, but they convey the intent. "I can't conceive," he continues, "a more practical method of maintaining liaison with the people we hope will rely on us."

Is this a point, or is it? The idea has a great many fascinating aspects. Of course we would have to make clear that they should not depend solely on NTS when they have normal (commercial) facilities available, that routine administrative (not business) traffic should always be backed up by mail or whatever other means they would normally use, but here is a source of good traffic for NTS that would give us real training, and at the same time train some of our "customers" in using our facilities in the event of emergency.

Suppose we leave this idea in the hopper for a month or so, see what kind of reaction we get, if any. — WINJ.M.

November Reports.

Net	Ses- sions	Traffic	Rate	Aver- age	Represen- tation (%)
1RN.....	53	614	.398	11.6	68.2
2RN.....	58	476	.464	8.2	97.9
4RN.....	59	540	.336	9.2	94.5
RN5.....	60	697	.327	11.6	83.1
RN7.....	58	506	.248	8.8	68.5
SRN.....	57	304	.206	5.4	77.3
9RN.....	60	860	.703	14.3	68.7
TEN.....	76	897	.503	11.8	59.6
ECN.....	30	108	.153	3.5	75.6 ¹
TWN.....	30	244	.467	8.1	80.7 ¹
FAN.....	30	1328	.839	44.3	100.0
CAN.....	30	1375	.831	44.3	100.0
PAN.....	29	1022	.662	35.2	96.7
Sections ²	1038	5044		4.9	
TCC Central.....	90 ³	1217			
TCC Pacific.....	119 ³	752			
Summary.....	1668	15982	EAN	8.5	EAN, CAN
Record.....	2025	24014	.931	12.6	100.0

¹ Region net representation based on one session per day. Others are based on two or more sessions per day.

² Section nets reported (38): CPN & CVN (Conn.); VSN & VN (Va.); SCN (Calif.); BUN (Utah); EPA (Pa.); NCSN & NCN (N.C.); MDD & MDDS (Md.-Del.-D.C.); SCN (S.C.); NEB (Nebr.); WIN & WSB (Wis.); BN (Ohio); W. Fla. Phone; GBN (Ont.); Wolverine (Mich.); TSSN, FTPN & TN (Tenn.); AENT, AENP Eve, AENO, AENM & AENB (Ala.); TLCN (Iowa); OQN (Ont.-Que.); GEM (Idaho); RISP (R.I.); (SPN (N.H.); MSPN Noon, MSPN Eve, MSN & MJN (Minn.); WSN (Wash.); KYN (Ky.)

³ TCC functions reported, not counted as net sessions.

November Net Reports.

Net	Ses- sions	Chek- ins	Traffic
Eastern Region Traffic (Oct.)*	31	158	51
All Service (Oct.)*	4	62	39
Early Bird Traffic	30	—	148
Fourth Region Day	30	209	134
All Service	4	49	71
75 Meter Interstate SSB	30	1446	475
Eastern Region Traffic	26	110	90
7290	42	2047	1382
Northeast Area Barnyard	—	867	13
Mike Farad E & T	52	524	1002

Your NEC was invited to sit in on a conference of Post Office Net officials, Oct. 2-5, 1962. Shown above are the conferees. Sitting, left to right are L. B. Schoonover (from Chief Postal Inspector's Office), Sol Gershon (Official POM Organizer), WINJM, W9HMQ (of Chicago P.O. Dept. and our official host), Sam Blum (Mr. Gershon's assistant). Standing, left to right, are W8QCU (Ohio), W3TZN (Pa.), W6ADP (Calif.), K8GAG (W. Va.), K8TFE (Mich.) and W1UEQ (New England).



The New York State Net has a perfect attendance record on 2RN since 1952, thanks mostly to W2FEB. W4SHJ has issued 4RN certificates to W4MXF, W4PTR and K4LND. W5GY submits his last report as RN5 manager but promises to stick around; meanwhile, K4AKP has started his RN5 managership with a fine bulletin. RN6 misses another report. RN7 is having good luck with its early session and shows an increase over last month as well as over November 1961. W8CHT says 8RN is being bothered by conditions, but the early session is a lifesaver. No comment from 9RN; the report speaks for itself. TEN is using its early session more, too; W0BYV put out a letter to all NCS and all net stations. VE3BZB says "Condx EAN — Ugh!" W2EZB has issued EAN certificates to K8KMQ and K8TIG; EAN and CAN are swapping QNB stations each night, but much of the traffic has to be relayed and this naturally slows things down. W9DYG says the RN5 boys often can help out on CAN, when their QRN isn't too bad. W7OEB has been awarded a PAN certificate; WA6ROF says same old song and dance, all regions short staffed, but they are still struggling along.

Transcontinental Corps. You'd think this long skip would be just the thing for TCC, but it plays havoc there too, because it's so irregular. One good thing about it, the fellows can make more use of 80 meters, which is a better traffic band. K4AKP says his own activity is down to three TCC skeds a week now, and he is ready to give those away to anyone qualified who wants them. W7DZX reports no great happenings on TCC-Pacific front.

November Reports.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Central	90	92.2	2488	1217
Pacific	119	85.8	1502	752
Summary	209	88.6	3990	1969

TCC roster: Central Area (K4AKP, Dir.) — K4AKP, W9s ZYK JOZ DYG VAY FSP, K9s DHN UGY, W6s SCA J.G. K0YRQ. Pacific Area (W7DZX, Dir.) — W4UEI/B, W6s EOT HC, K6s DYX EID, WA6ROF, W7DZX, K7s NHV NWF, W9s WHE/7, WME KQD, VE7AEF.

FREQUENCY MEASURING TEST FEBRUARY 15

ARRL invites every amateur to try his hand at frequency measuring when W1AW transmits signals for this purpose starting at 0230 GMT, Feb. 15. **CAUTION:** Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting, 0230 GMT Feb. 15 becomes 2130 EST Feb. 14. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to

help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3507, 7017, and 14,009 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0236. It is suggested that frequencies be measured in the order listed. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0530 GMT, February 15, W1AW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3557, 7046 and 14,024 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for QST listing of top results. Listing will be based on over-all average accuracy, as compared with readings made by a professional lab.

ELECTION NOTICE

(To all ARRL members residing in the Sections listed below.)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Section. 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 in West Hartford, Conn., on or before noon 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, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be ob-

tained, 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.

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL. [place and date]
38 La Salle Road, West Hartford, Conn.

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.

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.

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.

— F. E. Handy, Communications Manager

Section	Closing Date	SCM	Present Term Ends
Vermont	Feb. 11, 1963	Miss Harriet Proctor	Aug. 10, 1962
North Dakota	Feb. 11, 1963	Harold A. Wengel	Aug. 19, 1962
Canal Zone	Feb. 11, 1963	Thomas B. DeMeis	Oct. 1, 1962
Maine	Feb. 11, 1963	Albert C. Hodson	Resigned
Michigan	Feb. 11, 1963	Ralph P. Thetreau	Apr. 10, 1963
Idaho	Feb. 11, 1963	Mrs. Helen M. Maillet	Apr. 10, 1963
Alberta	Feb. 11, 1963	Harry Harrold	Apr. 10, 1963
Los Angeles	Feb. 11, 1963	Albert F. Hill, jr.	Apr. 18, 1963
Oregon	Apr. 10, 1963	Everett H. France	June 10, 1963
Nebraska	Apr. 10, 1963	Charles E. McNeel	June 10, 1963
Eastern Pennsylvania	Apr. 10, 1963	Allen Breiner	June 15, 1963
Iowa	Apr. 10, 1963	Dennis Burke	June 16, 1963
South Dakota	Apr. 10, 1963	J. W. Sikorski	July 3, 1963
Hawaii	May 10, 1963	John E. Montague	July 14, 1963
New York City	May 10, 1963	George V. Cooke, jr.	July 31, 1963

Support Your AREC

Are you an AREC member? Does your group have an exercise each month? Local AREC groups work together as a team. Virginia's AREC, K4MJZ, says, "Let's keep the credit going to the amateur. Don't wait for the Red Cross or CD to make a move. ARRL operating booklets outline the whole story on AREC and RACES. Build a strong AREC backbone so no matter what happens, storms or local communications failures, we are ready."

ARRL Phonetic Alphabet

A ADAM	N NANCY
B BAKER	O OTTO
C CHARLIE	P PETER
D DAVID	Q QUEEN
E EDWARD	R ROBERT
F FRANK	S SUSAN
G GEORGE	T THOMAS
H HENRY	U UNION
I IDA	V VICTOR
J JOHN	W WILLIAM
K KING	X X-RAY
L LEWIS	Y YOUNG
M MARY	Z ZEBRA

ARRL Communications Department
Operating Aid No. 1

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.

Colorado Donald Ray Crompton, K0TTB Feb. 14, 1963
In the Maryland-District of Columbia Section of the Atlantic Division, Mr. Andrew H. Abraham, W3JZY, and Mr. Carl E. Andersen, K3JYZ, were nominated. Mr. Abraham received 398 votes and Mr. Andersen received 266 votes. Mr. Abraham's term of office began Dec. 10, 1962.

In the Southern Texas Section of the West Gulf Division, Mr. Roy K. Eggleston, W5QEM, and Mr. John B. Beckham, jr., K5WIC, were nominated. Mr. Eggleston received 491 votes and Mr. Beckham received 201 votes. Mr. Eggleston's term of office began Dec. 10, 1962.

In the Alabama Section of the Southeastern Division, Mr. William S. Crafts, K4KJD, and Mr. Walter W. Coleman, sr., W4OXU, were nominated. Mr. Crafts received 233 votes and Mr. Coleman received 156 votes. Mr. Crafts' term of office began Dec. 26, 1962.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for November Traffic:

Call	Orig.	Recd.	Ret.	Del.	Total
W3CUL	201	3391	2742	622	6956
K6HPI	98	2038	1853	185	4174
W8YDK	1434	889	849	40	3212
W0LGG	258	1128	1053	61	2500
W8JZJ	14	789	785	4	1592
W8SCA	56	754	750	0	1530
W1PEX	33	716	679	28	1456
W3IVS	23	679	653	26	1381
W7BIA	13	655	601	52	1321
K5PNM/KG6	1265	0	0	0	1265
W7DA	25	584	580	4	1168
W8UPH	30	535	451	83	1069
W3VR	36	522	516	3	1077
W1TXL	161	448	429	9	1045
W4ZGPT	51	486	427	55	1021
W6BSY	35	458	371	74	968
K8QXV	26	433	408	12	899
K6EPT	48	423	354	69	894
W3JML	40	371	326	9	746
K1TSD	36	350	336	8	730
W4TUB	17	363	338	12	730
K9YRQ	103	244	225	55	672
W0ZWL	4	452	4	173	633
K7JHA	20	313	267	3	603
W9MI	0	285	282	3	570
W1AWA	11	287	247	13	558
W0DYG	14	273	197	37	511
W0YRK	18	263	264	6	551
K4HSB	110	218	117	101	546
WA9AJF	142	301	86	108	537
WA2TQT	118	208	108	100	534
W9FSP	68	235	221	8	532
W7DZX	5	270	251	2	528
K2URG	36	278	199	28	541
K3JEX	15	263	239	13	520
K6EEO	0	257	243	14	514
W2OE	88	242	172	10	512
K0HGI	136	188	90	98	512
K3MQP	2	252	226	24	504
W4IB	5	248	240	8	501
Late Report:					
W0ZWL (Oct.)	0	359	12	130	501

More-Than-One-Operator Stations

Call	Orig.	Recd.	Ret.	Del.	Total
W6TAB	160	3989	3924	64	8137
KR6GF	604	1724	1674	50	4052
K6EAF	55	1991	1961	30	4037
W4PFC	108	862	816	46	1830
K9NBH	1651	14	0	0	1665
KR6MH	300	476	415	61	1252
W6CBE/KG6	1100	0	0	0	1100

BPL for 100 or more originations-plus-deliveries

W9NZZ	274	WA2QJU	127	WA2UZH	101
K6GZ	253	W4RHA	127	WA4AME	101
W7APS	211	K4VFX	120	W4UGI/0	101
W4NTR	170	K3WBV	117	W8LDR	101
W2W	162	W6GYH	110	Late Reports:	
W0PZO	156	WA2CCF	107	K7SEG	(Oct.) 189
WA6NIE	133	WA2GAB	106	W7GUH	(Oct.) 186
		W8DAE	104		

More-Than-One-Operator Stations

KR6CF	226	WA2JSG	135	KR6MB	121
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BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: W44IEH.

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 more or 100 or more originations plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 45 hours of receipt in standard ARRL form.

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

3550	3875	7100	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; phone — 3765, 14,160, 28,250 kc.

SUGGESTED RTTY OPERATING FREQUENCIES

3620, 7040, 14,090, 21,090 kc.

GMT CONVERSION

To convert to local times subtract the following hours:
 ADST -3, AST -4, EDST -4, EST -5, CDST -5,
 CST -6, MDST -6, MST -7, PDST -7,
 PST -8, Hawaii -10, Central Alaska -10.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Feb. 21 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,700 and 145,800 kc. The next qualifying run from W6OWP only will be transmitted Feb. 7 at 0300 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION:** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given; *Example:* In converting, 0230 GMT Feb. 21 becomes 2130 EST Feb. 20.

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.

W1AW conducts code practice daily at 0230 GMT on all frequencies listed above with speeds of 15, 20, 25, 30, and 35 w.p.m. on Tuesday, Thursday, and Saturday, and at 5, 7½, 10, and 13 w.p.m. other days. Approximately 10 minutes' practice is given at each speed. To check your copy, the texts used on several transmissions are listed below. The order of words in each line of QST text is sometimes reversed. To improve your list, try to send in step with W1AW.

- Date Subject of Practice Text from Dec. QST
- Feb. 2: *It Seems to Us*, p. 9
 - Feb. 6: *A Tunable I.P. Amplifier* . . . , p. 11
 - Feb. 8: *How to Protect Your Station* . . . , p. 17
 - Feb. 12: *A Low-Noise Preamplifier* . . . , p. 36
 - Feb. 17: *A Two-Kilowatt P.E.P. Amplifier* . . . , p. 40
 - Feb. 19: *Looking at Phone Signals*, p. 46
 - Feb. 23: *A Monitored Electronic Key* . . . , p. 51
 - Feb. 28: *MARS, Navy Style*, p. 67

W1AW SCHEDULES

(February 1963)

Operating-Visiting Hours

Monday through Friday: 3 P.M.—3 A.M. EST.
 Saturday: 7 P.M.—2:30 A.M. EST.
 Sunday: 3 P.M.—10:30 P.M. EST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 4 miles south of West Hartford. A map showing local street detail will be sent on request. The station will be closed Feb. 22, Washington's Birthday.

Operating Frequencies

C.w.: 1820, 3555, 7080, 14,100, 21,075, 28,080, 50,700, 145,800 kc.
 Voice: 1820, 3945, 7255, 14,280 (s.s.b.), 21,330, 29,000, 50,700, 145,800 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in Greenwich Mean Time.

C.w.: Monday through Saturday, 0100; Tuesday through Sunday, 0500.

Voice: Monday through Saturday, 0200; Tuesday through Sunday, 0430.

Caution: Note that in the U. S. and Canada, because times are GMT, bulletin hours actually fall on the evening of the previous day.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from any amateur station in accordance with the following schedule:

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0030-0100	7255*	7080	7255*
0120-0200 ¹	7080	3555	7080 ²	3555 ²	7080
0210-0230 ¹	3945	50.7 Mc.	145.8 Mc.	3945	3945
0330-0430	3555	3945	7080	1820	3555
0440-0500 ¹	3945	14,280	3945	14,280	3945
0520-0600 ¹	3555 ²	7255*	3555	7080 ²	3945
0600-0700	14,280	14,100	3555	14,100
0700-0800	7255	3945	7080	3945	7255*
2000-2100	14,280	21.28 Mc. ³	14,100
2100-2200	14,280	21.28 Mc. ³	14,100	21.28 Mc. ³	21,330*
2200-2300	14,100	14,280	21,075 ²	14,280	14,100

¹ General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0200 and 0430 on phone and at 0100 and 0500 on c.w. Starting time is approximate.

² W1AW will first listen for Novices before checking the rest of the band for other contacts.

³ Operation will be conducted on either 21,075, 21,330, 28,080 or 29,000 kc.

* Operation may be on s.s.b. as announced at the beginning of the period.



DX CENTURY CLUB AWARDS



Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions received from November 1, thru November 30, 1962.

W1FH.....312/327	W3KT.....308/321	W6AM.....306/320	G4CP.....305/318	VE7ZM.....304/316
W6GUO.....311/325	W8BRA.....307/320	HB9J.....306/318	W1CLX.....305/317	W1BIH.....304/317
W2AGW.....311/324	W2HUO.....307/320	G2PL.....306/318	W2MHJ.....305/317	K2GFO.....304/317
W1GKK.....311/325	W8ADZ.....307/319	4X4DK.....306/317	W5MMK.....305/317	W9HUZ.....304/316
W4DOH.....310/323	W5EBG.....307/321	W5ASG.....306/319	W7PHO.....305/316	G3AAM.....303/316
W3GHD.....310/323	W5BF.....307/319	W0QVZ.....306/317	W3JNN.....304/317	W9INM.....303/317
W9RBI.....309/323	W8UAS.....307/319	W7GUV.....306/319	W1ME.....304/317	W1MA.....303/315
PY2CK.....309/322	W9YFV.....307/320	W2BXA.....306/319	IU6DJX.....304/317	W2LPE.....303/316
W8K1A.....309/322	W8JTN.....306/320	W8BKP.....305/317	W8KML.....304/316	W4TM.....303/316
KV4AA.....309/322	W8DMD.....306/318	CE3AG.....305/318		

Radiotelephone

W8RIS.....312/326	W8GZ.....308/320	W8POO.....304/315	W8KML.....303/314	W2ZZ.....300/312
W9RBI.....309/321	W1FZ.....307/319	4X4DK.....304/315	W7PHO.....303/314	W6YY.....300/313
PY2CK.....309/322	W8BF.....306/318	VO4ERR.....304/317	CX2CO.....302/315	W6AM.....300/312
		W4DOH.....304/315		

From November 1, thru November 30, 1962 DXCC Certificates and Endorsements based on contacts with 100+ countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

W2DJT.....155	DI9CT.....116	K4LRX.....107	K5YVT.....104	W4IVN.....102	W2EAF.....100
W2GHK.....135	W4KV.....115	DJ3WU.....107	W4BZ.....103	K4YFQ.....101	K2YFE.....100
I1ZPB.....142	W9PTN.....112	PY4AP.....105	W5KTW.....103	W4ZPO.....101	K3JQU.....100
W2RWQ.....141	GM3OEV.....111	Y03RR.....105	V81GC.....103	K6CYG.....101	W81ZV.....100
DI1XA.....123	K4PVZ.....110	K3NMY.....104	W1GAG.....102	K60BA.....101	VE1ZE.....100
W2NGG.....118	W4VWW.....109			K8ONW.....101	SM2ABX.....100

Radiotelephone

DI4FX.....148	W6DAX.....120	CR7CR.....109	K6KCI.....104	W2HC.....102	W5EDX.....101
I1ZPB.....129	CR7IT.....110	W6DFR.....105	K6GHI.....103	W4UF.....102	K2KGS.....100
W2OHK.....123	I1SCA.....110	K4LYG/7.....105	W6TGY.....103	DI9CT.....102	K2RAP.....100

Endorsements

G6ZO.....311	W8ID.....271	G6LX.....229	ZS6A.....201	W4UHC.....166	W6DFR.....131
OB1ER.....311	W1BGA.....270	W4MS.....223	W2LNB.....200	SP5HS.....161	W42KSD.....130
ZL1HY.....311	DI3RK.....270	DI7CS.....222	W3YZI.....200	ZL2JO.....161	W3MVZ.....130
W9WHM.....301	W04NB.....270	W9QGR.....221	W4OEP.....200	VE3AGC.....160	K3MNV.....130
LA7Y.....301	PY4OD.....266	K1MOD.....220	KP4RK.....200	W6DAX.....155	W9MCJ.....130
W4OM.....300	W1ACB.....265	W4ZELS.....220	ZS6ATA.....200	W48NU.....154	W1UUK.....127
W9PKC.....300	W61N.....260	K4AVY.....220	CR7LU.....194	K5YFE.....151	W42BK.....126
G3AAP.....300	PZ1AX.....258	W6PHI.....220	W42CBB.....190	DI5GC.....151	W4TF.....125
G8KS.....300	SM5WL.....253	W7ABO.....220	W2QDY.....190	OZ4H.....151	W4GFE.....121
W2AER.....290	VE3DKY.....252	W7ATV.....220	W418.....190	K5OGP.....150	W0QHT.....121
W5LGG.....290	K4ZKI.....251	W8KMD.....220	VE3TB.....190	K1MEN.....147	DJ2SR.....121
W8NJU.....290	W1PFA.....250	ZL3AB.....220	IU5ABL.....190	VV5AO.....145	W2TKZ.....120
W9VBQ.....290	W4ZTB.....250	ZS6J.....215	PA0E.....189	W1NTH.....141	W3TRC.....120
W5GJ.....283	W8KG.....250	W8JXY.....213	K4GXK.....182	K1RTB.....140	K9QW.....120
W2BRV.....290	W8KUT.....250	W8YCP.....213	W1FJJ.....176	W5VA.....140	K8BM.....120
W2RQS.....290	G6VQ.....245	W1HWH.....211	W1WHQ.....174	K8ANX.....140	K4ORQ.....117
W2IRV.....290	VE6BV.....242	G5VU.....211	W8QNW.....173	K60HJ.....138	K5QVH.....112
K17PI.....290	K8ONV.....241	ZS6J.....215	W2HC.....172	W7DR.....138	W46HRS.....112
K16JL.....278	IB9KUT.....236	W42AEI.....210	K4HYV.....172	CR7CB.....138	SM2BQB.....112
W1BAN.....274	W4HUE.....232	K4LZW.....210	K2BG.....170	W2TSD.....132	W42CUL.....110
W4RJ.....274	G2FUE.....231	K4WIS.....210	K48CT.....170	K8RBB.....132	W6YZD.....110
W6NW.....273	OK1CX.....230	W9QFC.....210	EA9AP.....168	WA2LWJ.....131	FJ3AO.....110
W6ANF.....272	VE2YA.....229	W31NH.....204			

Radiotelephone

HC1FG.....307	PZ1AX.....258	W2BQM.....240	K0FMG.....183	W4HUE.....160	K6EXO.....132
W9WHM.....300	W4OM.....255	W1BIH.....231	W81Z.....166	I1KDZ.....156	V89AFH.....132
W4QCW.....291	W4JGO.....254	W4NYN.....230	K8ONV.....176	CE3WN.....150	W1BPM.....130
W3GHD.....290	K4HEF.....250	W4TDW.....230	W4ZELS.....175	CT1EF.....150	W8TTN.....130
W9JF.....283	LA7Y.....250	W6NJJU.....229	W4RZ.....175	W4XCG.....142	W3QZT.....125
G8KS.....281	VV5EC.....245	G6LX.....222	W8JXY.....173	W6KLC.....140	W46DET.....123
H9J.....290	K1XC.....243	DI3RK.....200	K4HYL.....171	W9WIO.....140	W6KUT.....122
W1LLE.....273	W42TB.....242	IB9KUT.....188	W0AMP.....161	CR7LU.....140	K5YV.....121
W1BAN.....272	W6NBD.....242	W1JXM.....186	W9QLX.....161	W9ZVI.....134	W9AGX.....120

Strays

A group of amateurs (early participants among them being W4IU, W0NFA, K4AIM, W4DAL, W5BBT, K3LJB) have joined in a program of financial aid to the townspeople of Rowan, Iran, a village particularly hard hit by the September earthquakes. The project has been initiated by W4JOH, a professor at Georgia States College, who recently returned from a year of lecturing in Iran, and EP2AC, a missionary working in the earthquake area; both have

been appalled at the hardships and suffering in the disaster areas and chose the isolated village (33 persons left alive) for a rebuilding project supported by amateurs. Lyndon DeWitt, EP2AC, c/o Seventh Day Adventist Mission, 111 Pahlavi Ave., Tehran, Iran, is the airmail address for donations, and daily discussions of the progress of "Operation Rowan" take place on 14,265 kc. sideband in the early mornings.

IT ISN'T A DREAM

IT ISN'T just an artist's drawing or an engineer's specification.

It's actual production units that are being shipped since December 1 and are "on the air" all over the country. It puts out 100 watts P.E.P. on not one band or two bands but all five ham bands (80 through 10). It's a superb product backed by over six years of production experience in S.S.B. transmitters. It has important features you need in a transceiver not available in any other unit announced or in production. For example, what other unit has R. I. T. and A.A.L.C.?

IT WAS designed by the same engineering team that gave you the "standard of comparison for S.S.B." — the HT-32 and its brother the HT-37.

EVEN the matching factory engineered AC or DC power supplies or mounting racks are available if you wish. Nothing has been left undone to provide you with a fine transceiver. Drop in today at your amateur distributor and see an SR-150. If you are in Chicago, visit our plant and let us personally show you our production lines where not only the SR-150 is built, but HT-32, HT-37, SX-115, SX-117, and some 38 other fine products in the amateur and short wave field.

— FRITZ A. FRANKE

W. J. Hoelger W9AC

Levin Marshall K9EBE



hallicrafters

Viking®

ADVENTURER—Self-contained . . . 50 watts CW input. . . rugged 807 transmitting tube . . . instant bandswitching 80 through 10 meters. Crystal or external VFO control—wide range pi-network output—timed sequence keying. With tubes, less crystals.
 Cat. No. 240-181-1 Kit. Net \$69.95

CHALLENGER—70 watts phone input 80 through 6; 120 watts CW input 80 through 10. . . 85 watts CW on 6 meters. Two 6DQ6A final amplifier tubes. Crystal or external VFO control—TVI suppressed—wide range pi-network output. With tubes, less crystals.
 Cat. No. 240-182-1 Kit. Net \$124.75
 Cat. No. 240-182-2 Wired, tested. Net \$169.75

6N2—Rated 150 watts CW and 100 watts phone—instant bandswitching coverage 6 and 2 meters. Fully TVI suppressed—use with "Viking I, II", "Ranger I, II", "Valiant" or similar power supply/modulators. Operates by crystal control or external VFO with 8-9 mc. output. With tubes, less crystals.
 Cat. No. 240-201-1 Kit. Net \$149.50
 Cat. No. 240-201-2 Wired, tested. Net \$194.50

10 METER "MESSENGER"—A compact, superbly-engineered transceiver. Ideal for fixed location or mobile operation. Completely crystal controlled, the 10-Meter "Messenger" contains 10 tubes (including rectifier). Instant selection of five frequencies in the range of 29.4 to 29.7 mcs., within a 300 kc. segment of the 10-meter band. Super-heterodyne receiver with excellent sensitivity and selectivity. AM, AVC—positive action "Squelch". . . wide range pi-L network output . . . push-to-talk ceramic microphone! Transmitter section uses a 7054 crystal oscillator coupled to a high gain 7061 final amplifier—delivers a clean, crisp, well modulated signal! Unit is light weight, easy to install. With power cords, tubes, microphone and 29,640 kc. crystals for National Calling and Emergency Frequency.
 Cat. No. 242-201 115V AC only. Net \$129.75
 Cat. No. 242-202 115V AC/6V DC. Net \$139.75
 Cat. No. 242-203 115V AC/12V DC. Net \$139.75

10 METER "PERSONAL MESSENGER"—Two models: 100 milliwatts for short range; 1 watt for extended range—11 transistors and 4 diodes—super-heterodyne receiver with tuned RF amplifier gives excellent sensitivity, two stage transmitter punches signal home. "Quiet" control silences receiver on standby. With battery compartment for penlight cells (less cells). Rechargeable cadmium battery and other accessories available.
 Cat. No. 242-103 10 Meter "Personal Messenger", 100 milliwatt, with 29,640 crystal, 8 penlight cell battery case. . . . Net \$109.50
 Cat. No. 242-104 10 Meter "Personal Messenger", 1 watt, with 29,640 crystal, 8 penlight cell battery case. Net \$129.50
 Cat. No. 251-806 Leather carrying case and strap. Net \$8.50
 Cat. No. 250-804 Rechargeable nickel cadmium battery. Plugs into 115 V AC outlet to recharge. Net \$19.95

RANGER II—Now—a new version of the popular 75 watt CW or 65 watt AM "Ranger". The "Ranger II" transmitter also serves as an RF/audio exciter for high power equipment. Completely self-contained instant bandswitching 160 through 6 meters! Operates by built-in VFO or crystal control. High gain audio-timed sequence keying, TVI suppressed. Pi-network antenna load matching from 50 to 500 ohms. With tubes, less crystals.
 Cat. No. 240-162-1 Kit. Net \$249.50
 Cat. No. 240-162-2 Wired, tested. Net \$359.50

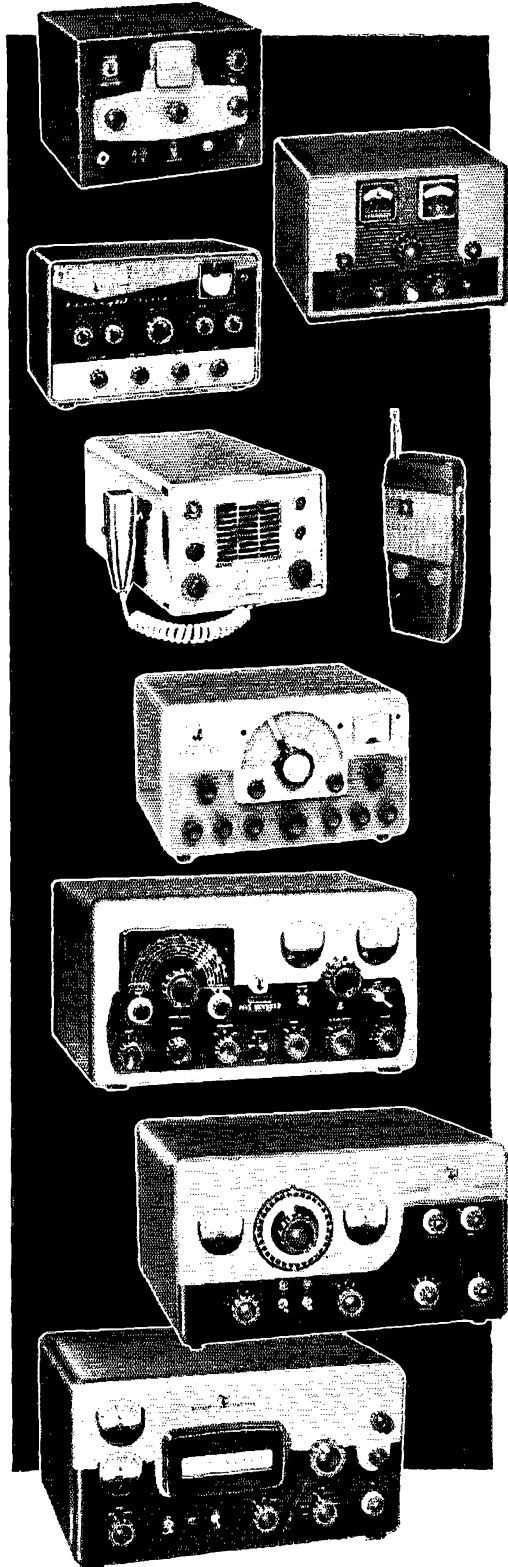
FIVE HUNDRED—Full 600 watts CW—500 watts phone and SSB (P.E.P. with auxiliary SSB exciter). Compact RF unit designed for desk-top operation. All exciter stages ganged to VFO tuning—may also be operated by crystal control. Instant bandswitching 80 through 10 meters—TVI suppressed—high gain push-to-talk audio system. Wide range pi-network output. With tubes, less crystals.
 Cat. No. 240-500-2 Wired, tested. Net \$1050.00

"6N2 THUNDERBOLT"—1200 watts (twice average DC) input SSB and DSB, Class AB1; 1000 watts CW, Class C; and 700 watts input AM linear. Continuous bandswitched coverage on 6 and 2 meters. TVI suppressed. Drive requirements: approx. 15 watts Class AB1 linear, 6 watts Class C CW. With tubes and built-in power supply.
 Cat. No. 240-362-2 Wired. Net \$549.50

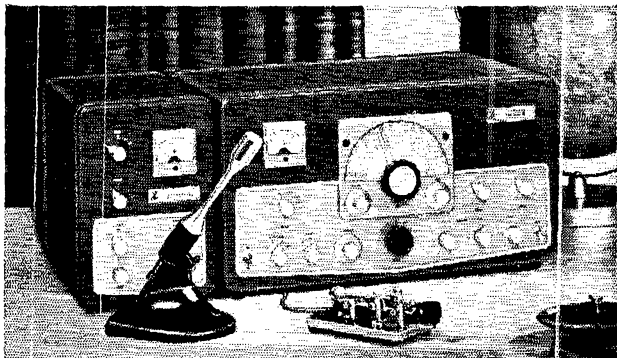
"THUNDERBOLT"—The hottest linear amplifier on the market—2000 watts P.E.P. (twice average DC) input SSB; 1000 watts CW; 800 watts AM linear. Continuous coverage 3.5 to 30 mcs—instant bandswitching. Drive requirements: approx. 10 watts Class AB2 linear, 20 watts Class C continuous wave. With tubes and built-in power supply.
 Cat. No. 240-353-2 Wired, tested. Net \$659.00

New Catalog

The E. F. Johnson Co. also manufactures other transmitters and accessories . . . all described in our newest amateur catalog. Write for your copy today!



1st Choice Among Nation's Amateurs!



Matched Pair

Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

"SSB ADAPTER"—The new filter-type SSB generator—with bandswitching 80 through 10 meters . . . more than 50 db sideband suppression . . . more than 45 db carrier suppression! When used with the Viking "Valiant" or "Valiant II" it places 275 watts P.E.P. at your command. Two compact units and interconnecting cables . . . RF unit is only 8" wide—may be placed on your operating desk. Power supply unit may be placed in any convenient location. Features built-in multiplier requiring VFO input only—band-pass interstage couplers require no tuning—design and front panel make operating practically fool-proof. Superb audio fidelity and balanced audio response; excellent sideband, spurious and carrier suppression. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

Cat. No. 240-305-2—Wired, tested Net \$369.50

"VALIANT II"—Outstanding flexibility and performance --bandswitching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Other features: TVI suppression; time sequence (grid block) keying; high gain push-to-talk audio built-in low pass audio filter; self-contained power supply; and single control mode switching. As an exciter drives any popular kilowatt level tubes and provides quality speech driver system for high power modulators. Provision for plug-in SSB operation with no internal modification. With tubes, less crystals.

Cat. No. 240-105-1—Kit Net \$375.00

Cat. No. 240-105-2—Wired, tested Net \$495.00

INVADER—More exclusive features than any other Transmitter/Exciter on the market today! Specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Instant bandswitching 80 through 10 meters—no extra crystals to buy—no realigning necessary. Delivers a solid 200 watts CW input; 200 watts P.E.P. SSB input; 90 watts input on AM! (25-30 watts output—upper sideband and carrier.) Built-in VFO—exclusive RF controlled audio AGC and ALC (limiter type) provide greater average speech VOX and anti-trip circuits. Fully TVI suppressed. Self-contained heavy-duty power supply. With tubes and crystals.

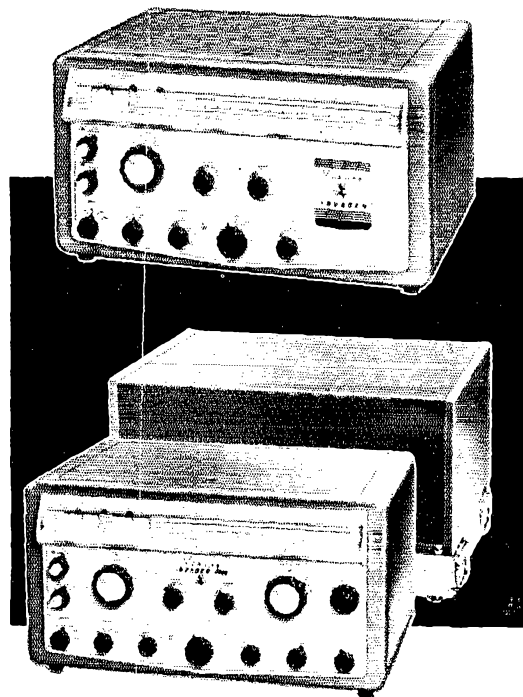
Cat. No. 240-302-2 Wired, tested Net \$619.50

INVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated at a solid 2000 watts P.E.P. (twice average DC) SSB, 1000 watts CW, and 800 watts AM! (250 to 300 watts output—upper sideband and carrier.) Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. With power supply, tubes and crystals.

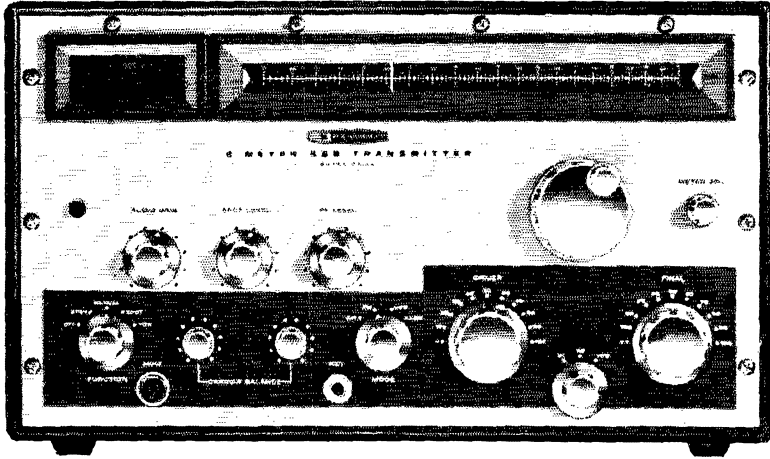
Cat. No. 240-304-2 Wired, tested Net \$1229.00

HIGH POWER CONVERSION—Take the features and performance of your "Invader" . . . add the power and flexibility of this unique Viking "Hi-Power Conversion" system . . . and you're "on the air" with the "Invader 2000". Wired, tested, includes everything you need—no soldering necessary—complete conversion in one evening.

Cat. No. 240-303-2 Net \$619.50



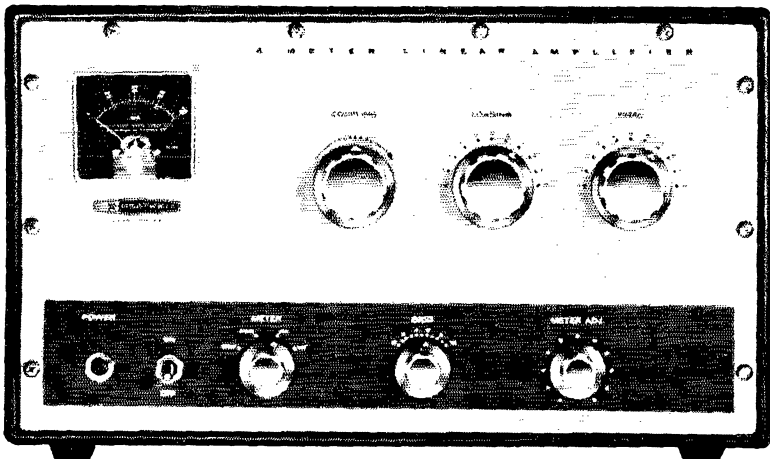
E. F. JOHNSON COMPANY
WASECA, MINNESOTA, U.S.A.



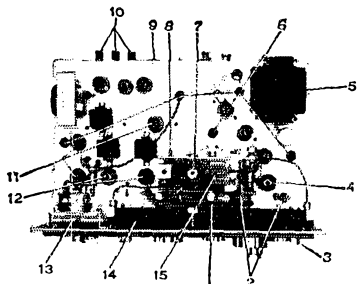
HEATHKIT HX-30 SIX METER SSB TRANSMITTER

SSB SIX PACK

A NEW EXCITER & AMPLIFIER FOR 125 WATTS PEP ON SIX

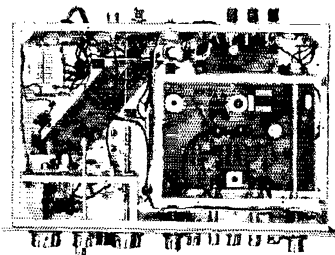


HEATHKIT HA-20 SIX METER LINEAR AMPLIFIER



**HEATHKIT HX-30
SIX METER SSB TRANSMITTER**

1. Anti-backlash helical gear for smooth VFO tuning. 2. Adjustable final amp. coupling and loading. 3. Meter control with push-button over-ride to check carrier null. 4. 6360 final amplifier for 20 watt PEP RF input. 5. Regulated power supply. 6. Five test-point jacks for easy alignment using panel meter. 7. Low frequency heterodyne VFO electronics on circuit board. 8. VFO frequency determining components mounted on "heat-sink" plate in enclosure. 9. Accessory socket for control functions. 10. Built-in VOX & anti-trip circuitry. 11. Three audio stages with speech filter. 12. Phasing-type SSB generator heterodyned to output frequency. 13. Meter indicates relative power output. 14. Lighted slide-rule dial with 9' per megacycle of bandspread. 15. Two crystal sockets for net or MARS operation (provides frequency coverage down to 49.8 mc).



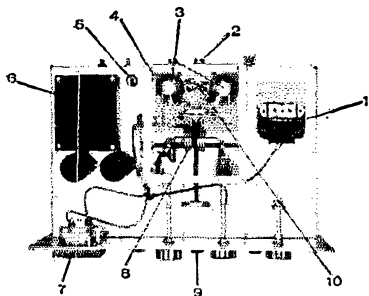
TAKES LESS THAN 30 HOURS TO ASSEMBLE:

3 extra-strength circuit boards and 3 precut, cabled wiring harnesses simplify assembly and insure correct parts placement. Compartmentalized construction and thorough shielding assure stable, reliable performance. Advanced design features provide 50 to 54 mc coverage in four 1 mc segments (crystal for 50 to 51 mc supplied); USB, LSB, CW, AM operation; 50 db carrier suppression; 40 db unwanted sideband suppressions; grid block keying with filter; 50-75 ohm coax output and many more. Overall dimensions only 16 1/2" W x 10 1/8" H x 10" D.

Kit HX-30, 50 lbs., no money down,
\$18 mo. **\$189.95**

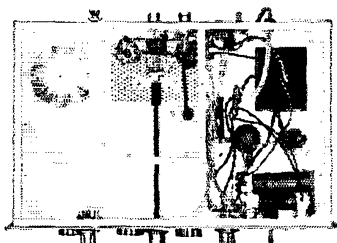
**SSB
SIX PACK
as low as
\$27 per mo.**

Attention all six-meter fans! Here's another Heathkit first! A brand new SSB exciter and linear for six meter operation at sensational savings! Only \$289.90 for the pair . . . less than the cost of most transverters. Together they form a complete, high performance 6-meter SSB station designed for maximum efficiency and operating convenience. Check the many features of these two units . . . you'll find them the perfect pair for your station . . . enter your order today and go SSB on Six!



