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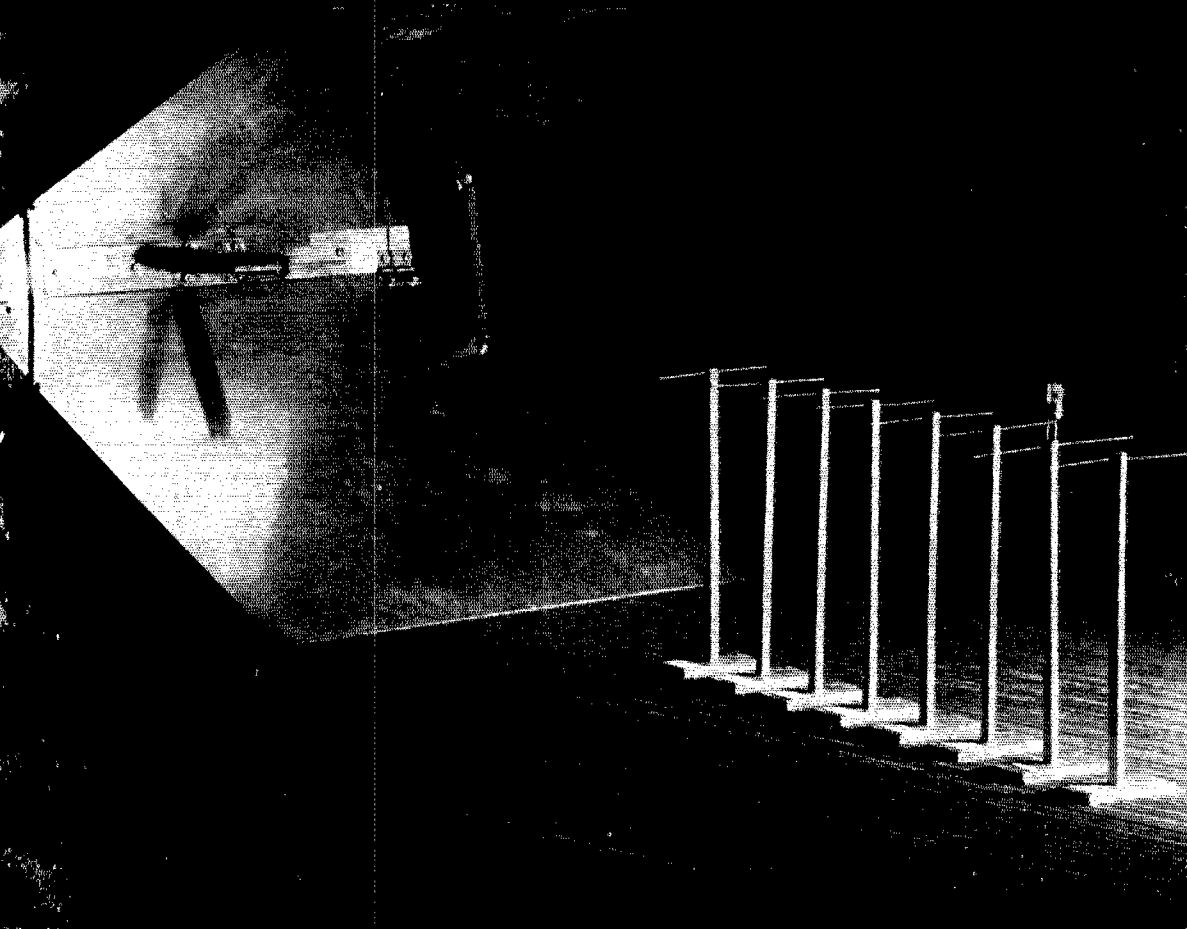
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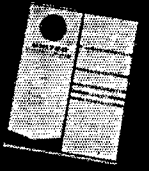