**HEATHKIT HA-20
SIX METER LINEAR AMPLIFIER**

1. Fan forced-air cooling of final amplifier. 2. Only 2.5 to 10 watts PEP driving power required. 3. 125 watts PEP input. 4. Completely shielded RF circuitry. 5. Regulated screen voltage. 6. Solid-state rectifiers for cool, efficient operation. 7. Metered grid current, plate current, plate voltage & relative power output. 8. Link coupled RF output, 50-75 ohm coaxial. 9. 50 ohm tuned grid input to accommodate various levels of driving power. 10. Neutralized push-pull 6146 final amplifiers.



EASY ASSEMBLY: Clean, open circuit layout permits conventional wiring with less than 10 hours actual construction time. As in the HX-30, a heavy steel copper-clad cabinet provides strength, beauty and superior shielding, measures just 16 1/2" W x 10 1/8" H x 10" D. Frequency coverage is 49.8 to 54 megacycles. All power supplies are built in. A tremendous value at this low Heathkit price!

Kit HA-20, 43 lbs., no money down,
\$10 mo. **\$99.95**



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CATALOG**
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more than 100
new kits since
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over 250 kits in
all.



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GOTHAM VERTICALS DELIVER THE CONTACTS

THE ULTIMATE PROOF OF THE FINE PERFORMANCE OF THE
GOTHAM VERTICAL ANTENNAS IS IN THE ACTUAL FIELD
RESULTS, BY HAMS ALL OVER THE WORLD.

PROVEN! PROVEN! BY THESE EXCERPTS FROM UNSOLICITED TESTIMONIALS:

CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when bought it." D. S., New Jersey.

CASE HISTORY #250

"I have one of your vertical antennas and have been having fine results on 10, 15, and 20 meters." N. S. P., Missouri.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #123

"I am full of praise for your vertical. In the recent field day, we went up to the mountains near here and QSO'd a KA2, KZ5, and an XE at 2100 PDST on 15 meters. We got a 59 plus from the KA and KZ and 58 from the XE." D. P., Nevada.

CASE HISTORY #398

"Some months ago I purchased one of your V80 vertical antennas. I have had wonderful results with this antenna, and I think it was of far greater value than the small amount I paid for it." R. C., Utah.

CASE HISTORY #766

"The Gotham vertical takes almost no room. I don't see how I could have used any other type very well. Sure do appreciate the fine record this antenna has made so far." H. C., Haiti.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

CASE HISTORY #407

"I recently purchased a Gotham V80 vertical antenna and I am very pleased with the results. Up until now my home brew antenna has had a very high SWR, but with the V80 the SWR is 1:1." J. D. R., Virginia.

CASE HISTORY #414

"Just a quick note to tell you how pleased I am with my 2 day old V80. My old SX-28 just seems to be re-born. An excellent receiving antenna as well as a fine transmitting antenna." D. J., Utah.

FREE

Catalog of all Gotham antennas,
including 47 different beams
covering 2 meters through 20
meters, free on postcard request.

ANNOUNCEMENT!

GOTHAM proudly announces our appointment as an *AUTHORIZED FRANCHISED DEALER* for ALL LEADING MANUFACTURERS OF TRANSMITTERS AND RECEIVERS.

We feature a unique plan that absolutely guarantees proper installation and operation.

ORDERS AND INQUIRIES SOLICITED

WHY

THE GOTHAM VERTICAL ANTENNA IS THE BEST ALL-BAND ANTENNA

- Absolutely no guying needed.
- Radials not required.
- Only a few square inches of space needed.
- Four metal mounting straps furnished.
- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
- Mount it at any convenient height.
- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

73.
GOTHAM

DO YOU KNOW

1. YOU WILL HAVE NO DIFFICULTY INSTALLING YOUR GOTHAM VERTICAL ANTENNA IN JUST A FEW MOMENTS, REGARDLESS OF YOUR PARTICULAR PROBLEM, SO ORDER WITH CONFIDENCE EVEN IF YOU HAVE RESTRICTED SPACE OR A DIFFICULT SITUATION.
2. LOADING COIL NOT REQUIRED ON 6, 10, 15 AND 20 METERS. FOR 40, 80, AND 160 METERS, LOADING COIL TAPS ARE CHANGED MANUALLY EXCEPT IF A WIDE-RANGE PI-NETWORK OUTPUT OR AN ANTENNA TUNER IS USED; IN THIS CASE BAND CHANGING CAN BE DONE FROM THE SHACK.
3. EVERY GOTHAM ANTENNA IS SOLD ON A TEN DAY TRIAL BASIS. IF YOU ARE NOT FULLY SATISFIED, YOU MAY RETURN THE ANTENNA PREPAID FOR FULL REFUND OF THE PURCHASE PRICE. THIS IS YOUR GUARANTEE OF FULL SATISFACTION.



FILL IN AND SEND TODAY!

Airmail Order Today — We Ship Tomorrow

GOTHAM Dept. GST

1805 PURDY AVE., MIAMI BEACH, FLA.

Enclosed find check or money-order for:

V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 AND 6 METER BANDS..... \$14.95

THE V40 IS ALSO MADE FOR CITIZENS BAND OPERATION, WITH SPECIAL INSTRUCTIONS. DESIGNATE CB-11 ANTENNA. PRICE SAME AS THE V40

V80 VERTICAL ANTENNA FOR 80, 40, 20, 15, 10 AND 6 METER BANDS. MOST POPULAR OF THE VERTICALS. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS... \$16.95

V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO..... \$18.95

HOW TO ORDER. Send check or money order directly to Gotham. Immediate shipment by Railway Express, charges collect. Foreign orders accepted.

Name.....

Address.....

City.....Zone.....State.....



TO MY FRIENDS AND FORMER CUSTOMERS IN AMATEUR RADIO AND COMMUNICATIONS FIELDS

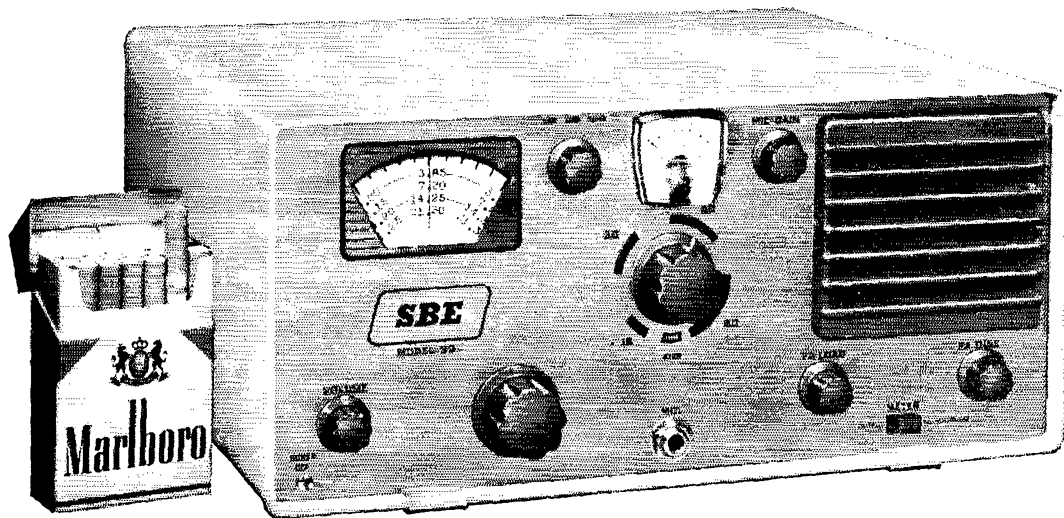
I am pleased to announce formation of SBE, Sideband Engineers, Inc., a new communications manufacturing company headed by myself and a fine group of former amateur radio associates. As many of you know, I retired from active electronic manufacturing several years ago and since then have been asked continually when I would return to the field. After careful study of potential new items that would meet my requirements of high value and performance, I have formed this group to bring you a new series of dynamic products. All will have outstanding "break-through" features.

Our first product is a new single-sideband transceiver which is described on the adjoining page. It is my personal feeling that this exceptional unit will soon lead the field. It is physically small, outstanding in circuitry, provides 4-band operation with selectable upper and lower sidebands, has built-in power supply. These are truly dynamic new features. There are several other new products in our laboratories that will soon go into production. These will be announced in the near future.

73

Faust Gonsett, W6VR, Pres.

Sideband Engineers, Inc. Rancho Sante Fe, California

**SB
33****ONE OF THE BIGGEST VALUES EVER!**

Entirely New! Outstanding! Dynamic!

SB-33 transceiver . . . dynamic product of solid-state electronics and advanced electro-mechanical design! Exceptionally small—less than one-half cubic foot including built-in AC supply and weighing only 15 pounds! Powerful . . . 135 watts P.E.P. input. Four-bands, 80-40-20-15 meters. Upper or lower sideband selectable by panel switch and without carrier or dial shift! Collins mechanical filter. Very low frequency drift. Check the specs . . . compare prices. This has to be one of the biggest values ever! Available at your SBE distributor during February 1963. Write today for complete specifications.

SIZE: 5½"H, 11¾"W, 10¼"D. Weight 15# (approx.)

FREQUENCY RANGE: Band 1: 3.8-4.0 mc.
Band 2: 7.15-7.35 mc. Band 3: 14.2-14.4 mc.
Band 4: 21.25-21.45 mc.

TRANSMITTER

POWER INPUT: 135 watts P.E.P. max. (Speech waveform.)

DISTORTION PRODUCTS: Down at least 25 db.

CARRIER SUPPRESSION: -50 db.

SIDEBAND SELECTION: Upper or lower sideband selectable by panel switch.

UNWANTED SIDEBAND: -40 db.

OUTPUT IMPEDANCE: 40-100 ohms unbalanced.

RECEIVER

SENSITIVITY: Better than 1 uV for 10 db signal/noise ratio.

SELECTIVITY: 2.1 kc @ 6 db. 5.3 kc @ 60 db.

SPURIOUS RESPONSE: Images and I-F response down at least 40 db.

STABILITY: Less than 100 cps drift in any 30 minute period in any normal ambient temp. condition.

AUDIO OUTPUT: 2.0 watts @ 10% distortion.

TUNING RATE: 30 kc per revolution.

POWER SUPPLY: 117VAC **POWER SUPPLY IS BUILT IN.**

POWER CONSUMPTION: AC operation. Receive 35 watts.
Transmit: 165 watts (single tone).

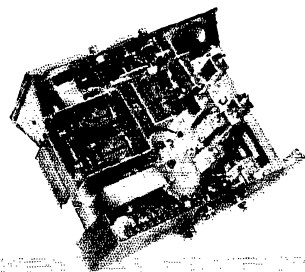
DC operation through vibrator or transistorized inverter.

TUBE AND SEMI-CONDUCTOR COMPLEMENT:

2—PL-500 beam power tetrodes, PA. 1—12DQ7 driver.

19—transistors, 13—diodes, 1—zener diode.

OPTIONS: Several options are separately available including VOX and Calibrator unit with provisions for mounting on rear of transceiver. Internal power supply provides operating power. Rear connections are brought out for linear amplifier



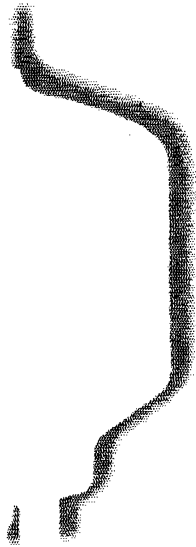
389⁵⁰

LOCKING-TYPE MOBILE
MOUNTING BASE 12.50
SPECIAL INVERTER, 12V
DC-115V AC . . . 59.50

SBE

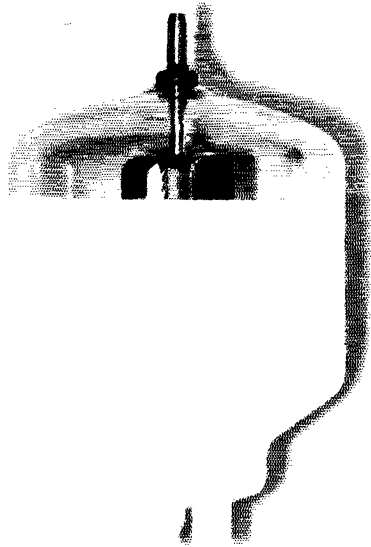
Sideband Engineers, Inc.
Rancho Santa Fe, California.

SSB TUBES DON'T JUST HAPPEN



From its radiation-cooled graphite anode and all-glass envelope, to its unique internal structure, the new Amperex 8179 Tetrode was designed from concept through accomplishment to be a better SSB linear amplifier than any other tube ever before available in its power class.

THEY



How well Amperex has achieved its objective is expressed in the significant facts that the 8179 will provide more power, with lower intermodulation distortion, at higher operational efficiency than ever before attainable in SSB linear service—and we mean linear!

The highly efficient heat radiation properties of the 8179 eliminates the need for costly, space-consuming cooling fans, blowers and related accessories. The tube incorporates a thoriated tungsten filament with high reserve emission rated at 7.5 volts and 22.6 amperes.

HAVE TO BE



DESIGNED
FOR SSB



Class AB₁ Grounded Cathode Linear RF Amplifier
Single Sideband Suppressed Carrier Operation

Typical Operation at 2 Kw PEP Input

DC Plate Voltage4000 volts
DC Grid No. 2 Voltage600 volts
Zero Signal DC Plate Current150 Ma
Max. Signal DC Plate Current515 Ma
Max. Signal DC Grid No. 2 Current115 Ma
Tube Efficiency at Peak of Envelope68%
Average DC Plate Current (two tone test) . .360 Ma
Average DC Grid No. 2 Current
(two tone test)60 Ma
Peak Envelope Plate Power Output . .1410 Watts
3rd Order Intermodulation Distortion34 db
5th Order Intermodulation Distortion38 db

For complete data on this and other transmitting tubes, write: Amperex Electronic Corporation, Communication and Industrial Tube Department, Hicksville, Long Island, New York.



Transistor Audio System

(Continued from page 41)

laced with waxed cord wherever possible. This helps to give a neat and uncluttered appearance to the chassis.

The panel and cabinet are finished with gray marine-engine enamel applied from a spray can. After spraying, they were baked for about two hours at 200 degrees F., and the resulting finish has a hardness and durability comparable to the best commercial finishes. The marine-engine enamels are true enamels of the highest quality and are much better than the so-called "quick-drying" enamels sold by electronic-supply houses and hardware stores. These latter are usually lacquers and are quite soft and easily scratched. The panel controls are identified with Tekni-Cal instrument decals.

Transistors and Components

A long article could be written discussing nothing but selection of components for transistorized equipment. The last comprehensive tabulation of transistors and diodes listed 6000 transistor types and 13,000 diodes and rectifiers. The ones shown in the diagrams are simply some of the ones that will work. The only diodes in the receiver which have any special characteristics are those used for temperature compensation, voltage regulation, noise limiting and b.f.o. tuning. For the rest, any general-purpose germanium diodes can be used in place of the germanium diodes shown, and similarly for the silicon diodes. Germanium should not be substituted for silicon or vice versa, however. For the other components, it is primarily a matter of obtaining reasonable quality and a sufficiently-small physical size. In this regard, some of the Japanese imported electrolytic ceramic and paper capacitors are remarkably good, especially when price is taken into account.

Grounding

A word concerning positive *vs.* negative ground is perhaps in order. Most commercial transistorized equipment intended for operation from internal batteries uses a positive-grounded supply. With p-n-p transistors (most germanium so-called r.f. transistors are p-n-p), a positive-grounded supply puts the emitters and bases close to ground. This facilitates design in some areas, and is somewhat more economical when high-capacitance emitter bypass capacitors are required. This is not too significant, however, and either positive or negative ground can be used. Negative ground was chosen for this receiver because most automotive and marine electrical systems are now 12-volt with negative ground. The receiver is therefore adaptable to mobile operation using the vehicle power supply.

(The fourth and concluding article of this series will describe a group of five crystal-controlled converters covering the amateur bands from 7 Mc. to 50 Mc., inclusive.)

ST

THE AMERICAN RADIO RELAY LEAGUE
RADIOGRAM

TO ALL RADIO AMATEURS...

DEAR OM: All the gang from Swan Engineering want to take this opportunity to extend our wholehearted thanks to those of you who have become Swan owners during the past 18 months. It is your overwhelming and enthusiastic acceptance of our first product, the single band SSB transceivers, which has made the growth and expansion of Swan Engineering possible.

And now, once again, Swan moves ahead in the field of SSB transceivers with this announcement of the new SW-240 three-band model. This advanced design embodies all of the high quality, reliability, and performance of the famous Swan single band design, and in a price class which we feel certain makes it the best buy on the market. Incidentally, the SW-240 is in production NOW, and on display at your dealer.

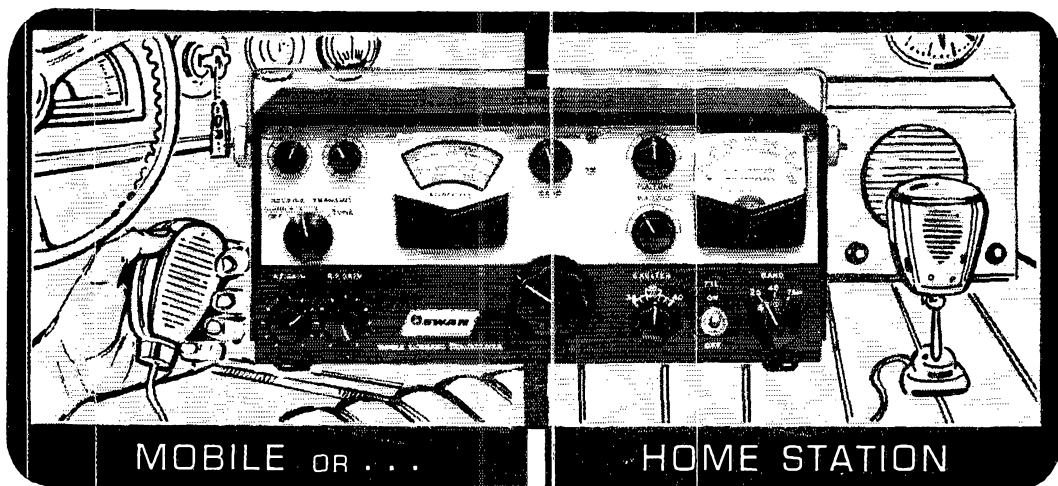
...73...DE...W6QKI...WA60QY
...K6HON...K7PPO...WB6AWJ
...WA6ZQU...W6OFT...W6KNV

NAME: _____ ADDRESS: _____ CITY: _____ STATE: _____

CALL LETTERS: _____ PHONE: _____

DATE: _____

Announcing a **THREE BAND SSB** **TRANSCEIVER** from **SWAN**



SWAN SW-240 THREE BAND SSB **TRANSCEIVER FOR 20-40-75 METERS**

\$320

Now on display at your nearest Swan dealer!

(SW-240 SPECIFICATIONS)

Frequency Range: 3780-4020 Kc, 7050-7320 Kc, 14,130-14,370 Kc.

Power Rating: 240 Watts PEP Input on SSB, 200 Watts Input on CW, 60 Watts Carrier Input on AM. 6DQ5 P.A. Tube.

Emission: Lower Sideband on 75 and 40 Meters, Upper Sideband on 20 Meters. (Opposite Sideband Available as Accessory Kit.)

Swan Bandpass Filter: High Freq. Crystal Lattice, 3 Kc bandwidth at 6 Db Down.

Output Impedance: Pi Coupler, Approx. Range: 20-200 Ohms.

Suppression: -40 Db Unwanted Sideband, -50 Db Carrier.

Frequency Stability: Fully Compensated for Wide Variation in Temperature, Supply Voltage, and Mechanical Shock or Vibration.

Tuning System: Precision Capacitor and Friction Drive Assembly, 25:1 Ratio.

AGC: Adjustable, with Controlled Delay and Release Time, Provides an Extremely Smooth, Wide Range, automatic gain control System.

Separate audio & R.F. gain controls

Receiver Sensitivity: Less than 1 UV for 10 Db S/N Ratio.

Total of 15 Tubes, including 6DQ5 P.A., 12BY7A Driver, 12BE6 Trans. Mixer, 12AU6 VFO, 6BA6 Rec. R.F., 12BE6 Rec. Mixer, 6BZ6 1st I.F., 6BA6 2nd I.F., 7360 Bal. Mod., 12AX7 Prod. Det.-1st Rec. A.F., 6V6GTA Output A.F., 6U8A Carrier Osc., 12AU7 Mic. Gain, 6AL5 AGC Rect., OD3 Volt. Reg.

Meter: 0-400 MA., Illuminated.

Mechanical: All Aluminum Construction. 5½ In. High, 13 In. Wide, 11 In. Deep. Weight: 11¼ Lbs.

Shipping Weight: 13½ Lbs., including Mobile Mounting Bracket and Hardware. Each Set is Shipped in a Specially Designed Polystyrene Container.

Power Requirements: 800 Volts D.C. at 300 MA., 275 Volts D.C. at 110 MA. -100 Volts DC at 5 MA., 12.6 Volts AC or DC at 3.5 Amps.

 **SWAN**
ENGINEERING CO.
Oceanside, California

MATCHING POWER SUPPLIES!

Model SW-12DC (transistorized)

\$115

Model SW-117AC, with matching cabinet and speaker

\$95

• 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

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3DUL, RM: W3EML, PAM: K3-BHU, V.H.F. PAM: W3SAO, W3LXN is now EC for Northumberland County. The former EC, K3JSX, performed a fine job. W3FEY notes an increase in 220- and 432-Mc. activity. "From Here'n there": W3PDJ is on 2 meters, W3BUR is DXing on 160, W3LEI says 6 meters is like the old 5-meter band and K3AVX is working the night shift. W3BKF was quite instrumental in the formation of the Bradford County AREC. W3RV now runs 800 watts with a new Warrior. New Gear Dept.: K3MDG a 6-meter beam. K3TYL an HT-40 and an SX-140 receiver. K3NSUB an HT-40 and he handled his first traffic. K3TLX also broke into traffic handling. W3CHU spent the month of October in Colorado on business. W3BNR/7 was quite busy handling out SS contacts for Wyoming. The Susquehanna Chapter of the QCWA was formed with W3OY as chairman and W3AXA, secy. New officers of the Haverford Jr. High School RC and K3OMP, pres.; K3RZM, vice-pres.; K3NRKL, secy.; K3PWW, treas. The Germantown High School RC's officers are: K3RHC, pres.; K3LWY, vice-pres.; K3TUX, secy.-treas. K3RBN installed a new v.f.o. and electronic keyer. The station of K3RZM was victimized by lightning. W3BNU worked his first Z59. W3CHC got a 3V8CA and W3CBY worked 9G1DT who, incidentally, formerly was W3OVI. W3EU has closed his town house and moved permanently to the country. Guam emergency traffic kept W3CUL and W3VR hopping together with all the other section traf-fickers. Observer K3RFH monitored the SS Contest but noted no off-frequency operation. K3PNI recently placed a kw. on the air. K3VFP is on c.w. and 2-meter mobile in the Kingston area. The E. Pa. C.W. Net had 368 QNI and 349 QTC. How good a traf-fiker are you? K3KTH, an E. Pa. Net member, with crippled arms and hands, sends with his toes and receives via translating traffic into a tape recorder. Can you top this? Traffic: W3CUL 6956, W3VFX 1381, W3VR 1077, W3EML 746, K3JSX 520, K3MGE 502, W3FAF 439, W3HKN 210, W3ZRQ 132, W3JKX 91, K3CAH 86, K3MVO 74, K3NLW 06, W3AXA 58, K3RHU 55, W3RV 50, W3CHU 48, W3-BNR 46, K3CKB 44, K3OWE 43, K3MDG 32, W3EEN 26, W3LC 23, K3HNP 20, W3NF 18, K3EAM 16, W3ADE 14, K3ANU 14, W3OY 14, W3BFF 13, W3ITL 13, K3ADS 12, W3BUR 12, K3NSUB 11, K3LKL 9, K3HTZ 7, K3MNT 7, W3BKF 5, W3AHZ 4, K3AKN 4, W3FEY 4, W3PDJ 4, K3AVX 2, W3ELI 2, K3LDD 2, W3SAO 2, K3TYL 2, K3TLX 1.

MARYLAND-DELAWARE-DISTRICT OF CO-LUMBIA—SCM, Andrew H. Abraham, W3JZY—Asst. SCM Delaware: Skip Nelson, K3GKF. SEC: W3CVE, RM: K3JYZ for the MDD Traffic Net which meets on 3649 kc. at 0000Z daily. MDDS (slow) meets on 28.1 Mc. daily at 0130Z; Del. Emg. Net meets on 3905 kc. at 2330Z on Sat. Del. Delaware is now a separate section. Send all Delaware activity reports to your Delaware SCM, K3GKF. Skip keeps busy with OBS skeds on 7050 kc. at 0000Z. K3CNI has his 6- and 2-meter Viking working and is receiving excellent reports. W3EEB is busy working the c.w. nets. W3HKS is having transmitter trouble. W3JFR is working phone traffic nets. K3KAJ keeps busy with school work. K3PZL wants to thank all MDD members who helped him get started in handling traffic and getting his ORS certificate. (We need more ORS like Tom). This is my last report for Dela-ware. Good luck to you in your new section. *Md.-D.C.* My next report will be for Maryland and the District of Columbia section. W3BKE worked 500 stations in the SS Contest. W3EOV is enjoying working 6 meters with an 80-meter Windom antenna. W4EMX/3 is waiting for his Persian call and will use a new Collins KWM-2 trans-ceiver. Art will be in that area until June, 1963. K3GVE

is working on a 1-kw. rig for 20 meters. K3GZK sure has been having transmitter trouble. W3IVC is working EAN on Fri. and Sun. W3WVJ worked in the SS Con-Test. K3JYZ made over one-hundred thousand points in the SS Contest. K3LFD is keeping skeds on MDD, MEPN and 3RN. K3LLR would like some schedules with New Mexico. W3MCG lost his 40-meter beam and is now ready with the repairs. K3NCM sends in a very fine traffic report. W3OHI has his 453 working FB as a Q5er. W3PQ is active on c.w. after an absence of 3 years using a Valiant II and a vertical, also doublets for 30 and 40 meters. K3QFG says home work is getting rough but he still finds time to look for traffic so that he can make BPL. W6QEG/K3QOO compliments the MDD Net on being patient and courteous. Mike is using an electronic keyer. K3SET will be joining the MDD Net as soon as he can get the traffic procedure down. W3TN sends in a very fine traffic report. W3ZQA is very active as an OO and reports that conditions are terrible on the bands. W3ZNV reports that traffic is very slow on the MDDS on 28.1 Mc. (See head of column for time of operation). K3PRN reports an opening on 6 meters to the south; he heard VP7CX. K3LLR is working on a 2-meter transceiver. I, your SCM, would like to receive more reports so that we can use all the space allotted for our section. The Baltimore Amateur Radio Club is holding on-the-air meetings each Mon. at 8 p.m. on the 10-meter band. W3FT is net control station. I thank all of you who sent me cards and those who came to see 10-meter band. W3FT is net control station. I thank all me in person while I was hospitalized for four weeks. Traffic: (Nov.) W3IVC 187, K3WBJ 125, W3JYZ 115, W3TN 97, W3BKE 74, K3NCM 51, W3EEB 38, K3LLR 26, K3LFD 23, W3JFR 21, W3NO 20, W3ZNV 18, W3EOV 16, K3OSX 15, W3OHI 13, W3PQ 8, K3KAJ 6, W3MCG 4, (Oct.) K3QFG 150, K3PZL 11, K3SFT 3.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARA, PAM: W2ZI, RMs: W2HDW and W2VAT. New appointments: W2ZVW, Beverly, as ORS; W2WLN, Linwood, as ORS; K2JJC, Pitman, as OPS, K1CIE 2 and W2TLO have been endorsed as ORSs. NJN totals supplied by W2QNL: 30 sessions, QNI 529, traffic 301, K2RXB, Margate, was re-covered from an illness and is back on the traffic nets. W2RG, Merchantville, has equipped his fallout shelter with a transistor receiver and transmitter, NJ Phone Net November totals, supplied by Net Mgr. W2ZI: 30 sessions, QNI 420 traffic 110. The net is about one-third s.s.b. to date and hopes for a larger percentage soon. W2BEI, Anduhon, has added a few more DXCC credits. W2HJD, Paulsboro, received his Amateur Extra Class ticket when only 15 years old. W2ARJ, Millville, reports W2EZE is a new Cumberland Co. call. W2NXV, also MARS AD2NXV, Gloucester, has a new kw. built from *Handbook* specifications. SJRA's officers for 1963 are W2HBE, pres.; K2BZK, vice-pres.; W2EYI, secy.; K2OYW, corr. secy.; K2GK, treas. W2KRX is SJRA's V.H.F. Chairman for 1963. The SJRA has been affiliated with the League since 1921. The Burlington County Ra-dio Club now meets the 2nd Mon. of each month at Moorestown. The Levittown (N.J.) Radio Club members have visited many interesting spots including WCAU TV. No news was received this month from the SCARA or Salem County area. All appointees, please check certi-ficate dates and forward certificates to SCM for endorse-ment. An EC is needed for Camden County. W2EIF, Official Observer, is back on the air at his new QTH, Stratford. W2UOF is trustee of Explorer Communica-tions Post 234's club station, W2BFGH, and W2WLM is advisor to the group. Traffic: K2RXB 138, W2RG 134, W2WLN 109, W2BZJ 76, W2ZVW 71, W2BLV 63, W2ZI 44, W2VAT 26, K2JJC 17, W2NXV 12, W2ARJ 8, W2BEI 8.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2LXE, RMs: W2RUF, W2EZB and W2FEB. PAM: W2PVI, NYS C.W. meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800. NYSPTEN on 3925 kc. at 1800. NYS C.D. on 3610.5 and 3993 kc. at 0900 Sun. and 7102.5 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 1900, IPN on 3980 kc. at 1600, 2RN on 3960 kc. at 0045 and 2345 GMT. W2OE made the BPL in No- vember. Congratulations. Appointments: W2FFL, EC Delaware County; W2ATHY, OBS; W2ATGC, OES. En-dorsements: W2PYC, EC Herkimer County; W2VLM, EC Broome County; Congratulations to the North High ARC, Binghamton, N.Y., on its ARRL affiliation. The

(Continued on page 102)



Amateur / CB / Industrial 2-Way Radio Operators ...

DON'T WASTE A WATT!



714SR



PA15

729SR

Add an E-V microphone and speaker to significantly improve your communications.

When You Talk...

these E-V microphones guarantee smooth, carefully tailored response that eliminates power-robbing peaks—allows maximum useful modulation to better cut through noise and interference. For highest effective output from your transmitter, select one of these Electro-Voice microphones.

MODEL 714SR Ceramic Mobile Microphone

All-new hand-held design. Unbreakable Cyclocac® case withstands roughest handling—feels comfortable at any temperature. Ceramic element is unaffected by extremes of heat, humidity. Panel mounting bracket included. Hi-Z output -55 db. Shielded coiled cord. DPDT switch. Net price \$9.90.

MODEL 729SR Ceramic Cardioid Microphone

Improves base station performance at remarkably low cost. Cardioid pickup pattern cuts out room noise, improves VOX action, permits greater working distance from microphone. Ceramic element rugged enough for mobile use. Handsome case fits easily in hand, or slips quickly into desk stand or floor stand adapter provided. DPST switch. Hi-Z output -60 db. Net price \$15.90. Without switch (Model 729) \$14.70.

When You Listen...

an E-V communications loudspeaker adds useful volume and articulation to your fixed or mobile receiver. Carefully controlled band-pass of compression driver and horn improves efficiency, cuts distortion and overloading, eliminates unwanted noise.

MODEL PA15 Communications Loudspeaker

Rugged, die-cast construction ideal for outdoor or indoor use. Outperforms typical cone speakers. Install with no circuit changes. Impedance 8 ohms. Universal swivel mount. Net price \$18.00.

Electro-Voice

ELECTRO-VOICE, INC., Commercial Products Div.
Dept. 232-Q, Buchanan, Michigan

Send me the new E-V communications products brochure and address of my nearest E-V communications specialist.

NAME _____

ADDRESS _____

CITY _____ STATE _____

Station Activities

(Continued from page 100)

Niagara Radio Club, W2QYV, set up a station at the National Guard "Hobby-Rama." W2QVP was chairman and those assisting were K2ZII, WA2PVT, WA2IBO, WA2AAX, WA2SKU, WA2YNE, WA2SEU, KN2ENX, K2UWW, WA2VZD, W2SSJ, WA2GCI, WA2UHR, WA2YFN, K2UGI and WA2UFF. The Coming ARA members got a nice write-up in the *News* for their aid in curbing Holloween vandalism. WA2DAC reports that 90 stations are on 2 meters in Champlain Valley. All have the same crystal, W2WS has taken over as Editor of *Roads Review*. He is continuing the fine job vacated by WA2KQK. Congratulations to the Niagara Frontier DX Assn. (W2SSC/2) on making the top national score in the two-transmitter class in the 1962 Field Day. WN2ECL is on the air with a knight T-60 and an S-38, he is interested in the Novice Net, to help with code speed. Ontario County Monitors 50.25 and 144.35 Mc., reports K2ZRV, QRMJ, publication of the CARA, blossomed out in full color for the Christmas edition. The ARATs held its annual Banquet, which was a fine affair. A 2-meter v.h.f. repeater station has been proposed for Erie County and is in the process of construction by W2EUP, who is also the "Project Engineer." The unit will have about 250 watts output. Any licensed ham can use the setup and it is expected to provide reliable mobile-to-mobile operation within a 30-mile radius of the antenna location, or a maximum of about 60 miles. W1UED, from ARRL, attended a recent meeting of the Squaw Island ARC. Traffic: W2OE 512, W2RUF 233, W2EZB 226, WA2KQG 173, WA21YB/2 163, WA2HSB 125, K2QDT 124, WA2LKW 75, WA2KZQ 34, WA2DAC 30, W2RQF 23, K2LNG 21, K2PBU 21, WA2WEE 21, K2IMI 19, K2ULY 17, WA2ANE 16, WA2GLA 13, K2RYH 12, K2H0H 10, K2HTG 7, W2EAM 2.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC, W3LIV. RMs: W3KUN and W3NUG. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets 2330 GMT on 3585 kc. Mon. through Fri. We regret to record the death of W3LRG, of Pittsburgh. K3OOI now is KSSN manager. KN3TQW recently passed the General Class exam; Charlie is handicapped by blindness. The Steel City ARC reports via *Kilovatt Harmonics*: W1UED, from Headquarters, was a recent visitor; W3RYC and W3YDP are putting up triband beams; W3GQJ is attending Duquesne University. K3PJH is now General Class, K3EBT has a 40-ft. tower. W31YI is on phone. The Centre County AREC group had a two-phase get-up in the annual SET. Up Erie way: K3SBT is working 15-meter DX; K3UTL is putting an Apache together; K3RDQ is back on 6 meters; K3VLQ is home from the hospital. The Juniata Valley ARC reports via *The Static Blast*: K3DOL received his 1st-class radiotelephone ticket; K3GZQ has a new SX-111; K3PCD lost his tribander in a recent storm; W3PVZ worked the HMS Bounty (VE0MO) on its recent voyage. W3ZKR is on 2 meters. KN3SJD passed the General Class exam. The Dividing Ridge ARC is organizing AREC activity. K3QBM is now WB6BTE. K3BWI is mobile on 10 meters. Coke Center RC reports: The recent club Novice contest was won by KN3UB; W3QZV has an HT-37; a new Novice is KN3VBP. Congratulations to the Coke Center Radio Club on its 35th year of amateur activity. Out in Los Angeles W3WRE is now WB6BBO and W3WRC is WB6BBL. The Etna RC reports via *Oscillator*: Pittsburgh's Educational TV station, WQED, had a demonstration of ham radio under W3ZAO's supervision; K3OYU put up a vertical; K3OQR built a keyer; W3TOC has a Hy-Gain vertical. The Horseshoe RC reports through *Hamateur News*: K3AYU is getting on 2 meters; W3BTX is back on 6; K3QPB has a new HQ-110. W3MBN has a new Panadaptor. Traffic: (Nov.) W3MFB 351, W3KUN 266, K3OOO 207, W3UHN 128, K3DKE 100, K3EDO 41, W3OEO 22, W3KWO 20, W3YA 18, W3JHG 17, W31YI 12, W3UIU 12, K3COT 5, K3SMB 5, K3JCZ 2, K3BWI 1. (Oct.) W3SNV 35.

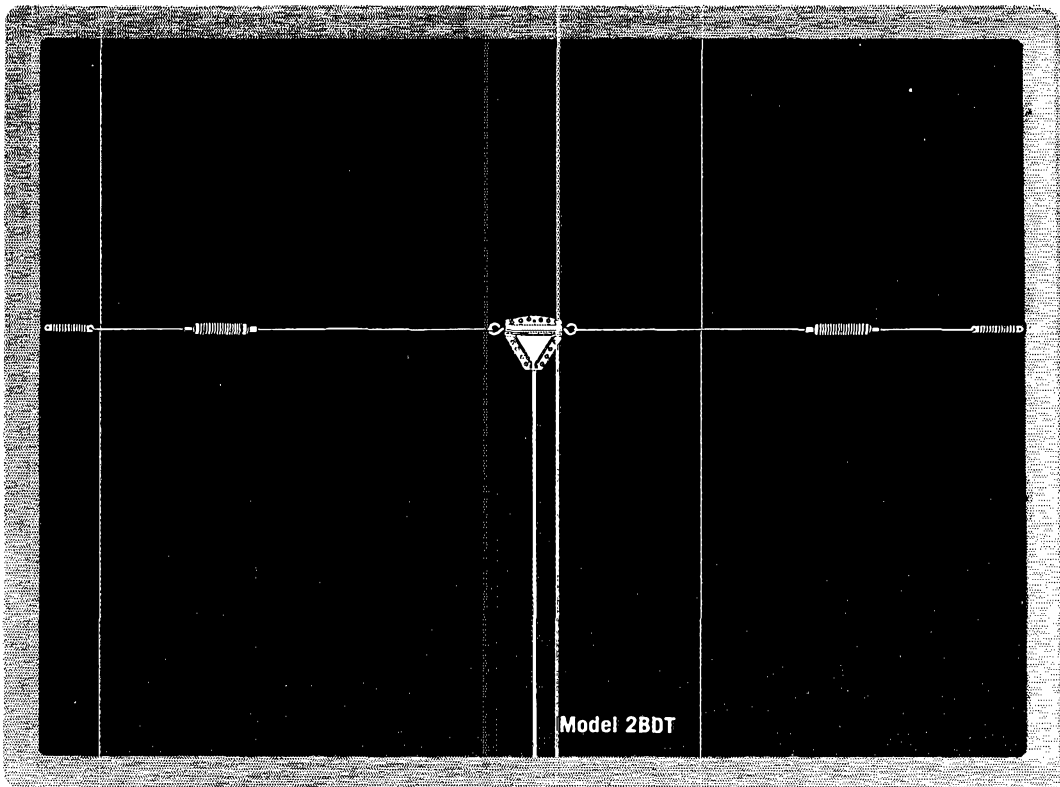
CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM, Grace V. Ryden, W9GME. SEC, W9RYU, RM: W9USR, PAM: W9VWJ. EC of Cook County: W9HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. K9RVG, W9DMF and K9CGD have joined the ranks of 2-meter s.s.b. K9AMC is being heard reading the Official Bulletin prepared with a Wheatstone perforator and McElroy tape reader. The new officers of the Chain of Lakes Amateur Radio Club are W9NSA, pres.; K9ROL, vice-pres.; K9WZH, sec.; K9TYA has a new S-Line. W9DQX is sporting a new Hallcrafters SX-115. K9FRF is bringing in the new ones with a newly

acquired s.s.b. transmitter. WA9AII and her OM WA9AIII have finished building a Heath HO-10 scope. W9BMJ, K9SCE and W9OYD were presented awards at the November meeting of the 5th Army MARS (Illinois). W9OKI has worked all Illinois counties and has received certificate No. 4. K9VTK reports that the Fox River Radio League, Inc., meets the 1st and 3rd Tue. K9BTE is busy tending the Heathkit version of the Thomas organ. W9ERU is celebrating his 35th of amateur radio operating. Congratulations, WN9FYL is a new call heard. K9LXG and W9AXV share a new HT-37 and LA400C. K9ZQT is new secretary of the Rats Nest Net (RTTY) which meets Thurs. at 9 p.m. and Fri. at 0300 GMT on 3625 kc. K9UCG received his WAS certificate. Stations are invited to work the Illinois Institute of Technology (Chicago). They are on bands from 80 to 6 meters. W9BKN passed away in November and will be missed by the traffic gang. This column's sympathy is extended to his family and friends. The Central Illinois Radio Club (Bloomington) has passed 12 more amateurs from their recent code and theory classes. K9ZIA has joined the faculty ranks and is now an instructor at Coyne. K9UCG also has made WAS. WA9AWP still is working on his amateur TV station and hopes to have it in FR working order soon. K9ILG has finished his Heath Seneca and is bringing some fine reports on the v.h.f. bands. W9YW, the Rho Epsilon Radio Club, is back on the air. A new 2-meter station heard was K9VSL. W9PNY lost his mother. Our sympathy to him and his family. The Illinois Medical Center Wesley Foundation League's affiliation has been approved. The officers of the recently formed North Shore Amateur Radio Club are K9FNN, W9FKC, W9VMZ and W9DEF. K9FPG reports the officers of the Staunton High School Amateur Radio Club are K9KHY, WN9DQT, K9FGG and K9FGP. K9WEH is now an Amateur Extra Class licensee. K9AMID has 25 No. 1 certificates on her wall. K9FJM, WA9BXB, K9FZB and WA9ALS are officers of the new Worth Township Radio Club. W9NWK and K9ZQT were appointed Official Bulletin Station. New calls heard in the Lake Forest area are WA9DAU and WN9FSC. K9RII is s.s.b.ing with a Hallcrafters HT-37, and W9LNG is using a new Valiant II. The Skokie 6-Meter Club assisted the Skokie Police during Halloween with emergency communications. W9OKI has completed a Heath HX-10 Ma-rauder. A late report from the North Central Phone Net reports a traffic total of 128 for the month of October. For November the total is 229, and the 75-Meter Interstate S.S.B. Net had a traffic count of 475. K9NBH, W9IDA and WA9AJF are recipients of the RPL Award. Traffic: (Nov.) K9NBH 1665, W9IDA 1193, WA9AJF 537, K9BTE 215, W9AKV 95, W9JXV 90, K9JJD 48, K9ZQT 38, K9DRS 30, K9CYZ 29, WA9DEW 22, K9LXG 20, K9CRT 16, W9PRN 16, K9ISF 15, K9RAS 6, K9UCG 6, WA9FOI 5, W9SKR 4, K9FNE 3, W9CSG 2, K9GJN 2, W9SXL 2, WA9AWP 1, W9LNQ 1, W9OKI 1. (Oct.) K9VMN 149, K9VOF 87, WN9CLM 8, K9OKI 6, K9RAS 5, K9ISP 4, W9LNQ 2.

INDIANA—SCM, Donald L. Holt, W9FWH—Asst. SCM: Clifford M. Singer, W9SWD. SEC: W9NSQ. PAMs: K9KTL, K9CRS, K9GLL. RMs: W9TTF, K9SGZ, K9WET. Net shed (all times in GMT): 1FN, 1300 daily except Sun. at 1330 and 2300 M-F on 3910 kc. ISN (s.s.b.), 0030 daily on 3920 kc. IN (training), 0000 M-W-F on 3745 kc. QIN, daily at 0030 and RFN, at 1300 Sun. on 3656 kc. New appointments: K9HMX as EC of Tipton County. K9ZIW as EC of Dearborn County and K9MAN advanced to OO Class II and added linear to the HT-37. The QIN training net would like to have increased participation to effectively pass traffic on a state-wide basis. This net has been operating several years for the purpose of training new operators in efficient message handling and for the Novice to increase code speed as well as learn net procedure. All amateurs are requested to inform new licensees of this QIN training net and its purpose. Frequently there are crystals available to the newcomer at a very nominal fee. QIN Honor Roll for Nov.: W9TT, K9YZC, W9QLW, K9SGZ, QIN Honor Roll for Oct.: W9TT, K9SGZ, K9VWJ, K9UEF, W9YAY, W9QJW, W9ZYK. Those making RPL: W9JQZ, W9MIM, W9ZYK, W9NZZ. *Amateur radio exists as a hobby because of the service it renders.* Nov. net reports: 1FN 341, ISB 1485, QIN 267, QIN (training) not reported, Hoosier V.I.I.F. 82, RFN, 30, 9RN 860 with Indiana representative 98 and three-tenths per cent. Traffic: (Nov.) W9QJZ 1592, W9MIM 570, W9ZYK 551, W9NZZ 441, W9QJW 327, K9ZIB 234, K9IVG 212, K9SGZ 184, W9VAY 163, W9TTF 152, K9RWQ 151, W9PAP 114, K9KTL 86, K9DHY 80, W9OG 80, W9BUQ 77, W9FVH 76, K9VZC 58, W9SNQ 56, W9SWM 51, K9ILK 44, K9CRS 43, K9INF 39, W9RTH 36, K9AUT 33, K9VHV 30, W9CC 29, W9QYQ 26, K9RST, 24, K9GLL 24, W9RTZ 20, W9DCA 20, W9BDG 18, W9EJW 17, W9DOK 16, W9RE 15, K9DZD 13, W9BZI 11, W9CJY 11, K9RCZ 11, K9TFF 11, K9CIP 10, W9KLC 10, W9ZSW 10, WA9EED 9, W9DZC 8, W9CKW 7, K9FHQ 7, K9MWC 7, W9YYS 7, W9YXX 7, K9DFG 6, W9BDP 5.

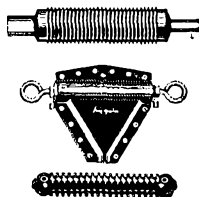
(Continued on page 104)



It's NEW!

Hy-gain TRAP DOUBLET for 80 and 40 Meters

Here's a $\frac{1}{2}$ wave length Doublet with an overall length of 109 feet that will deliver optimum performance on 40 and 80 meters. Featuring a matched set of famous Hy-Gain "Slim Line" solid state traps that are virtually indestructible, the Model 2BDT provides automatic band switching and an SWR of less than 1.5:1 at resonance on both bands. It is designed to be fed with a single 52 ohm coax feed line. On 75 or 80 meters, the 2BDT will withstand maximum legal power and on 40 meters, it will withstand 500 watts CW or 1 kw PEP. The ruggedly constructed "Slim Line" traps, the slim profile injection molded end insulators and the unique Hy-Gain center insulator/coaxial adapter are impervious to all weather conditions—complete antenna will survive winds in excess of 100 MPH. The 2BDT is supplied complete with two end insulators, two matched 40 meter traps, center insulator/coaxial adapter and stranded copper-clad steel antenna wire.



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Hy-Gain's Model 2TD kit consists of two matched "Slim Line" solid state traps resonant at 40 meters just like those used in the Model 2BDT described above. Also included in the kit is the necessary hardware for attaching the antenna wire to each end of the traps along with detailed instructions for building and tuning a doublet antenna for operation on 80 or 75 and 40 meters.

HAM NET \$12.95

For further information, see your favorite Hy-Gain Distributor, or write...

HY-GAIN ANTENNA PRODUCTS

8402 N.E. Highway 6, Lincoln, Nebraska

(Continued from page 102)

W9J5V 5, K9ARW 4, W9HUF 4, K9WET 4, W9ETI 3, (Oct.) WA9BFF 4L.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9BCC, RMs: W9VJK and W9VHP. PAMs: W9NRP, W9SAA and W9NGT. New appointees: W9FSP as OBS, K9BLN as OPS and W9ITW as EC for Fond Du Lac county. Renewed appointments: K9ELT, W9KZZ, W9DYD and W9WJH as ORSs, K9WIE as OBS, W9LFF as OO, K9DTK as OPS, W9SAA as PAM and W9NGT as PAM and OPS. K9CJL is now at the Naval Nuclear Power School. W9IQW has received a 45-watt, code certificate. K9VSY needs only Wyoming for his WAS. K9DGY is again on 6 meters. W9OFS has a new 2-meter rig. W9JQP is on 2 meters from Three Lakes with a Seneca. W9EFT and W9LVC are on 2 meters from Appleton. W9FSP has received an A-1 operator club certificate. K9GDF has received the "WRONE" award. W9ZYA has a home-brew three-element 20-meter beam up 40 feet. W9CKQ has an APX-6 and is putting it on 1296 Mc. W9KZZ has produced a fine series of articles in the *Ravine Club Bulletin* about handling your neighbors when they complain about TVI. New in the Milwaukee area are WN9ESX and WN9FLF. WN9CWU and WN9CVY are busy working toward their WAS awards. W9LUQ and W9HNE have been active on 160 meters. W9ITW and K9CMW have been working on RTTY gear. Traffic: (Nov.) W9DYG 551, W9FSP 532, K9AIR 261, W9SAA 214, K9BLN 210, W9AOW 198, K9GSC 84, W9VHP 80, W9NRP 33, W9CBE 19, K9CJP 19, W9SZR 18, K9UUT 17, W9OTT 15, K9DOL 14, W9LFL 11, K9GDF 10, W9UEB 7, W9KQB 3, WA9AOI 2, W9IQW 2. (Oct.) W9RYA 8.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, W0HYA—SEC: W0CAQ, PAM: K0TYY, RM: K0QWY. The North Dakota 75-Meter Phone Net reports for November: 23 sessions with 529 check-ins, a maximum of 34 and a minimum of 5. The net handled 33 pieces of formal traffic and 80 informal, with 16 relays. W5MCVQ is on the air in Williston after being off the airwaves for a year and a half. W0HVA, your SCM, has made another move. He now lives in Minot, at 805 3rd St., S.W. Traffic: K0ITP 89, W0YVL 64, K0FRP 23, K0TVI 18, W0VCM 7, K0FOP 6, W0BHT 1.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN—SEC: W0SCT. The Ellsworth Amateur Radio Club, Ellsworth AFB, has received notice of ARRL affiliation. K0HPY, formerly of DeSmet, has been issued the call KR6AU, on Okinawa. His rig is a Viking II, a 10A and an H-388. New calls: W0FAAI, Fort Alcade; W0ZLS, Canton, and W0QECK, Sioux Falls. W0CUC returned to Sioux Falls in October after spending 4 months in Northern Manitoba. W0KPB built a transistorized keryer. K0GJX gave up bachelorhood. He's off the air at the home QTH—landlord says no antennas. He's operating mobile with a new Swan. Traffic: (Nov.) W0ZWL 633, W0SCT 269, K0BMM 168, W0DYB 112, K0AIE 65, W0AQOY 60, W0OFP 36, K0VYY 33, K0ZMA 24, W0NXX 23, K0YGZ 19, K0ZBJ 14, K0TVJ 12, K0WJT 9, W0DYI 8, K0TNN 8, K0HQD 6, K0DHA 4, K0GSY 4, W0BMMQ 2, K0YJF 2. (Oct.) W0ZWL 501.

MINNESOTA—SCM, Mrs. Lydia S. Johnson, W0KJZ—Asst. SCM: Charles Marsh, W0ALW. SEC: K0KKQ, PAMs: W0GCR, K0EPT, RMs: K0UXK, K0IJD. M5SB Net Mgr.: W0FHN. Minnesota Net frequencies: Noon phone 3820. Evening at 6 P.M.; M5SB at 1730Z on 3805 kc, and 0045Z on 3815 kc. C.W. nets: MSN at 0030Z and MJN 0100Z on 3595 kc. MJN is the slow-speed traffic training net. W0NDXW can be heard on 3730 kc, using a 80-watt Knight and an S-100 receiver in Ferguson Falls. OBSs K0VLD and K0YMJ have their 420-Mc. transceiver built. W0HYE applied for AREC membership. He has several transmitters and receivers, is using a Viking I and a Ranger transmitter and an NC-173, and SX 17 and an S-20R. W0NDET is in Mankato, not Jamesville as I reported. K0OTH is selling all of his equipment and giving up ham radio until he graduates from college. The Itasca Radio Club is now affiliated with ARRT. Club members are as follows: W0S PUO, DVG, FLK, ZOB, DHU, CKL, EMJ, AGQ, A.JI, POU, K0S IYL, RDP, WVV, VLP, WAOs AAK, BZG, OZL, CUK and W9WAY/OJ. K0DHY built a hi-fi stereo amplifier. W0BPPE put up a 50-ft. antenna tower. Congrats to K0PIZ and his XYL on a new son named James. Our SEC's (K0KKQ) fifteen-year-old son is gravely ill and has been hospitalized many weeks. New MRC (Minneapolis) officers are W0JYA, pres.; W0MXC, vice-pres.; W0HPV, secy.; W0CCCR, treas. *Splatter* staff: W0DQL, editor; K0YCK, asst. editor; W0SFU,

business mgr. W0CCR is publisher. W0DQL is the new Hennepin County Radio Officer with W0s CKI and JYA as alternates. OBS W0KLG and W0WMA listed fifty-two violations. The FCCs for the following counties are: K0CNI, Sibby; K0HKA, Lake and Cook; W0TCK, Waseca and Steele; K0EGE, Wilkins; K0JOA, Polk, Pennington, Red Lake, Norman, Marshall, Mahanomen; K0IHD, Dakota, Scott, Goodhue; W0ACAH, Big Stone and Traverse. Your February traffic and net reports will go to the new SCM. Traffic: (Nov.) W0ATO 149, K0IHD 117, W0YU 117, K0GCG 111, W0HEN 109, W0KJZ 105, K0QBI 86, W0GCR 82, W0BVO 53, W0THY 43, W0WMA 42, W0GABU 40, W0UMX 32, K0ZRD 32, K0ZKK 27, W0KLG 25, K0BAD 24, K0ADI 23, W0OPX 23, W0RIQ 22, W0ALW 21, W0AAK 20, K0WPK 20, K0LIU 19, K0VPJ 17, W0AAM 14, K0FLT 11, K0PIZ 10, K0CNI 7, K0ZOI 6. (Oct.) K0ZKK 19.

DELTA DIVISION

LOUISIANA—SCM, Thomas J. Margavi, W5FMO—The Lafayette ARC threw another of those fabulous affairs in December with more than 160 persons attending. All attending had a chance to meet Delta Division Director W5MUG, SCM W5FMO, SEC W5MZO and RM W5CEZ. Ex-W4CMG, now K5KQG, is active in New Orleans. W5CEW still is trying to QSO LA4C. Louisiana stations are invited to check in on RN5, which meets daily at 0145 and 0330 GMT on 3645 Kc. K5CTR is pondering the advisability of drilling a hole in his 75S-1 to install a notch filter. The Lafayette ARC placed 4th in the class 1A group in Field Day this year. K5WOD is trying to get on s.s.b. W5MXQ has rig trouble but is looking for EC material throughout the state. K5QXV made BPL again. K5FYI got his 6-meter rig going. W5CEZ got his RTTY going. W5ZBC reports that Shreveport has a tenner group on 28.6 Mc. W5HHA, though snowed under with night work, manages to get in some fine QSOs on the bottom end of the 80-meter band. W5DYY made contacts with 15 new countries in November and has received her A-1 operator certificate. OM W5CME worked only 12 new ones. W5CEW has 279 worked, 278 confirmed. K5MOJ tried his hand at frequency measuring in the Nov. JEAT. W5HWB is building a new g.k. amplifier, 4-811A and expects to run around a kw. input. The East Frankfort, Ky., Optimist Club addressed a card of appreciation to your SCM on the way Louisiana hams handled Optimist Club traffic. Congrats. Traffic: K5QXV 899, W5CEZ 352, W5ZBT 65, W5CME 36, W5MXQ 36, W5EA 11, W5HWB 11, K5VJT 11, K5KQG 7, W5HHA 6, K5FYI 3, K5UYI 3.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: K5SQS. Cooperation has been wonderful since my election. Thanks, fellows. Enjoyed the sidebar supper on the Coast. The crowd at the Clarkslake dinner discussed Miss.-Ark. emergency cooperation. New hams in Corinth: W5SUFU, W55CJL, W5NEUX. Check in on RN5—W5JDF and W4CJD/5 alternate NCS Sat. The Keeler Club got its old call (K5TYP) back and elected K6DGW/5, pres.; K1BR/5, vice-pres.; W9DUM/5, secy.; K5VYY, treas.; K5DPG/5, ARRL representative and is working toward DXCC on all bands 80 through 2 meters. K6DGW/5 made a fine score in the DX Contest. W5BX and his XYL had a wonderful trip to Rome. We welcome W5CVY back on the air after a long illness. Appointment: W5JDF as EC of Monroe Co. Traffic: K5LHQ 25, K5YTA 23, W4CJD/5 22, K5PPI 16, K5YPV 14, K5AFO 12, K5DVM 10, K5GVV 9, K5QXM 6, W5AMZ 5.

TENNESSEE—SCM, David G. Goggio, W4OGG—SEC: W4WBK, RMs: W4OQG, K4AKP. PAMs: W4LLJ, K4WWQ. Net reports:

Net	Freq.	Time	Days	Sessions	QTC	QNI	Average
ETPN	3980	0640E	M-F	21	27	416	20
TN	3635	1000C	M-S	23	57	161	7
TSSN	3980	1330C	M-S	26	91	730	28

EC W4VM received special commendation from WDEF lauding work during the election. New officers—MARA: K4PPN, pres.; K4FZJ, vice-pres.; W44HY, secy.; K4PSH, treas. Delta: W4ZHK, pres.; K4HOZ, vice-pres.; W4ZDK, secy.; K4BSI, treas. WA4AVX added an HT-41 with his OPS appointment. Weakley County EC W4FLW reports the AREC group is using ten-element beams on 145.5 Mc. OBS K4KYL logs 50-Mc. band openings to Bermuda. OO K4RIN comes through with another fine month of activity keeping many c.w. stations from receiving FCC citations. Your SCM would like to thank all those who made our trips to Humboldt, Crossville, Paris, Knoxville, Covington, Nashville and Union City during 1962 such pleasant visits. New appointments: WA4FTY as OBS; K4IOQ as OBS; WA4AVX as OPS. W4ZBQ made Class I OO. OBS W4HHK is building a moon bounce dish 18 feet in
(Continued on page 106)

HALLICRAFTERS MANAGEMENT:

"Can we build a **quality** receiver, capable of all important coverage from **85 kc through 30 mc**, with at least **3-step variable selectivity**, including a transmitter-type V.F.O. that can be **locked on frequency**, with sensitivity **under 1 μ v** on the high frequency range, a high order of **mechanical and electrical stability**, that weighs under 20 lb., is extremely compact . . . and will sell for about **\$400** ■?"

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Exceptionally versatile and compact triple-conversion, super-heterodyne communication-type receiver. V.F.O. can be used as crystal locked oscillator; **Selectivity:** Variable in 3 steps, 0.5—2.5—5.0 kc. Crystal-controlled 1st and 3rd oscillators. Selectable sidebands, constant tuning rate. **Sensitivity:** less than 1 μ v on AM, less than 1/2 μ v on SSB/CW. T-notch for up to 50 db. attenuation to unwanted heterodyne in I. F. pass band. I. F. type noise limiter. Audio inverse feedback. Crystals provided for 3.5—4.0, 7.0—7.5, 14.0—14.5, 21.0—21.5, 28.5—29 mc. Four add'l. crystal pos. for 500 kc. segments between 85 kc. and 30 mc. 100 kc. crystal calibrator included. Size: 15" x 7 1/8" x 13". Net wt. 18 lb. Amateur net price: \$379.95.

HA-10 Low freq. tuner adapts SX-117 for 85 kc.—3 mc. \$24.95

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A Word From Ward . . .



"IT WON'T PAY, WARD!"

Three years ago, when I first started this column to have a chat with my friends and customers, a business associate said to me:

"You're off the beam, Ward old man. You're paying good money to reach your customers but you don't mention specific items and specific prices. That's not advertising. It won't pay, Ward!"

My friend was so wrong. It has paid. During the past years we have heard from thousands of hams all over the country by letters, post cards and personal visits to our store. Some asked questions. Some just wanted to say hello. Some bought. Some didn't. The main thing is we heard from them. And that's what's important to Adirondack Radio.

Ever since Adirondack Radio Supply opened its doors for business back in 1936, this one idea has been uppermost—a sale is a fifty-fifty proposition. One half of a sale is the item the purchaser buys; the other half—is the dealer he buys it from. To me, both halves are equally important.

I can't speak for other distributors, but here at Adirondack Radio, I assure you, you'll get a five square deal every time. You'll get the item best calculated to meet your needs—at a price you can afford—from a company which firmly believes that customer satisfaction is by far our most important asset.

Sincerely,

Ward J. Hinkle WJH

We also have a constantly changing line of good used equipment. Be sure to write for our latest "used" list.

Before you buy or trade, wire, write, call or drop in to see WARD, W2FEU

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(diameter. QFS W4ZNV heard WA4BNL (Memphis) working Midway Island on 50 Mc. Third-party traffic may be handled with Bolivia, Canada, Chile, Costa Rica, Cuba, Ecuador, Honduras, El Salvador, Haiti, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela, per ARRL Official Bulletin No. 873. Coming Events: Novice Roundup, Feb. 2-17. DX Contest, Phone Feb. 9-11; C.W. Feb. 23-25. Traffic: (Nov.) W4ZJY 330, W40GG 154, K4WWQ 11, W4PQP 81, WA4-AXX 74, W4OQG 69, W4RAMJ 50, W4MXP 49, K4JIG 41, W4CVG 34, K4JNG 27, W4LLJ 25, WA4AIS 23, W4TZG 16, W4KAT 14, W4TZJ 13, K4WUH 12, WA4CRH 11, K4OUK 11, W4HPN 10, K4LPW 10, W4ZAC 10, W4IGW 8, K4RQP 8, W4JVM 7, K4LTA 6, K4QA 5, W4DTI 5, W4TYV 3, W4SGI 2, W4ZBQ 1. (Oct.) K4JTG 41, W4FLV 17, W4VNU 6, K4WUH 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Elmer Leachman, W4BEW—SEC: W4TFK, PAMs: W4SZB, K4ECJ, V.H.F. PAM: K4LOA, RM: W4CDA. (Asst.) RM: K4NYO. The MKPN reports 31 sessions, 628 QNTs, 102 QTCs, largest single roll call 37. The early session held 22 sessions, with 227 check-ins and 35 messages cleared. The Evening KPN (s.s.b.) reports 25 sessions, 434 QNTs, 84 informals and 29 formal QTCs. The Central Kentucky 6-Meter Net held 9 sessions and cleared 11 QTCs with 31 stations participating. K4KJQ is NCS, K4NYO is the new Asst. RM for KYN, K4ZRA's July CD score put Kentucky first in the Great Lakes Division. K4HOE originated more than 100 messages during 1962. The civil defense station in City Hall, Louisville, now has the call WA4FYH and is using the S-Line. Credit this month goes to K4HSB as the most active station on the nets—9RN, 2RN, 4RN, KYN, KPN, TEN, CAN, W.VaPN—and daily with H18xAG and KZ5BC with 56 QTCs. Can anyone do more? Kentucky now has 21 EC districts with 14 active Emergency Coordinators as follows: W4JPS, W4SWE, W4RHZ, W4SZB, K4CC, W4CMP, W4CSN, W4TQD, K4ECJ, K4QHZ, W4NOA, W4NDY, W4JSH, W4ITC. Over the air contacts are being set up. Each will get a copy of the Florida AREC manual of operations as an aid in planning. Traffic: (Nov.) K4HSB 546, W4RHZ 175, K4KJQ 115, W4BYG 69, WA4APU 54, W4SZB 50, W4CDA 49, K4QCQ 48, W4USE 46, K4QJO 24, W4YYI 21, W4KJP 20, W4BEW 18, W4HSF 13, K4TQZ 12, K4YU 11, WA4GFN 10, K4LOA 10, WA4CGQ 4, K4QHZ 2. (Oct.) K4ZQQ 41.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX, KMs: W8EGI, W8XJ, W8FWQ, K8KMQ, PAMs: W8CQU, K8LOA, V.H.F. PAM: W8RPT. Appointments: K8BDR, K8CHS, W8QFQ, K8RNN, W8SLV, W8UCG as ECs; W8AUD, K8KMQ, W8PBO, K8PYW, W8RTN, W8ZHB as ORS; W8ATR, W8FSZ, K8LNV as OPS; W8RMH as OO; K8PBA as OES. New officers—Mich. Tech. ARC: K8NVK, pres.; K8IFL, vice-pres.; K8RCA, secy. Copper Country RAA: W8ALD, vice-pres.; K8CBK, prog. Calhoun ARC: W8VZY, pres.; VE3CYG/W8, vice-pres.; W8EEK, trans.; K8UCY, secy. W8EOI is NCS of the Upper Peninsula Net, which meets each Sun. at 9 A.M. on c.w. The Phone Net meets at 20 A.M.; the C.W. Net on 3663 kc. WA8ASV, W8BDNL and K8ODS made General Class. The Midwest YL Convention will be held June 23, 1963, at Newberry, Mich. W8HAV is chairman. Genesee County (Flint) has a daily Country Cousins Clam Bake (net) on 29.480 from 5 to 10 A.M. and 4 to 6 P.M. with W8EFF as NCS. Mobile-wise this net is doing very well. Michigan still needs Generals on 50 Mc, as Official Observers and Official Bulletin Stations. OOs need frequency measuring gear. W8YY runs a 1-kw. home-built station of 1930 vintage. I don't believe it. W8JUU says that W8CVQ is retiring and the recent 8th Annual V.H.F. Conference might be the last. The MCRC gives a list of 28 stations on 146.94 Mc, wide-band f.m. in S.E. Michigan. The Huron Valley ARA had 18 visitors at its November meeting. K8MEG was back on Navy leave in December. The Council of Amateur Radio Clubs is holding a county-wide Swap & Shop at Lovett Hall, Greenfield Village, some Sat. in March. The Ford ARL 6-Meter Net meets Fri. 10 P.M. on 50.250; the 10-Meter Net Sun. at 9 P.M. on 28.800. Linears using four 6DQ5 tubes with 700 watts p.e.p. are now popular around Grand Rapids. New towers and beams: W8IV, K8SPW, K8UAZ, K8ZZZ, K8RQO now is on 7050 kc. at Keesler AF Base. W8OIV and K8ZVC are both home from the hospital. Traffic: (Nov.) W8XJ 195, K8KMQ 152, K8NJW 148, K8GOU 102, K8QKY 87, W8FU 86, W8IBB 72, W8BEZ 63, K8WQV 62, K8TIG 61, W8DWS 59, W8FWQ 47, K8QLL 46, K8TFE 46, K8LUY 44, W8ELW 42, W8EQI 38, W8FX 37, W8EOI 35, W8RTN 34, K8LNE 33, K8PYW 29, W8FUJ 26, W8COU 24, W8HKT 23, K8VDA 23, W8SWP 18, W8AHV 14, W8DSE 12, W8HK 10, K8MEG 10, W8ZLK 8, W8PWP 7, K8TJH 6.

(Continued on page 108)

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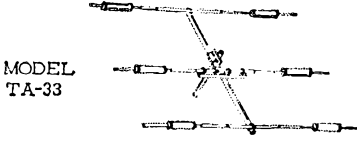
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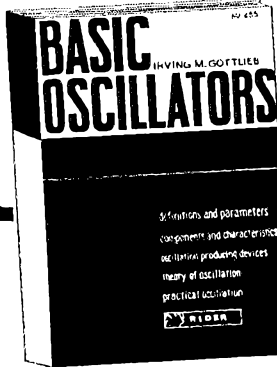


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BUILDING THE AMATEUR RADIO STATION by Julius Berens W2PIK. If you intend to buy the equipment for an amateur radio station, or build one, you will find this book indispensable. It's the next step for the beginner amateur radio enthusiast who has earned his operating license. A guide for construction of the beginner's transmitter and receiver. Also includes instructions for receiver and transmitter on-the-air operation. #221, \$2.95

HOW TO LOCATE & ELIMINATE RADIO AND TV INTERFERENCE (2nd ed.) by Fred B. Rowe. Covers latest techniques for locating and eliminating radio and TV interference. Tells you what to look for, and what to do and how to do it. Discusses the newest FCC rules and regulations. #158, \$2.90

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W8AUD 5, K8GJD 5, W8ILP 5, W8MSK 5, K8HLR 4, W8ZHB 4, K8KVY 3. (Oct.) K8TFE 54, W8USZ 44, K8-MKG 11, K8EPZ 9, K8LNE 9, K8YAY 4, W8ASV 2.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE, W8VTP, K8ONQ. PAMs: W8VZ, K8BAP, K8UBK. Appointments made in November were K8ZIP as OBS; K8ATA, K8LXA, K8NSE, K8RPO and K8-ZHA as ECs. Warren ARAs *Q-Match* states that WN8s; DGR, FWP, FYS, FZU and GBB are new hams in Warren and the club held a dinner-dance. The Babcock & Wilcox RC held an election of Officers and received W8RCC as the club station call. Columbus ARA's *Carascope* informs us that W8EYH spoke on "Transmission Lines, Friend or Foe" and that W8EYE joined the Silent Keys. K8SQK received a CP-30 sticker. Dayton ARA's *R-F Carrier* relates that W8BGT spoke on Practical Uses for Semi-Conductors, the club held an election of officers and W8QG vacationed on the West Coast. From the Findlay RC's *W8FT News* we note that the club started a 12-week Novice course with 34 in the first class. Parma RC's *P.R.C. Bulletin* says that Sgt. Sandidge discussed the Marine Corps and showed a color movie "Force in Readiness," and the club nominated officers. The Butler County V.H.F. Association's *Vibrator Hash* states the club nominated 1963 officers. W8AJD received a CP-20 sticker and visited WINBC Thanksgiving. The Six-Meter Nomads' *The Amateur Extra* tells us the club elected officers and held a membership contest. South East ARC's *Ham Raz* informs us that W8ANV and K8IDT received their General Class licenses and K8JFK her Technician. The Seneca RC held its annual Thanksgiving potluck with an auction and the 1963 officers are K8JIV, pres.; and K8ZMM, secy.-treas. Your SCM, being a member, attended the annual steak dinner of the Sunday Noon Nuggers Net with 35 amateurs attending. W8RSE received WAOC No. 11. Greater Cincinnati ARA's *The Mike and Key* informs us that W8FGX spoke and showed movies of the DXpedition to HK0 and KS4. W8BEW, an old-time amateur and ship operator, joined the Silent Keys. Canton ARC's *Feedline's* cover page shows W8IKM seated in his station and he is in a hospital following surgery; HB9ACI was a visitor at a meeting and told of amateur radio in Switzerland, new hams in Canton are W8AFGE, WN8FOU, WN8GAI and W8GAJ; W8BDR has a new Ranger, an HQ-170 and a TA33 jr.; the stork brought K8ZCO a baby boy harmonic and K8QZL has a new Valiant. From the Queen City Emergency Net's *The Listening Post* we learn that the members have a training program in operation to instruct them in handling emergency traffic efficiently. Springfield ARC's *Q-5* says that W8-KJP and W8RCFU have enlisted in the Navy and the club held an auction. Toledo's *Ham Shark Gossip* names K8GII as its Ham of the Month and tells us that W8IQ was in the hospital; a family has four hams, namely WN8s EIS, PQP, FQR and FQS; K8KDT joined the Silent Keys. W8DAE and W8UPH made the BPL in November. W8WRP moved to Newark. W8QGT is operating RTTY. K8BXT received Oxford RC and Bluegrass awards. Traffic: (Nov.) W8UPH 1099, W8DAE 413, K8UBK 396, W8CMT 315, W8BZX 269, K8YUZ 183, K8SQK 153, K8PCL 110, K8OBW 78, K8AGN 55, W8-MGA 50, W8KCN 47, K8ONQ 44, K8TKG 44, K8BNL 38, K8DDR 32, K8VWN 28, W8IEP 27, W8ILC 22, K8DDG 17, K8RXD 17, K8LGA 14, K8BAP 13, K8DIU 11, W8AL 9, K8KLA 8, W8ADP 7, K8AOP 7, W8DIH 7, W8WVS 7, W8AJD 6, K8KXS 4, W8UID 4. (Oct.) K8ONQ 56, K8ITI 24, W8LZE 23, K8YBN 4, W8AJD 3, W8ARZ 3, K8PBE 3.

HUDSON DIVISION

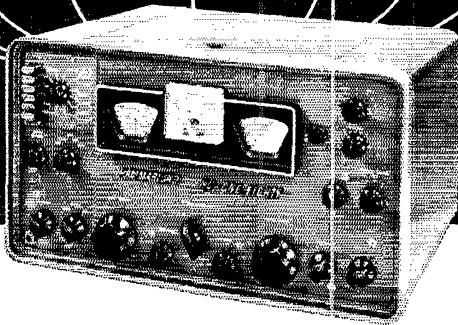
EASTERN NEW YORK—SCM: George W. Tracy, W2EFU—SEC: W2KGC. RMs: W2PHX and K2QJL. PAM: W2LJG. Section nets: NYS on 3670 kc. nightly on 0000 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; MIHT (Novice) on 3716 kc. Sat. at 1800 GMT; Inter-club on 28,690 kc. Mon. at 0130 GMT; EC on 146,550 kc. Fri. at 0015 GMT. Appointment: W4JWV as EC. Endorsements: W2HO, W2EHZ and K2GCH as ECs; K2QJL as RM and ORS. Sorry to lose W4QEQ, formerly EC for Pelham, who is now K1ZHF in West Hartford, Conn. All section ECs are invited to call into the new EC Net listed at the top of this column to discuss AREC matters with the SEC and fellow ECs. W4MHH reports groundwave contacts on 6 meters averaging 45 miles. Transistor applications to amateur radio was the topic of the Schenectady Club Nov. meeting. The club is sponsoring a homebrew contest with prizes for the neatest job and most unusual design features. Watch out for State Police radars; your 6-meter mobile rig will cause them to read 40 m.p.h. when the car is standing

(Continued on page 110)

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still. WA2AUI won a prize at the Hudson Division Convention. K2SJM was trustee of W2ICF at the N.Y.C. Coliseum Nov. 28-Dec. 2 during the International Communications Fair, Edison Award Winner W2JIO was speaker at the New Rochelle Club. Larchmont is establishing an AREC-RACES program under the direction of W2MRQ, assisted by K2IES. The Albany Club elected new officers in November. K2LHF was the speaker on 6-meter converters at the R.P.L. Club. K2UTC reports DXCC 166/140 on 15 meters only; covers five years. Traffic: K2TXP 212, W2THE 172, W2DQW 126, W2EFC 106, WA2HGB 102, W2PKY 51, K2SJM 49, WA2VYS 26, W2URP 21, WA2TJX 13, K2HNV 5.

NYC-LI QSO PARTY

February 9-11

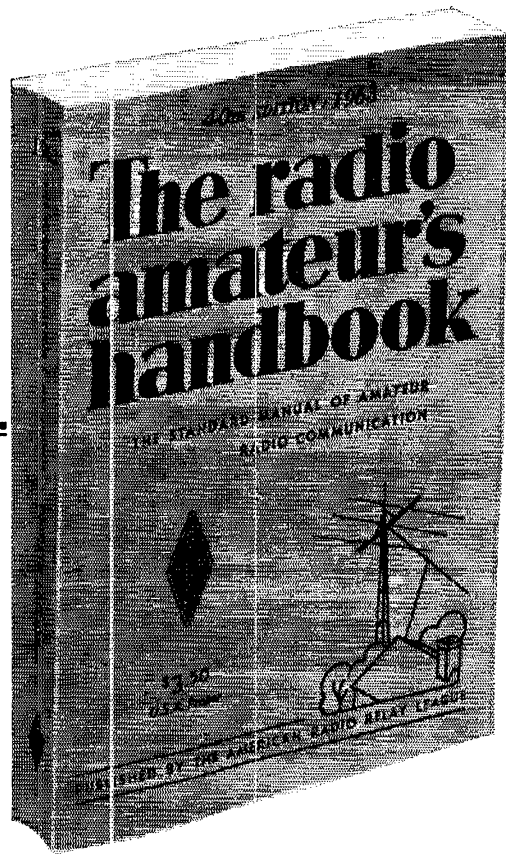
The South Shore Amateur Wireless Assn. invites all amateurs to participate in the New York City-Long Island QSO Party by contacting as many NYC-LI stations as possible.

Rules: (1) *Contest Period:* 2300 GMT Feb. 9 to 0500 GMT Feb. 11. (2) *General Call:* On c.w. "CQ NL" or "DE NL." On phone "CQ New York City-Long Island." (3) *Scoring:* Stations outside NYC-LI count two points for each NYC-LI station worked, and multiply by the number of counties worked (7 maximum). NYC-LI stations count two points for each station worked outside the section, one point for station contacts and multiply by the number of ARRL sections worked. Multiply final score by 1.25 if power 150 watts or less at all times. Phone and c.w. are considered the same contest. (4) *Exchange:* QSO number, RS(T), and ARRL section (county for NYC-LI stations). (5) *Awards:* Certificates go to section winners (if two or more entries), county winners, and Novice high scorer. (6) *Frequencies:* 3560-70, 3900, 7080-90, 7250, 14080-90, 14250, 21050-60, 21350, 28010-20, 29000 kc., and 50.4 and 145.5 Mc. (7) *Entry:* Logs must be postmarked no later than Feb. 28, 1963. Send logs to the SSAWA, 116 Locust Street, Valley Stream, New York.

NEW YORK CITY AND LONG ISLAND—SCM. George V. Cooke, Jr., W2OBI—SEC: K2OVN, RAM: W2WFL, PAM: K2HCU, V.H.F. PAM: W2EW. Section nets: NLI, 3630 kc. at 0015Z nightly; NYCLIPN, 3908 kc. at 2230Z nightly; V.H.F. Net Tue.-Wed.-Thurs. 145.8 Mc. at 0100Z and Fri. through Mon. 146.25 Mc. at 0000Z; Mike Farud on 7238 kc. at 1700Z; All Service Net at 1800Z Sun. on 7270 kc; Q5 Net on 3935 kc. at 2100Z daily. BPL certificates for the month of November have been earned by WA2GPT, WA2TQT, K2UBG, W2EW, WA2QJU, WA2JSG and WA2GAB, in that order of traffic totals. The NLI 80 C.W. Net had its best month of 1962 with a QNS of 201, a traffic total of 246 with 29 different stations reporting in. Lake Success RC Officers for 1963 are W2CWD, pres.; K2YOR, vice-pres.; W2NBI, secy.-treas. Officers of the Teleo ARC of Manhattan are WA2HYH, pres.; WA2EZY, vice-pres.; W2WJO, secy.; W2LQP, treas.; W2BPA, act. W2GKZ lost his antennas in a recent storm and replaced all with a new tower section, a tribander and a 2-meter beam. W2ICE, the special license station at the International Communications Fair at the Coliseum on Nov. 23 to Dec. 2, displayed amateur radio to the general public in good fashion; WA2CCF acted as over-all supervisor with the assistance of a number of HARC member clubs. WA2FUL is happy about working VP7-CX on 6 with a big 30-watts output. WA2ZXR is now an RCCer. W2PF is QRL aiding the SSBARC to be a somewhat charitable organization in this area since the original aims of the group have been fulfilled. WA2BIT has been bitten by the DX bug; he worked his first ZK and KS stations on his first try at 20 meters. The Staten Island ARC now meets in new quarters at the St. Charles Seminary on the 2nd and 4th Fri. of each month. The Nassau County AREC, covering 3 townships, is averaging 125 to 150 stations reporting in on 2 meters on Mon. nights together with approximately 30 stations on 10 meters, truly a well-organized and masterfully-controlled operation. The Nassau station also is acting as master control for the section Internet get-togethers on 146.25 Mc. at 0230Z as a meeting place for all section AREC representatives from all boroughs and counties. Contact W2FI of K2OVN for particulars. K2BH/W1QGU is back in Garden City

(Continued on page 112)

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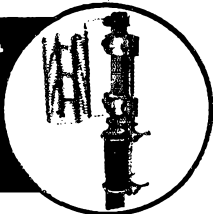
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again. The Five Towns RC's new officers are K2RPW, pres.; WA2YLO, vice-pres.; WA2MPU, secy.; WB2BEO, treas. Meetings are being held in the Long Beach Public Library the 4th Thurs. of each month. K2RDP/6 greets his many s.s.b. friends from the University of California at Berkeley where he is studying for an EE. W2MTA is now 1/2 located in Levittown for an extended period and wasted no time in keeping up his traffic totals. WA2UYQ and WB2CAV have started the SSSN (South Shore Long Island Net) on 3595 kc. at 2000 EST daily. WA2TFG. with WB2DOF as a passenger in the car, assisted in emergency operations with K2QDE at the Nov. 30 airplane accident and fire at the New York International Airport and subsequently received recognition via broadcast material supplied WABC radio and TV. It is with deep regret that the passing of W2AD, Andy Sannella of Huntington, must be entered in Silent Keys. Andy, a pioneer in the entertainment field in the heyday of radio broadcasting, will long be remembered as an outstanding amateur in our NYCLI section. Traffic: (Nov.) WA2GPT 1021, WA2TQT 534, K2UBG 521, W2EW 418, K2UAT 373, W2WFL 329, WA2QJU 236, WA2JSG 193, W2MTA/2 171, WA2GAB 135, WA2RMP 109, WA2EXP 105, WA2ZDT 94, WA2IUQ 90, W2GKZ 60, W2ICF 54, K2KYS 50, W2JGY 45, K2AAS 37, WB2CAV 37, WA2LJS 34, WA2PUE 33, WA2EFN 31, W2OME 31, K2SPG 29, W2GP 20, W2DBQ 18, WA2IMH 15, WA2RZJ 12, WA2FUL 10, WA2YLK 10, WA2ZXR 10, WA2RZJ 8, W2PF 7, K2UFT 4, WA2WEA 3, WA2RAQ 1. (Oct.) K2UAT 238, WA2FUL 15, WA2VVV 7.

NORTHERN NEW JERSEY—SCM, Daniel Earley, WA2APY—SEC: K2ZFI, RM: W2QNL, PAM: K2SLG, V.H.F. PAM: K2VNL. Names, times and frequencies of the NNJ NTS nets: NJN, 2400Z, 3695 kc, daily; NJPN, 2300Z, 3900 kc, daily except Sun. (1400Z same frequency); NJ 6&2 Net, Mon.-Thurs.-Sun, at 51.15 Mc., 0300Z Tue. and Sat. on 146.70 Mc. at 2200Z. Sessions, attendance and traffic for Nov.: NJN, 30-529-301; NJPN, 30-429-110; NJ 6&2, 21-92-25. K2PSW has been appointed EC. Appointment renewals: W2AZZ as ORS; K2SLG as PAM; W2CFB as ORS. We regret that K2VZJ had to give up his OO appointment but the pressure of school was too much. WA2SRK has become a member of the A-1 Operator Club. K2AGJ wonders how many more worked LH4C. Call off the muscle men, K2UKQ's antenna is back up. WA2CCF was chief "op" at the International Communications Fair. The Hudson Amateur Radio Council arranged to have operators take and handle traffic at the ICF. The NJN held its annual meeting Nov. 17 at the Red Cross Building in New Brunswick. A great many topics were discussed; tape recordings verified a lot of the complaints. W2QNL was unanimously elected for another year as Route Manager. Instead of the usual donations for "coffee and" a collection was made and the proceeds sent to the ARRL building fund in the name of our late SCM, "Sparks" Remecky. The East Coast V.H.F. Society elected K2HHS, pres.; W2SWI, vice-pres. Contact either about the annual dinner to be held Feb. 23. Glad to hear that W2NY has his XYL home from the hospital. Sounds like K2UCY is having the homestead done over; it interferes with the hamming. WN2DEP has joined the League and is an RCC member. WA2KTY says that WV2HSA is eagerly awaiting a Heath Twoer. WA2ZQH got his 40th state. W2EWZ reports that the SS score was low but he had a swell time getting it. W2CVW was at the ICF; so was I. Ed. W2ABL says work keeps him busy but he has a new Drake. W2NKD had a lot of fun meeting the NJN gang at the meeting. K2SBS still is very unsettled in the new QTH but it won't be long now. K2DQT reports that vandals tore his antenna down, with damages of \$200 and says there have been about six other cases of the same thing. It seems that it's mostly aimed at the 2- and 6-meter boys so, fellows, keep your eyes open. W2QNL was the last leg in a message that originated from Guam following the storm informing parents of their sons' safety. There was a nice write-up in the local paper. WA2CCF made RPL; he also made it from his other station WA2UZH. Traffic: WA2SRK 426, WA2CF 209, K2VNL 176, K2UCY 126, WA2UZH 101, W2QNL 78, K2JTU 54, W2CVW 45, WA2LUD 24, W2TFM 24, WA2JTZ 15, WA2APY 14, W2BVE 12, K2EQP 10, WA2ZQH 10, K2VNK 8, K2AGJ 6, W2CFB 6, W2NKD 6, K2UKQ 4, W2EWZ 1, K2SBS 1.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke, W0NTB—SEC: K0EXN. New appointees: K0TDO as OO; K0UQL as EC Buchanan County. With the results of Field Day at hand I wish to commend and thank all who took part. Scores ranged from 5000 down to 400, with an even dozen groups or individuals participating in this section. Now let us support our AREC and RACES programs where possible, likewise local clubs. If you do not like

(Continued on page 114)

FIVE BEAM PENTODES FOR S.S.B.

If you plan to build a new single-sideband linear amplifier and want it to be the ultimate in quality—or if you're dissatisfied with the performance of your present tetrode linear amplifier—then you'll be interested in these five beam pentodes from Penta Laboratories, Inc.

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swing which can be obtained at a given screen voltage is the direct result of the electron beaming due to use of the suppressor, and leads to increased linearity, efficiency, and output.