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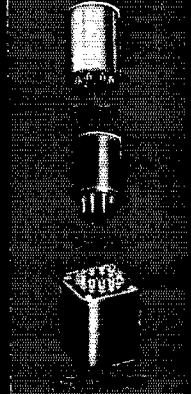
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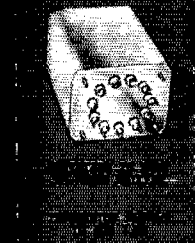
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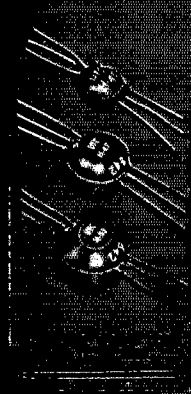
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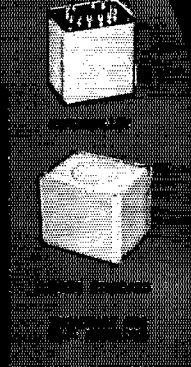


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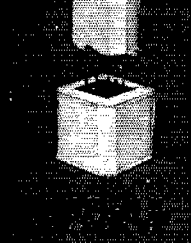
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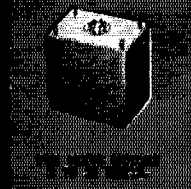
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Very Hot News . . . from hallicrafters

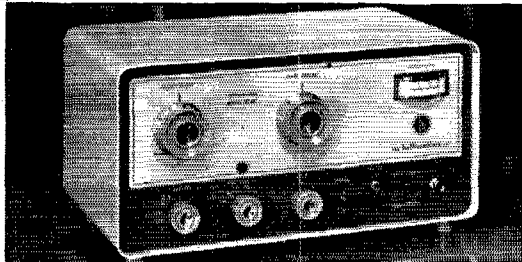
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HALLIKITS, we call them—a completely new concept of kit engineering that brings to your workshop, for the first time, these two outstanding advantages:

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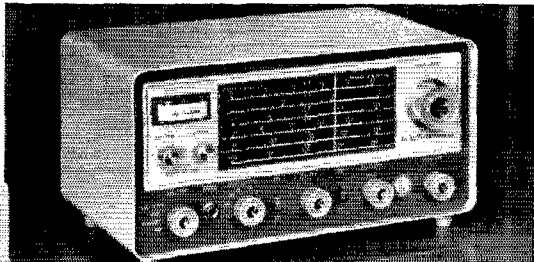
Have a wonderful time! Save a bundle of money! End up with a station the most experienced amateur would be proud to call his own.



HT-40 TRANSMITTER, \$79.95

A perfect match for the handsome SX-140, both in quality and appearance. Hallicrafters' transmitter leadership is evident in every precision-engineered feature of this crystal-controlled 75-watt beauty—features as important to old-timers as they are to novices.

- **FEATURES:** You get excellent CW performance as well as AM. Full band switching, 80 through 6 meters. Enjoy easy tune-up and crisp, clean styling that has efficient operation as well as appearance in mind. Unit is fully metered, TVI filtered.
- **SPECIFICATIONS:** Maximum D.C. power input: 75 watts. Power output in excess of 35 watts CW, 30 watts peak AM phone. (Slightly less on 6 meters.) Frequency bands: 80, 40, 20, 15, 10 and 6 meters.
- **TUBES AND FUNCTIONS:** 6DQ5 power output; 6CX8 crystal oscillator and driver; 12AX7 speech amplifier; 6DE7 modulator; silicon high voltage rectifiers.
- **FRONT PANEL:** Function (AC off, tune, standby, AM, CW); Band Selector (80, 40, 20, 15, 10, 6); Drive control; Plate tuning, plate loading, Crystal-V.F.O.; Grid Current; Meter; AC indicator light; RF output.
- **REAR CHASSIS:** Microphone gain; antenna co-ax connector; remote control terminals; AC power cord.



SX-140 RECEIVER, \$94.95

Doesn't it make sense to team up your skill with the experience of a company who has designed and built more high-performance receivers than any other in the world? Especially when the result is the *lowest-priced amateur band receiver available?*

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- **TUBES AND FUNCTIONS:** 6AZ8 tuned RF amplifier and crystal calibrator; 6U8 oscillator and mixer; 6BA6 1650 kc. IF amplifier and BFO; 6T8A 2nd detector, A.V.C., ANL and 1st audio; 6AW8A audio power amplifier and S-meter amplifier; (2) silicon high voltage rectifiers.

P.S. Both units are available fully wired, and tested. SX-140, \$109.95. HT-40, \$99.95.

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Circulation Manager

J. A. MOSKEY, W1MY
Assistant Circulation Manager

OFFICES

38 La Salle Road
West Hartford 7, Connecticut
TEL.: ADams 6-2535

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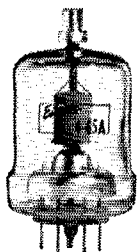
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EIMAC FIRST... for all band transmission

CW

SSB

AM

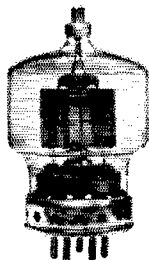


4-65A

4-65A Radial-Beam Power Tetrode

Smallest of the Eimac internal-anode tetrodes, the 4-65A has a plate-dissipation rating of 65 watts and is ideal for deluxe mobile as well as fixed-station service.

	CW	AM	SSB
Plate Voltage	3000v	2500v	3000v
Driving Power	1.7w	2.6w	0
Input Power	345w	275w	195w



4-400A

4-400A Radial-Beam Power Tetrode

Ideal for high power amateur rigs, it will easily handle a kilowatt per tube in CW, AM or SSB application. Forced-air cooling is required.

	CW	AM	SSB
Plate Voltage	3000v	3650v	4000v
Driving Power	6w	4w	0
Input Power	1000w	1000w	1000w



4E27A/5-125B

4E27A/5-125B Radial-Beam Power Pentode

The Eimac 4E27A/5-125B is intended for use as a modulator, oscillator or amplifier. The driving-power requirement is very low, and neutralization problems are simplified or eliminated entirely.

	CW	AM	SSB
Plate Voltage	3000v	2500v	4000v
Driving Power	1w	2w	0
Input Power	500w	380w	360w

4CX1000A Ceramic Power Tetrode

Specifically designed for SSB operation, the ceramic-metal 4CX1000A Class AB, linear-amplifier tube achieves maximum rated output power with zero grid drive.

	SSB
Plate Voltage	3000v
Driving Power	0
Input Power	2700w

4CX250B Ceramic Power Tetrode

A compact, rugged tube unilaterally interchangeable in nearly all cases with the famous 4X150A, with the advantages of higher power and easier cooling.

	CW	AM	SSB
Plate Voltage	2000v	1500v	2000v
Driving Power	2.8w	2.1w	0
Input Power	500w	300w	500w

4-125A Radial-Beam Power Tetrode

The versatile tube that made screen grid transmitting tubes popular. This favorite for commercial, military and amateur use is radiation cooled.

	CW	AM	SSB
Plate Voltage	3000v	2500v	3000v
Driving Power	2.5w	3.3w	0
Input Power	500w	380w	315w

4-250A Radial-Beam Power Tetrode

A high power output tube with low driving requirements. A pair of Eimac 4-250A's easily handle a kilowatt input in AM, CW or SSB service.

	CW	AM	SSB
Plate Voltage	3000v	3000v	4000v
Driving Power	6w	3.2w	0
Input Power	1000w	675w	660w

4CX300A Ceramic Power Tetrode

A new ceramic-metal high power tetrode designed for rugged service. Will withstand heavy shock and vibration and operate with envelope temperatures to 250° Centigrade.

	CW	AM	SSB
Plate Voltage	2500v	1500v	2500v
Driving Power	2.8w	2.1w	0
Input Power	625w	300w	625w

Information on these popular tubes for amateur applications is available from our Amateur Service Department.