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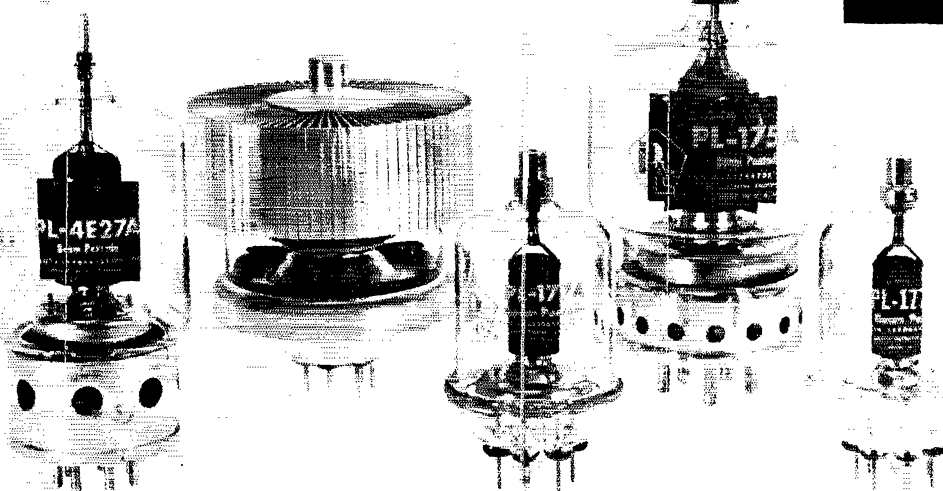
RATINGS

Type	FILAMENT			Max. Plate Dissipation (Watts)	USEFUL OUTPUT* CLASS-AB ₁ LINEAR AMPLIFIER				
	Voltage (Volts)	Current (Amps)	Plate voltage in volts		Plate voltage in volts				
					1000	1500	2000	2500	3000
PL-177A, PL-177WA	6.0	3.2	75	95W	140W	210W	—	—	
PL-4E27A	5.0	7.5	125	—	—	220W	280W	—	
PL-175A	5.0	14.5	400	—	—	445W	570W	680W	
PL-8295	6.0	8.2	1000	—	—	1040W	1260W	1590W	

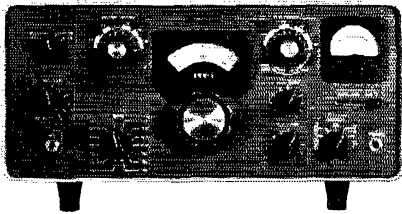
*Actual power output delivered to load from typical amplifier.

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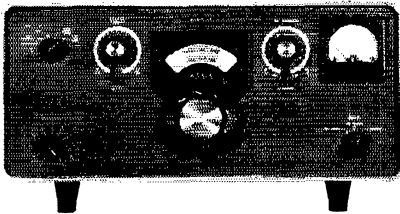
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the way it is run get into the work yourself and make it better. In spite of our astonishing growth since WW2, remember we are a minority group and our success as such, truly our very existence, is dependent upon our ability to get along with one another and work together in a common cause. Don't point the finger of scorn at other groups until you have a good look at your own. All groups have one thing in common, they are people — wonderful people, in most cases, I still have trouble getting reports from some nets. Please observe for Nov.: 160 meters, QNI 939; QTC 51; sessions 30, average 1.67. 75 meters: QNI 1070; QTC 272, sessions 26, average 10.46. Tallcorn, QNI 236, high 14, low 7; QTC 169, high 20, low 0, average 8.4. Traffic: WOLGG 2500, WOSCA 1530, WOPZO 265, WOPDR 154, WONTB 80, KOCACU 61, KOGXP 32, WOUSL 23, KOAFG 20, WOFMZ 20, WOJJP 17, WOTTT 15, WOBTX 13, KOJSI 13, WOQVA 13, WOBLH 10, WOYDV 10, WOGQ 9, WOEEG 6, WOFDM 6, KQKQD 5, WOQVZ 4, KOTDO 3, W9CTJ:Ø 2.

KANSAS—SCM, C. Leland Cheney, W0ALA—Asst. SCM, Richard G. Caspari, W0YZB, SEC: K0BXP, Asst. SEC: K0EMB, PAMs: K0EFL, W0BOR, RM's: W0SAF, W0PFG, V.H.F. PAMs: W0HAJ, K0VHP. New appointments: K0GII and W0BOR as OPSs; K0TGR and K0BXP as OBSs; K0VHP as OES. C.w. and phone nets are now operating on both 40 and 75 meters. Operators are invited to check in. See schedules below. K0GIC caught the 6-meter band open on Nov. 18 and had a picnic working area 4s. The club at Emporia is now sporting an 85-ft. tower for 2 and 80 meters, thanks to the hard work of K0CKP, K0ZSG, W0QLD, K0LHF and K0BJP. K0IRL has been appointed RACES Officer for the city of Pittsburg. The 1962 Kansas Ham Convention at Wichita in December attracted 420 amateurs from throughout the state. A section meeting is scheduled to take place in the western part of the state in February. Watch for details on the nets. Nets: KPN, 3920 kc. Mon.-Wed.-Fri. 1245Z, Sun. 1400Z; 17 sessions; QNI high 49, low 13, total 403, average 23.7; QTC high 23, low 0, total 96, average 5.65; NCSs: K0GII, K0MER, K0QKS, K0EFL, W0ORB and W0FHU, QKS, daily 3610 kc. 0030Z; 30 sessions; QNI high 14, low 6, total 281, average 9.37; QTC high 22, low 0, total 246, average 8.2; NCSs: K0BXP, K0EFL, K0IRL, K0YTA, W0BYV, W0QGG and W0SAF, HBX, 7280 kc. Mon. through Fri. 1800Z; 20 sessions; total 356; NCSs: K0YWT, K0ICB, K0RWL and K0HGI, SCAN, Tue. 0100Z at 7170 kc. SCAR, 7205 kc. Wed. 0100Z. V.h.f. nets now are organizing. Contact the PAM or SCM. Traffic: K0YRQ 672, K0HGI 512, W0BYV 275, W0RJP 266, W0SAF 161, K0YTA 102, W0ABJ 64, K0BXP 54, W0ALA 52, K0EFL 39, W0IFR 30, W0YZB 30, K0GII 22, W0BLI 17, W0ORB 16, K0PSD 16, K0LHF 12, K0LPE 3, K0RWC 3, K0TGR 3, K0VQC 1.

MISSOURI—Acting SCM, R. C. Gordon, K0WNZ—SEC: K0WNZ, RM's W0OOD, K0ONK, PAMs W0BVL, W0TPK, W0LFE (v.h.f.), Net reports: MEN (3885 kc. 0000 GMT, Tue., Thurs., Sat.) 12 sessions, QNI 281, QTC 101; NCS W0TPK 5, K0ONK 4, K0VPH 3, MON (3580 kc. 0100 GMT Tue.-S) 26 sessions; QNI 183, QTC 152; NCS W0OOD 15, W0TPK 5, W0BAZ:Ø and K0VNB 2 each, K0FPC and K0VBT 1 each, MSN (3817 kc. 2200 GMT M-F) 20 sessions, QNI 62, QTC 27; NCS W0OCVY 8, K0ONK 5, K0FPC 4, K0GFA 3, M.SSB.N. (3963 kc. 0000 GMT W-F) 8 sessions, QNI 158, QTC 32; NCS W0OMM 7, W0ECA 1, PON (Mo.) (3810 kc. 2100 GMT, M-F) 20 sessions, QNI 291, QTC 91; NCS W0AQN, K0BWE, W0HVJ, K0ONK, SMN (3580 kc. 220 GMT Su) 4 sessions, QNI 22, QTC 18; NCS W0OOD 4, Appointment: K0TCB as EC, Endorsements: K0OLW as OBS; W0OOD as OBS, OO reports are gratefully acknowledged from W0PME and K0JJP as well as an OES report from K0FPC. The Lee's Summit Radio Club is now an ARRL affiliate and puts out an excellent monthly bulletin. K0WNZ was operating under difficulties for a while—antenna down on the house and ground plus a blown plate switch. He's back in business, though. The ARRL building fund can still use your help. Traffic: K0ONK 349, W0TPK 275, K0VNB 116, K0VPH 98, W0BVL 83, K0FPC 77, K0RWL 74, W0OMM 73, W0ZEY:Ø 63, W0KIK 55, W0BAZ:Ø 36, W0ZLN 14, W0OYV 6, K0JJP 6, K0WNZ 6, W0EPI 4.

NEBRASKA—SCM, Charles E. McNeel, W0EXP—SEC: K0TSU, W0NIK reports the Western Nebraska Net had QNI 644; QTC WX 453 and 65, total 518; 100 per cent reporting W0AAS, K0AIE, K0BMQ, W0DVB, W0ZHV, K0ITP, W0OFP. The Nebraska Storm Net which meets daily at 1830 CST on 3983 kc. had QNI 548, QTC 7, as reported by K0JXN. The Morning Phone Net, K0DGW reporting had QNI 580, QTC 68. The Nebraska Emergency Phone Net, W0HXH NC report—

(Continued on page 116)

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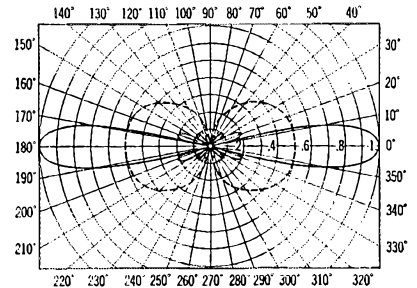
Vertical field strength pattern of
Cat. No. 200-509 Stationmaster Antenna.
A dipole pattern is shown for reference.

Electrical Specifications:

Nominal input impedance	50 ohms
VSWR	1.5:1
Bandwidth	±0.3%
Maximum power input	500 watts
Internal feedline	RG-8A/U
Flexible terminal extension	18" of RG-8A/U
Termination	Type N male with Neoprene housing
Omnidirectional gain	144-174 Mc 5.8 db 130-144 Mc 5.5 db
Vertical beam width (½ power points)	18°
Lightning protection	Direct ground

Mechanical Specifications:

Radiating element material	Copper
Element housing material	Fiberglass
Element housing tip diameter	¾"
Element housing butt diameter	1 1/4"
Element housing length	19"
Ground plane element length	18"
Support pipe	2 3/4" dia. hotgalvanized steel, 22" available for mounting
Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs.
Grounding moment 6" below ground plane at rated wind	450 ft. lbs.
Weight	30 lbs.



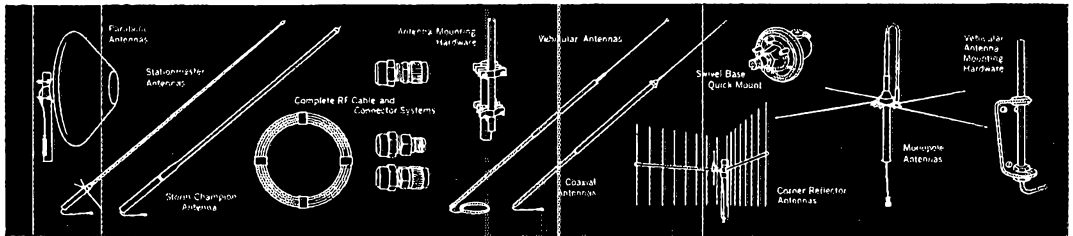
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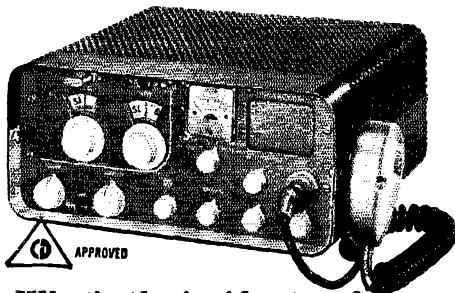
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ing, had QNI 587, QTC 44. New members are KODVI, KOENJ, KOTIE, KOYRQ, WOEGQ, WOEGQ was elected NC for 1963. The Nebraska Section Net, C.W. on 3525 kc, daily at 0100 GMT, reports QNI 165, QTC 68, 30 sessions. The Western Nebraska C.D. meeting held at Ogallala recently with State C.D. officials was well attended. Traffic: WOGGP 445, WOOKO 107, KOKJP 79, KODGW 68, WOLOD 65, WONIK 55, WOZJF 43, KORRL 38, WOEGQ 36, KOAL 31, WOWUV 26, WAQAFS 25, WORYK 25, WOOCU 25, WOBOQ 23, KOKTZ 22, WONYU 19, KOZBD 19, WQAHB 17, WNØBD 13, WOYFR 13, KOMSS 12, KOAL 12, WQVEA 10, WOFIF 7, WOZVJ 6, WNOBIE 5, KOJFO 4, KOJFN 4, KOYZP 4, WOZOU 4, KOWPG 4, WORJA 4, WNØRRH 3, WOSWG 2, WOPQP 2, KOSCN 2, KOFSC 1.

NEW ENGLAND DIVISION

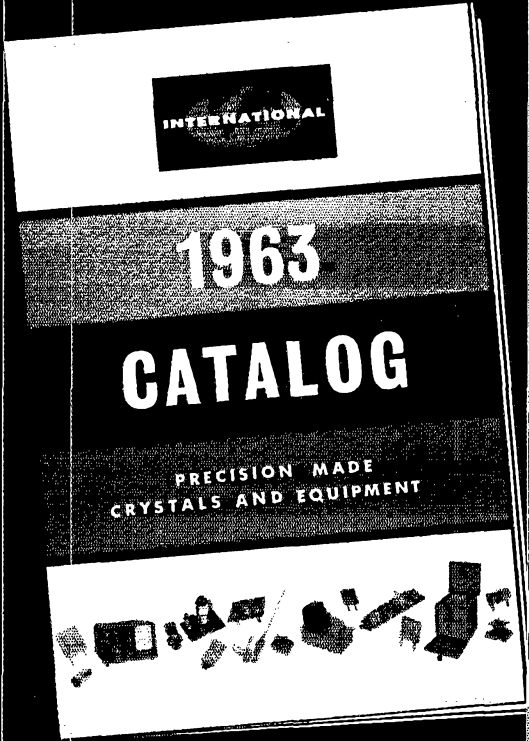
CONNECTICUT—SCM, Henry B. Sprague, jr., W1-CHR—SEC: W1EOR, RM: WIKYQ, PAM: W1YBH, V.H.F. PAM: W1FHP. See Dec. QST for traffic skulls. W1BDI tried unsuccessfully for an hour to work W7VIU Nevada, during the SS. Later that week and he rag chewed with a blind ham who, believe it or not, was in Nevada! W1OJB worked ZM6AW besides skydiving on week ends. K1QPN plugs homework and traffic too! W1BNB is operating portable from Manchester. W1APA hunts DX on 7.2-Mc. s.s.b. W1QV added 4 new countries. K1PIR reports that the Stamford High School RC station, K1IZK, is active. K1GHO is club president. Congratulations to W1EFW on his reelection as New England Division Director. K1TGX had a power supply catch fire. Five fire extinguishers from his boat were on hand so the fire was quickly squelched. K1SDX still is looking for 1215-Mc. contacts. K1BUI is building a 2-meter nuvistor transmitter. W1s ZGO, CHR, AGS and K1YKY met with local c.d. officials to establish a RACES program for Weston. W1FHP reports that CVN held 11 sessions handling 9 messages. K1s NKT, CFW and W1JUV were awarded CVN net certificates. CFCN has expanded to Sunday sessions on 145.98 Mc. in addition to h.f. sessions. K1QVX is a new OPS. K1MND a new OO and K1ONX a new OBS. CPN held 30 sessions handling 183 messages with a daily attendance average of 24. Reporting 20 or more times were W1s FPH, LUH, DAV, VQH, HKT, IHG, K1s OJZ, BOP, PPF, SRF, VQQ, AQE, LFW, DGK and NTR. This may be my last report. Let's give my successor (unknown at this writing) the same wonderful support you gave me the past two years. Thanks again for your enthusiastic cooperation. Traffic: W1RZG 248, W1EPW 158, W1AW 125, W1CTI 120, K1PPF 115, K1PQS 95, W1KUO 70, K1LFW 67, W1NJM 66, W1LUH 62, K1JAD 60, K1GGG 58, K1QPN 53, W1YBH 45, K1DGG 42, K1EIR 40, W1BDI 34, W1FHP 29, W1QV 29, W1CUH 27, K1PUG 24, K1AQE 22, W1CHR 17, K1OJZ 13, K1QVX 13, W1FNS 2, W1MPW 12, K1MBA 10, K1SRF 10, K1WWI 9, W1ORR 6, W1APA 4, W1BNB 3.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALP—W1AUG is our SEC. ECs reporting this month: W1FMW, W1JJP, K1ICJ, K1MBU. New appointments: W1HNW Nahant, K1MIO Foxboro, as ECs; K1PHJ as OBS. Appointments endorsed: K1GYM Winchester, W1BB Wintthrop, W1JJP No. Attleboro, as ECs; K1GYM and W1ZSS as OPS; W1s AUQ and BB as OOs; K1BUP, who says she will be on the air soon, as ORS. The EM2MN had 22 sessions, 242 stations, 205 traffic. K1VXB has a net certificate. W1OFK is set in his new QTH and is on the air. W1ALP finally got back on the air, too. W1SIV and his NYL went on a cruise. The Old Colony ARA elected K1MIO, pres.; K1RAA, vice-pres.; K1WLK, secy.; K1TKI, treas.; W1YOQ and K1ILK, exec. comm. W1ALP spoke at the meeting. W1CMN and W1TA are Silent Keys. W1SE has s.s.b. with his Marauder. W1BGW worked LH4C on 7 Mc. W1s PMV and LES are working on phone. K1DJJ is building his station. W1ALP spoke at the Middlesex ARC meeting. K1VOK is on our e.w. net. K1PNB has a Valiant and an RME-6900 receiver. W1PEX, W1AWA and K1TSD made the SPL. K1MEM is on 6 meters and his tower is up. K1ONW was in the SS. K1IRC is on 6 meters. K1WTK is building a new rig for 6 meters. The Minuteman ARC has the call K1ZEV, reports W1TTD, W1ALP, W1DWY and W1FEX spoke at a meeting at W1BB's QTH for the Wintthrop c.d. group. Amateur Radio Day was held at NURC, W1KBN, and from all reports a very nice time was had by all. K1KED was behind this. Officers of the club are K1DIR and K1KNS, pres.; W1LFA, vice-pres.; K1JCE, secy.-treas.; K1KED, trustee; ex-W1WX, advisor. The Wellesley ARS had a talk on the Coordination of Red Cross with C.D. by two men from the Boston Chapter. W1ZPI moved to N.J. K1LBS, ex-W1RED, now is in Hudson. W1FON, our Boston EC, has a net Boston AREC on Mon. at 0030 GMT on 28.95 Mc. The EM75PN

(Continued on page 118)

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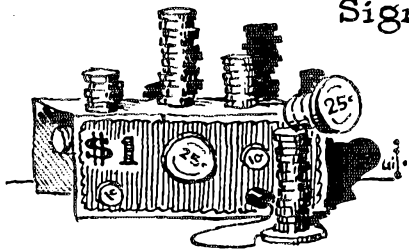
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had 31 sessions, 568 check-ins, 248 traffic. The 6-Meter Cross Band Net had 27 sessions, 482 check-ins, 103 traffic. North Shore Radio Assn. officers are K1JFF, pres.; K1MVD, vice-pres.; K1LVG, treas.; K1PXS, secy. W8GTT now is in Walpole. New officers of the Cape Cod & IARA are W1AKN, pres.; K1IDA, vice-pres.; W1EYK, secy.-treas. The club's annual picnic will be held the Sunday of Field Day, W1GRC is laid up. K1GRP is at Wentworth, W1GMT is at his son's. W1SGL is on 2 and 75 meters. Traffic: (Nov.) W1PEX 1456, K1TSD 730, W1AWA 558, W1EMQ 383, W1LES 205, W1ZSS 234, K1PNB 110, K1ONN 80, W1VYS 51, W1AOG 42, W1SIV 36, K1DGI 34, W1OFK 27, W1AUQ 25, K1NVXB 25, K1GKA 20, K1LCQ 19, W1DIY 16, K1GTX 9, K1QNZ 9, K1CMS 5, K1MEM 4. (Oct.) W1AUQ 45. (Sept.) W1EMG 94.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: W1BYH/K1APR, RM: K1IJV, PAM: K1RYT. We regret to report the passing of a New Hampshire ham well known to many of our West. Mass. gang—Ray Gallagher, W1TA, W1AN (3560 kc. 7 p.m. daily) cleared 89 messages during November at the rate of .167 messages per minute for the total time in session. Our W. Mass. Route Manager, K1IJV, has been elected president of WRONE, the New England YL club. Sincere congratulations, Jean! Top stations in attendance on W1AN in November were W1DVV, K1IJV, K1SSH and K1LBB. W1DVV spent several weeks in the Cooley Dickinson Hospital in Northampton for a check-up. K1IJV got out about 50 bulletins to prospective members of a West. Mass. Novice traffic net. W1IYA has been appointed Asst. Comm. Director for C.D. in Westminster. Approximately 90 hams attended a halo hula-hoop contest held by the Quinnebang Valley Club. K1RYT, K1PES and K1TTT are now considered official representatives to the East. Mass. Phone Net from West. Mass. Our SEC, W1BYH, reports a total of 162 AREC members in West. Mass. of whom 133 are Full Members. K1VJC is active on 160 through 10 meters with an AF-67 and an SX-99. New members of the Hampden County Radio Assn. are K1NLN, K1VRO, K1RYZ, K1N1WW, K1IJV, K1N1WW and K1VXX. W1AZW's beam is working better now since he removed a pint of water from one of the traps. W1HNE is undergoing treatment at Ravena, N.Y., but is home week ends. In mid-January the Nimuc Emergency Radio Corps of Upton started code and theory classes. Traffic: K1IJV 104, K1SSH 70, K1LBB 56, W1BVR 54, K1PES 48, K1TTT 37, W1ZPB 33, K1TLY 12, W1EFC 2, W1IYA 2.

NEW HAMPSHIRE—SCM, Albert F. Haworth, W1YHI—SEC: W1TNO, PAM: K1XXV, RM: K1BCS, GSPN meets Mon. through Fri. at 2400Z and Sun. at 1430Z on 3842 kc. CNEN meets Mon. through Sat. at 1130Z on 3842 kc. NHN (c.w.) meets Mon. through Sat. at 2330Z on 3685 kc. Endorsements: W1AJ as ORS and OPS. It is a pleasure to welcome W1TNO, W1ALE, Ted Everett, as our new SEC. Under Ted's leadership the AREC and emergency communications will expand and grow. Deep sorrow is expressed on the death of W1TA. Ray will be missed by all of us. Congratulations to the following new officers of the Port City Amateur Radio Club, who took office at the annual banquet: W1LBG, pres.; K1VXXM, vice-pres.; K1DWZ, secy.; K1SDI, treas. The PCARC meets the 2nd and 4th Thurs. of each month in the Clinic Building, Portsmouth. New Hampshire was well represented (in second place) in the Ohio 1962 Worldwide Contest. High scores were made by K1AEG, K1HK, K1PMY, K1RKH, K1SWX, W1GV and K1UHE. OO K1NBN is keeping stations within the hands. Traffic: (Nov.) K1DQM 52, K1BCS 34, W1YHI 15. (Oct.) W1CUE 18, K1BCS 13, W1SWX 7.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE, PAM: W1TXL, RM: W1SMU. New appointments: K1RFM as EC for Coventry; K1JGF as EC for Narragansett; W1QLT as EC for Kent and Washington Counties. Net reports: R1SPN, 30 sessions, 673 QNT, 124 traffic, R1N, 10 sessions, 23 QNT, 12 traffic. The Providence RA, W1OP, will hold its Second Annual QSO Party Feb. 23 and 24. K1LPL is contest chairman and awards will be made to each ARRL section and each country. The NCR, of Newport, held its election with the following results: W1TXL, pres.; K1PTV, vice-pres.; K1VPK, treas.; K1VQO, rec. secy.; W1JFF, corr. secy. The club is planning an auction for the benefit of K1ZHA in order to buy equipment. K1ZHA is at the R.I. Medical Center with muscular dystrophy. K1VPK received his NCR certificate for working five club members. The W1AQ Club of Rumford was happy to see the Field Day scores and the club's score was the largest it has made. A new club has been formed at the Raytheon plant in Portsmouth. The club call is K1WEW. For information contact W1PKW. The club is open to non-Raytheon hams.

(Continued on page 120)

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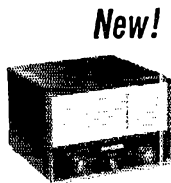
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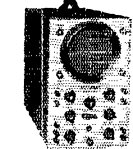
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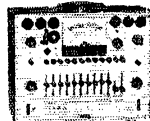
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KITHE now has his Tech. Class License. Traffic: (Nov.) WITXL 1045, WIVNE 59, K1GRC 37, KITPK 34, K1DZX 32, K1NJT 22, K1PZY 17, K1SXY 14, K1LDK 9, W1VXL 4. (Oct.) K1OZI 7, K1GRC 6, K1LDK 1.

RHODE ISLAND QSO PARTY

February 23-24

The Providence Radio Assn., W1OP, announces the Second Rhode Island QSO Party and invites world-wide participation.

Rules: (1) *Times:* 1700 GMT Feb. 23 to 2259 GMT Feb. 24. (2) Phone and c.w. are considered the same contest. A station may be worked twice per band, once on phone and once on c.w. (3) *General call:* "CQ RI." R. I. stations will identify themselves by signing "DE RI" on c.w. and "Rhode Island calling" on phone. Only phone-to-phone and c.w.-to-c.w. contacts count. (4) *Suggested frequencies:* 1815, 3530, 3850, 7020, 7250, 14040, 14275, 21060, 21225, 28080 kc., and 29, 50, 144 Mc. (5) *Exchange:* QSO number, RS(T), and QTH (ARRL section or country). R. I. stations will send the county for QTH. (6) *Scoring:* Outside stations multiply the number of stations worked times the number of counties (maximum of 5). R. I. stations multiply the number of stations worked times the total number of ARRL sections and countries. (7) Awards will be sent to the highest scoring station in each ARRL section and country with 5 or more contacts and 1st and 2nd place awards in each R. I. county. Novice and Technician awards will also be issued. (8) Logs must, in addition to the above information, show date, time, band, and emission and be received no later than March 31, 1963. Send logs to: Frank Donovan, K1LPL, 108 Whitehall St., Providence 9, R. I.

VERMONT—SCM. Miss Harriet Proctor, W1EIB—SEC: K1DQB. PAM: W1HRG. RM: W1KRV. The Green Mt. Net, with W1VMC as manager, is very active. The Middlebury Mike & Key Club has voted to conduct a New England Transmitter Hunt championship event at the International Field Day held by the BARC. W1WOD is back on the job after convalescing from surgery. Traffic: K1YD 34, W1KJG 32, W1EIB 3.

NORTHWESTERN DIVISION

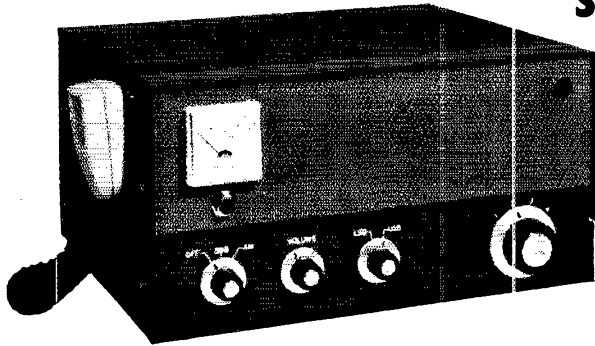
IDAHO—SCM. Mrs. Helen M. Maillet, W7GGV—The FARM Net meets at 1900 MST on 3935 kc. M-F. The Gem State Net meets daily at 2000 MST on 3580 kc. TEN meets Sun. at 0900 MST on 3910 kc. The Boise Valley 2-Meter Net meets Sun. at 1930 MST on 145.44 Mc. with W7YX as NC. K7TWR, formerly of Potlatch, became a Silent Key Nov. 7. W7LIF is the new EC for Bingham County. The Magic Valley Club assisted the CAP in a search and rescue drill; also provided mobile coverage for Vice-President L. B. Johnson's visit to Twin Falls, and for Sabin Vaccine Drives Nos. 1 and 2. OES W7GAS is working with the Boise group on a 2-meter repeater station on Ham Hill. The Puenteillo Club is conducting code and theory classes. Please send new officers' names and addresses to your SCM for her records. Joe W7DWE is Net Control for the Eastern Idaho CD net, which meets Wed. at 0715 on 3991 kc. New amateurs on the air are KN7TLI and KN7TIS. FARM Net traffic: 52. Gem State Net traffic: 61. Traffic: W7EMT 144, K7HLR 40, W7GGV 31, W7LQV 19, K7OAB 5, K7OVG 3, W7MJZ 2.

MONTANA—SCM. Walter R. Marten, W7KUH—SEC: W7UPR. PAM: W7YBS. RM: K7AEZ. Montana net meets as follows: MPH, M-W-F, 3910 kc., 1800M; MSN, T-T-S, 3550 kc., 1830M; TSN, Mon, through Fri., 7230 kc., 1200M; FV, T-F, 50.135 kc., 11EN, 1st and 3rd Sun., 3885 kc.; MAEN, each Sun., 0900M 3890 kc. Appointments: K7KME Helena; W7OIO Butte; W7TYN Butte, as EC; W7CJN, W7NML, W7TYN. K7OEG as OESs; K7NDV as OPS. W7UWY has a new GSB-101 kw. s.s.b. amplifier. K7NHV has a new Army MARS call, AA7NHV. KO0BF completed the homebrew TO kover and installed a new 14AVS antenna on the dorm roof. W7EWR is back on 15 and 40 meters, also 75 mobile. K7EWW still is rebuilding the home QTH. K7OGF now holds code classes Mon., Wed. and Fri. at 1900 MST on 3825 kc. and is doing a fine job. W7RZY held a very successful SET. W7FIS sent 31 OO discrepancy reports. W7NVP reports 12 students in the radio club and theory classes in Bozeman. K7KME and W7NPV

(Continued on page 122)

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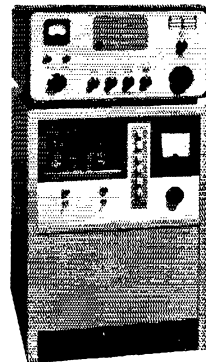
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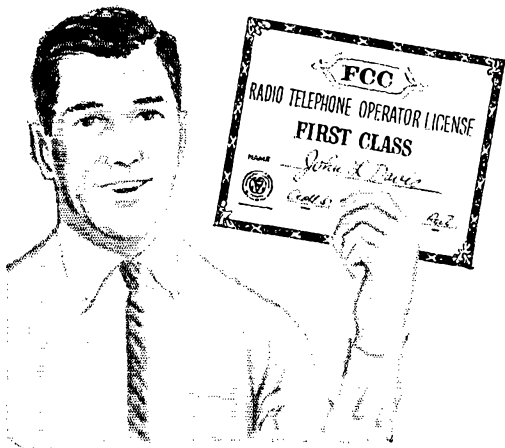
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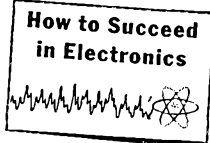
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sent a roster of all amateurs active and inactive from Helena and Bozeman. We are saddened by the passing of W7YFU. Officers of the MSCARC, Bozeman, are K7NKS, pres.; K7RAU, vice-pres.; Stan Peterson, secy.; K7EVS, treas.; W7NPV, act. mgr. The new club call of the MSC is W7YB (Yogi Bear). The MSCARC has much fine equipment on all bands including a van with a 7.6-kw. power plant on a trailer. W7UPR is visiting in Oregon. New officers of the Yellowstone Radio Club (YRC) are K7GHK, pres.; K7LGV, vice-pres.; KN7UPH and K7QWB, directors. Congratulations to K7NHV on the 30-w.p.m. Code Proficiency sticker. W7BGX is the new owner of a Drake 2B. KN7TZE also has a new Drake 2B. W7LHJ is rebuilding the ham shack. K7TGR passed the Conditional Class exam. Great Falls amateurs had a dinner and get-together. The Butte Radio Club is putting out a DD award. More on this later. The Anaconda Radio Club is getting together a c.d. station. Your SCM, W7KUH, visited members of the Helena, Butte and Anaconda Radio Clubs. Many fine reports were received this month. Thanks. Traffic: W7NHV 234, K7EGA 126, K7DCI 58, K7GHK 39, K7OGF 15, K7NDV 14, W7TY 12, K7DCH 10, W7FIS 4, W7EWR 2.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP, RM; W7MTW. Appointments: K7IWD as OO Class III, W7KFK as OO Class IV. Endorsements: W7DEM as EC, K7KBK as OPS, K7IWD as OO Class IV. Oregon State Net (OSN) had sessions 21, total attendance 147, traffic 30. BRAT awards to W7AJN, W7ZFH, K7DYI. The OAREC Net had no full reports because of bad band conditions. W7DEM reports the Southern Oregon Radio Club is using the ARRL training films and says they are excellent. The Portland Area, Multnomah County AREC is gaining rapidly in membership and a very large attendance is noted at the regular monthly meetings. W7RVN, W7PJO, W7ZB, K7OWF and W6BUM furnished radio communications for the Mountain Rescue Council in locating an airplane crash and bringing out the victims on Nov. 24 and 25. Traffic: (Nov.) W7ZB 119, W7ZFH 76, W7DEM 17, W7AJN 11, W7DIT 8, W7MAO 6, K7CNZ 4, W7BYH 3. (Oct.) W7UGH 27, K7SEG 20.

WASHINGTON—SCM, Robert B. Thurston, W7PGY —Asst. SCM/SEC: Everett E. Young, W7HMJ, RM; W7AIB, PAM; W7LFA, Washington nets: CBN, 3960 kc.; WARTS, 3970 kc.; NSN, 3700 kc.; WSN, 3535 kc. All amateurs are invited to participate in the section nets of their choice. W7MBO has a Drake 2-B and an HT-37 with an 814 grounded grid linear. K7HEF and K7HFN are active in AREC and RACES and operate on 6 and 2 meters. K1RFX/7 has a new 80-meter dipole and is assisting in getting K7EFA in operation on full power. K7CWO has a DX-20 and an SX-71 in use at Pullman. The Vancouver Radio Club raised approximately two hundred and thirty dollars and donated same to the Mental Health Association. The following amateurs were on the committee: K7AMP and his XYL, W7QQF and his XYL, W7WFO, W7WFP, KN7SUQ and KN7SUR. W7RCM is recuperating at home from a sojourn in the hospital. W7USO is going to Australia to work. NSN had 26 sessions, 212 QNIs and 41 QTCs for the month of November. It is with deep regret that we report the passing of K7TWR, the XYL of K7TRN of Walla Walla. Approximately sixty attended the QCWA dinner at the CPO Club in Seattle on Nov. 10. The Northwest Chapter will sponsor the QCWA-QSO party Feb. 17. The Bremerton Club has purchased two 1200-watt generators for emergency power. Added to the four they previously had makes a total of six with more under consideration. W7VPV went to Morton, Pa. K7CIH is being swamped with school work with not enough time for hamming. W7CZY transmits the Official Bulletins on RTTY on 80 and 40 meters. The Skagit Amateur Radio Club will hold its annual banquet in April. Date and place to be announced. K7PIG received his General Class ticket. W7RGL had his driveway full of a broken antenna mast and tangled wires from the snow-storm of Nov. 24. We understand that W7ZVY will be getting married early in the year. A new General Class licensee in the Bremerton Area is W7NZO. K7QMF is building a new pres-selector per Nov. QST. A new radio club has been formed at Sammamish High School with eleven members and officers are K7MWK, pres.; K7JRE, secy.-treas. K7AYC is a new OO and K7JHA a new ORS. KN7TOG is QRL studying for the Conditional Class exam. Walla Walla station K7UEB has a new linear. W7GYH has a new little mobile rig. K7LET is the new EC for North Seattle. K7TGN has a new FA-33 jr. Congratulations are in order to W7HZ for taking the fourth national PD title. W7JJK, W7MJC and W7SLB are setting up RTTY on 145.65 Mc. W7HMJ is visiting the Lower Columbia Radio Club on AREC business.

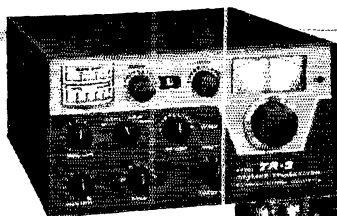
(Continued on page 124)

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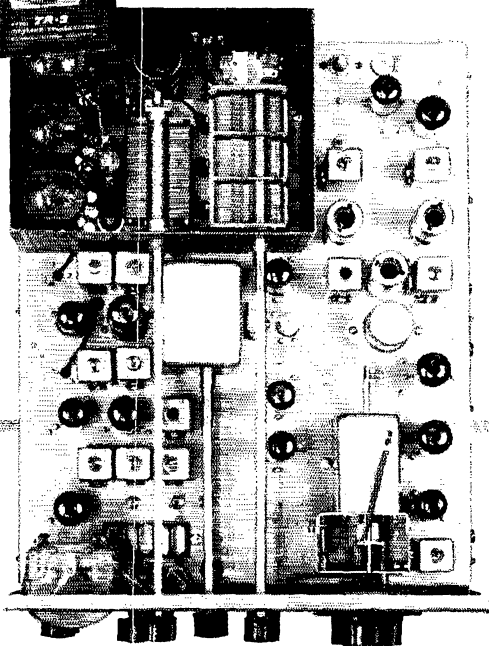
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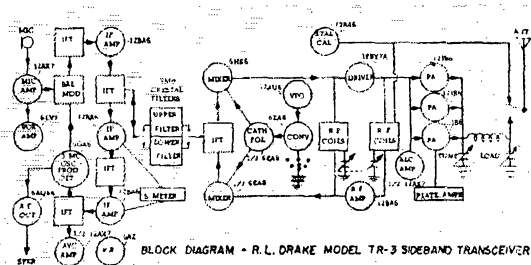
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W7WJR, W7OEB and K7PWM handled the Novice tutoring for the Richland Club. Traffic: W7BA 1321, K7JHA 603, W7DZX 528, W7APS 256, W7GIP 149, W7OEB 138, W7AMC 29, W7BTB 21, W7AIB 19, K1RFX/7 15, W7GYF 15, K7QMF 10, K7JRE 8.

PACIFIC DIVISION

HAWAII—Acting SCM, Mike Fern, KH6ARL—RM: KH6DVD, PAM: KH6EGL. The Pacific Island gang certainly did an excellent job in the Typhoon Karen emergency. The traffic totals are fantastic but true. The stemwinders on Guam were K2QC/KG6, KG6AKZ, W6CBE/KG6, WA6ROP/KG6, K4PNM/KG6, KG6-AA, KH6EGO and KG6GZ. In Hawaii there were KH6EGO, KH6EKO, KH6AJF, KH6KS, KH6GF, KH6FU, KH6FFH, KH6BGS, KH6EFU, KH6CYS, KH6DKD, KH6EVT, KH6EWD, KH6AHQ, KH6DYG, KH6EKR, K9VEA, KH6 and KH6FFO. The Oahu relay load was taken by KR6MD, KR6GF, KR6OH and many more. Others active were KW6CJ, KW6CV, KW6-DK, KH6COY, KW6, KC6BD, KC6BK, W6ZDF/KM6 and KJ6BV. K6CQV/KS6 kept his Samoan phone schedules and relayed hundreds of ARL texts from Guam. New HARC officers are KH6DNT, pres.; KH6-DIA, vice-pres.; KH6EIT, secy.; KH6EBA, treas. KH6EVT has a gallon on 6. Traffic: KH6AJF 4037, K4PNM/KG6 1265, W6CBE/KG6 1100, KH6EGO 527, KH6EKO 505, W6ZDF/KM6 64, KH6EWD 54, KH6DKD 32, KH6AFC 21, KH6EGL 10, KC6BO 4, KH6ECT 4, KH6BZF 1.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. The Over the Hill Net on 145.8 Mc., with K7-RKH as NCS, is creating a lot of interest with the Las Vegas and Boulder City gang in trying out different types of antennas. Currently in use are verticals, dipoles, wagonwheels, cloverleafs and various combinations of beams. SNARC officers for the coming year are W7PRM, pres.; W7TKV, vice-pres.; K7RKH, vice-pres.; John Harness, secy.; W7BJY, treas. The club's new mailing address is P.O. Box 73, Boulder City. W7CFE has an HX-20 on the air. K7OLQ is active on 75 meters. W7MWF is active with 500 watts into a trap antenna. W7PRM is building an HX-20. K7RKH has an HX-50 and an HA-2, K7ADD, ex-4N4J, and his NYL are home after a two-year tour in 4N4-Land. K7ICW is working on more and bigger antennas. K7FSU is putting out a nice signal with his new Gonset. W6PWE, ex-W7PWE, was back for a few days. Traffic: (Nov.) W7PBV 15, (Oct.) W7YU 5.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6XVO, SEC: WA6EIC, RM: K6KCB. New officers of the CCRG are WA6MH, pres.; K6JOJ, vep; WA6MIE, treas.; WA6-QVS, secy. The group enjoyed a fine dinner meeting in San Mateo Dec. 7. W6XVO reports that K6LR is now a Silent Key. The Santa Cruz CD Net is active on 147.33-Mc. f.m. and EC K6RDK reports that the Santa Cruz Club now numbers 50 members. WA6HRS is building a new quad and sending Official Bulletins. New officers of the North Peninsula Electronics Club are W6KVL, pres.; WA6PFT, vice-pres.; WA6GRL, secy.; and WA6NWR, treas. The Santa Clara County Amateur Radio Assn. Christmas Party was held Dec. 8 with the installation of WA6KCV as pres.; K6YKG, vice-pres.; WA6VWL, secy.; WA6HVM, treas.; and WA6DOS, WA6MKE and WA6HVN on the Board. San Carlos RACES is now rebuilding under W6VEV and WA6CXJ. W6ASII qualified as Class I OO. The SCVSN held 17 sessions for 57 traffic, according to WA6TNY. It meets on 146.7 Mc. at 0300Z Mon. through Fri. and welcomes all comers. OES WA6VBY reports very good groundwave and tropo on 50 Mc. up to 150 miles nightly. The South County Amateur Radio Society enjoyed its annual potluck Dec. 17 in Redwood City. The club station, W6WJL, has OBS skeds every Mon. on 50 and 144 Mc. W6RSY sports a Viking I and is doing better on the nets. K6GZ reports heavy traffic from the Typhoon. K6DYN is now RTTY. Traffic: (Nov.) W6RSY 938, K6GZ 398, K6DYN 148, K6KCB 121, W6YBV 116, W6DEF 89, W6AIT 74, W6YHM 73, W6ATC 57, W6ASH 53, W6OH 53, K6VQK 16, K6YKG 14, W6ZRJ 14, WA6EIC 13, W6RFF 13, K6EQE 9, WA6OJQ 8, K6BBF 7, K6CID 6, K6MTN 3, K6TEH 3, WA6UAM 3, (Oct.) K6EQE 24, W6HC 18, (Sept.) W6RSY 450, (Aug.) W6RSY 367.

EAST BAY—SCM, B. W. Southwell, W6OJW—WA6-MIE made the BPL WA6WLE converted his Heath GW-31 to 28 Mc. The Miramonte RC is looking for a receiver to go with its 4-813 rig. W7QOH 6 is a new ORS and is mobile on 3995 kc. with a 50-watt rig and an ARC-5 receiver. WA6VAT got WAS and 6 new ones for DXCC with Africa needed for WAC. WA6MJP has a DX score of 110 74 on 14-Mc. c.w. W6LGE made 103
(Continued on page 126)

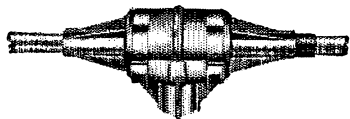
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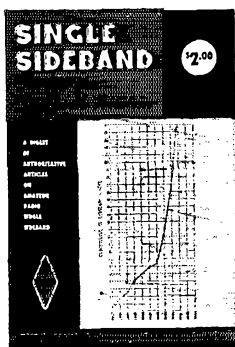
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contacts in 38 sections in the SS. The Vallejo gang helped the police on Halloween with Operation Pumpkin, with W6ALGE, W6KOJ, WA61EC, W61ZU, W61RT, WA6MXI, K6VXM, K6EHR, K6MIS, K6GTR/M, WA6LGD/M, WA6PRX/M and WA6ADL/M. 6 and 2 meters were used. WA6FFF is the new EC for West Contra Costa County. The ORC held its Annual Old Timers Nite on Nov. 2 with W6IT as guest speaker. WA6MIE snugged 61 sections in the SS. W6QYB is chief of communications, e.d., and K6HTJ is his assistant for Alameda County. Congrats to both. WA6NFF took the General Class exam and WA6MIE took the Extra Class exam. K6HTJ has a new Heath Marauder. New officers of the MDARC for 1963 are WA6DKG, pres.; WA6FBS, vice-pres.; K6IMV, secy.; W6CGS, EC; K6OSO, WA6FMZ and K6TFC board members. The CCRC's 1963 officers are W6AMH, pres.; K6OJO, vice-pres.; WA6MIE, treas.; WA6QVS, secy. The Richmond RC meets the 3rd Fri. of each month. W6VAE has a new Swan on 7 Mc. WA6FBS is on 75-meter mobile in his new Chevvy. WA6YET is a new General. K6DYV moved to Barstow. K6SCF has a new KWM-2 and is mobile. Fifty-four hams helped in the KO-Polio campaign. K6OSO is leaving for the L.A. area. Contra Costa RACES are shifting to 145.32 Mc. The Mission Trail gang plans its 75-meter net roundup for 1963 in Santa Cruz. Contact WA6GHC for information on parts, etc. for RTTY equipment. WA6OLF is in traction for a bad back in the hospital. W6BLG was a recent visitor at the HARC. New HARC members are WA6ZXY, W6VZX/M, WA6NYA, W6ZXX and WA6OHZ. K6ESZ puts out the RTTY bulletin on 3620 kc, and 146.475 Mc, at 7 p.m. The HARC meets the 2nd and 4th Fri. at 8 p.m. Write Box 113, Hayward, for a map and directions to the club house. Traffic: WA6MIE, 166. K6GK 132. WA6WLE 2. W7QOH 6 1.

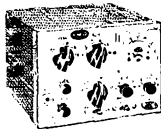
SAN FRANCISCO—SCM, Willbur Bachman, W6-BIP—The San Francisco Radio Club enjoys using the new movie projector recently purchased by the group. We are happy to report that W6HIW is once again home and improving nicely. Kay underwent surgery but had to return to the hospital after a relapse. W6BAGU now operates on 15 meters and says that Novices in the group would like to see more Novices active on that band. We are sorry to report passing of Edna Lopez, whose husband Jack is a very active member in the SF Club. K6IFM who, after one week of wedded bliss, was called in the Air Force because of the Cuban crisis, is now home again. Lots of better luck to Jan and Alan. Hope you have many happy years from now on. W6ZSE reports that there are now 14 fellows on the 2-meter net between Arcata to Scotia. They are using 147.31 Mc. on 1m. W6JSY is due for a serious heart valve operation at University Hospital early next year. Thirty-five pints of blood will be needed to see him through. WA6MDL is active on NCTN, NCN, TCEN and SJVN. Fellows in the Marin Club are active on 3835 kc. in the Red Cross Net. SEC W6KZF is trying hard to get the fellows to join RACES. WA6PNT and W6EJY are building a 2-meter repeater at W6HST's on Mt. Tamalpais. Other members also are helping with this project. Meetings are held the 2nd Sun. of each month at 3 p.m. at the homes of the different amateurs by the Ukiah Club. The club plans to hold meetings at the local picnic grounds in the summer months. Our SEC says, "Start the New Year right, sign up with the AREC. Have your EC liaison your local 2-meter met with regional phone and c.w. traffic nets. Train your net members in message form use and traffic handling." W6QMO, Jerry, is back on 40 and 2 meters on phone, c.w. and RTTY.

SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—K6ORT, up Redding way, has been appointed ORS. W6LSW, Eldorado County EC, reports the new disaster plan and interest in emergency communications in his area has attracted most all the hams in the county. WA6OXK, Shasta County EC, reports that activity is picking up and new AREC members are being recruited. W6WLI worked 67 stations in 29 states in the recent RTTY SS. WA6PVT had lots of fun in the SS and is working big DX on a new 10-meter beam. W6AF has returned from a visit to Lakeview and a fishing trip to Folsom Lake. Recent FMT results: W6-GDO scored 1.4; K6CFE 9.1; WA6NAU 54.4. W6ZJW 395.1 WB6AMV/K6ROU is on the air in Sacramento using a Ranger II, an HQ-145 and an indoor antenna and is getting FR reports clear across the country on 20 meters. The Sierra Foothills ARC has been issued the call K6CBP in memory of past club member Mike Bauman. Buzz La Bontes is now in charge of Placer County e.d. (RACES). The club net meets on 3860 kc., says K6ZWZ, club secretary, as he operates his new HX-20. The Sacramento Aerojet ARC has elected WB6BXW new presy. John Clapp, vice-pres.; and W66YEE, secy. WA6SIZ is authoring an article for

(Continued on page 128)

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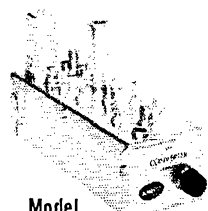


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CB-6W—6 meter wired & tested\$27.50

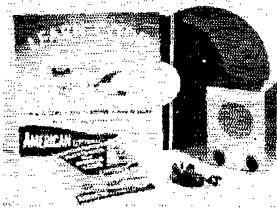
CB-2K—2 meter kit, 6ES8 1st rf amp., 6U8—2nd rf amp./mix. 6J6 osc. only \$23.95

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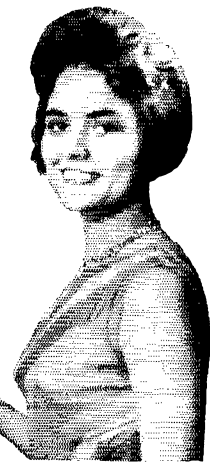
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one of the radio magazines. Incidentally, Walt's Navy son, WA6QDY, in a nice letter to your SCAM, says he will be home soon and is presently handling lots of traffic (Navy that is) from aboard the USS *Hollister* in the Pacific! Golden Empire ARC: WA6QYD is home on Navy leave from the carrier *Ticonderoga* and working all the old gang on 160 meters. W6TSR has a new HQ-170 receiver. WA6FYB is on 160-meter mobile. The North Hills ARC's meeting place was "sold down the river" recently so they met at the QTH of W6ZOH for a bang-up Field Day film and the usual coffee, etc.! Traffic: W6WGO 20, K6HEZ 19, WB6AMV 1.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—The new officers of the Fresno Amateur Radio Club are W6ARC, pres.; WA6FEJ, vice-pres.; WA6WXP, secy.; and K6BBL, treas. The Fresno Amateur Radio Club will hold its Annual Hamfest and Pacific Division Convention here in Fresno May 18, 1963 at the Town and Country Motel. W6CR is back on the air after 10 years of QRT with an SX-101A and a DX-100. W6NPI has an RME-45 and is modernizing it. The Fresno Radio Club held its annual installation dinner at Cedar Lanes, Dec. 6, 1962, with approximately 70 attending and WA6FFJ walked away with the honor trophy. WA6CWT is on 75-meter mobile when his car is running. The Turlock Radio Club furnished communications for the 99 Sports Car Rally in Stockton Dec. 8, 1962. The Modesto Radio Club holds its monthly meetings every 2nd Wed. at 1930 in the basement of the McHenry Library. WA6BTK is in the Army. K6EUY is on 20 meters with home-brew equipment. W6JPS is monitoring 3995 kc. nearly all day. W6CUA has a Swan. The Fresno Radio Club supplied communications for the Motorcycle Enduro run held in the Sierras. The SJVN reports 696 check-ins, 27 contacts, 5 contacts and 7 bulletins. The Fresno Radio Club meets every 2nd Fri. at 8 p.m. in the Power Building. See you there. Traffic: W6ADB 61, W6EPB 21.

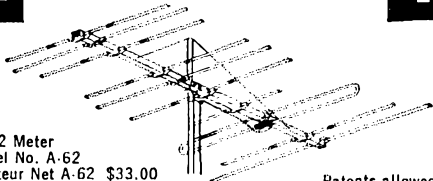
ROANOKE DIVISION

NORTH CAROLINA—SCM, N. J. Boruch, W4CH—SEC: W4MFK, RM: K4CPX, V.H.F. PAM: W4ACY. Our SEC is busy getting ECs lined up to promote a new AREC program for N.C. W4YMI has consented to act as Assistant SEC for Eastern N.C. All those wishing to participate in the emergency plan and who desire to be ECs for their counties, please contact W4MFK. K4CPX announces that N.C. was represented 100 per cent in 4RN during October. South Piedmont ARC became an ARRL affiliated society. Newly elected officers of the Wayne County ARA (Goldsworthy) are K4KDX, pres.; W4LWU, vice-pres.; WA2WBA/4, secy-treas. Salisbury held a very effective SET drill on 145.2 Mc. The Davidson Co. RACES/AREC group also held a practice drill. W4BUZ, W4COJ, K4QFV and K4SWN maintain their regular scheduled transmissions of OBS. WA4FJM topped his previous OO record by notifying 48 stations. W4HJZ and W4OAB report 6-meter activity down with no outstanding propagation conditions observed. K4ZSS reported completing a fallout shelter under the patio; he also is studying radiology at Elon College. K4MPE picked up two rare ones—3U7AC and LA4C—giving him a total DXCC 179/163. K4WOD returned to Ft. Bragg after a 4000-mile trip to the Midwest. Traffic: (Nov.) W4EJP 151, W4PCN 106, W4EJQ 104, WA4FJM 102, K4CPX 94, K4MPE 68, K4QFV 52, WA4ANH 31, K4YCL 27, W4BAW 20, K4TPK 19, WA2WBA/4 19, W4COJ 18, K4CWZ 16. (Oct.) K4MPE 10.

SOUTH CAROLINA—SCM, Lee F. Worthington—K4HDX SEC: W4BCZ, S.S.B. PAM: K4JOQ, A.M. PAM: K4KCO, RM: W4PED. Nets: C.W., 1900 and 2200 EST 3795 kc.; S.S.B., 1900 EST 3914 kc.; A.M. 1900 EST 3930 kc.; AREC S.S.B. 1400 EST Sun. 3985 kc. Welcome to the DX Amateur Radio Club of Camden as an ARRL affiliate. Newberry is in the stages of organizing a radio club with K4KCO as president. New appointments: W4UMW as EC, K4VTT as EC, W4NTO as OO Class I; K4HDX as OO Class IV. The Greer ARC reports a total of nine Novice Class amateurs were licensed during 1962. The Spartanburg ARC elected new officers at its December meeting. K4VWL, pres.; W4ZFC, vice-pres.; K4GVE, secy-treas. and W4NTO, act. mgr. were installed at the January meeting which also was the NYL appreciation banquet night. The S.S.B. Net is to be congratulated on the fine increase of formal traffic handled. Net traffic: S.S.B. Net 144, C.W. Net 86, A.M. Net 26. Traffic: K4LND 92, K4OCU 31, K4VWL 22, W4PED 21, W4AKC 17, K4YFK 16, K4WOI 14, W4NTO 10, W4V1W 8.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM: H. J. Hopkins, W4SHJ, SEC: W4VMA, RMs: W4LK, K4ITV, W4IA, W4SHJ, W4QDY, PAAL, W4UFX. The Va. QSO Party was a big success and is being well
(Continued on page 130)

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 Model No. A-62
 Amateur Net A-62 \$33.00
 Stacking Kit AS-62 \$2.19

Patents allowed
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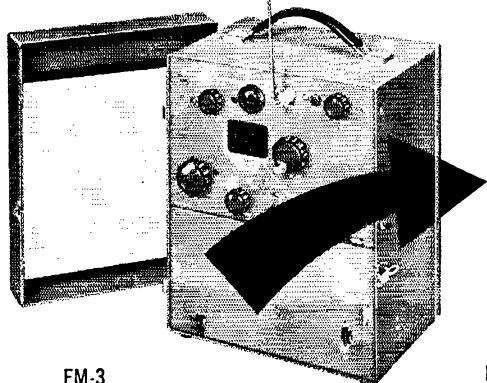
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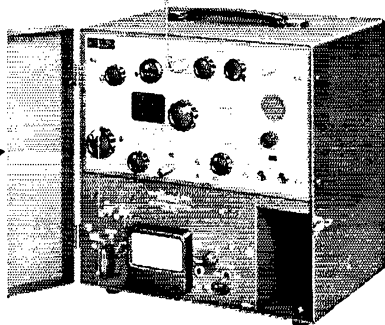
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Conversion includes: an all transistorized converter module, a new front panel and carrying case, and a built-in amplifier (with speaker). Also, a front-panel jack allows input of external audio signals, such as those from a Gertsch Model DM-3 deviation meter. Space for a DM-3 is provided in the case.

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Towers are shipped to your home knocked down. FOB Kansas City, Mo. 4th class freight. Prices subject to change... so order now!

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FOR COMPLETE
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reported. The Virginia gang went all out as usual with the SS and made a fine showing. K4YDL received the QWCA 25 Award and worked two new continents. W4WBC got his Marauder parking. K4ORQ is involved in fulltime language training. The LARC elected its 1963 slate of officers with W4QYL as president, W4DLA is taking on the job of editor of the LARC bulletin as well as Director, W4WRG's antenna blew down twice during the SS! Vic, the PVRC sparkplug reports a visit from YNICAA and much contest activity. W4PTR is building a new antenna tuner and is getting ready for the DX Contest. It looks like W4JUC has copped the Va. QSO Party scoring. W4PRO is learning about transistors. K4TZE is busy with school and basketball. W4AGWD is the new asst. EC for Northampton Co. K4IEE is the new V8NB Mgr. In Tidewater the TMRC held a reliability check of its 10-meter communications. EC W4OJD reports on Eastern Shore AREC activity. Up in Roanoke K4IKF tried 2-meter aeronautical mobile from the club sailplane with no ignition noise and fair results. W4RHA likes his Cruiser. W4NTR is very busy with Guam traffic, signing up with new Navy MARS. W4CVO now is a registered professional engineer. Old workhorse W4FOR will be leaving Virginia shortly and we sure will have to lose him. Thanks, John, for a very FB job! Breathtaking slowed down K4IIP's activity. November wallpaper for K4AL is WAVE and WACAN. K4WMP is running a bandswitching 813 rig. The Northern Va. Emerg. Net NVEN (AREC), meets Tue. at 8 p.m. on 1.815 Mc. Net mgr. is W4EJY. Traffic: (Nov.) W4PPP 1830. W4NTR 424. W4DLA 332. W4RHA 325. W4FOR 306. K4FSS 175. W4DVT 159. W4PTR 132. W4LK 130. W4DKP 105. W4AGWD 104. K4ITY 103. W4EJY 92. W48BAG/4 88. K4IEE 74. W4ZM 64. K4AL 52. K4IXF 41. W4FA 39. K4YDL 39. K4WMP 35. W4BGP 25. W4QDY 21. W4CVO 20. W4SHJ 17. W4TE 16. K4JYL 14. K4TZE 14. W4WRG 12. W4ZAU 11. K4GRZ 8. K4BAV 7. W4WBC 7. K4YZT 7. W4JUC 6. W4KFC 6. W4KN 6. W4LRN 6. K4LTK 5. K4IIP 4. K4PIK 4. W4PRO 4. W4ADUW 3. K4JQO 2. K4UVT 2. (Oct.) W4ITX 31. K4UVT 1.

WEST VIRGINIA—SCM. Donald B. Morris, W8JM—SEC. W8SSA. PAM: K8CFT. RM: K8HID. WVN (c.w.) 0000 GMT. (Phone) 2330 GMT on 3570 and 3890 kc. Phone Net reports 19 sessions, 467 stations and 60 messages handled. The C.W. Net 19 sessions, 95 stations and 60 messages. W8DRU is back after eight years in Virginia and reports v.h.f. high in the Hinton area with W8DIS, K8EAT, K8DRK, K8GJY, K8SIT, K8OHD and W8DRU active daily on 6 meters. W8HZA, W8VMP and W8DHX are active in c.d. work in the Charleston Area. The Mountain State Radio Club of Elkins elected K8ZWM, pres.; K8TPF and K8MSP, vice-pres.; W8AYB, secy-treas. with W8XCXJ assisting; W8TGF and W8GFP, station engineers; W8CNXJ, K8CHW and K8TPF, pictures, publicity, activities; with K8CHW, state council representative. The Blennerhassett Radio Club of Parkersburg has a new club call, W8FGL, formerly held by the late Ken Weekly. Contact K8CHW or K8TPF for rules of the W. Va. Centennial Award. K8YRU for Centennial QSO Party rules and W8JM for the V.H.F. Centennial Award. The West Virginia ARRL Convention will be held at Jackson's Mill, July 6 and 7. Plan now to attend. Traffic: W8DUV 78. W8NYH 77. K8UQY 65. K8CFT 12. W8HZA 10. W8JM 5. W8ESH 2.

ROCKY MOUNTAIN DIVISION

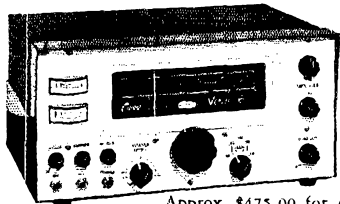
COLORADO—SCM. Donald Middleton, W0NIT—SEC. W0SIN. PAMS: W0CXW, W0LJR, W0GK. RM: W0FEO. OBS: K0DCZ. W0BAG reports an AI contact on 144.1 Mc. with K7HKD in Cheyenne. Contact was made by bouncing signals from Pikes Peak. The new proxy of the Pikes Peak Radio Amateur Assn. is K0WMD. The new PARA president is W0ANO. More than 50 amateurs are currently enrolled in various courses at Pueblo College. K0MNP, of Thornton, reports almost daily contact with K0WCP, in Pueblo, on 2 meters during the month of November. Colorado SEC W0SIN is now on 2 meters with 5 watts. K0WVJ is working on a project of closed surgery using the radiation created by a laser. Steve states that this project still is in the theory stage but that he has high hopes. Three Colorado nets reported as follows: Colorado Weather Net, total QNI 1018 and total QTC 936. Colorado Emergency Phone Net, total QNI 140, and total QTC 55. High Noon Net, total QNI 489, and total QTC 218. Congratulations to W4UGLØ, who made BPL in November. Traffic: W4UGLØ 387. K0ZSO 125. K0DCW 74. K0WGC 55. W0ENA 45. K0WVJ 40. W0ETT 17. W0MYB 12. W0SIN 11. K0LCZ 6.

UTAH—SCM. Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: K7BLR, K7PRJ operated a 2-meter phone station from the top of Mount Timpanogas during the annual Timp Hike. He handled

(Continued on page 132)

Here's Clegg's top performance line for VHF in '63...SSB...AM...and CW!

VENUS 6 METER TRANSCEIVER

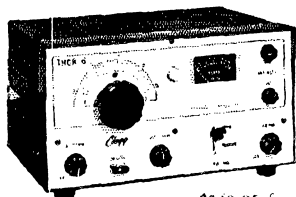


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Here's what you can expect: A superbly engineered crystal lattice filter, SSB transmitter of greater than 85 watts PEP input; amazing frequency stability, VFO controlled by the receiver's tuneable oscillator; full power input on CW and a substantial signal on AM phone. There is also output provision to drive a KW linear final.

In the receiver section a double conversion, low noise super-het of extreme sensitivity and selectivity, with crystal lattice filter and product detector provides flawless reception of sideband, AM phone or CW. A 115V AC power supply of adequate capacity is a separately mounted unit which can be installed at any convenient distance from the transmitter.

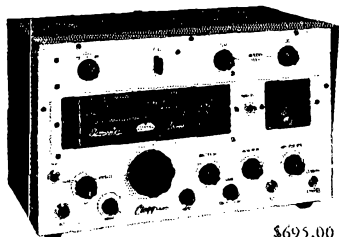
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A low noise double conversion super-heterodyne receiver complete with BFO and ANL provides maximum selectivity and sensitivity with stability equal to the exacting requirements of SSB and CW; separate power supply/modulator for 115V AC operation. A fully transistorized power supply/modulator for 12V DC available



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ZEUS VHF TRANSMITTER FOR 6 AND 2 METERS

A highly efficient, AM, high power VHF transmitter for full coverage of the amateur 6 and 2 meter bands and associated Mars frequencies. Maximum TVI suppression.

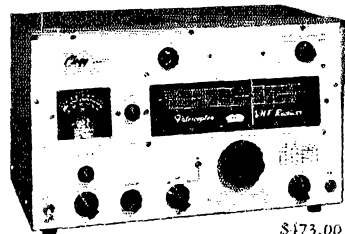
Automatic modulation control with up to 18 db of speech clipping provides magnificent audio with "talk power" greater than many kilowatt rigs.

This beautiful unit with its ultra-stable VFO is the ultimate in VHF equipment for amateur and Mars operation.

INTERCEPTOR VHF RECEIVER FOR 6 AND 2

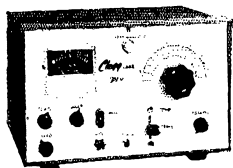
Designed for the serious operator on these bands, the INTERCEPTOR, with cabinet and panel exactly matching the famous ZEUS transmitter, offers performance features unmatched by presently available equipment for these frequencies.

For example, here is a receiver with virtually no cross modulation. Navigator RF stages give an extremely low noise figure and sensitivity better than .25 microvolts. Stability is ideal for exacting requirements of SSB and CW.



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This famous little transmitter-receiver is ideal for both fixed station and mobile operation. Small in size, low in cost, and tops in performance, the 99'er offers operating features unequalled in far more costly equipments. The double conversion superhet receiver provides extreme selectivity, sensitivity and freedom from images and cross modulation. The transmitter section employs an ultra-stable crystal oscillator which may also be controlled by external VFO. An efficient, fully modulated 8 watt final works into a flexible Pi network tank circuit. A large S meter also serves for transmitter tune-up procedure.

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Clegg

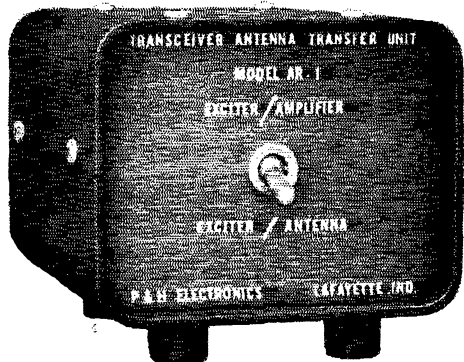
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The AR-1 requires 6.3VAC (6.3V jack on KWM-2) and normally open auxiliary contacts on the exciter relay. (ANT. RELAY jack on KWM-2). The AR-1 may also be used as a conventional antenna change-over relay. Size 3" X 4" X 4".

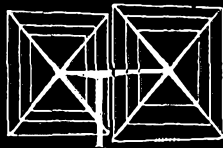
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traffic for many climbers to their families in the towns below. New officers of the Utah ARC in Salt Lake are W7WKF, pres.; W7KSS, vice-pres.; W7QWH, exec. vice-pres.; K7COM, secy.-treas.; K7HFV, editor of the club paper. W7NFT and K7GRC, program committee. W7OCX, K7MPQ, W7QWH, K7QGW and W7VTD earned BRAT awards on BUN. K7QGW in Cheyenne, Wyo., has earned a net certificate on the Beehive Utah Net. The Utah ARC held a banquet with John Sampson, W7OCX, Vice-Director, as speaker. The Utah State Civil Defense officials used BUN for communication to all county c.d. directors. They were well pleased with the results. Traffic: (Nov.) W7OCX 116, W7QWH 12. (Oct.) K7PRJ 12.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN, V.H.F. PAM: W5FPB. 10-Meter PAM: W5WZK. The new club at the ABQ Training Center for the visually handicapped has been named the Yale ARC. The Lion's Club was well as other individuals have made funds available for the club station, W5ZHN will be the custodian. Two local amateurs have pledged four ARRL memberships for those who obtain licenses. Several more are needed. See W5ZHN for details. A banquet meeting of the ABQ ARC was held at Western Skies Motel Dec. 5. The guest speaker, Jack Lacy of the State Dept. of Development, spoke on "Amateur Radio Can Promote Industrial Development in New Mexico." W5CA/W7ZC, who drove from Tucson to attend, also spoke to the 72 amateurs and their wives and guests. The SCM has been confined to his bed following a collapse on Dec. 2. He will get your various letters answered as soon as he is able. No traffic reports were received for the month of November. How about some reports on "who is who and what he's doing" to help fill this column.

WYOMING—SCM, Lial D. Branson, W7AMU—SEC: W7HH. The Pony Express Net meets Sun. at 0800 MST on 3920 kc; the YO Net is a c.w. net Mon., Wed. and Fri. at 1830 MST on 3610 kc.; Wyoming C.D. Net meets Wed. at 1900 MST on 3537.5 kc.; TWN Net daily at 2000 MST on 7060 kc.; Wyoming Emergency Net at 1215 MST every day on 3920 kc. W7BKI has a new HX-50; W7HKD reports being the first W7 to contact VE3-Land. K7GDW is leaving Sheridan for Salt Lake City; he is going to electronic school. K7AHO is the new EC for Washakie County. K7QYD is going s.s.b. and had 840 QSOs and 70 sections in the 1962 S.S. Contest. W3BNR/7 made a good score in the SS Contest. K7IBM is in Boulder at School. W7BXS visited in Dallas, Tex. for a month. Traffic: W7HH 80, W7DXV 53, W7AMU 51, W3BNR/7 46, W7BHH 28, W7AEC 27, W6GDW 20, W7LVU 20, K7IBM 12, W7GZG 10.

SOUTHEASTERN DIVISION

ALABAMA—Acting SCM, Walter W. Coleman, sr., W4OXU—SEC: W4FQQ, RM: W4USM, PAMs: K4BTO, K4KJD, K4ZTT. S.s.b.: K4KJD, W4GKO reports that the Winston County Emergency Net is meeting Tue. and Thurs. at 1930 CST on 30.25 Mc. with K4YFX, net manager. W4RLS, RACES Officer for Franklin County, was the main subject of an excellent article on amateur radio in the Nov. 1 issue of the *Franklin County Times*. K4SFH reports contact with HCF15 on 6 meters Oct. 6. W4WGI reports the Madison County group is experimenting with a two-tone signal alerting system for 50 Mc. Traffic: (Nov.) K4A0Z 79, K4WOP 61, W4USM 45, K4BSK 34, K4FQG 32, K4VHW 30, W4PEX 24, K4FZQ 21, K4ZTT 16, K4DJR 15, K4WSH 13, K4KJD 12, K4BTO 10, W4NML 10, K4BRZ 8, W4AEC 8, K4GXS 8, W4OXU 8, W4FWP 7, K4WSK 6, W4MI 5, K4NUW 5, K4RIL 5, W4RLG 5, K4DSO 3, W4EDF 2, W4AHGN 2, K4WWP 1. (Oct.) K4NGD 90, W4QGT 90, K4CFD 28, K4YUD 13, W4ABSE 12, K4GRA 8, K4NKT 4, W4HGN 3, K4WWP 1.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJE—SEC: W4YVT, RM: K4KDN, RM RTTY: W4EHU, PAMs: 40 W4SDR; 75 K4LCF; V.H.F. W4RMU; S.S.B. W4OGX, W4EXM soon will be an EP2 with a KWM-2, you DXers. Welcome to WN4KKW on the v.h.f. traffic nets. Old stand-by W4CNZ is leaving us soon. Good luck, W4UJH, let's get that BPL. Congrats to W4MIN the new Net mgr. of the Dixie Early Bird Net. K4LCF is doing excellent as usual. Nothing wrong with that brain. Glad you are back, W4DVR. This time stay retired and enjoy life. Surprise. Worked W4QVJ operating at HK0ZU on 40 meters. Dunno how he does it—and work, too. A big hello again to W1AGM/4, back with us 'til June. W4OGX is proving a good S.S.B. PAM. Nice going. The St. Pete and HARS, Tampa, visits were among the best ever for this SCM. Both are go-go clubs. Thanks for the nice reception, gang. Traffic: (Nov.) W4TUB 730, W4KIS 501, W4BMC 394, W4COR 352, W4MIN 262, W4UJH 255, W4AKB 250, W4SDR 176, K4BY 163, W4AME 148, K4KDN 142, W4ZZZ 136, W4ABGW 118, W4EHW 90, K4SJE 90,

(Continued on page 134)

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1	495.00	349.00		149
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Saturday, Feb. 23rd

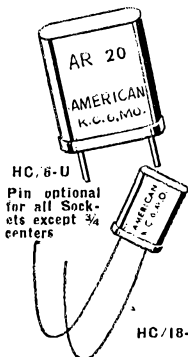
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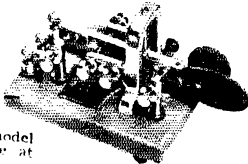
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WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE, PAM: W4WEB, RM: W4BVE, Panama City: PCARC members set up a station and antennas for W4JLV, the youngest YL in town. The club is issuing a certificate for working four members. W4FIJ is acting as Area RACES officer, and has completed a homebrew 10-meter transmitter. W4EJF monitors 29,560 kc, regularly with a 10-meter squeak receiver. K4VPY continues active as OO. Chlipley: W4CYG has a fine-sounding 75-meter mobile signal. W4LXK has a 67-ft. vertical for 75 meters. W4IKB worked Panama City on a 10-meter groundwave. Blountstown: K4DHK has a new 10-meter antenna. Apalachicola: W4GWU soon will be active on 10 and 75 meters. Marianna: W4ADED has joined WFPN and is Jackson County EC. W4AJRT, in Sneads, and W4AIR, in Chattahoochee, are newcomers to the net. Madison: W4PBO was reappointed as Madison County EC. W4-GHE is erecting a windmill tower and 10-meter antenna. Fort Walton: V.h.f. lums are experimenting with the possibility of backscatter from ionized clouds released from rockets launched at nearby Eglin AFB. W4ZGS has antennas mounted on a new 60-ft. tower. W4-EYU is on with a Seneca and Fincio 6/2 beam. Pensacola: New V.H.F. Club officers are K4QAC, pres.; K5WIV/4, vice-pres.; K4FMI, secy.; W4AEE, treas. Traffic: (Nov.) K4VY 263, W4BVE 26, W44FJ 25, W4ZGS 3. (Oct.) W4BVE 52.

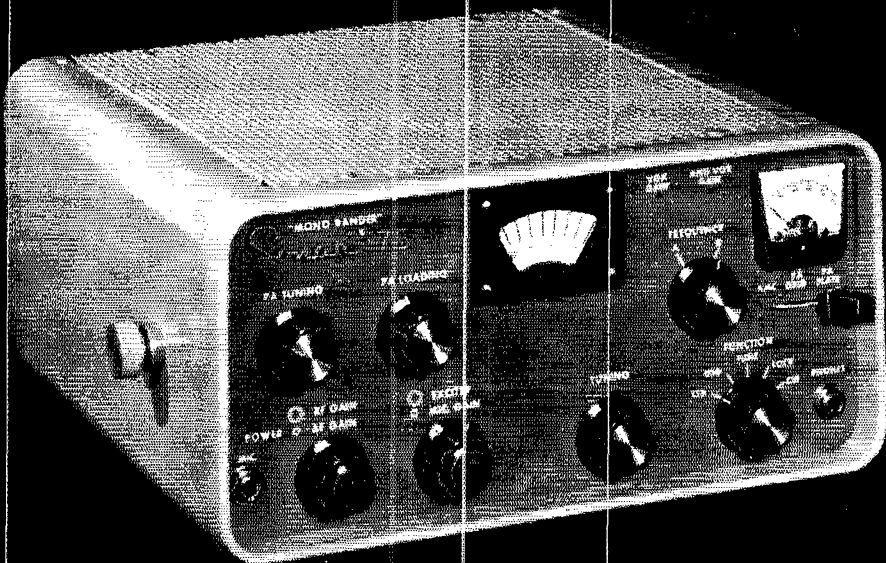
GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE, PAM: W4KR, RM: W4DDY. New officers of the Atlanta Radio Club are K4HJV, pres.; W4HEG, vice-pres.; W4LG, treas.; K4MDC, secy.; K4QOC, act. mgr.; W4TLM, editor; K4YTD, K4DNL and W4FYPH, trustees. K4YVK has a rotatable three-element beam on his mobile on 6, which he refers to as the "Reinder Configuration." K4NCL has RTTY capability. New officers of the Confederate Signal Corps are K4VJM, pres.; K4DEE, vice-pres.; K4XTS, treas.; K4JGK, secy.; W4ORI, act. mgr. W4OHA is a student at Moreer University, Macon, Ga. K4YZE has a new homebrew v.h.f. receiver that is working PB. New officers of the Amateur Radio Club of Augusta are W4ALK, pres.; W4ZOY, vice-pres.; W44ARJ, secy.—treas.; W4YE is very active on mobile c.w. He uses a leg-type key while driving. Amateurs are invited to write W4DDY, 2608 Fuller Drive, Augusta, Ga., for information on the Georgia State (C.W.) Net. New officers of the Greater Atlanta V.H.F. Society are K4YVK, pres.; K4WLI, vice-pres.; W4COWU, secy.—treas.; W4NOE, act. mgr.; W4HIZ, asst. act. mgr. K4WVY's rig trouble didn't prevent him from handling emergency traffic from Guam recently. Traffic: K4MCL 489, W4IDDY 169, K4WVY 136, W4PIAM 97, W4RZL 71, W4YE 52, W4LME 41, K4FRM 37, K4YRL 31, K4VEC 20, K4ZYI 6, W4RZ 4.

WEST INDIES—SCM, William Manager, KP4DJ—C.D. Radio Officer: KP4MC, QSL Bureau Manager: KP4YT, P.O. Box 1061, San Juan, KP4BJD, in Santurce, joined the AREC and operates all bands, phone and c.w. KP4BAU, at Ramey AFB, has a weekly sked with W8UPJ for Ohio and Michigan traffic. KP4AFI, worked mobile on the way to the PRARC elections. KP4WT has a new Hornet tribander beam and a 40-ft. tower. KP4AWH's NYL is studying for her Novice license. KP4BCA put up a Vee antenna for 40 meters that is 536 feet long. KP4DJ brought back a Hy-Gain 14AVS trap vertical from New York.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—Conditions for the Sweepstakes were not so good from here this year. KZ5MQ made only 160 contacts and KZ5TD logged only 150 which is somewhat lower than the usual 400 or better contacts for this contest. One station worked claimed all 73 sections and was glad to get the Canal Zone. KZ5MQ has shifted location back to Gatun. KZ5KR is temporarily off the air because of transmitter troubles. KZ5BL is operating and maintaining schedules on 10 meters with his new HT-37. KZ5RW and KZ5HJ are getting ready for 40-meter operations. KZ5LC has offered to match anything the

(Continued on page 136)

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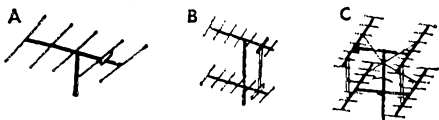
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2 Meter 7 element	A144-7	8.85
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6 Meter 3 element	A50-3	13.95
6 Meter 5 element	A50-5	19.50
6 Meter 6 element	A50-6	32.50
6 Meter 10 element	A50-10	49.50

DUAL STACKS (B)	Model No.	Ham Net
3/4 Meter 22 element	A430-11 D	18.50
1 1/4 Meter 22 element	A220-11 D	22.90
2 Meter 14 element	A144-7 D	21.25
2 Meter 22 element	A144-11 D	29.00

QUADS (C)	Model No.	Ham Net
3/4 Meter 44 element	A430-11 Q	43.00
1 1/4 Meter 44 element	A220-11 Q	54.50
2 Meter 28 element	A144-7 Q	62.50
2 Meter 44 element	A144-11 Q	76.00

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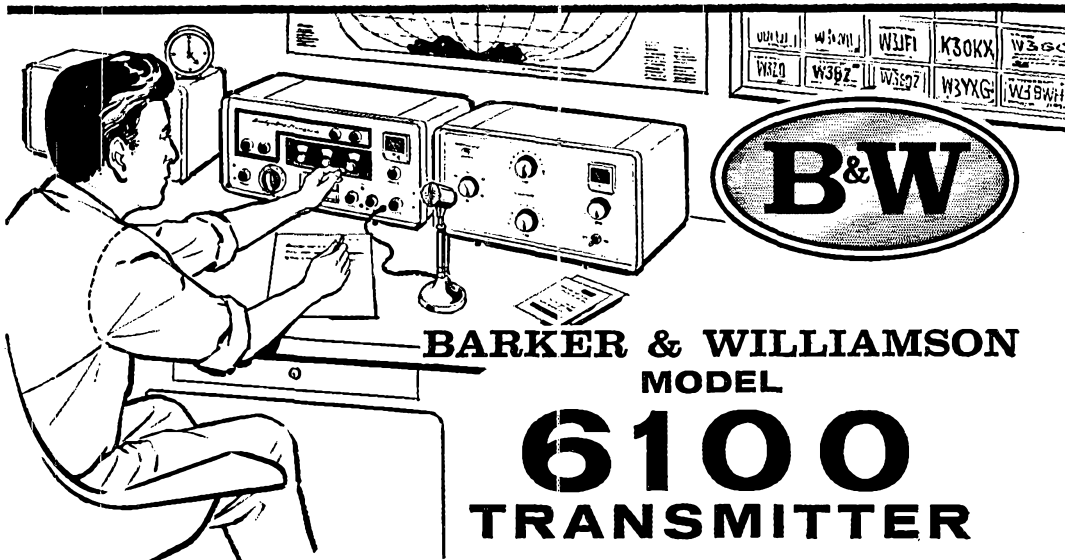
CZARA puts up for the building fund, it was reported at a recent meeting. Election of officers took place at the CZARA meeting in January. Traffic: KZ5TD 9.

SOUTHWESTERN DIVISION

LOS ANGELES—SCM, Albert F. Hill, jr., W6JQB—Asst. SCM, W6KGC, SEC: K6YCN, RM: W6BHG, PAMs: W6ORS, K6PZM. The following stations earned BPL for November traffic: K6EPT and W6GYH. Congrats, fellows! W6CK and his NYL have been gallivanting around the country of late. New officers of the Ramona Radio Club are K6GWH, pres.; WA6TWS, vice-pres.; K6GJV, secy.; WA6UPV, treas. The Duarte gang is on 160 meters with K6BOD, WA6CDY, W6RPX and K6YGH. WA6CKR is making week end trips in the camper and meeting a batch of the gang. W6AM has 4 rhombies moved to new locations on the reduced "antenna farm"! W6VOZ was "star" in a play at Norton AFB. K6CDW reports nice work in the SS. WA6HUO is very busy with the AREC and c.d. as a result of publicity given on the SET! K6UMV reports a new harmonic, girl type. Congrats, Don! We welcome to the section ex-W3WRE, who was the SEC of the W.Pa. section and now is W6BBO. Glad to have you Lou! K6KUU is active on 80 meters with a Viking Ranger. New officers of the So. Calif. Chapter of the QCWA are W6EKM, chairman; W6YRP, vice-chairman; W6AYF, secy.; W6AMZ, treas.; W6GH, historian. WA6LGZ has a new Pawnee on 2 meters. WA6YWR is now on 6 meters with a Heath Sixer. Activity in the Blythe Area from Midland are WA6ZNG and W6ZWT. Support your section nets. On c.w., the Southern California Net meeting on 3600 kc. at 0300 GMT daily; on phone, the Southern California Six Net (SoCal 6) meeting daily on 50.4 Mc. at 0300 GMT and 2000 GMT. Traffic: (Nov.) K6EPT 894, W6GYH 483, K6MDD 396, W6WPF 373, K6YVN 234, W6QAF 154, WA6KAW 92, WA6WTK 87, W6BHG 30, WA6TWS 74, W6USY 53, K6SLX 48, K6UMV 43, WA6ORS 4, W6VOZ 4, W6CK 1, W6VUZ 1. (Oct.) WA6VIK 30.

ARIZONA—SCM, Kenneth P. Cole, W7QZH—Asst. SCM/SEC: K7NYV, PAM: W7OIF, RM: W7LND. The Copper State Net meets at 1930 MST Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 0800 MST on 3880; the Tucson AREC Net Wed. at 1900 MST on 3880; the Cochise County AREC Net each Sun. at 1400 MST on 7260; the Tucson 2-Meter Net at 1000 MST on 145.35 Mc.; the Arizona Interstate Net, c.w., Mon. through Fri. at 1900 MST on 3555 kc.; the Maricopa County AREC Net each Thurs. at 0200 GMT (7 p.m. MST) on 28,620 kc. Please note the Maricopa County AREC Net change from Mon. to Thurs. The Pima County Simulated Emergency Test was conducted on Oct. 7 from 1300 to 1700 MST in conjunction with the ARRL Annual SET. Emergency traffic out of the Killito-Murana Area, which had been flooded by a rampaging Santa Cruz River and from the site of a derailed Southern Pacific express train, was well-handled by the following: W7s PCX, LZL, HWJ, IWJ, ZFC, DRU, SQX, LHN, JVK, CAD, CFR, LFN, K7s CRO, GJL, DDX, CET, IBX, OPX, UEA. Also assisting were W7s AMM, TCQ and KYP. W7DRU was NCS on 2 and K7CET was NCS on 75 meters. The exercise represented the combined participation of members of RACES, AREC, MARS, and Pima County Search and Rescue communications groups. On Oct. 27 from 0500 to 1500 MST AREC members helped furnish communications for Pima County Sheriff's Search and Rescue teams who were aiding the Arizona Wing of Civil Air Patrol in their test given by the U.S. Air Force. The mission was to locate two (2) simulated plane crash sites and rescue survivors of the crashes. Radio traffic during the ground rescue phase was handled by AREC members W7s SQX, DRU, HWJ, CUR, ZFC, QNC, K7s CRO, CET and GCC. K7EVZ, K7HPV and K7KZE handled traffic as part of the CAP communications team. Due to the efforts of K7RUR a chapter of the QCWA has been established in Arizona. K7RUR was elected chairman; W7CS, vice-chairman; K7TJN, secy., treas. All amateurs who have held a license for 25 years or more are cordially invited to contact one of the three (3) above regarding membership. This year, as in the past 10 years, the amateurs in the Phoenix area set up shop in the farm store museum to accept Christmas messages and explain amateur radio to the general public. Over 500 messages were forwarded. Portable stations on 2, 20 and 75 meters used the club call W7IO. W7GO stole the show with his spark-gap transmitter. K7RDH is mobile on 8 meters in the Gila Bend area. Traffic: K7RUR 20, K7CET 7.