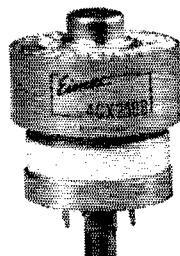
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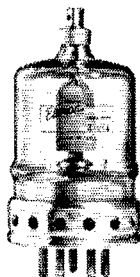
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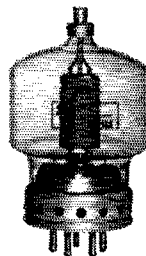
4CX1000A



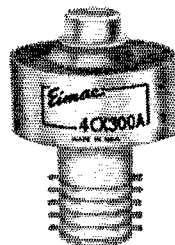
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4-125A



4-250A



4CX300A

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Hermetically sealed; calibrated 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc.; .050" pins.....**\$4.95 Net**

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Fifth overtone; for operating directly in 6-meter band; hermetically sealed; calibrated 50 to 54 Mc., ± 15 Kc.; .050" pins.
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CITIZENS BAND CLASS "D" Type Z-9R, Transmitter

FCC assigned frequencies in megacycles: 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225; calibrated to .005%. (Be sure to specify manufacturer of equipment).....**\$2.95 Net**

CITIZENS BAND CLASS "D" Type Z-9R, Receiver

Specify I.F. frequency, also whether receiver oscillator is above or below transmitter frequency. Calibrated to .005%. (Be sure to specify manufacturer of equipment.)
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Type Z-9R, Radio Control

FCC assigned frequencies in megacycles: 26.995, 27.045, 27.095, 27.145, 27.195, 27.255; calibrated to .005%. (Be sure to specify manufacturer of equipment).....**\$2.95 Net**

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Official assigned frequencies in the range. Calibrated to .005%. 1600 to 10000 Kc.....**\$3.45 Net**

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Channels 2 thru 13.....**\$6.45 Net**

4.5 Mc. Intercarrier,

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5.0 Mc. Signal Generator,

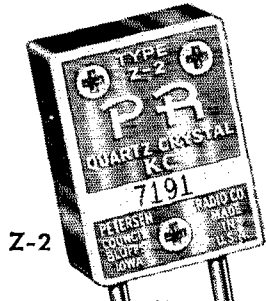
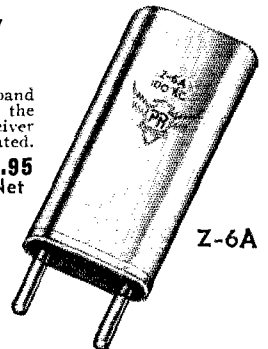
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10.7 Mc. FM, IF,

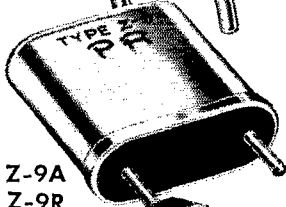
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Type Z-6A, Frequency Standard

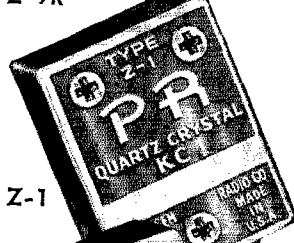
To determine band edge. To keep the VFO and receiver properly calibrated.
100 Kc. ... **\$6.95 Net**



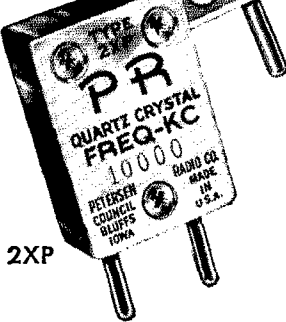
Z-2



Z-9A
Z-9R



Z-1



ZXP

Type ZXP

Suitable for converters, experimental, etc. Same holder dimensions as Type Z-2.