SAN DIEGO—SCM, Don Stansifer, W6LRU—Convention Chairman K6BPL reports the convention committee is organized and meeting regularly. From advance plans it looks like the 1963 Southwestern Division
(Continued on page 188)



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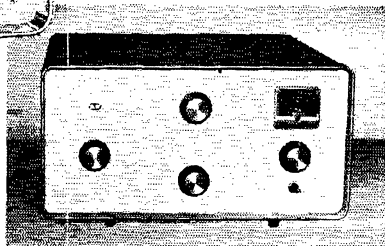


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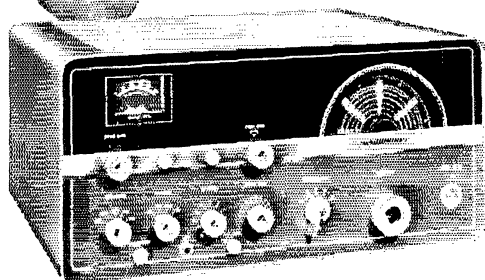
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Convention here in San Diego Oct. 11-13 will be a big one. W6SYA spoke to the Astro Club about his experiences in a sub under North Pole ice. ZL1ABZ was country No. 300 for K6EC, who becomes the third San Diego DXer to reach 300. W6BGX, ex-San Diego ham, is now active portable 7 in Fallon, Nev. The 1963 chairman of the San Diego County of Amateur Radio Organizations is W6SK. WA6EYX has been appointed EC in Escondido and is doing a fine job. The new OO in Orange County is WA6VJV, former OO for the FEARL in Japan. A San Diego Chapter of the QCWA was formed in December at a meeting held at the Midway Chuckwagon and was attended by over 75 persons. The Newport Club enjoyed a family Christmas Party in December. Elections were held by the Orange County Club and will be listed next month. Attendance at the council meeting in November was much improved; was your club represented? If not, get representation at the meetings and have your club share in convention planning and work. Call W6SK, W6RCD or W6LRU for further information. The Guam disaster made some fantastic traffic totals for November, with W6IAB handling over 8000 pieces of traffic. WA6ROF, in Orange County, was visited by W4UGI at Christmas time. WA6YSQ is a new General in El Cajon. K6BTO has now worked five RTTY stations on 222.52 Mc. Traffic: W6IAB 8137, K6BPI 4174, W6YDK 3212, W6EOT 396, WA6ROF 244, WA6CDD 87, K6IME 83, K6KGR 73, K6TKD 35.

SANTA BARBARA—SCM. William C. Shelton, K6-AAK—WB6BMJ and WN6ATF are AREC members. We need more AREC membership applications and an SEC plus ECs for all areas of the section. WA6PFF has been appointed OPS. Incidentally, WB6BMJ is a real old-timer from Ohio. Welcome to California, Francis. I need reports from the many nets active in the section to include in the records. The most active nets to my knowledge are the Oxnard Emergency, Poinsettia and the Channel Cities 2-Meter Nets. How about some reports of your activities? I got out of the hospital after an auto accident just in time to make the deadline for this report, so I may have missed something. W6BJM was a nice kiver at the S.S.B. Convention. K6DXW is active in RACES.

WEST GULF DIVISION

NORTHERN TEXAS—SCM. L. L. Harbin, W5BNG—Asst. SCM: E.C. Pool, W5NFO. SEC: K5AEX, PAM: W5AYX, RM: W5LR. The Terry County ARC held its Annual Swapfest Nov. 11 with the usual 500 in attendance. More than 65 attended the Saturday night get-together and took part in discussions about RACES, AREC, MARS and traffic handling. This was a very interesting and informative meeting and was enjoyed by all. Nov. 11 was designated as "E.C. Pool, W5NFO Day" by the Brownfield Chamber of Commerce. A nice plaque and proclamation was presented E. C. in recognition of his outstanding efforts in promoting amateur radio. Five girls from Girls Town U.S.A. were presented their General Class licenses by E.C. The Permian Basin ARC had a booth at the Oil Show in Odessa Oct. 18 through 21 and 245 stations were conducted with 180 messages being handled. The guest sheet was signed by 46 visiting hams. New officers of the Central Texas ARC are W5BOO, pres.; WA5BPM, vice-pres.; K5JMC, secy.; W5GLY, treas. The club will hold its regular code and instruction class beginning the first Mon. night in March. K5RSK has been reappointed EC for Potter County. K5OV is the new EC for Armstrong County. WA5DCH reports plans for the organization of a 2-meter net in the Northern Texas section. K5HUR is a newcomer on 6 meters. K5ERQ reports openings on 6 to W8-, W4-, W2- and W0-Land during October and November. K5AKB is busy modifying a KC-640 for 6 meters. Traffic: W5BKH 216, W5BOO 28, W5GY 21, W5BNG 10.

OKLAHOMA—SCM. Adrian V. Rea, W5DRZ—The Oklahoma Central V.H.F. Net is getting a good start with W5PPE as manager. Net frequency is 50.42 Mc. K5BBA has a new SX-101. W5YLH and K5JTG have new homebrew s.s.b. rigs. New officers of the North Fork Amateur Radio Club are W5TKE, pres.; K5GTR, vice-pres.; K5JCH, secy.-treas.; W5FRB, bulletin editor. K5LGV recently acquired a new partner; her name is Vicki. K5JPZ's son, K5HXL has received his discharge from the Army after a stint in Germany. W5QAC is back in business on 2 meters. W5FRB is back at work after an illness. W5ADC says he is doing his best to increase the ham population of Holdenville. K5TZS has a new home in Henryetta. WA5CWH has a new Heath Tower. Just wonder if that radio gear and generator K5CKS took to Colorado with him had anything to do with his getting his limit of deer? W5QMJ is the new NCS on RN3. This net is part of

(Continued on page 148)

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the National Traffic System and meets nightly. K4AKP is the new Region 5 net manager. K5FSU has a new Apache. K5AUX is operator of the month for Oklahoma. Frank is carrying a big load on the SSZ (slow-speed c.w.) Net. He needs NCSS. Wonder if W5LXH ever got his telephone pole up? Traffic: (Nov.) K5TEY 296, K5IBZ 228, W5PPE 192, W5JXM 142, K5AUX 101, W5DRZ 96, W5QMJ 68, K5ZCJ 43, W5JMJ 42, K5OCX 37, K5YTH 35, W5CCK 22, W5FMX 17, K5FSU 15, K5JOA 14, W5VJG 14, K5VNJ 14, K5ZEP 12, K5RWL 11, W5PML 10, W5EHC 9, K5OOV 8, W5PFG 8, K5CBG 6, W5FKL 6, W5MGZ 3. (Oct.) K5TEY 355.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and H. C. Hillyard, VOICZ. Congratulations and best wishes to VE1VJ and his NYL on their recent wedding. VE1AHY has transferred from Sable Island to Newfoundland. VE1KG recently returned from a trip to VP9. VE1PB has a new 75S-3. VE1PV and VE1VQ report good results working aeronautical mobile on 6 meters. Ex-VE1ADN is now signing VE3FKB. VE1AL will celebrate 50 years in amateur radio on April 13, 1963! The School Boys' Net meets daily (except Sun.) on 3770 kc. at 1730 AST. Officers of the Sydney Club are VE1AJ, pres.; VE1AJ, vice-pres.; VE1RB, secy.; VE1ABM, treas. VE1DO is transferring to south of the border. A strenuous effort is being made to reactivate the AREC. Your assistance and cooperation is needed in this work. It seems that no one has the courage to take on the Section Emergency Coordinator's post! Sincere thanks to the many who assisted the Boy Scouts' Jamboree-of-the-Air. The Jamboree Committee is pleased with the results and deeply appreciates your efforts. Traffic: VE1RT 38, VE1OM 10, VE1AEB 2.

ONTARIO—SCM, Richard W. Roberts, VE3NG—VE3CYR, mgr. of the OQN, invites newcomers to join the net. Speed is *not* a must. OQN is part of the National Traffic System, Niagara Penn. ARC voted all its executives back in for '63. VE3WX and VE3ACM are Silent Keys. Our congratulations to VE3UW, of Downsview, our new QSL Manager for Ontario. Our sincere thanks and appreciation to Les Whetham, who resigned in early December. The Windsor ARC was hard on the heels of Nortown and Scarborough for Field Day honors. VE3BSZ and VE3BTT are Advanced Class amateurs. VE3DIR has 39 states on 144 Mc. Many of the VE3 clubs have completed their 2-meter projects. We suggest that these groups form 2-meter nets locally. Write to the SEC, VE3AML of Sarnia, for appointments as EC or the SCM for PAM appointments. VE3EZI is awaiting her award certificate for coming in first in the recent YL/OM C.W. Contest. VE3CAV is on 2 meters. VE3AHU has a new beam. VE1ADR is now in Kingston. VE3NF has plans for a tall tower. VE3EIG is running frequency tests with the local gang in Sudbury. VE3QD and VE3CGP are mobile. VE3CYR now has his 25-w.p.m. sticker. North Bay held a successful SET under VE3DXG, the EC. VE3EWD has returned to the air. VE3KK has returned from a session in the Windsor Hospital. The Lakehead ARC has a new paper called *Hi-Q*. VE3EEG is editor. VE3EO has a new car and will be mobile. VE3CXZ is on phone in Sarnia. VE3CDI is recovering. VE3BSB is on 144 Mc. VE3EWE is back from Europe with a bride. VE3BCL has gone to the Congo. Traffic: (Nov.) VE3CVR 175, VE3COW 76, VE3EHL 67, VE3DRF 58, VE3GP 58, VE3FES 54, VE3EIM 43, VE3BAQ 36, VE3AML 35, VE3RUR 29, VE3FAU 29, VE3RN 29, VE3CUL 28, VE3ELQ 27, VE3DWN 24, VE3DU 24, VE3BZT 17, VE3AG 17, VE3BUR 12, VE3AKQ 10, VE3CFI 10, VE3OT 10, VE3APK 8, VE3DH 7, VE3CE 5, VE3VD 2. (Oct.) VE3DXG 117, VE3BZT 73.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Jean P. Achim, VE2ATL, VE2WW scores a Canadian First. In his Beacraft Bonanza (CF-FZC) he operated "aeromobile" and picked up 28 countries and AVAC. He claims reception with a vertical antenna is FB up in the sky. VE2NV, VE2WY and VE2YA tried a shunt-fed tower (QST, June '60) on 40 and 80 meters with good results. We now have an Official Observer, VE2AQV. VE2BB (RM) is active again. Quite a few VE2s "visit" the Ont.-Que. C.W. Net (0001Z, 3535 kc. daily) and we hope all will become permanent dwellers. VE2HN skeds his son via VE3UOW. Recent DX visitors to Montreal: VQ8AV, DJ1MM and G3LBM. VE2AQV enjoys 2 meters with 30 watts and a 10-element beam. MECC activities are frequently interspersed with simulated emergency exercises which are educational and well attended. Christmas and New Year "suck" up on us. Our belated best wishes to all of you; hope your resolutions included more reports to the SCM, who is always starving for news. Con-

(Continued on page 142)



FORT ORANGE

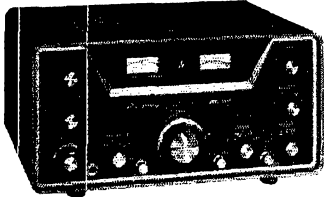
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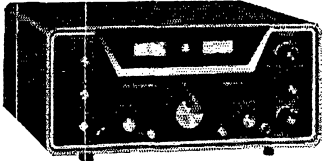
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P-150 AC power supply.....\$99.50
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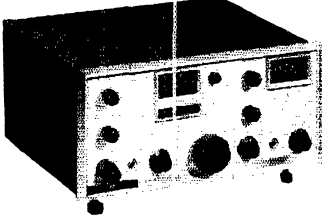


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	WWV

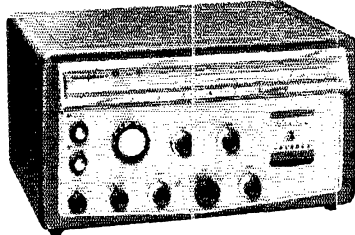
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NATIONAL NCX-3 TRI-BAND TRANSCEIVER

3.5, 7, 14 mc. 200 watts SSB PEP, 180 watts CW, 100 watts AM. SSB and AM-VOX or PTT; CW—grid block break-in. Receiver sensitivity 1 μ v for 10 db S/N. Requires 700 VDC @ 300 ma, 280 VDC @ 100 ma, -80 VDC @ 10 ma, 12.6 V @ 5A.

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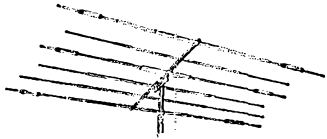
Power Input: 200 watts PEP, 200 watts CW, 90 watts AM.

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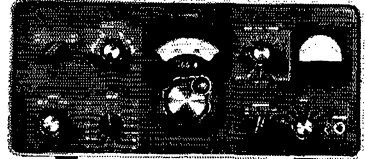
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4 Elements on 10
3 Elements on 15
3 Elements on 20

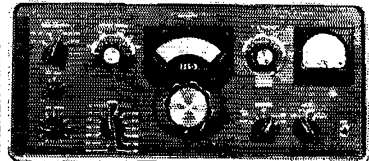
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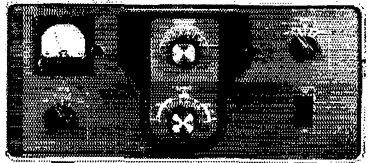
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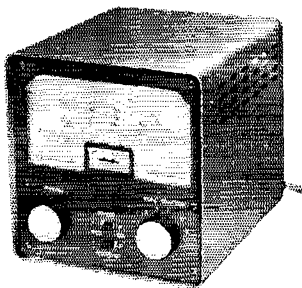
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COUNCIL BLUFFS, IOWA

gratulations to the South Shore gang on recapturing Field Day honors. We regret reporting two Silent Keys: Bert Wilson, ex-AE2HO, and VE2EX. VE2ATL reports: VE2BAC is active on 75- and 20-meter phone. VE2BFE now signs VE8PC with the R.C.A.F. VE2AXN est. actif sur 40 m. Un bon nombre d'amateurs du Quebec ont assiste au Bar B-Q de VE2DN. VE2BHA, VE2ALF, VE2ATE or VE2KC experimentent sur 2 m. Resultats des elections a J.C.: Pres. VE2AJV; ler V-P, VE2ABE; 2e V-P, VE2BKE; sec., VE2BJY; treas., VE2AWR; dir., VE2PY or VE2ATL. Traffic: VE2DR 54, VE2AUU 37, VE2AGQ 27, VE2FB 25, VE2BG 21, VE2AGM 9, VE2SC 8, VE2AQV 5, VE2AJD 4.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS, PAM: VE6PV, RM: VE6AEN, ECs: VE6FK, VE6SS, VE6ABS, OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, OOs: VE6HM, VE6NX, VE6PL, OBS: VE6HM, ORS: VE6BR, OESs: VE6HO, VE6DB, VE6-DB is busy inspecting boilers away from home a great deal so has no time for listening. VE6HO goes to town occasionally on 2 meters and gets DX. The Vulcan county radio club now is an affiliated club. Other clubs, please take note and watch Vulcan make your club look small. VE6HM is doing well with Official Bulletins. VE6SS would like contacts with any ex-members of the 16th Canadian Scottish CEF, Sig-Soc. The 106-m.p.h. wind on Nov. 19 was a good test for antennas here. We now have four affiliated clubs in the Alberta Section—Vulcan, Lethbridge, Calgary and Edmonton. Our PAM reports poor band conditions this month with 352 check-ins. VE6PV, VE6AAX and VE6UH had perfect scores. CARA's 1983 officers are VE6AAT, pres.; VE6-ADL, vice-pres.; VE6AGF, secy.; VE6AAL, treas. Do a good job, fellows, and bring up your AARRL membership. Traffic: VE6HM 158, VE6AEN 10, VE6FS 6, VE6PL 6, VE6VE 5, VE6AFJ 5, VE6SS 4, VE6WN 3, VE6CA 2, VE6BL 1, VE6FF 1, VE6UH 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—S.s.b. has taken my RM. If anyone finds him on a stray sideband, please route him back to us. The AREC program is well on the move and there still is room for you. See your EC or contact Bill Orhard, VE7OM, your SEC. Eva and Alan have worked up quite a nice AREC program for their district. VE7AGF lays claim to a 75-meter beam; if he could rotate the house it acts as a reflector in one direction. VE7BJV is our newest ORS. Have you been listening to 3650, the BCEN. If so, give it a whirl. The BCARA annual cup award for the amateur who has done the most for amateur radio in B.C. in 1982 goes to an amateur who has done much to promote the good will of our hobby. Congratulations from us all. VE7BBL, of the Burnaby Amateur Radio Club, VE7ALU is back home so now we will hear another signal from the North. VE7BPW found that Mr. Newton and his laws of physics were correct. He rolled his car and ended up himself somewhat damaged. The East Kootenay ARC reports two new members from their radio classes: VE7BKR and VE7BKW. The BCARA reelected VE7ALE, pres.; VE7DZ, vice-pres.; VE7YG, secy.-treas. On Field Day the Vancouver ARC lost a 90-ft. tower which cost the club \$150. Traffic: VE7AGF 120, VE7BJV 76, VE7AC 15.

MANITIBA—SCM, M. S. Watson, VE4JY—The WARA reports a successful year, both financially and in membership increase. Sorry to hear that VE4AB and Pat are moving to Edmonton. VE4JW reports plenty of activity during the Scout Jamboree and the Oct. CD Party. VE4WS and his NYL have built a fine home on the farm. VE4JW and Margaret recently celebrated their 25th wedding anniversary. VE4MN and Delsie are the proud parents of twin girls. The 6-meter boys had a successful transmitter hunt recently, VE4PU being the winner. The ARLM November meeting was favored by a showing of colored slides and a travel talk by Geo. R. Tatlock. Congratulations to VE4BJ on making the top score in the RTTY Contest, to VE4ON for 200 countries confirmed, to VE4IM for making the top score in the W/VE Contest and to VE4ZX on his top score in the Bermuda Contest. Traffic: VE4JY 18, VE4JA 11, VE4NW 5, VE4GB 4.

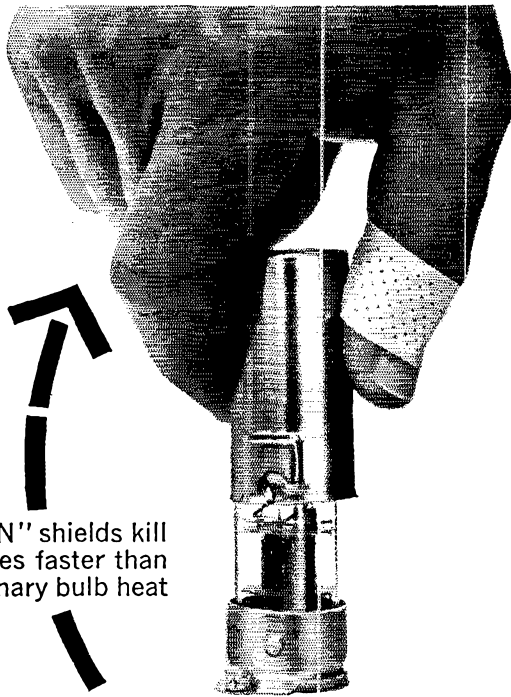
YL News and Views

(Continued from page 69)

Lillian Byrne, K2JYZ, vice-president of the YLRL, who tabulated the contest results, advises that any logs received after the deadline date of Nov. 22, 1962, were used only as confirmation logs.

K0IKL takes the Corcoran Award (a copper plaque donated by W8TPZ and her OMD) from highest combined phone and c.w. scorer for the past two years Harriett

(Continued on page 144)



1.

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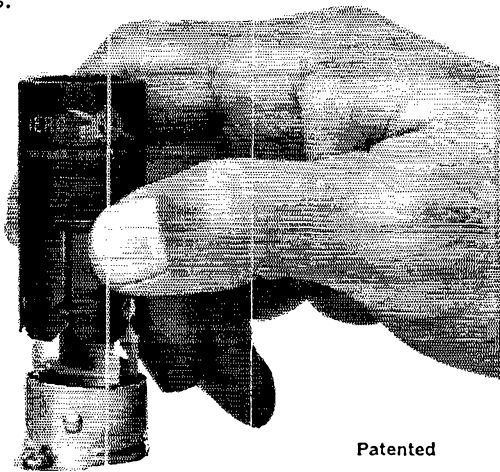
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 6, 10, 15, 20 M. Net \$16.95

(Continued from page 142)
 Wochst, K5BJU. (It takes a three-time win to retain the cup.) The highest phone log and c.w. log in each district and country will receive a certificate.

YL and YF

From Lt. Colonel Lloyd Colvin, W6KG, comes the following suggestion on the "What to call YLs and XYLs" issue —
 "I wish to offer my solution on what to call our lady operators. Approximately 25 years ago I invented the term "YF" for married lady operators. Of course, YF stands for wife. All other lady operators can be called YLs and the problem is nicely solved."
 We think this suggestion is one of the best yet offered — and to think — it occurred to W6KG 25 years ago. What say, YLs and YFs, your comments, please!

Coming Events

Annual California YL Get-Together — April 5 and 6 in Santa Monica at the Miramar Hotel. The Los Angeles YLRC is hostess this year. Registration Friday evening; YL luncheon Saturday; YL-OM dinner Saturday evening. K6BUS, Midge, is chairman of arrangements.

Silent Keys

It is with deep regret that we record the passing of three YLs — Mary Lehard, WA6EZK, South Gate, Calif.; Carolyn S. Murray, K7TWR, daughter of K7TWP and K7TWQ, Walla Walla, Washington; and Joy Lannin, K2HWM, formerly W3RXD, wife of K2HWL, in Holbrook, New York.

Survey of Communications Practice

(Continued from page 54)

c.w. and phone, for example. It will be found particularly useful when we take a look at the distribution of amateur populations on a world-wide basis and examine their operating habits.

One factor, which stands out above all others, is the unequal ratio of c.w. to phone channel assignments. It should be recognized that factors which degrade communication capability apply equally to both modes of transmission. It appears desirable to consider the equalization of the sub-band assignments from the standpoint of the communication capability available to them.

The use of standard a.m. transmission on these bands degrades the communication capability very drastically. From this standpoint of bandwidth, one a.m. station takes the spectrum space used by three s.s.b. stations. The non-information-carrying a.m. carriers produce interference which cannot be calculated accurately in terms of spectrum waste. In all probability one a.m. station produces as much QRM as four s.s.b. stations.

Is it not high time to ban the use of a.m. transmission on these bands on a programmed basis, allowing time for conversion to side-band? How about January 1, 1964, on the 20-, 40-, and 75-meter bands as a starter? Action on 15 meters can be taken later on as the need arises. As a group, U. S. phone men simply cannot afford to put up with any form of spectrum waste much longer. It is not a case of liking or disliking a.m. It is absolutely necessary that we begin to utilize the spectrum space available to us as well as the state of the art permits. There are far too many

(Continued on page 146)

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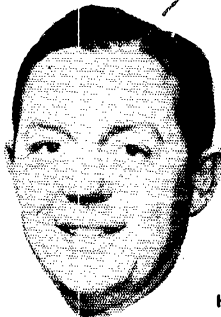
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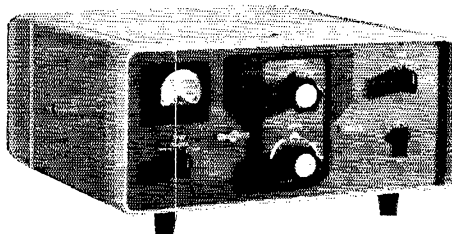
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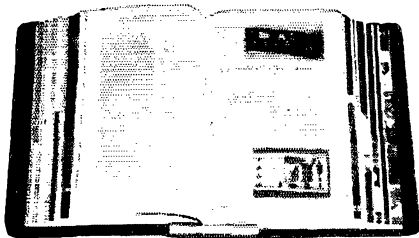
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of us already, and we are increasing in numbers at an extraordinary rate.

— . . . —
This completes Part I of this survey. During the interval before Part II appears, the writer can think of no better exercise than to use the $Q = N/C$ formula on all of the ten sub-bands in Table II, inserting various percentages of our total population of 250,000 amateurs as you see fit. This is suggested because Part II will be concerned with the effects of human behavior patterns on amateur radio operator activity. If you do this homework, you will be able to grasp the importance of human behavior faster than you can spell antidisestablishmentarianism phonetically. QST

Wasp Discontinued

(Continued from page 33)

That's the first honest . . ."

"OK then, the guys who work a hundred WORMS gets a WOW. Eager beavers with a hundred WOWS get a WHY. And all them beautiful stickers and ribbons and stuff as usual for everything. Right? Nothin' to it. They'll all love us again!"

"Holy cow, Charlie!"

"Well, now, fella, maybe we can make a COW endorsement, if ya want one. Lemmee seeeee Maybe we could make it so's every time a guy who's a WORM works another WORM, they trade little stickers that look like legs, see? Then these guys could paste the legs on their WORMS—see—and this makes Centipedes Out of Worms! Got it. Centipedes Out of Worms—C O-W—COW. Got it? Nothin' to it. There's your COW endorsement, fella! Now then maybe we should make it so as guys who get COW and Another Ten Stations could get the CATS endorsement! Get it?—C-A-T-S! Then maybe guys with CATS who Really Operate With Side-band could get . . ."

QST

Second European Foxhunt

(Continued from page 45)

The International jury announced the following results:

II European Championship in Fox Hunt on 144 Mc.

Teams Results

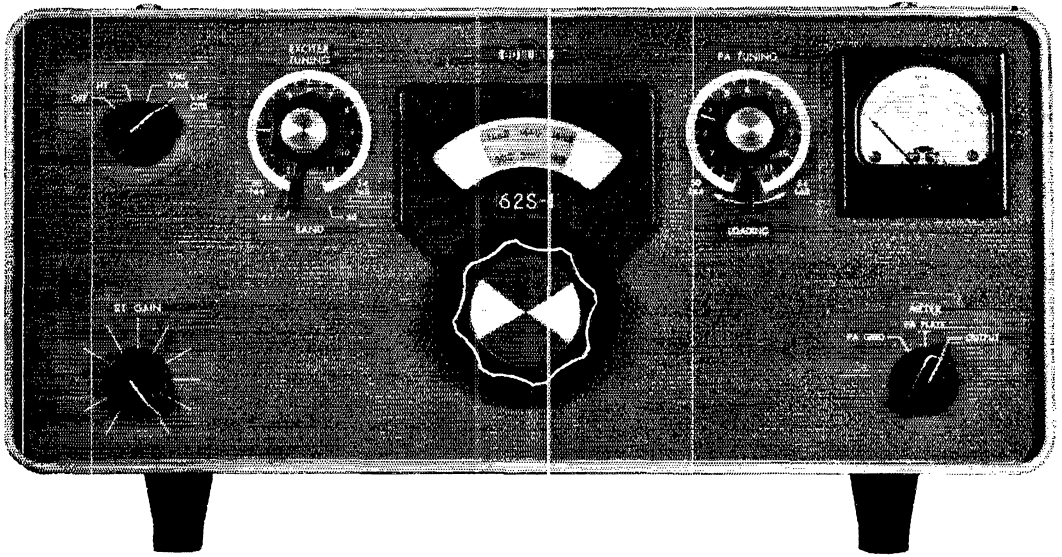
1. UA-Team	6 foxes	1,32' 30"
2. YU-Team	6 foxes	2,58' 00"

Place	Name and call sign	Total time
1	Anatolij Grecihin, UA3TZ	0.38' 00"
2	Ivan Martinov, UA3KBW	0.48' 00"
3	Aleksander Akimov, UA3AG	0.54' 30"
4	Martin Cavells, YU6GF	1.00' 00"
5	Igor Salimov, UA3AEF	1.07' 30"
6	Tomislav Laco, YU4CFG	1.08' 00"

(Continued on page 148)

Double your frequency coverage with **COLLINS NEW
62S-1 VHF CONVERTER**

Double your frequency coverage with **COLLINS NEW
62S-1 VHF CONVERTER**



Get full 6 and 2 meter operation simply by flicking a switch. And without changing cables. Collins 62S-1 is a self-contained (using exciter's high voltage) unit and supplies 3 to 5 db noise figure on receive . . . 160 watts PEP input on transmit.

The 62S-1 covers 49.6 to 54.2 mc and 143.6 to 148.8 mc (crystals for amateur bands provided). Crystal switching provides a choice of any one of twenty-three 200 kc bands in the 6 and 2 meter range.

Collins new VHF converter is system engineered for the S-Line/KWM-2 and needs no additional power supply when used with this equipment. Also, the 62S-1 can convert most equipment operating in the 14.0 to 14.2 mc range.

See the entire Collins S/Line . . . stop in soon.

62S-1 VHF CONVERTER

\$895.00

Weight 25 lbs.

Height 7 $\frac{3}{4}$ "

Width 14 $\frac{3}{4}$ "



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 CITIZENS BAND—11 METERS—.005% Tol. ... \$2.95
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FT-243 Holders 5700 KC to 8700
 KC in steps of 25 KC's

\$119
ea.

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80 Meter 3701-3748—Steps of 1 KC. FT-243 **149**
 40 Meter 7150-7198—Steps of 1 KC. FT-243 ea.
 Dbl. to 40 Meter 3576-3599. Steps of 1 KC. FT-243
 15 Meter 5276-5312—7034-7083 Steps of 1 KC. FT-243

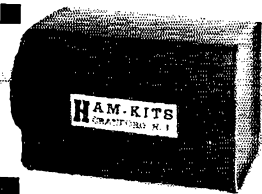
FT-243—2 Meters (Steps of 1 KC) ... \$1.49
 FT-243—6 Meters (Steps of 1 KC) ... \$1.49
 FT-243—From 3000-4000 ... \$1.49
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 SWR 1.2 to 1.

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7	Veselin Babic, YU6BLM	1.10' 30''
8	Ivo Prime, YU3DL	1.3' 30''
9	Sevaljevic Sava, YU6BLM	1.16' 30''
10	Antoni Hadydin, SP9QZ	1.18' 30''
11	Gunnar Svensson	1.19' 00''
12	Veajak Zdravko, YU3CW	1.19' 00''
13	Susan Sundukovic, YU2NXC	1.31' 30''
14	Milan Bah, YU2NBZ	1.38' 30''
15	Aleksander Tosic, YU1FC	1.39' 00''
16	Radovan Begovic, YU6RLM	1.48' 30''
17	Stanko Kulidzan, YU4GR	2.03' 30''
18	Zoran Nedeljkovic, YU1AHI	2.10' 30''
19	Slobodan Djordjevic, YU5CZY	1.08' 00'' (2 foxes)
20	Sotka Cvetanovski, YU5FEF	0.12' 00'' (1 fox)
21	Joze Vehovec, YU4BMN	0.37' 30'' (1 fox)

To the competition were present as observers
 IIAIV, DLICU and other hams from DL.

Each fox hunt lasted 3 hours. The course of
 competition was followed and announced by
 loudspeakers in amateur's camp for each fox was
 in permanent contact with the control on the
 start by mobile v.h.f. stations. Thus the foxes
 reported the arrival of competitors (their start —
 number and time) which was transmitted to the
 camp by the station on the start. By this means
 a broad auditory of amateurs and other people
 were informed about the course of competition
 and its events.

After the competitions were over the results
 were officially announced on the hamfest when
 the president, SRJ, distributed the prizes and
 badges to the winners.

The representatives of various societies em-
 phasized in their final speeches the perfect
 organization of everything during this Cham-
 pionship, the orderly work of the foxes and other
 technical services. They pointed out the great
 possibilities which such a sport offers to amateurs
 whose technical knowledge, good physical condi-
 tions and sense for orientation could be displayed
 in full light.

Each one of them concluded with the hope
 that the next Championship will see a much
 greater number of competitors from many other
 countries. — YU1AA

QST

The World Above 50 Mc.

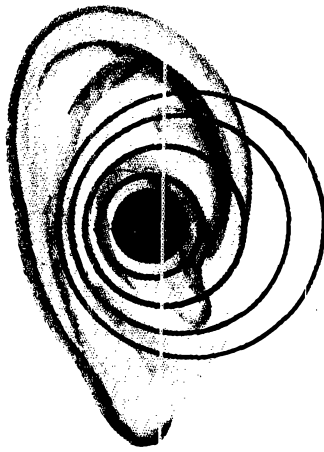
(Continued from page 64)

Shelby could read him very clearly through the telephone.
 Approximately two hours later Shelby made his own contact
 with K7HKD for the "First Wyoming" from 4 land.

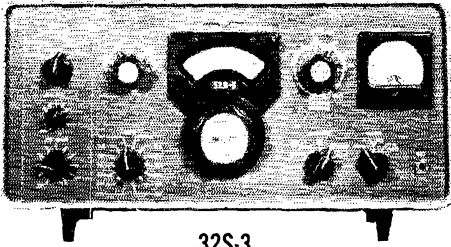
The Leonids were also good to W6LFE who worked
 W7JRG in Billings, Montana for state number 30 on 144
 Mc. Ed also got complete calls from K7HKD but was un-
 able to get all the information across for a contact; and also
 heard pings from W8EYE in Colorado but no contact.
 Activity on two-meter s.s.b. is quite high in the Missouri/Illi-
 nois area according to W6LFE and frequency for the side-
 banders is 144.350. Seems like K7HKD was a very busy
 boy during the Leonids 'cause we hear from Ernie, W7LHL,
 that he also kept skulls with Hal but he also had no luck.
 Although Ernie heard a number of bursts from K7HKD
 Hal received only Ernie's call letters. Better luck with
 W7JRG however on November 17 when W7JRG and
 W7LHL had a contact and exchanged full information on a
 burst lasting one minute and twenty seconds. This brings
 states worked on 144 Mc. up to seven for W7LHL.

The Leonids brought good signals from the North/South,
 but poor ones from East/West according to Jack, W8PT
 in Benton Harbor, Michigan. He heard very fine signals
 from K4LXC and nothing at all from K7IDD or W8IUF.

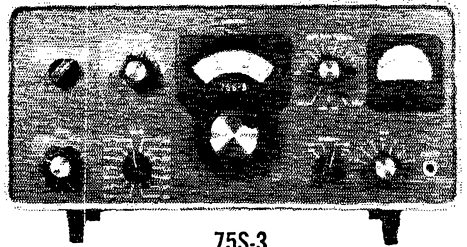
(Continued on page 160)



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The 75S-3 provides SSB, CW and AM reception between 3.4 and 29.7 mc (except 5.0—6.5 mc) Features incorporated in the 75S-3 include dual conversion with a crystal-controlled first heterodyning oscillator; bandpass first IF; stable, permeability-tuned VFO; RF amplifier designed to minimize cross modulation products; 2.1-kc Mechanical Filter and 200-cycle crystal filter; both product and diode detectors, rejection notch filter, manual and crystal BFO, and AGC time constant control.

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AMERICAN RADIO RELAY LEAGUE

West Hartford 7, Connecticut

Jack also comments that there were several good nights for tropo contacts on 432 Mc. during November, particularly the 26th, 27th, 28th and 29th.

More Meteor Shower results from K9UIF who worked W0MOX and W0BYE both in Colorado to give those boys their first Indiana contacts on 144 Mc. Nevada was also represented during the Leonids, by K7ICW who sez: "Leonids best intermediate shower ever heard here. W0ENC was heard nineteen out of 60 minutes with many pings and burst heard along with three loud screamers lasting up to 25 seconds. We almost had a QSO on this one. W0ENC heard on 83 out of me along with the i.d. Sked with W0MOX produced only one 8-second burst with positive call sign i.d. Results were nil at his end. Have many hopes for coming Geminids skeds in December."

WA2EMA is one of the active schedulers for meteor showers and sent in his report: Sked with K4LXC was completed on December 12 (Geminids) at 2035 making a new state for K4LXC. Also on the 12th successful contact was made with W0BFB in Iowa making state number 19 for Bill on two meters.

QST

Double-Conversion V.H.F. Converter

(Continued from page 18)

frequency ranges desired. The desired injection frequency for two mixers will always be half that required for a single mixer with the same output frequency range. For example, if one wants to use the range from 3.5 to 4 Mc. for tuning the low end of the two-meter band, 144.0-144.5 Mc., the injection frequencies would be 140.5 Mc. for single conversion and 70.25 Mc. for double conversion. In the case of double conversion, the first i.f. range would be 73.75-74.25 Mc. and the second i.f. 3.5-4.0 Mc.

In double conversion there are two mixers requiring approximately the same injection voltage. If control grid injection is used, it should be noted that the second-mixer input circuit is tuned much closer to the injection frequency than the first-mixer input. This factor must be taken into account in layout of the circuit, and in means for providing injection to the first mixer. In the author's case, sufficient coupling between the oscillator and the second-mixer grid was obtained by positioning the oscillator coil with respect to the second-mixer input coil. A small amount of capacitance between the oscillator tank and the first-mixer grid provided adequate injection voltage to the first mixer.

In conclusion, it should be stated that the usual rules of good circuit shielding are not relaxed by the use of double conversion. Make sure that the only path to the second-mixer grid is via the antenna terminals and preceding r.f. tuned circuits of the converter. This is important because any mixer, being a nonlinear device, is capable of producing beats not only with the injection frequency but with the harmonics of it which are produced in the mixer. Thus, strong signals which find their way to the second-mixer grid because of inadequate shielding can mix with the second harmonic of the injection frequency and be heard in the tuning range of the communications receiver. If, however, ordinary care is taken in circuit layout and shielding, the net result is a v.h.f. receiving system of highly satisfactory performance.

QST

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LIGHT • STRONG

2 METERS	MODEL	CP-2A	24.00 net
6 METERS	MODEL	CP-6A	48.00 net
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The following models are cut to exact frequency

30 to 50 MC	MODEL	CP-30A	57.00 net
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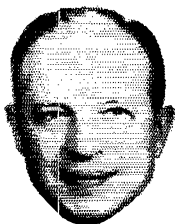
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NEW

Collins

62S-1 VHF CONVERTER

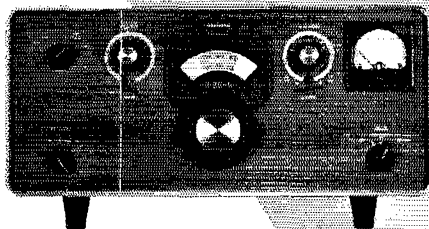
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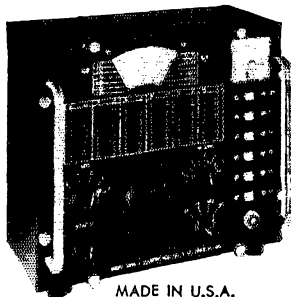
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Accurate to approximately 10%
- ✓ 360 kc. to 30 Mc. in six bands. 1% calibration accuracy
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Interlaced Quad Array

(Continued from page 14)

RG-58/CU used by the writer be employed in duplication of this array, particularly if the line run is to be appreciable, or the power output of the transmitters is in excess of 100 watts. Finally, once the neighbors become accustomed to the sight of "the thing" in the air, the user will find that it performs very well for its size and weight, and he can be quite happy with his choice of something a little out of the ordinary in the way of v.h.f. antenna systems. QST

How's DX?

(Continued from page 69)



VS6EP was recently voted Hongkong Amateur Radio Transmitting Society's award as outstanding member of the year (see p. 65, March '62 QST). Paul gives many a W/K a "first VS6!" QSO with this outfit in Kowloon. (Photo via K2UYG)

run into the show beginning at 1830 GMT. . . . Ws 1GKK 1BII 1JYH and 2WZ pace North Eastern DX Association DXers with 325, 318, 317 and 314 countries. Ws 2WZ 1FZ 2VCZ and 1BII lead the phone totals with 270, 264, 253 and 236 in the bag. . . . Florida DX Club's DXCC parade is led by Ws LVV 1AI AZK and K4PDV with 297, 297, 295 and 285 countries. W4ANE, K4HEF, W4 CWV and PAA head the phone team with 270, 253, 240 and 229. . . . Via the collective clubs press: KP4BIQ and cohorts cast DXpeditionary glances toward Barthelemy, a French island between St. Kitts and St. Martin. . . . XEIs AZ CE and GJ are lately mentioned in connection with upcoming Revillagigedo reactivation. . . . Darn that encroaching suburbia—W6AM parted with 93 of his 120 acres at Rolling Hills. Getting so a ham can't find room to string a 2-meter dipole anymore. Quiz answers, in order: Ultraviolet, 2000, March '58, 1755, 1930s, half, 75, 40, 1962-'67, north-south.

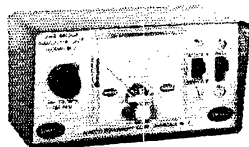
Ten Years Ago in "How's DX?" — Jeeves & Co., in opening remarks for February, 1953, point out that QST's DX column is essentially written by its readers. Its scope and quality depends, therefore, on you. . . . The bands aren't exactly jumpin', but 29 c.w. is good enough for 'Crs 5AD 5JB 8AB, FK88BC, FN8AD, Jan Mavens' LB6XD, MF2AG, MI3s AT LK, OE13HL, OQ5s CP RA, OY3IGO, SU5 1HS 5EB, TA3AA, YK1AH, ZD1AE, 4UAG, 9S1s AR and AX. . . . Twenty phone offers MF2AA, MI3s AB KE VG, SV5UN, VR4AE and ZC5VR. . . . The best on 15 are CS3AC, HZ1MY, TA2EFA and ZD9AA. . . . Forty c.w. is popping up thanks to FF8AG, FK8AJ, FM7WD, KC6QL, KJ6FAA, KT1RF, VPRAP, ZC5VS, ZD2DOP and Z59I. . . . Down on 80 c.w. we find OE13RN, VR2CG, VU2EJ and ZD4AB much in demand. . . . With 14 Mc. so spotty, KAs anticipate early 7-Mc. hamming authorization. . . . ZC4XP knocked off the first DXCC on Cyprus, and WQJHH comes away with the first H-22 sheepskin awarded to a non-European by USKA of Switzerland. . . . Jeeves gets a real snow job, and there are pictures of IS1AHK, OE13JR, many Massachusetts DXCC members, PY1DD, TI2s BR DL PZ and TY to round out the column. QST



AMECO MODEL SWB STANDING WAVE BRIDGE

High quality bridge accurately reads SWR's from 1.8 to 225 mc. (including ham, CB and commercial bands). Can handle up to 1 KW.

Uses inductive coupling and can be left in the line continuously without insertion loss. Contains two SO-239 VHF connectors. Satin copper case, 1 5/8" x 2 3/4" x 4 1/2". Wired and tested. **\$9.95**



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Expressly designed for the 6-meter band, the Maverick II suppresses harmonics generated by 8 mc crystals or by SSB mixing. Five complete filter stages of K and M Derived types are tunable for optimum xmttr to antenna match and suppression of spurious frequencies. RF meter is calibrated directly in watts for 6 meter band (0-50, 0-400 w.). Rejection: more than 35 db. Insert loss: less than 1 db. Power Rating: 400 w. plate input. Cutoff Freq.: adjustable 50-54 mc. Impedance: 50-75 ohms. Size: 5"x3"x2". Standard UHF connectors.

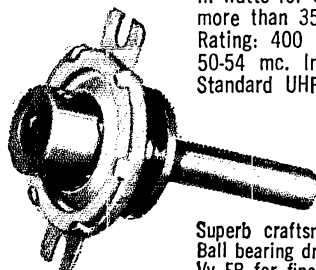


MAVERICK II with meter **\$34.95**

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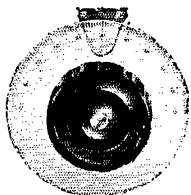
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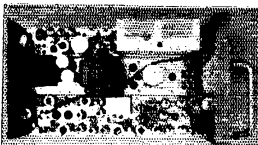
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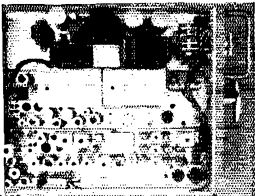
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33 Myrtle Ave. Cedar Grove, N. J.

Members Are Saying

(Continued from page 55)

practise the precepts of that code. It is our hope that the enclosed check will, in the light of the Christmas season, furnish evidence of our *faith* in ARRL, of our *hope* that the years ahead may be even greater ones for our League and amateur radio everywhere, and of our recognition that our contribution to the new Hq. building is *not* a charity but a privilege. — *Turlock Amateur Radio Club (Calif.)*

It was in 1931 that I received my mail-order amateur license, and certainly the modest contribution enclosed is little enough for the benefits I have received. ARRL has championed the cause of amateurs even long before I was licensed, and it is doubtful that I would ever have become an amateur except for the month-old *QST* magazines I was able to buy for 5¢ after the front cover was removed by my magazine-stand operator! — *W0BNF*.

I am not yet a radio amateur, but I have nothing but the highest praise for the League and its ideals in promoting amateur radio. Enclosed is a check. As the membership grows, so must its voice. — *Allan Gordon, Bronx, N. Y.*

Though our ARRL affiliation is only in its second year, we have already seen the many ways we benefit as a club (besides as individual hams) — films, bulletins, guest speaker from Hq., Field Day help, etc. We deem it a privilege to contribute to the new building. — *River Park Amateur Radio Club (Ill.)*

Couldn't help but think that 21 years ago today (December 7, 1941) I wondered if we would ever be back on the air. Thanks to the efforts of the League, we made it. Please accept this contribution to the building fund. — *W1NKK*.

While the enclosed may only buy a few bricks, I consider it a privilege to contribute and maybe I can send more later. Suggestion: if all of us were to send a dime for each time we have copied WIAW for code practice, you would have no further worries! I for one would not have my General license without it. — *W18AXB*.

Feeling that the League has done a great service for the amateur fraternity, and that the new administrative office building has long been needed, our club recently sponsored an auction to benefit the building fund. With Christmas approaching, many local hams were delighted to be able to contribute in the form of equipment rather than dip into their Christmas savings. Others were especially happy that their contributions to the fund would not only bring them the future services of the League, but also some additional gear at the present. Regardless of their reasons, local hams supported this project 100%. Therefore, we are proud and happy to enclose the proceeds. — *Lake Washington Amateur Radio Club (Wash.)*

Congratulations to the Board for your devotion to the set task of constructing a better "house" for the League's headquarters, and here's hoping all members — amateurs and non-amateurs — will dig down and send in something, no matter how small. My wife and I hope to soon make Novice at least. — *W. V. McNeil, San Antonio, Texas*.

I have noticed in the last several issues that the fund is not doing as well as I expected; therefore I

(Continued on page 156)

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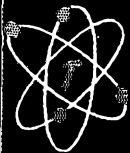
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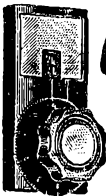
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am enclosing another contribution. I hope this might also encourage others to make a second contribution. — W4JJK.

Here is a small contribution. I did not become a ham just to sit on my hands and let the others do the supporting. I am very proud to be not only a ham but also a member of ARRL. Without the support of ARRL, we hams might as well close up shop and go home. — W6BYY.

I have procrastinated long enough. Feeling that all radio amateurs should contribute something towards the building program, I would like to do my share. Enclosed is a check. — W9CRV.

I have been talking before various radio clubs about the fund. Recently the North Bay Amateur Radio Assn. of Vallejo "passed the hat" in open meeting, and I am sure the results have been forwarded to Hq. The rivalry between the Vallejo and Napa clubs has been keenly watched by me, feeling such rivalry is good for amateur radio. Recently the Silverado Amateur Radio Society (Napa), not to be outdone, "passed the hat" which resulted in the contribution enclosed. It is felt that rivalry between clubs can help a great deal in swelling the fund. — W6ZP.

I know I've been represented through you at all Geneva conferences, and against unfavorable efforts toward the amateur by many groups. My membership in the League is insurance that when I turn on the rig, I'll still be able to enjoy all the privileges in amateur radio. I feel that every amateur owes it to his League to help along in this project, with as much as he is able. — W120BV.

It is wonderful that members are able to make such a contribution, since your progress depends upon the generosity of every member. In return, each member will receive greater benefit from the League. I am speaking of an expanded organization which will be capable of providing many services in the field of electronics and communications and — most important — a unified body working together for the good of the radio club, country, and the entire world. — W16GUR.

I was looking through some back copies of QST the other day. The history of amateur radio is, indeed, dynamic. The efforts and dedication of Mr. Maxim and his co-workers leave me somewhat awed, in light of what I sometime hear on the bands today. The pioneers whose voices and fists have become silent, and those who we are so fortunate to have with us still today, have left us a heritage, and traditions that are worthy of preservation at any cost. By familiarizing myself with these exploits, amateur radio has taken on a new meaning for me. It therefore gives me great pleasure to make the enclosed contribution. — W3RKA.

This is one ham (and NYL) who is behind the ARRL 100%. We could express unending praise for the fine job being done by the League. — W12SKD, W12UDF.

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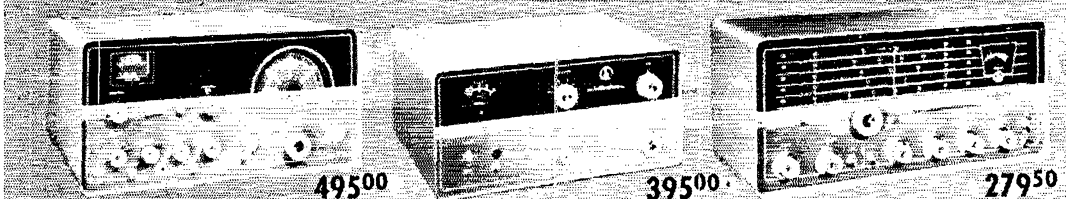
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New design — low cost! 6 bands; full line of features. A perfect match for HT40 transmitter at right! High sensitivity and selectivity; crystal calibrator; band edge marker; crystal oscillator circuit; 25:1 tuning ratio; full controls. 13 $\frac{3}{4}$ x8 $\frac{1}{2}$ x6 $\frac{5}{8}$ ".
20K44DX807, Kit, Sh. wt. 11 lbs.....\$114.95
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HT40 Amateur Band Transmitter
A feature-packed CW/AM transmitter! 75 W peak input, AM slightly less on 6 m; 6, 10, 15, 20, 40, 80 m output; CW/AM transmissions; TVI-filtered; xtal controlled, provision for external VFO; 52!! harmonic suppression tunable pi network & more. 13 $\frac{3}{4}$ x8 $\frac{1}{2}$ x6 $\frac{5}{8}$ "
20K44DX806, HT40K Kit, Wt. 19 lbs. \$89.95
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HAS Powered Heterodyne VFO
Deluxe self-powered heterodyne type VFO. Extreme stability, versatility. Illuminated dial calibrated for amateur bands 80 thru 2 meters, may be calibrated to WWV. 3:1 tuning ratio. Output freq. range: 3.5-4.0 mc, 7.0-7.5 mc, 7.8-8.3 mc, 8.333-8.833 mc; 5.0-5.5 mc VFO range. 7x5x8 $\frac{1}{2}$ ", Wt. 8 lbs.
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HT37 Phasing Type Transmitter
Modern design, phasing type side band generator unit at a moderate price! Single sideband, continuous-wave, and AM output on 80, 40, 20, 15, 10 meters. 144W plate input; unwanted sideband down to 40db at 1kc; distortion products down 30db; instant CW calibration, precision VFO & more! 19 $\frac{1}{4}$ x9x15 $\frac{1}{2}$ ".
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Compact unit, employs 2 tetrodes with 250W plate dissipation. Input 50-75! matching, can be driven by 20 to 100W. Full wave rectifier, exceptional regulation. 80-10 m coverage; adj. pi network output; metered circuits; RF output meter; stand-by bias supply. Power in SSB/CW 1 kw DC through 20 m. 19 $\frac{1}{4}$ x9x17 $\frac{1}{2}$ ".
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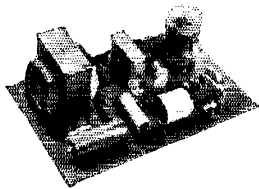
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factory wired
and tested, with
power supply
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Installation consists simply of connecting the TU directly to the receiver speaker output and the printer selector magnets. The built in power supply furnishes necessary selector magnet currents up to 30 ma. All adjustments are factory set for national standard mark and space frequencies (2125 and 2975) and no operating controls are required on the TU. Built in limiting circuit provides automatic triggering above sensitivity threshold.

Special mark and space frequencies available upon special request. Write for literature on additional RTTY operating accessories.

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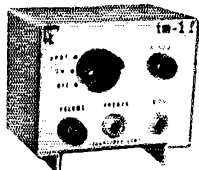
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CW MONITOR

\$16.50 PPD

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Correspondence From Members

(Continued from page 76)

Q I've just read . . . "The Templeton Case," in the January 1963 issue of *QST* and I liked it very much. The story is imaginatively conceived and expertly written . . . — *Theodore M. Hannah, K3CUI, Silver Spring, Maryland*

Q I got a big kick out of the two stories in January *QST*, S4 + 30 db. and the Templeton Case. John Troster is doing a fine job and his stories are the first thing I look for in *QST* each month, so I say keep 'em coming. S4 + 30 db. I read one time, but the Templeton Case I had to read twice before I realized it was a clever piece of fiction. Jack Najork did a first-rate story. — *Al Parham, W4MR, Greensboro, North Carolina.*

Q Re: "The Templeton Case" by Jack Najork, K9ODE — whose leg are you trying to pull? — *James L. Spates, W1R11, West Springfield, Mass.*

Q Re: "The Templeton Case" (January *QST*) There are probably many ways to produce an "d.f."-able signal. If you had many xmtrs on the same frequency spaced fairly close together, it would be impossible to zero in on any one of them. If you shield an xmtr and antenna and radiate straight up (helix) and bounce off the ionosphere, there would be no way to d.f. that kind of signal. The thing that surprises me is that the person who did it had the foresight to use an auxiliary power supply. — *Ray Robertson, W2JRE, Morristown, New Jersey.*

Q "We wuz Rapp-ed" — in January this time! A Barnes Magnetic Oscillator, Model 25-C, no less. And just as it appeared that we had the perfect eliminator for a.m., s.s.b., c.w., f.m., RTTY, and TV too! I was just about to see what could be done toward locating a copy of Barnes Report when the inconsistencies showed up in K9ODE's story. If we get this one in January, what do you have on tap for April? — *H. B. Brown, W4ZZZ, Gallinburg, Tennessee*

Q There are four Templetons in the United States: Indiana, pop. 150; Iowa, pop. 385; Mass., pop. 1200 and Penna., pop. 900. Which one was the subject town in your mystery of the year? Good story, though. — *Bill Doose, W40BYO, Little Falls, Minnesota*

Q The Templeton Case in the January issue is a very fascinating article. Everything seems o.k. except where in the W-KOO coo world is Templeton? The last time I read an article as mysterious as this one, I discovered that it was the April issue. [which] I was reading (in July). Now I read my issues when they come — but it didn't help much this month. — *Wiley D. Wenger, jr., K7OFQ, Portland, Oregon*

Q I do not appreciate those phoney articles about interference to TV stations, even on April 1.

Also, I do not see the advantage of pf (picofarads) which still have to be explained as μaf . (pf is also power factor.)

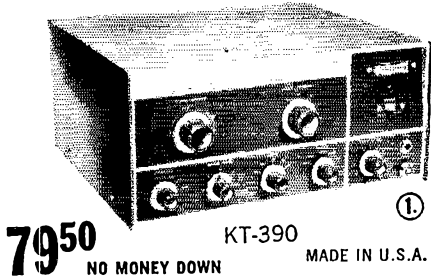
Is this why I contribute to your building fund? — *W2HFFZ, Hackensack, New Jersey*

Q Orchids to K9ODE for one of the most interesting and fascinating stories I have ever read! This was the first time I had ever heard of the Templeton Case, but I hope it is not the last. The story seems almost too unbelievable to be true, but I guess we have to remember that someone once said, "Truth is stranger than fiction." — *Don Murray, K4FMA, North Miami 61, Florida*

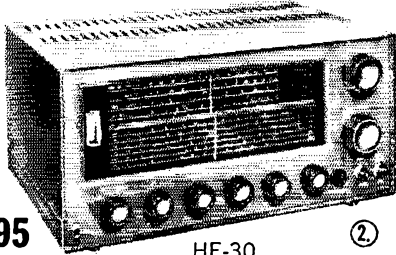
(Continued on page 160)

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QUALITY AMATEUR GEAR SINCE 1923

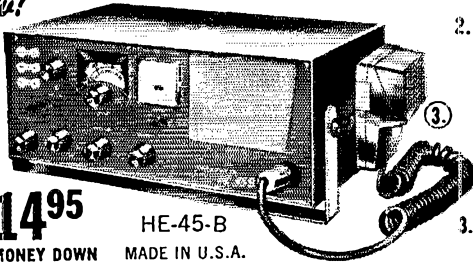


79⁵⁰
NO MONEY DOWN
KT-390
MADE IN U.S.A. ①

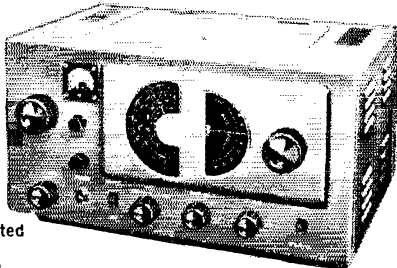


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KT-200
in Kit Form
64⁵⁰
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KT-200
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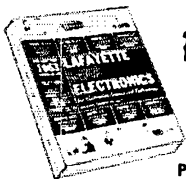
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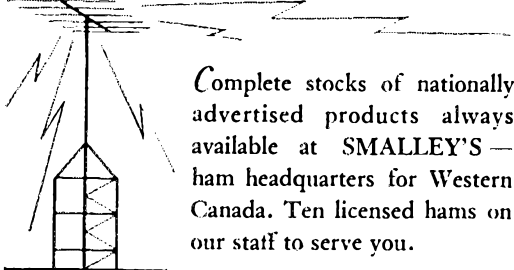
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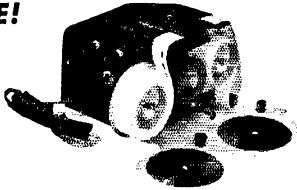
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☐ This afternoon I read "The Templeton Case" in the January issue of *QST*. Being the extremely naïve person I am, I accepted the story as being factual. I sat around for several hours in awe wondering exactly how such a thing could actually take place. My roommate, who is much more intelligent than I, then read the story and, after pointing out several discrepancies, immediately concluded that the story was fiction. After examining the facts given and analyzing the style of writing, I also concluded that the story was fiction. Needless to say, I was somewhat disillusioned.

The story, however, was extremely interesting, and it completely captivated my attention. I would appreciate it if you would, in the future, save such stories for your April issue, when I will be sufficiently on guard to prevent myself from being fooled again! — *Tom Nunclin, WSSLX, Ann Arbor, Michigan*

☐ Who remembers that the Catholic-dominated countries celebrate "April Fools' Day" in January? Also, who stopped to research and find out that WKOO-TV did not exist in 1954? Who is expected to research every article in *QST* to see if it is authentic or not before proceeding further. Trying to just make a living in this fast-moving world leaves little time for reading, and carefully designed articles such as this are certainly a waste of time. My experience has been that even in a good construction article there are errors such as wrong values, diagrams drawn wrong, etc. Why not spend more time on proofreading prior to publication — you could thereby eliminate your "Feedback" column and also save the members many weary hours of trouble-shooting.

I am wondering if the results of the 1963 DX Competition will be phony or if the article on "FCC Lifting The Power Limitations in Certain Sections Of The Country on the 420-450 Mc. Band" is a big joke. Possibly the "All-Nuvistor Converter for 420 Mc." article has just enough truth in it to cause some of the "non-professional electronic brothers" to rush out and sink \$20.00 in 6CW4 tubes to find out it won't work!

Articles such as "The Templeton Case" and Rapp's Kipper-on-The-Charles items may possibly have some value. However, let's get them out of the "meat" pages of *QST* and put them in the back somewhere. Or, a better idea, let's eliminate them altogether and use the space for which it was intended — "Cultivating the art of amateur radio." — *L. F. Rylic, W7CKT, Arlington, Washington*

(Continued on page 162)



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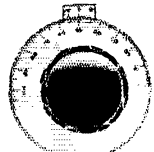
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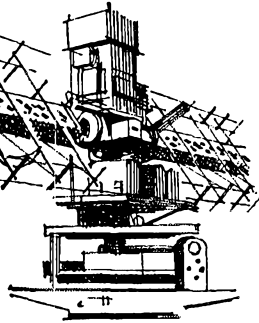
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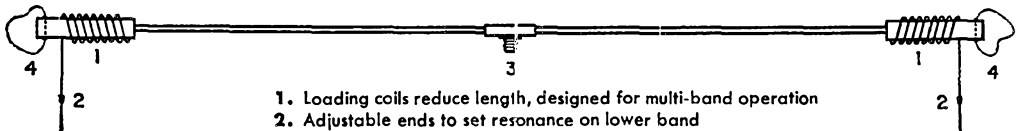


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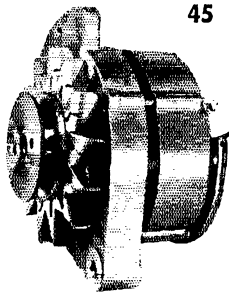
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☐ Regarding the Templeton Case; K9PLH and I have figured out a seemingly obvious answer. Jerome L. Barnes was using a narrow-band, ultra-modulated power sucker. — Paul A. Miller, K9DFA, River Forest, Illinois

☐ It appears that someone has finally topped Larson E. Rapp. Very good reading. — John E. Magnusson, W0.UGD, Waseca, Minnesota

NEW BOOKS

Single-Sideband Communications Handbook, by Harry D. Hooton, W6YTH. Published by Howard W. Sams & Co., Inc., 1720 East 38th St., Indianapolis 6, Indiana. 5½ by 8½ inches, 286 pages, including index. Cloth cover. Cat. No. SIII-1. Price, \$6.95.

This reference text covers basic principles, operation, design, construction and circuitry of single-sideband communications. The early chapters are devoted to the origin of single sideband and the derivation of s.s.b. signals. Other chapters include carrier-suppression techniques, sideband selection, carrier generators, balanced mixers and frequency converters. Although the book starts out with commercial uses of single sideband, the later chapters are devoted strictly to amateur sideband and even go into detail on several commercially built amateur sideband transmitters and amplifiers.



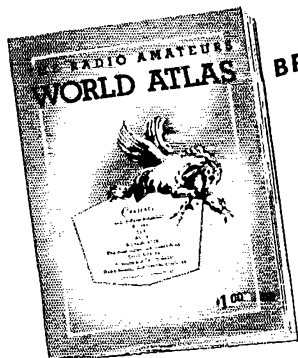
25 Years Ago
this month

February 1938

... W1DF discussed future DX and ionospheric trends.
... W1RH reported on the first Interamerican Radio Conference at Havana, while Budlong continued his dissertation on national and international amateur regulations in "Cairo, Part II."

... Technical articles included a low-cost 100-watt transmitter by W1JEQ, a regenerative receiver with high audio selectivity by Gager and Graham, inexpensive coax line by W2BZR, 28-Mc. preselection by W1HRX and W1BZR, plate modulation of screen-grid tubes by W1BOD, sweep-circuit considerations in the TV receiver by W2KJL, a simple 56-Mc. transmitter by W2FZQ and W2GNL, and the harmonic tank circuit by W9KNZ.

... Another technical article was the "QSL Forty," by W8QBW, which was destined to be one of a series of compact low-power transmitters by this same author. . . . Contest news included announcement of the Tenth DX Contest, and the results of the 1937 Navy Day Competition. . . . There were currently 414 holders of WAS certificates, and 13 members of DXCC.



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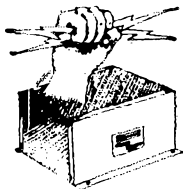
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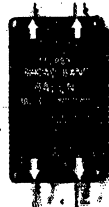


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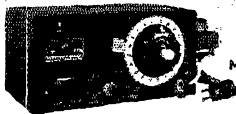
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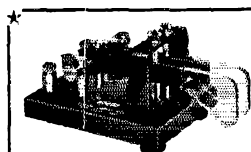
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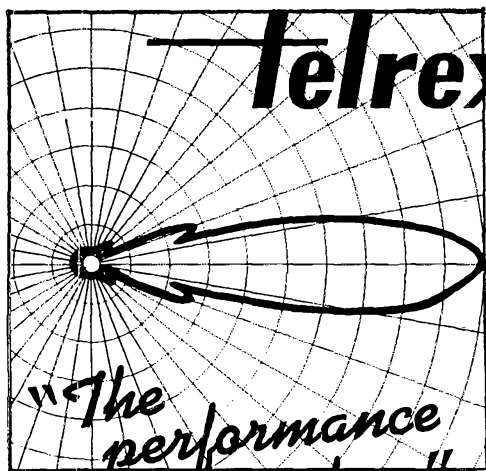
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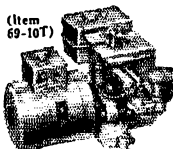
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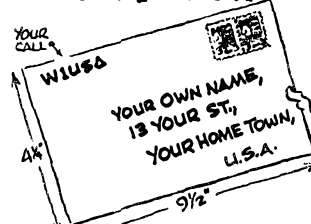
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A.R.R.L QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped self-addressed envelope about 4 1/4 by 9 1/2 inches in size with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

- W1, K1 — G. L. DeGrenier, W1GKK, 109 Gallup St., North Adams, Mass.
 - W2, K2 — North Jersey DX Ass'n, P.O. Box 303, Bradley Beach, N. J.
 - W3, K3 — Jesse Hieberman, W3KPT, P.O. Box 400, Bala-Cynwyd, Pa.
 - W4, K4 — Thomas M. Moss, W4HYW, Box 20644, Municipal Airport Branch, Atlanta 20, Ga.
 - W5, K5 — Brad A. Beard, W5ADZ, P.O. Box 25172, Houston 5, Texas.
 - W6, K6 — San Diego DX Club, Box 6029, San Diego 8, Calif.
 - W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.
 - W8, K8 — Walter E. Musgrave, W8NGW, 1245 E. 187th St., Cleveland 10, Ohio.
 - W9, K9 — Ray P. Birren, W9MSG, Box 510, Elmhurst, Illinois.
 - W0, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.
 - VE1 — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, N. S.
 - VE2 — George C. Goode, VE2YA, 188 Lakeview Avenue Point Claire, Montreal 33, Quebec.
 - VE3 — R. H. Buckley, VE3UW, 20 Almont Road, Downsview, Ont.
 - VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
 - VE5 — Fred Ward, VE5OP, 899 Connaught Ave. Moose Jaw, Sask.
 - VE6 — W. R. Savage, VE6EO, 833 10th St., N., Lethbridge, Alta.
 - VE7 — H. R. Hough, VE7HR, 1291 Simon Road, Victoria, B. C.
 - VE8 — George T. Kondo, VE8RX, % Dept. of Transport, P.O. Box 339, Fort Smith, N. W. T.
 - VO1 — Ernest Ash, VO1AA, P.O. Box 6, St. John's, Newf. Bay, Labrador.
 - KP4 — Joseph Gonzalez, KP4YT, Box 1061, San Juan, P.R.
 - KH6 — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, Hawaii.
 - KL7 — Alaska QSL Bureau, Box 6226, Airport Annex, Anchorage, Alaska.
 - KZ5 — Ralph E. Harvey, KZ5RV, Box 407, Balboa, C. Z.
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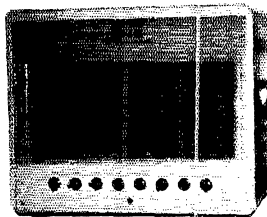
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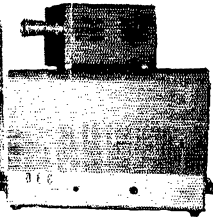
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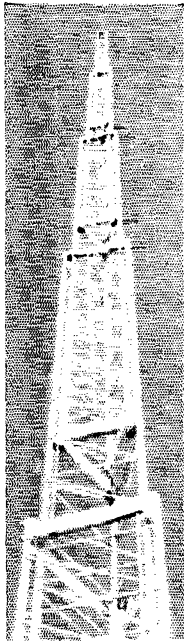
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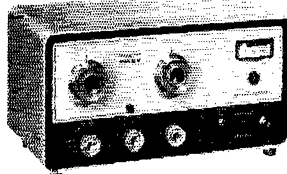
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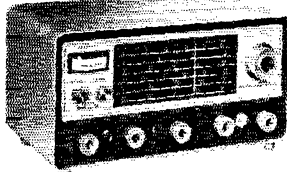
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Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCO, Ralph Hicks, Box 6097, Tulsa, Okla.

WE buy all types of tubes for cash, especially Elmac, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

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WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

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WANTED: Old wireless gear, tubes, magazines and catalogs before 1925. Amateur or ship equipment only. Please give complete information including prices. My purpose is to buy this equipment, put it in first-class shape and make it available either on a museum or demonstration basis to all amateurs who didn't live and operate during this era. W5VA, T. Frank Smith, P.O. Box 840, Corpus Christi, Texas.

304TL tubes wanted. Also other xmtg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

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TELEVISION Camera Kit easy to build step-by-step instructions suitable for Ham TV. Educational, Industrial, Medical uses. Craftmaster Instrument Labs. Inc. 60-30 34th Ave., Woodside, L.I., N.Y.

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500B Globe King, 60 hours optm. time. Best offer above \$290. W3MBB, RD 4, Box 259, Altoona, Penna.

TRANSMITTER, 300W., 80-20, SX-100 Mark II, \$325 (plus extras). K1NHJ, 390 Roosevelt Dr., Seymour, Conn.

WANTED: Two junker BC-221, no xtals, tubes or cal. bk. Write: K7MAT.

SWAP latest HO170C plus cash for Marauder and, or Mohawk unassembled. K9QGS.

NEW And used ham gear. Top trades. Norm, K9HRI at Dahm Electronic Supply, 14 Jayne St., Algonquin, Ill. Mail orders welcome.

WANTED: C-12 or equivalent, trace recording camera for LORANix also General Radio 16A RF Bridge also pair WD-1 tubes sell MM-2 scope \$70.00 and 75A receiver requiring some attention \$150.00 and sell KWAD-1 like new and perfect \$90.00, or might haggle slightly W2ASD.

CHANGE X-tal frequency, including plated type. Safe method, ammonium bi-fluoride, containers, holders, and complete instructions \$1.00. Deluxe model, \$2.00. Ham-Kits, Box 175, Cranford, N.J.

OFFERING DX-100 for \$140. W8RCI, 563 Magnolia Dr., Painesville, Ohio.

WANTED: HRO 50-60 coils, G. H. J. AA, AB, AC, AD and can swap. J. B. and E coils. Need: APS 90 AC pwr. supply, PMR7 AC pwr. supply, Amos Hadley, W1EBJ, 395 Stillwater Ave., Old Town, Me.

SX-20 Tunable Preselector, calibrated 3.5-40 mc/cycles, boosts reception 3+ "S" units. Complete kit, cabinet, built-in power supply, \$18.98 ppd. Holstrom Associates, Box 8640-F, Sacramento 22, Calif.

HAMMARLUND HQ-500 transmitter and HQ-180 receiver with clock and matching speaker, used but little, in perf. condx. In original cartons, 25% of list. F. Williams, 64 Prospect Ave., Hackensack, N.J.

SELL: Trade: Heathkit Tencer, in gud condx, with mike, \$30. Will consider trade for 2M Ameco converter. KØYCX, 35 Tulane, Pueblo, Colo.

FOR Sale: Heath Apache in perfect condx. All new tubes, \$175.00. Extra 6146s, 5763s, transformers and whatnot. First check or bank draft gets it. KØHWK.

GONSET Communicator III, six meters, with Hy-Gain Halo and mast; three xtals, and mike, \$180. Also Gonset Super Six, 10-watt 75-meter mobile, W5BZO all-band whip and heavy duty bumper mount. Also Heath pwr. supply for mobile, \$40 complete. Randy, K5KNR, 245B Roberts Hall, Austin 18, Texas.

LEECE-NEVILLE Alternator, 150 amp., \$40; 10 amp. 25 volt bridge rectifier, \$5.00; 100 volt cutouts, \$2.00; motorized Variac, \$20. B. J. Kucera, 1015 So. Highland Ave., Cleveland 25, Ohio.

SELL: Globe Champion 350A, 350W, c.w., 275 phone, PTT, 400 P.E.P. linear, \$240. Pick up deal. 10/15 M Skylane quad, \$15. Jim Russell, W4ZOFK, 596 Rutland, W. Enslowood, N.J.

COLLINS 75S-3, mint condx., \$525; 3251 W/516 F 2 P.S. factory reconditioned and modified in August, \$575. Complete package \$1050: Poly-Comm 62 B (62 meters) transceiver, factory modified in November, \$250; Swan 75 meters transceive w/10-paz matched P.S. and a Hustler Whip, full cost \$400. Original exlnt. package: \$325. HA-1 to keyer, W/Vibroplex key, \$50. W3QKW.

PIERSON-Holt Ke-93 receiver, \$150. Johnson Matchbox ground lost, used, for use with 40 ft. E-Z Way crank and tilt tower, \$35. All items for sale or trade. Dr. H. Martin, K4SCP, Hamilton Memorial, Dalton, Ga.

COLLINS 32V2 with manual, in exlnt condx. Need the money for college; \$200, or your best offer over \$200. Phil WA2V1Q, 62 Rock Spring Ave., West Orange, N.J.

NATIONAL CD-10 transceiver crystal controlled. Includes xtals, mike, transceiver, \$65 or trade for Hornet TB-500 or WA-33 Jr. W4JGF.

PHILATELIC Hams! Swap U.S. plate blocks for parts. Write W2DTE.

75A4, spkr, 8, 3.1 6, filters, \$450.00; KWSI, \$800; Johnson Viking KW desk, \$700; K2B0Q, Paul W. Haczela, 1 Woodland Road, Scarsdale, N.Y. SC J-8589.

HAMMARLUND HQ-100-C, used mostly as a broadcast receiver during Novice period. Can't tell from new, \$120. J. Buck, 208 Wetzel Rd., Liverpool, N.Y.

SELL: Excellent Knight R-100 with S-meter, calibrator, speaker, \$110; gud DX-40, \$50. Or your offer, WA2RAE, John Glendening, 26 Sherwood Ave., Pelham, N.Y.

SELL: KVM-2 (No. 10099), PM-2 supply, C.C-1 case, SM-1 mike, \$1050 complete. Will ship, W0AVS/3, 2843rd USAF Dispensary, Olmsted AFB, Penna.

FOR Sale NC-88 with external S-meter and Heath Q-multiplier, \$65.00 will deliver in Connecticut. Thompson, 349 Lee Ave., Chestnut, Conn.

ELMAC fixed/mobile station, AF-67, PMR-7, new M-1070 super, cable, mike, spkr, coax, relays, \$275 or your best offer. Shipped continental U.S. Collins 70E-8 PTO, VFO, like new condx, \$80 shipped. Offers considered, J. Steinhoff, W9FKW, RR 2, Angola, Ind.

FOR Sale: Swan SW-175 and matching SW-12A D.C. Power supply like new, \$299. J. Wolfe, East Ave., Albion, N.Y.

4-400A, new \$20; six 4X105As new \$5.00 ea; two 450THs, \$10; 3-4-1000A, \$40 ea; 4-4-1000A, \$8 ea; MM2 RF analyzer scope, \$80; 7 ft. Par-Metal rack w/locking front door, \$300; 3200 VDC 800 mil pwr. supply, \$85; CDR Ham M rotor/indct, \$50; SWR 10ms MicroMatch, \$20; LR-3 freq. meter oven xtal std, \$150; table top pwr. supply 250 VDC 450 mA, \$100; homebrew KVM 1/2 as pwr. supp., \$50; Hickok Lab tube tester, mod. 533, \$50; Gen. Radio Variac 2KV4, new, \$25; Collins PTO, new, hvy two \$30 ea; 350 VDC regulated rack, PS, \$30; commercial 2 marine radiotelephone whip antennas, \$25 ea.; 2 Weston 41 square meters, 8-150/0-300 VAC, \$10 ea., new. G. J. Migliori, W1QNZ, 622 Green End Ave., Middletown, R. I.

"HOSS-TRADER—Ed Moory," offers following—Item—in Sealed cartons with warranty for cash: New P1-4 Beam and Used Ham-M Rotor, \$175.00; 75S-3, \$379.00; 2-B, \$229.00; SX-111, \$185.00; HQ-110-C, \$169.00; New Swan Transceiver, \$229.00; Sonar Transceivers \$339.00; HT-37, \$359.00; Like New 100-V, \$539.00; Demonstrator Loudenbourn, \$239.00; Used Hallcrafters SR-150 Transceiver, \$549.00; New Clegg 99'er, \$138.00; SR-1, \$369.00; New Heath 755, \$259.00; New Heath 755, \$310.00; KVM-2, \$789.00; New Heath Warrior Wired, \$195.00; 75A-4, \$475.00; Johnson Ranger, \$149.00; New Invader 2000—Best offer; Johnson Pacemaker, \$179.00; SX-115, \$375.00; Johnson Valiant, \$229.00; Terms: Cash—"Ed Moory Wholesale Radio, Box-506, Dewitt, Arkansas. Phone Whitney 6-2820.

HAMS Operate, maintain vibration testing systems in aerospace laboratories. Shakers resemble loudspeakers. Huge audio amplifiers. Critical shortage trains technicians. Study at home. Tustin Institute of Technology, Santa Barbara, Calif.

HQ-170C, new. Won at hamfest. \$100 off of list. K4AOZ.

MORROW 5BRI mobile converter \$15; Thordarson 6284 transformer 10/220, 2450/5100-VT 500 Ma \$35; Acme 2738 choke 50H, 600 Ma \$20; 4-400A, new, \$25 ea. UTC S-3 trans former 115/1050/1150CT 500 Ma \$10. W1E2D, AC 413 JE 3-9649.

FOR Sale: Viking 500, factory-wired, \$550; HT-32A, \$425; Electro-Voice 664 with stand, \$40. Write W2HYS, 401 Lansdowne Rd., Dewitt, N.Y.

SFL: Vibroplex Original. In perf. condx. \$16. Joel Kosoff, WA2GWS, 33-24 91 St., Jackson Heights 72, N.Y.

SELL: HQ-10X in gud condx with xtal calibrator, \$170. Local deal. WA2HGJ, 1642 President St., Brooklyn, N.Y. PR 2-2178.

FOR Sale Or trade: all in like-new condx: Collins KWM-1, \$475; Heathcrafters 101 MK II, \$210; Drake 2-B, \$210; Technitron 51A scope, \$175; Heath Seneca \$135; Want 200V, 7553, 75A4, 51J3, KWS-1, KWM-2, W2EXH, A. Fenster, 90 Hausch Blvd., Roosevelt, L.I., N.Y.

SELL: Complete station: AF68, PMR8, M1070, Bell PTT mike, TR switch, 36 ft. steel tower, TA33, headset, rotator, control box, all cables and harness, MM body mount, spring, 40M loading coil plus self-powered VOX, 3 station intercom, xtal mike, LV pwr. supply, full box of assorted parts including 41 tubes, 22 transistors, 7 M500 rectifiers, coax and fittings, etc. First check over \$525 takes all. F.o.b. Dick Heyder, WA4HHI, 18822 NW 32 Court, Miami, Fla. 624-2114.

SELL: SX-111, \$185; HT-41 Kw. linear, \$295; both like new, not a scratch! WA2MJF, Richard Nadelson, Woodmere, L.I., N.Y. FR 1-0824.

FOR Sale: Heath GD-1B grid dipper with low freq. coils, \$15. Postage prepaid, Bob Aberle, 1 Rudolph Drive, Carle Place, N.Y.

A-1 Reconditioned equipment: On approval. Trades. Terms. Hallicrafters S-107 \$69; S-85, \$79.00; SX-99, \$99.00; SX-100, \$49; SX-111 \$69; SX-101 MK II, \$249.00; Hammarlund HQ-100, \$119; HQ-110, \$169.00; HQ-170, \$259.00; Valiant, \$279.00; NC-300, \$199.00; Collins 7551, \$379.00; J2S-1, \$499.00 National, Gonset, Elcam Heath, Johnson, RME, many others. Write us for lists. Henry Radio Co., Butler, Mo.

TV Camera, monitor, pwr. supply, no shippable, \$100. Transmitters: Meissner EX, \$35; ART-13, cables and dynamotor, \$50; Gas generator to run ART-13, \$50; 1 1/4 meter FM, \$15; TCS, \$15; Receivers: NC-88, \$80.00; RDE (like Wilcox F-3), \$25; BC348, \$50; 160M police, \$15, also rack, parabola, antenna, Tri-band vertical, instant. Need elbow room. W5EIM, 1212 S. Sandusky, Tulsa, Okla. 918-WF-6-8194.

SELL: HT40 with mike, 12 xtals and relay, \$75; SX140 and small speaker, \$60; Mini-Matcher, \$6; VOM, Simpson 268, \$35; Reflectometer, \$16; Knight GDM, \$12.00; Drake TV100 filter, \$3. All in exlnt condx. Woolfrims Box 382, University Station, Ames, Iowa.

CRYSTALS Bought and sold. Ashe, WA4GEX, 4610 Sharon View Rd., Charlotte 9, N.C.

SELL: Collins 75A4, serial 1290, like new, \$500; Hallicrafters HT32 serial 197207 with FSK built in, in A-1 condx, \$475.00; RTTY model 2B printer with stand, vly clean, \$80. Max Burch, K0VWZ, 342-10th Avenue North, Ft. Dodge, Iowa.

SALE: SX-101 MK III, \$175; HT-32, \$395. Both for \$550.00. Like-new condx. Will trade. Ben Sherman, DE 2-2339, K2ZEX.

SELL: HRO-5W general coverage coils 180 Kc. thru 30mc. Offer. KH6JL.

WANTED: 160 meter coils for 200V. Selling SX-101, \$200. Telrex 6B-10M beam, \$180; Ranger, \$150; Collins 310B1, \$100; Heath Q multiplier, \$10. WA2UTU 511 Laurelton Blvd., Long Beach, N.Y.

FOR Sale: 75A3 with xtal calibration and FM adaptor, \$300, exlnt. Johnson 6N2 Thunderbolt FW, \$350.00; Tapetone XC50C4, 26-30 Mc. IF, \$35; Tapetone XC144C, 26-30 Mc. IF, \$40; National VFO62, \$25. F.o.b. Columbia, David Kelce, K0DGF, 209 Longfellow, Columbia, Mo.

KWM-2 with PM-2 Collins lightweight pwr. supply, 110/220 Vac. Vly latest model with new Collins spinner knob, purchased two months ago and used less than 5 hours. Perfect. Shipped insured prepaid in U.S. In original cartons with manuals. \$400.00. Certified check or James C. Stevens Engineering Dept., RCA Duncan Canal, Petersburg, Alaska.

FOR Sale: Model 14 teletype tape printer, complete with beautiful mahogany table, like-new condx, just taken out of commercial service and now in ham RTTY service. All for \$100.00. St. John, 2720 Park, Jacksonville 5, Fla.

COLLINS, 3251, Ser. No. 2181, and 7551, ser. No. 1422, like new condx, both for first certified check, \$725 to George Cottrell, W41WA, 105 Lynnhaven Dr., Hampton, Va.

WILL Trade my HO-180X for a Viking Valiant. Will sell or trade the following: FW CE20A with BC348 and OT-1. FW Globe Scout 680A, Knight VFO, Mike reasonable offer. W8-ZBD, 1605 Iowa St., Midland, Mich.

MOHAWK Receiver, spkr, DC-6 converter, \$220; Gonset 6-meter linear, \$95; National VFO-62, \$35; Telrex 6M-6C, \$27 and 2M-814, \$70.00; P&K 6 meter xmt with 6-12-110 v. PS, \$75; Ham-M rotator, \$75; 2 1/4 x 3/4 Graflex press camera, \$75; Telefunken magnetophone 77 transistorized 4 track stereo recorder, \$175, Capt. William Ewing, WA2WOT, 353 Stewart Gardens, Newburgh, N.Y.

VIKING II and VFO in exlnt condx and appearance by original owner. 21E who went SSB and retired in Calif. \$160 F.o.b. K2IE, 1853 Euclid Ave., Camarillo, Calif.

HY-GAIN 3-el. Tribander, exlnt condx (132 countries worked), \$45; AR-22 rotator, \$15; buy both, \$50. Hy-Gain vertical 14-AVS with roof mounting kit, never used, \$20. Wanted: 40 ft. E-Z Way Tower, W0ENL, Box 2721, St. Paul, Minn. Tel. 633-2393.

SELL: Collins 75A4, #2163, with speaker, \$465; Hallicrafters HT-32A, #230705, \$425 with manuals and in gud condx. Both for \$850 or best offer. No trades, spy. Rule, W4ZUK, 2817 North Atlantic Blvd., Ft. Lauderdale, Fla.

WANTED: Manual for digital Model 955 counter and timer, mostly in need of tube location part. Robert Ireland, Pleasant Valley, N.Y.

CLEANING: Out shack. New 4E27, \$4; three 6146s for \$5; Bliley 100 mc xtal, \$3; coaxial relay, \$6. Send for bargain list. K0MYR, 424 20th St. N.E., Cedar Rapids, Iowa.

SELL: NC-183 receiver factory checked, Challenger transmitter and relays, \$300 takes it. KITCY, 201 Summit Ave., Brookline, Mass.

DX-100 all modifications, \$110.00; SB-10 factory-tested, mint condx, \$90. First \$190 acts both. W8FRM, 120 E. Willow Dr., Zanesville, Ohio.

HEATHKIT Seneca transmitter. Professionally wired and aligned in perf. condx. Kit price, f.o.b. W9CLB, 1792 Clifton, Highland Park, Ill.

DRAKE 2A serial No. 1782, \$185; HO-180 serial No. 812 with IF noise silencer, \$325.00. Both exlnt condx. P. Nicman, 613 W. Roosevelt, Wheaton, Ill.

FOR Sale or trade. I have a recently completed and factory-checked Heath Pawnee HW-20 transceiver for 2 meters. I will trade for 6-meter transceiver or sell outright. Contact John Phares, K5VVI, 445 Jay St., Beaumont, Texas.

DC/DC Converter transformers for mobile, epoxy cast, high efficiency toroidal units. Also complete mobile power supplies. Send for lists and specs. Supermarine, Box 185, Melbourne, Fla.

WANTED: KWM-2A or KWM-2, with AC supply and, or DC supply, mobile mount. State condition, serial and lowest price. S. Heipner, 5046 Veto Ave., Tarzana, Calif.

POLYCOM PC-6 6-meter transceiver. Used only 2 months. With Hi-Par halo and mount, \$260. K1QOT/2, 6410 U.H., Cornell University, Ithaca, N.Y.

RANGER for sale, Goink SSB. Like-new condx, \$170. K3MRO, 506 Webster Ave., Scranton, Penna.

FOR Sale: Homebrew, 2-meter fone 15 watt transmitter, 40 meter cw 100 watt converter T21/ARC5 transmitter, 2 meter xtal controlled converter common power supply, \$45 for all; Globe Scout, Model 680 with Heathkit VFI, \$55, WA2GVO, 1, Middleton, 14 Lake Shore Dr., Parsippany, N.J.

WANTED: All parts of APS 15, aircraft radar. Please write: Rolf Haerle, Muffelweg 58, Aachen, West Germany.

DRAKE 2B, Q-mult, and speaker with xtal calibr, less than 100 hours use. Best offer, over \$200. WA2SLZ, 228 Roberts Ave., Yonkers, N.Y., GR 6-4780.

SELL: HO-180 and spkr, in exlnt condx, \$329.00, Viking II with PTT and VFO, \$150. Both are a real buy! K7BBB, Route 1, Box 129, Gaston, Ore.

SELL: NC-98 w/spkr, \$75; Heath Two-er, \$35; Q-Mult, \$5; 2 M Halo, \$5; 15-watt 40-80 M, c.w. xmt, \$10; 7-9 Mc. Command revr, \$5. All in exlnt condx. Alan Rose, K2RHK, 33 Schenck Ave., Great Neck, L.I., N.Y. Tel. HU 2-5571.

VALIANT Factory-wired and Heath SB10, 275 watts p.e.p. with following built-in improvements. Full c.w. break-in, extra I position xtal switch, teletype shifter and more. Both \$350. Will sell separately W2GON, 114 Phyllis Court, Elmont, N.Y. HU 8-3555.

SELL: Separately or entirely: Panel mounted, power stat controlled power supplies; converted and unconverted Comman transmitters, receivers, unused 30 watt Varimatch modulation transformers; filament transformers; 677 enclosed standard rack; transmitting and VR tubes; Hy-pass condensers; R175, Z50 chokes; transmitting variable capacitors; B&W TA, JEL, JVL TVL coils, TVL base and Faraday Link; 28 volt dynamotors; assorted milliameters; ham xtals; brand new #13 sockets. Roberts, W1KUK, 49 Daniel Rd., West Haven 16, Conn.

FOR Sale: Collins 75A3, in exlnt condx, no wiring changes, with product detector, 6 kc. and 3 1/2 kc. filters, 100 kc calibrator, including 2M Terafft spring, total: \$325.00. Ludwig Dedel, WA2MSY, Summit Ave., Spring Valley, N.Y.

WANTED: 3D24 tubes, H. Van Wagner, W2ASY, 64 West Allendale Ave., Allendale, N.J.

SWAN 140 serial No. 4856, Webster Band Spanner, antenna body mount, Turner 350 mike; Monarch FS meter; homebrew pwr. supply. All cables, \$225. K8PGC, 504 Roy Ave., Dayton, Ohio.

SX-100 For sale. Local deal preferred. Modulator needs work, good, \$90. W3MWC, James C. Berger, 6615 Silverwood St., Phila. 28, Penna.

DX-40, key, microphone gud condx, \$50; VF-1, VFO, gud condx, \$15; new HG-10 VFO, with regulated supply, vly stable, \$30. Roger Warren, K9UHH, 8715, Guilford, Indianapolis, Ind. Tel. VI 6-5275.

75A1 Collins, \$190; 3V2 Collins, \$225. Both for \$400. In exlnt condx, W2KJT/M, Bernstein, 38 Dorchester Dr., Mansasset, L.I., N.Y.

DX-100 Transmitter, modified for SSB with SB-10 or usual AM or CW, reconditioned 3 months ago, \$145; Eico 723 transmitter, exlnt condx, \$45; Knight R-100 receiver with xtal calibrator and spkr, gud condx, \$75. WA8AXS, 605 Miller St., Alpena, Mich.

SELL: LW-51 Deluxe 2-meter transmitter, with tubes, new! \$55.00. W0KLG, Box 425, Dassel, Minn.

DX-20 with relay, \$35. Globe 680, \$55; VF-1, \$15. Will trade guitar for receiver. John Abbate, 809 Peach, Vineland, N.J.

DRAKE 2B recvr. Less than 10 hours use. In original box. \$210.00. Heath SB-10 SSB adaptor. In FB condx. \$60. John Williams, K8GOW, G-4381, Saginaw, Flint, Mich.

GE and Motorola, 7-way FM rear, buy-sell. Communication Engineering, Box 8338, Minneapolis 26, Minn.

FOR Sale: Heath Seneca in gud condx. Jim Johnson, RR #2, Ashley, Ill.

0L1-1, \$350.00. Huston, RFD 3, Cedar Rapids, Ia.

HEATH GR-91, \$35 or your best offer. Gary Young, 3329 Rex Ave., St. Louis 14, Mo.

COLLINS S/Line, 7551, 3251, \$167 pwr., 312B4 console, SM1 rvc. Will sell complete station: 51175, Herb Smith, W8AUI, 831-8484 or 622-7383.

For Sale: Vibroplex Presentation, \$20; ReGENCY ATC-1 converter, \$45. FB condx. WA8COC, 3017 Hudson Dr., Cuyahoga Falls, Ohio.

EMBOSSER Labels on adhesive vinyl, 1/8" each. For ham gear, parts bins, etc. (1/2" single line only; please print title and color wanted). JFA, Box 183, Cicero, Ill.

COMPLETE Rig: Phasemaster II-A exciter, Band-Hopper VFO, and P-400-GG linear amplifier. Also rack-mount HO-180, other equipment. Best offer on all. Fernandez, 376 East Palisade Ave., Englewood, N.J.

WANTED: Collins 30S-1 linear, in original packing and in mint condx at lowest possible price. F. E. Smoick, W9BAG, 1023 N. Marion St., Oak Park, Ill.

SELL: 75S-1 best offer over \$350. Used less than 30 hours. MM2 scope and adapter, \$90. Also less than 30 hrs. Brown, 1032 Lee Ave., San Leandro, Calif.

FOR Sale: Johnson Ranger and Collins 30L-1 final, in exclnt condx. Tom Willis, W0EFL, 108 N. 19th St., Marshalltown, Iowa.

ALUMINUM For every ham need. Write to Dick's, 62 Cherry Ave.,iffin, Ohio. For list of tubing, angle, channel, castings, plain and perforated sheet, and complete beam kits.

DX-100B wired by professional. Like new condx. \$160. Bill Murtough, 3635 Summit Ave., Riverdale 71, N.Y.

SELL: Subroc MF-15X 10M mobile xmttr, small size, perfect for small cars; \$20 or swap for B&W 851 tank assembly, WA2WCB, 5 1/2 Hamilton Ave., Cerinth, N.Y.

WANTED: 10-40 meter dipole preferably with 130 ft. of RG-8/U coax. Have Mosley MA-3, will consider trade. Arn, WA2UOE, 280 Prospect Ave., Hackensack, N.J.

TRADE: New 4-1000A for 4000-0-4000, 50 Ma. 220V pri. plate transf. K3EEP, 2649 Colmar Ave., Cornwells Hts., Penna.

EIMAC SK-500 Air System socket with By-pass condensers for 4-1000A. \$11. Postpaid. K2EGL.

HO-150 in exclnt condx: \$140. W2QDY, 2319 Wayne Ave., Camden 5, N.J.

RACK And panel style 5 channel marine radio telephone. Xtal. controlled automatic. Sell or trade, W9DTA.

SELL: HQ-140X, \$160; Viking II, \$150; VFO, #122; \$20; RME-1 speech clipper, \$25; 10-pass filter, Q-multiplier, co-ax relaz, spare 6146's, and xtal calibrator thrown in if package deal. No shipping. W2LEI, Phone 212-TW4-1142.

GOING To law school. Sell Gonset G-50 in exclnt A-I optg. condx, with mike and accessories for \$210. David Dahan, K2TTA, 87-6 63 Ave., Rego Park 74, N.Y. Tel. HA 9-4511.

SELL: NC-300 revr. Want: HT-37. Will trade or buy. WIWXX, 18 Harris Ave., Johnston, R.I. Zone Centredale 11.

SELL: Heath Sixer, with pwr. supply, \$40. WA2QHI, 10-30 River Road, Fairlawn, N.J.

COLLINS 75A4, #1370 three filters, exclnt condx, \$475. F.o.b. W0KFA, P.O. 627, Cedar Rapids, Iowa.

LIBRARY: Sell complete set of OSTs, run 1943 thru 1962. Theodore Ferus, 48 Hawthorne St., Lowell, Mass.

SELL: Knight kit R-100 with all accessories. Hy-Gain 12AVS with roof mount. Any reasonable offer accepted. David Slivka, 102-19 65th Rd., Forest Hills, L.I., N.Y.

SELL: DX-100, \$125; SB-10, \$65 or both for \$175. Will consider trade for gud mobile gear. K2UNY, Richard S. Mead, RD #1, Oswego, N.Y.

HARVEY WELLS TBS-50C with power supply APS-50; phone-cvt. 80-2 meters; \$65 or make offer. Need 500W modulation transformer, KW plate xtrmr. W. E. Moses, WA4URV, 716 Waco Rd., Knoxville, Tenn.

QUICK Sale necessary! Factory-wired Globe King 500-C in sealed crate, never touched, in warranty! Cost \$895, best offer over \$550. Will ship. Dan Vermut, 83 Blackheath Rd., Lido Beach, L.I., N.Y. Phone 516 GF-2/0707.

SELL: Like new SX-111, \$175 matching R48 speaker, \$14; Viking II with VFO, \$130; Johnson Signal Sentry, \$7; Hallicrafters HA-1 (latest model); Electronic Keyer, brand new, \$60. Vibroplex key for HA-1, \$14, W3NVD, 6215 Stardust Lane, Bethesda, Md.

ATTENTION: Receivers, Transmitters, Test equipment. Repaired, aligned, calibrated. Kits wired. Estimates given. Taled Co. 266 Park St., Stratford, Conn.

FOR Sale: Heathkit ACube, \$225; in exclnt condx. Morrow MB 560-A, \$75. WA6CCB, 1560 Dana Ave., Palto Alto, Calif. DA 3-3647.

COMPLETE Station for Sale: SX-99, DX-40, 45-watt modulator, VF-1, QF-1, mike, relays, key, \$200. K7JOB, 1007 South 9th Ave., Yakima, Wash.

SELL HT-30, \$190; HRO5TA1, A,B,C,D coils, \$150; Central Electronics Sideband slicer, \$25. Will throw in extras for package deal, and deliver within 50 miles. K2RA1, Joe, EV 6-3076 after 6 PM, 300 Troutman, Brooklyn 3, N.Y.

BEST Offer: Gonset GSB100 SSB transmitter, Thunderbolt 2000 P.E.P., Precision scope E5500A. Cost new \$190. All in A-1 condx. W2RGD, West. 88 Mohawk Trail, Wayne, N.J. Tel. TE 5-1249.

JUSTOM Building ham gear. VHF specialists. Converters, power supplies, etc. Free quotes. Frontier Electronics, Orr I, Minn. W0HPS, Everett E. Hoard, W0PYC, Frankie Hoard.

WANTED: Motorola FMTR-80D or 140D unit. Ralph Villers, Box One, Steubenville, Ohio.

FOR Sale: Complete station, DX-60, revr HR-10, VFO HG-10; \$214 value for \$160. K1BLJ, Riggio, Mariori Rd., New Canaan, Conn.

FOR Sale: Heath Mohawk receiver, \$230.00; National NC-9R revr, \$50.00; F.o.b. Richard Bedard, 15 Queen St., Worcester, Mass.

SALE: 1-Hallcrafters HT-41 demonstrator, new condition, \$295.00; 1-121F20 \$5.00; 1-6.3V 12.5A (new) \$5.00; 2-612V C.T. 500 ma (Collins 30S1 New) \$45.00 each; 2-8 by 500ma (Collins 30S1 New) \$10.00 each; 4-872A \$3.50 each; 2-4x150A \$5.00 each; 2-4x250B \$15.00 each; 2-5894 (New) \$17.50 each; 2-866A (New) \$1.50 each; 2-3B28 (New) \$4.00 each; 1-B & W Model 380B \$15.00; 1-B & W 10HDA \$3.00; 1-B & W 40HDA \$5.00; 1-Johnson 1000HCS10 \$3.00; 1-Johnson 1000HCS20 \$3.00; 1-Johnson 1000HCS40 \$3.00; 1-Johnson 1000HCS80 \$4.00; 1-Jackbins & Links \$3.00; 2-Johnson N375 \$5.00 each; 1-Johnson 75D190 \$7.50; 2-Johnson 124-213 sockets \$1.00 each; 1-Vibroplex Original Deluxe \$15.00; 1-EV 641 mike (New) \$21.00; 1-EV 950 mike \$10.00; 2-Eimac 2-C 12-32 (New) \$15.00 each; 1-Amperex VC 25 (New) \$5.00; 1-Heath QF-1 (New) \$8.00. R. Bellow, 1005 W. 4th, El Dorado, Kans.

DX-100, Heathkit Transmitter, used by little, in xclnt condx, \$160. F.o.b. H. M. Custer, 327 Freeman Dr., Johnstown, Penna.

SELL: Heath Mohawk with spkr, \$200; Heath Apache with SB-10 mike, antenna relay, key and all connecting cables; \$250. All in top condx. WA2CM, Richard Cooper, 1079 Astor Ave., N.Y. 69, N.Y. OL 4-6298.

WORKING on a research project concerning the biological effects of radio frequency waves. I would greatly appreciate any information or experience anyone may have concerning this. Please contact Harry Garland, WA8FJW, 1040 Lakeshore Road, Grosse Pointe 36, Mich.

UNDEREMPLOYED station seeks operator with extra time. Mohawk, spkr, DB-23 Preselector, Apache, D-104 mike w/g-stand, 275 watt Matchbox w/ directional coupler, low-pass filter. Needs only 110V AC, antenna and operating time. \$600 cash and carry. K1GAW, 10 Gloria Heights, Portland, Conn.

SELL: Heath MK-1, MT-1, HP-10, spkr, \$185.00. Johnson Viking II, ten xials, heavy duty 504's, \$95; RME VHF-152, 2-6-10 meter converter; spare tubes, realigned, \$48.00; CDR TR-4 rotor indicator and cable, \$25.00. All in new condx. W2UGM, 66 Columbus Ave., Closter, N.J. Tel. PO 8-1884.

WANTED: Commercial, Military, all types, ARC, ARN, ARM, BC, GRC, PRC, TRC, URR, URM, TS, 61RS, 17L, 51R, 51J, others. Ritco, Box 156, Annandale, Va.

SELL: Plate transformer, Thermoard CS5664, 4000VTC at 1.7A, also tapped for 1000V supply; 350W modulator, 6SN7's, 807's, 813's complete with tubes, all filament transformers, and theroard modulation transformer. Best offer all or part. \$675-\$5, WA0BA, 4117 Murrayhill, Charlotte, N.C.

NC-270 with spkr, practically new in original carton and manual. Will ship. \$255.00. DX-20, in exclnt condx, \$35. Charles Voigt, 30 Chapel Hill Rd., Huntington Valley, Penna.

TEN Transistor Heathkit short wave "Mohican" GC-1A communications receiver in kud condx with XP-2, \$88. Ralph Gould, K4TJB, 2122 Tarleton Drive, Charlottesville, Va.

SELLING Freq. meter TS-174, 20 Mc to 250 Mc, Bendix TA-12C transmitter, brand new. Make offer. WA2SV, 114 Phyllis Ct., Elmont, N.Y.

EVERYBODY Swap! Transmitter, receiver, component swamps offered in "Equipment Exchange." Interesting sample copy free! Write: Brands, Seacombe, Ill.

HT32-B, late model, like new in all respects, used only seven weeks. Going transceive is reason selling. Cost with tax is \$750. Ship, repairs, first certified check for \$525 or sell local for \$515. K9AGH, GL 6-4847, 1730 North 78th Court, Elmwood Park, Illinois.

HERE'S the magazine you have been waiting for, the Ham Trader, devoted 100% to the buying & selling of ham equipment. For free sample and information, write The Ham Trader, Box 174, Dept. O, Franklin Square, N.Y.

COLLINS 32V1 transmitter and/or Collins 75A1 receiver. Excellent condx. Used by little. Best offer takes. 89-24 139 St. Jamaica 35, L.I., N.Y. Tel. JA 6-4528.

SELLING Complete operating station: Super Pro receiver Hc-794B, general coverage to 40Mc and Bendix 150 watt transmitter with antenna relay. All just for \$200. Rosenfeld, 186 Landau Ave., Floral Park, N.Y.

FOR Sale: Johnson Ranger, factory-wired, push-to-talk, Vibroplex Blue Racer deluxe, xials, best offer; Gonset 6-61 extra tubes and parts, speaker. Best offer. WB2AJH, Edward Winters, 52-24 65 Place, Maspeth 78, L.I., N.Y.

MOBILE Package: Recent KWM-2, motor, power supply, mike and speaker, \$1050. Wooltries, W0DSP, Box 382, University Station, Ames, Iowa.

SALE: Excellent HRO-60, rack mounted. All coils, xtal cal., FM adapter. Make offer. Courtney, 21 Nairn Pl., Nutley, N.J.

GPR-90, little used, immaculate: \$400 or your best offer. 12V Wincharner dynamo, 400c, at 135 ma; \$15; 14AV vertical, \$8; 10-100V shifter, \$30. K6QTL, 4th Sqdn, TAFWC, Box 263, USAF Academy, Denver, Colorado.

DX-35 VF-1 \$50; RME MC-55 converter, \$30; 2 meter transceiver, \$12; 8-C FM tuner, \$18; Alliance rotor, \$12. Colfield, 40 Mitchell Ave., East Northport, L.I., N.Y.

SX-101 MK III revr, in mint condx. Will ship. \$195.00. F.o.b. Morara, Calif. Eckberg, 16 LaSalle.

FOR Sale: SX101A, in mint condx, \$275; Ranger II factory-wired, \$275; plate transformers: 3600-0-3600 at 100 Ma. with dual 110V and 220V primaries, \$35. Peter W. Dahl, 5331 Oaklawn Ave., Minneapolis 24, Minn.

SELL: Heath DX-60, \$70; HG-10 VFO, \$35. KIROL, 68 Mallet St., Dorchester, Mass.

SELL: Apache, \$200. WA2ZVF, 2115 E. 27th St., Brooklyn, N.Y.

FOR Sale: Eleven assorted Mosley antennas in factory sealed cartons. Also assorted accessories. S.A.S.E. brings list. H. Lacey, W0CEJ/2, Entry Rd., Hopewell Junction, N.Y.

TRADE: 110V AC motors up to 1/2 HP. Want ham equipment. W0RQ, Larrabee, Iowa.

COLLINS Noise Blanker for 75A4 new with instructions \$49.00. Blanker for 75S-1 new \$49.00, K-W-M-1 Mobil Mount new \$35.00. New VFO 75A4, VXE-34, K-W-M-1, 70K-1 and KWS-1, \$10-\$23, \$39.00 each. Used 4CX250B, 4 for \$5.00. Richard E. Mann, 7205 Center Drive, Des Moines, Iowa.

SELL: NC-105, hardly used, \$95; S-40B, in exclnt condx, \$65. Both for \$150. 150-watt c.w. transmitter, \$35. WA2MIF, 114 Dale Ave., Peekskill, N.Y.

PREMIUM Quality reconditioned equipments! Terms! Trials! Trades! World's largest stock! Collins 32V-2, \$249; Eico 720, \$59.95; Globe Chief 90, \$44.95; Gonset Commander \$49.95; Johnson Thunderbolt, (80-10M), \$399.50; Colling 75S-1, \$349.00; Hallcrafters SX-7R, \$449.00; SX-88, \$299.50; SX-100, \$179.95; S-120, \$49.95; Hammarlund HQ-105TR (transceiver) \$159; HO-110, \$169; National NC-190, \$169; TMC GPR-90 (late) #399. Leo, W0GFO, Box 919, Council Bluffs, Iowa.

FOR Sale: Collins MP-1 pwr. supply, new, but has scratch on top. (4) 2C39 (4) 3C23 and sockets. Best offer or trade. Earl R. Gaddy, WA4CKG, Dillon, S.C.

SELL: SX-25, in gud condx; \$35.00. Bollmann, 684 So. Washington Ave., New Market, N.J.

75A-4 and KWS-1, latest production, \$1400. 100V factory carton. \$495. W8WGA.

SALE: Radio-Craft 1938 Fifty Years of Radio Chronological History Radio 1600 to 1921, 1909 Operators Wireless Telegraph & Telephone Hand-Book by Victor H. Laughter. Oct.-Nov. 1930, Dec. 1930-Jan. 1931, April to Sept. 1931 1933 to 1937 Inclusive Short-Wave Craft \$1.00 per copy 1933 Super-Wasp with Supply No. 20. W. M. Collins Third addition Radio Amateurs Handy Book, 1918 Issue Wireless Course by H. W. Secor, S. Gernsback, A. Luscarboua. Best offer. Some 1930 and 1931, 1932 to 1939 OST \$1.00 per copy plus postage. No personal checks accepted. W7R0F, 1443 Easi 8425 South-Sandy, Utah.

IMMACULATE Valiant, \$250; HQ-140X, HC-10, \$200; Vibroplex Presentation, Johnson key, plex base, \$35; UTC 3000V 300 Ma. 1000V 1A xfrms; \$50; two deluxe 48 in. racks, access doors, \$50. Sinkler, RD 1, 7690 Fields Rd., Chagrin Falls, Ohio. Will ship.

KWM-1 Ser. 737 with 136B-1 blander, 516E-1 ser. 492 DC supply; 516 F-1 AC supply, 351D-1 mobile mount and cables. Equipment perfect with less than 10 hours mobile and less than 100 total. Will ship prepaid in continental USA. Packed in original cartons with manual, on receipt of certified check for \$595. This is a real buy! Ike Cosper, W9WPQ, 1603 Hoover Ave., South Bend 15, Ind.

FOR Sale: AF-68, PMR-8 receiver, Elmac PS, Master Mobile all-band antenna, spkr, used seven months. Perfect condx. Will not fly. W4 purchase price, \$511.96. Sell for \$375. John B. Ayers, W4KZF, Box 9, Toocoa, Ga.

FOR Sale: Gonset GSB-100 SSB exciter, \$250; GSB-101 KW PEP linear, \$250; Drake 2A receiver, \$165; TA-33 Tribander beam, \$60. W10Z, G.M. Golden, 42 Sunhill Lane, Newton, Mass. Phone LA 7-2641.

TRADE Delur 8MM movie camera turret telephoto lens, also Kodak 35MM camera and 35MM slide projector. Want Drake 2B. What have you? Coble, 251 Collier Ave., Nashville 11, Tenn.

SWAN 175 AC supply, \$225; trade for Viking II, plus \$100 or DX-40 plus \$175; BC-221 pwr. supply, \$45. Trade for Sixer, John Bagwell, Somerv'le, Tenn.

SWAP: 1949 40 HP Elgin Outboard motor, controls, Skis, etc. for complete all-band mobile station. K3NYG, 34 Need Lane, Chester, Penna.

HT-17, \$22.50 HT-18, \$48; Globe Chief 90, unused, \$50; screen modulator kit, unused, \$12.50; G-E model A 53B slicer, \$17.50; NC-98 spkr, \$8.00. W2CQG, Rt. 1, Box 547, East Brunswick, N.J.

ARIZONA Hams. Selling HQ-160, \$275; matching spkr, \$10; Eico VTMV, \$25; Deluxe No. 315 sig. generator, \$35; Heath grid dipper GD-1B-350 Kc to 250 Mc., \$15; late model portable elec., Smith Corona mill and case, \$10. All like new. Ken Stroud, K7TEZ, 21240 N. 24th Ave., Phoenix 27, Ariz.

HAM-BUERGERS-Used Equipment Money Back Guarantee. B&W 515B \$165.00; Gloce Linear \$79.95, Chief Deluxe \$59.95; Gonset COM-10 Meter, \$225.00; Gonset 6 Meter Linear \$99.95, G28 10 Meter \$119.95, COM-11 & VFO 2 Meters \$149.95; Hallcrafters SR34 \$274.95, FPM 200 \$1375.00; Heath Apache \$249.95, Mohawk \$249.95, DX 40 \$84.95; Johnson KW Matchbox with SWR Bridge \$119.95, Valiant FW/T \$149.95, Pacemaker \$324.95; National NC183 D \$239.95, NC300 \$244.95, NC101 \$364.95. TRADES - Write for FREE list of new COLLINS equipment in stock. Write for information & prices. Ham Burgers, Wyncote, PA. CA4-1740.

TRADE: Factory reconditioned Rolex H-16 Panciner "Zoom", few accessories and leather case. Want: "Mobile" SSB rig and/or KW linear makings. J. M. Fernandez, P.O. Dr. 595, Franklin, Ia. W5IOH.

EICO 720 xmttr with instrux book, TVI suppression, \$60. WA4JFX, K. B. Chappell, Louisa, Va.

MOBILE Morrow Twins with supply, whip, \$200. Kilowatt linear, \$350; Heath HX-20 Sideband, factory adjusted, \$229. K6GUW, Don Turner, 111 Newton Hall, Angwin, Calif.

WANTED: Johnson KW rotary inductor, No. 226-3; also, UTC CVM 4 or 5 mod. transformer. State price and condx. Write to Geo. Nordquist, Rt. 1, Lake Elmo, Minn.

SELL: AR-88, clean, \$125. W6KEV, 3088 Greencoak, San Mateo, Calif.

GONSET Communicator II-B, 6 meters, 6/110 volts with xtals and mike, \$140. Ronald Schwartz, 333 E. Dixon Ave., Dayton 19, Ohio.

MUST Sell: Johnson 6N2, \$145; Johnson 6N2 VFO, \$35; Eico 730, \$50; Elmac PMR8, \$135; AR22, rotor, \$18; Ameco 2 mtr. Nuvisor conv. (2R-32 Mc. 1, F.), \$30. All factory wired and in mint condx. Also exclnt homebrew pwr. supplies for 6N2 and Elmac, \$30. NYC, vicinity only. (You must pick up). Call WH 9-6059 week-ends, Pete, WA2DFF, Hartsdale, N.Y. (near White Plains).

SELL DX100 with B loading, improved keying, spotting switch and front panel crystal socket. In A-1 condx. Best offer. W0J0U, 904 Miss. Blvd., Bettendorf, Iowa.

COLLINS 75A-4, 2 mech. filters, spkr, in mint condx. Original owner, Ser. No. 4825, Sent PP, \$575. Max Freedman, K7LKL, 1342 N. 48th St., Phoenix 8, Ariz.

AUTOMOBILE AC/DC generator, 2300 watts, 115v, \$149.50; KWS175A4, Hunter transmitter, like Collins 310B-1, \$85; transistor stereo-preamp, \$29.50; stereo record-player, \$24.50; pair RCA transceivers, \$45 each; 220 and 432 Mc. linear tripler-amplifiers, \$20; Traveller, \$34; microphone transistor mobile supply, \$20; Heath color generator, \$55; pair new 4-40A, \$40; miscellaneous power supplies, transformers, chokes, condensers, 866A's, \$1; 3B2's, \$2; 813's, \$5; electronic flash, \$17.50; VHF Signal Generator, \$4.50; new Allied KN-600C spkr, \$40; list sell/trade, W4AP1, 1420 So. Randolph, Arlington 4, Va.

SACRIFICE: Gonset 101 Kilowatt Linear Amplifier, 6 mos. old, \$325; Pete, W2FDU, 124 Meadowview Ave., Hewlitt, L. L. N. Y. Tel. Area code 516-FR-4-7807

VERY GUD 32S-1 and 75S-1 for KWM-2 or \$850. KOJXN, 202 East 25th, Bellevue, Nebraska.

416's, pulled from wkg. eac. \$5.00 each. Guaranteed. E. R. Epley, W7SLZ, Rte. 3, Box 95-A, The Dalles, Oregon

FOR Sale: Collins 75A3, latest model built with 3 and 6 Kc. filters, matching spkr, xtal calib., vernier knob, product detector, in exclnt condx; \$395; BC221-B, built-in pwr. supply, \$35; Gonset GSB-100, like new condx, \$275. W. J. Moulton, W9DSP, Rte. 4, Chippewa Falls, Wisconsin. Phone Park 3-3000.

TELETYPE Mod. 15, Mo. 14 typink refer., Mod. 14 TD, CV-80 TU, RA-87 pwr. supply, 3 watt FSK VFO, "Switch-lette", paper, rack for machines, all for \$850 or trade for a KWM-2. Write for details. WA6AVJ, 4135 Jackson St., Riverside, Calif.

MUST Sacrifice for collette: Polycomm "6" AC, \$210; Tel-rex 6 cl. beam, 20, Saturn Six halo, \$10. All in exclnt condx. Kellersman, Box 266, Mitchell College, New London, Conn.

DX-100 with standard modifications. Local sale is preferred. \$125.00. WA2CTB, 82-23 246 St., Bellerose, L. I. N. Y. Tel. F1 7-4629

LA FAYETTE HE-30, \$85 or will trade for BC779, SX-28, VN2DWR, 186 Grove St., Angola, N.Y.

SELL: Hallcrafters SX-110, manual; in gud condx, \$105. WA2VAL, 48 Midfield Lane, Levittown, N.J. Tel. IR 7-9622.

NEEDED: Amateur radio equipment of any kind. Will be used in Franciscan Radio Corps. If you can help, write: Franciscan Radio Corps, Mt. St. Francis Seminary, Mt. St. Francis, Ind.

FOR Sale: Gonset G-76 transceiver 6 thru 80 meters; xtal calibrator, Sorensen A/C P/S, Topaz DC P/S, mounting brackets, dynamic mic, spkr, spare tubes, all new condition, \$415. RCA Senior Vrohmohist, \$30; TE-29 xtal calibr., \$6.50, 7094 tube, \$11.30. Fred Williams, 64 Prospect Ave., Hackensack, N.J.

KWM-1, in exc. condx, Collins DC supply, AC supply, Collins mobile mount, all cables, inst. book, mike, Mark Helihwms and mount for 10 and 20 meters. All for \$582. Jerry Hacker, Box 32, Dudley, Mass. Tel. 943-9762.

SALE: NC-303, \$317.00, 6 meter converter, \$17. Wayne Hacker, Box 271, Dudley, Mass.

FOR Sale: HT-32, HT-33A, SX-101 Mk III and TB-1000-4 beam, K9VAR, Joe. Tel. TU 9-7703, at 181 N. Rutherford, Chicago 35, Ill.

WANTED: AC coil for HRO-60, J. H. Fab, K9FZO, Butterfield Lane, Flossmoor, Ill.

MULTI-ELMAC PMR-8, one owner only, in exclnt condx, \$120. Brand new, never used! Amperex 4CX250 B, \$25. K9LAL, Hinsdale, Ill. Tel. FA 5-1375.

NEW GPR-90 no reasonable offer refused. Will trade for Amrex 601 or Crown 701/702 recorder, W2ZUP, AD 4-1118.

SELL: DX-40 and Heathkit Twox with manuals for both, in exclnt condx. Wilbert Schwarzk, 193 West Twelfth, Fond du Lac, Wis.

URGENTLY Need instruction manual or circuit diagram for Pierson KP-81 revr. W0POS, 725 11th Ave. NE, Rochester, Minn.

CRYSTALS Airmailed: SSB, MARS, CD, Commercial, Novice, CAP, Net, etc., -Custom finished FT-243, .01% any Filcyclo 3500 to 8600 \$1.49 (10 or more FT-243, same frequency 99¢), 1707 to 20,000 Kilocycles \$1.95. Above 10 megacycles are overtones. Fundamentals 10,000 to 13,500 \$2.95. Add 50¢ each for .005". Add 6¢ each for HC-6/u hermetics. OST Crystals Kits (FT-243), "SSB Package" five mixer \$29.95, seven matched filter (FT-241-A), \$9.95; "DCS-50" "IMP"; "Phasing" \$9.95/ set. Write regarding crystal needs. Airmailing 10¢/crystal, surface 5¢. Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

FOR Sale: RTTY converter Alltronics-Howard model in exclnt condx, \$60; Hallcrafters SX-99, in exclnt condx, \$75. K4MEP, 3517 West Stillwood Lane, Mobile, Ala.

SELL: Electro-Voice 600-D mike, \$15; Mon-Key automatic rev, \$30; Arbonne mike, \$10. Xtals, ham freqs., thirty different, \$20. S. Friedlander, W8ZMC, 1113 Lois Dr., Cincinnati, Ohio. Phone 351-2731.

6 M Equipment, Heathkit Shawnee transceiver, Get terrific signal reports, \$190. Two 3 ring Halo's, \$18; 6 M Hilltop Beam, \$7; Ameco Nuvisor 6M converter with pwr. supply factory wired. Used 10 hrs. \$50. Take all for \$240. Don Grimme, K2RHH, 9 Fieldstone Dr., Basking Ridge, N.J.

WANTED: Manual for Stancor ST203A transmitter. Also, full year 1956 OST back issues and low voltage transformer for 32V2. Will send cash immediately. Fred Fay, 47 Lisa Dr., Northport, L. I., N.Y.

GOING Single Sideband mobile, Heath Cheyenne, Gonset Super 12, Heath RM-1 mobile antenna, six months old, \$150. WA4-AEB, 304 Pineville Rd., Spartanburg, So. Carolina.

CASH For quick sale: Collins filter 455-31, \$25; National MB-150, \$12; Gonset Triband, \$12; Heath QF-1, \$6; GG 813 linear, \$50; desk rack, Monimach, \$5. Can ship the linear but will deliver with 75 mils radius. Offer items postpaid on receipt of check or m.o. Nickerson, Box 1832, New Haven 8, Conn.

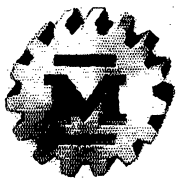
GLORE Champion Mod. 350 275 watts phone, 350 c.w., in exclnt condx, \$300. Gone homebrew, K1SNA, 2 Charles St., North Reading, Mass.

ELDICO SSB-100F 100 watt SSB-AM-CW exciter in exclnt condx, 10 thru 80 meters, xtal filter, built-in scope, adjustable pi-net output, with manual and factory carton; \$395. C. Bronner, Box 261, Morton, Ill.

SELL: Johnson 6-2 converter, \$50; Hammarlund HQ-100 with matching spkr, \$122; Heath Seneca, built by certified engineer, \$159; Astatic D-104 mike with stand, \$14; Hy-gain 14AV 10-40 trap vertical with mounting kit, \$19; Master Mobile 6M ground plane, \$5. All in exclnt condx. Ken Mann, WA6FZG, 1522 Kelson Ave., Los Angeles, Calif.

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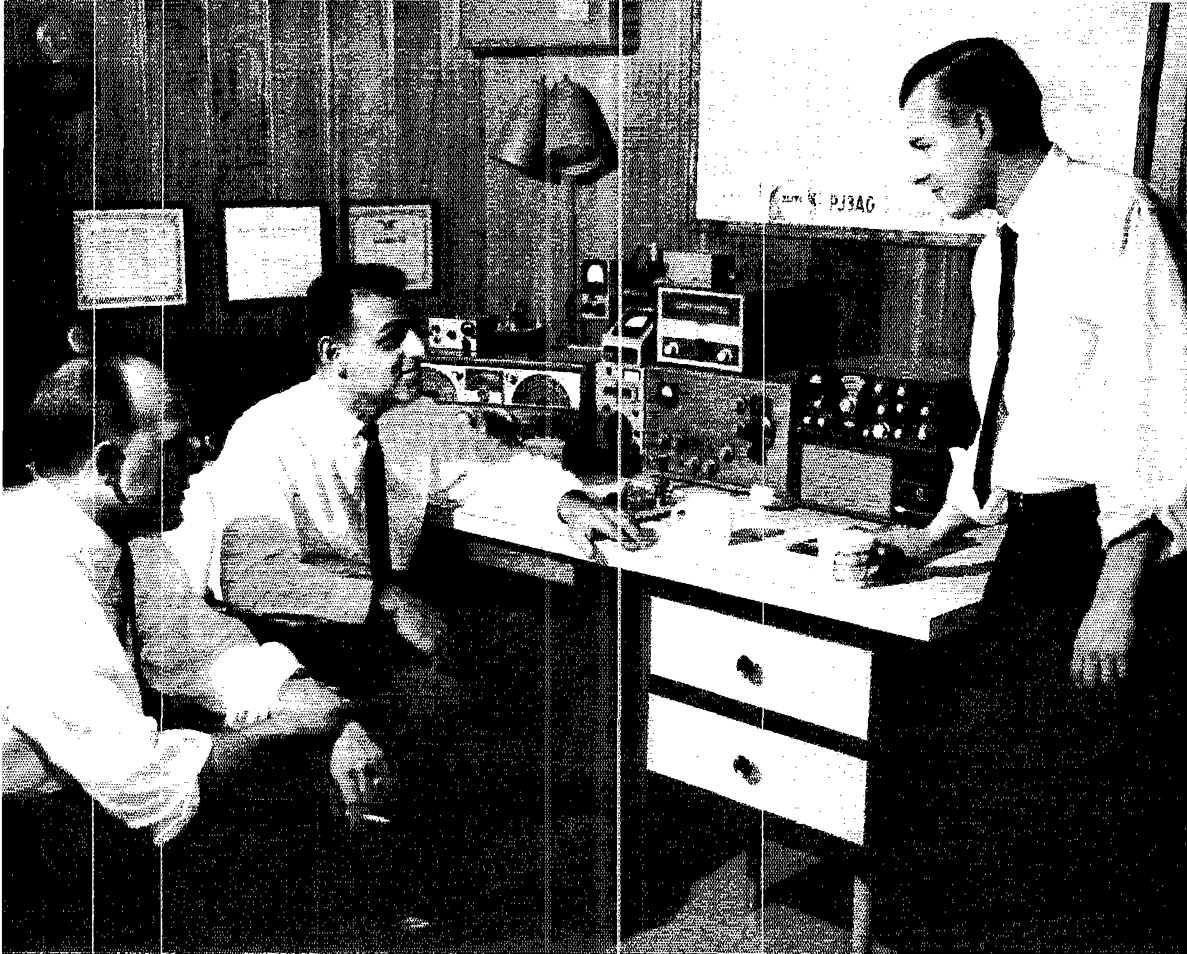
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George Lucas, W1ZYS, "Pops" Karentz, W1YLB, and Ray Churchill, W1VBI, enjoy an infrequent eyeball QSO at "Pops'" Millis, Mass., QTH.

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It is unusual for the three people pictured above to get together in the same ham shack — more often all three are on far-ranging domestic or foreign assignments supervising Advanced Capability Radar installations for our armed forces.

George Lucas, W1ZYS, is currently Raytheon's resident field engineer at Boeing, Wichita, Kansas. He has advised and instructed on new ACR alignment techniques at many major Air Force bases in the U. S.

Ray Churchill, W1VBI, specializes in high speed bombing radar aboard B-52's. He may be at Loring AFB, Maine one day, Edwards AFB, California the next.

Pops is the Field Project Supervisor of Air Force Programs for Raytheon's Electronic Services Operation. Pops served in a wide range of field engineering assignments prior to his promotion to Project Supervisor and is currently responsible for field programs requiring the services of a large group of field engineers. George Lucas and Ray

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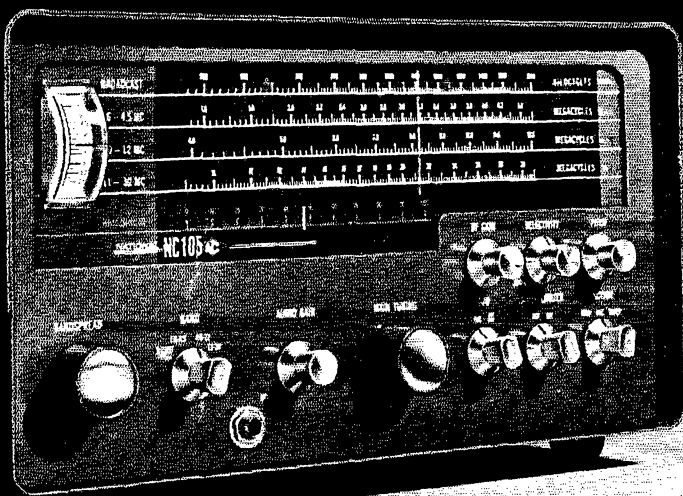
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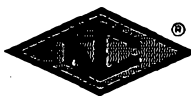
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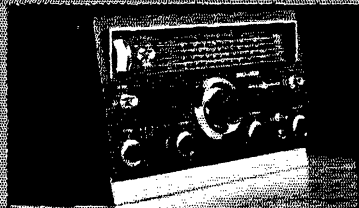
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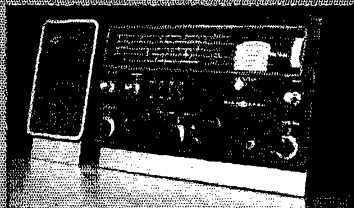


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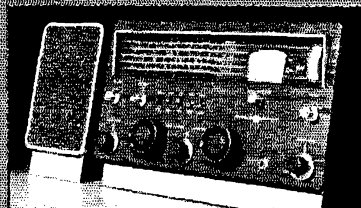
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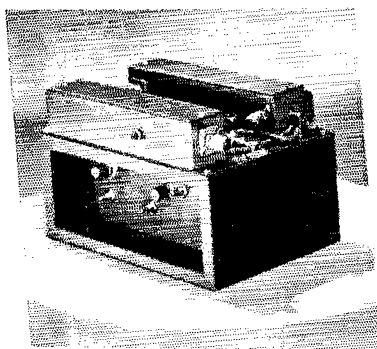
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