1600 to 12000 Kc., (Fund.) ± 5 Kc.....**\$3.45 Net**

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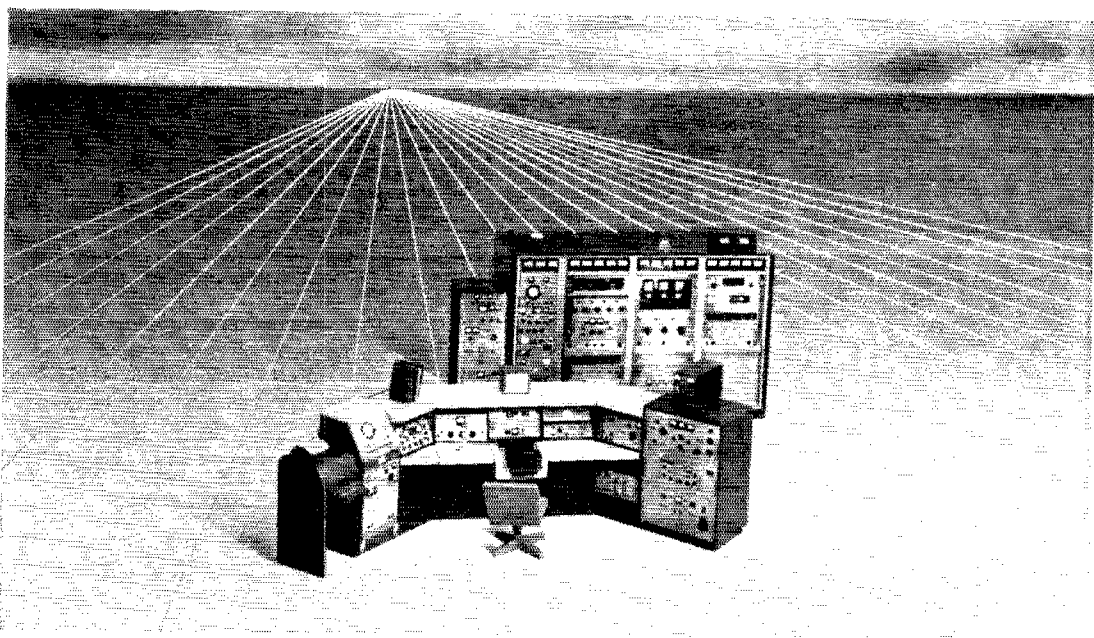
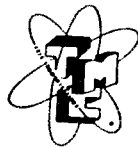
Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in the 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 also desire applications for SEC, EC, RM and PAM where vacancies exist. OES appointment is available to Novices and Technicians.

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Minnesota	W0KJZ	Mrs. Lydia S. Johnson	1258 Van Buren St.	St. Paul 4
DELTA DIVISION				
Arkansas	W58MN	Daniel B. Patterson	Courthouse	Ferryville
Louisiana	W5FMQ	Thomas J. Moravai	3402 Beaulieu St.	Metairie
Mississippi	W5MUG	Edward C. Peterson	2469 P. Den	Jackson 4
Tennessee	W4UTO	R. W. Ingraham	105 West Park Drive	Kingsport
GREAT LAKES DIVISION				
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HUDSON DIVISION				
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N. Y. C. & Long Island	W2TUK	Harry J. Dannaals	RFD 1, Arbor Lane, Dix Hills	Huntington, L. I.
Northern New Jersey	K2MFF	J. Sparks Remeczky	30 Kelly Parkway	Bayonne
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Kansas	W0FNS	Raymond E. Baker	1014 Lincoln St.	Neodesha
Missouri	W0BUL	C. O. Gosh	711 S. Oakland St.	Webb City
Nebraska	W0EXP	Charles E. McNeel	Route 3, RFD	North Platte
NEW ENGLAND DIVISION				
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Maine	W1JMN	Jeffrey I. Weinstein	79 Caleb St.	Portland
Eastern Massachusetts	W1ALP	Frank L. Baker, jr.	91 Atlantic St.	North Quincy 71
Western Massachusetts	W1BYR	Percy C. Noble	8 St. Dennis St.	Westfield
New Hampshire	W1HQ	Ellis P. Miller	406-335	Wolfeboro
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket
Vermont	W1EIB	Mrs. Harriet Proctor	P. O. Box 9	East Middlebury
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Idaho	W7GGV	Mrs. Helen M. Maillet	Route 1, South	Pocatello
Montana	W7SFK	Ray Woods		Brady
Oregon	W7JDX	Hubert R. McNally	11908 S.E. Madison St.	Portland 16
Washington	W7PGY	Robert B. Thurston	7700-31st Ave., N.E.	Seattle 15
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Nevada	W7VIU	Charles A. Rhines	Box 1025	Elko
Santa Clara Valley	K6DYX	W. Conley Smith	67 Cuesta Vista Drive	Monterey
East Bay	W6JFW	B. W. Southwell	200 South Seventh St.	Dixon
San Francisco	K6ANP	Leonard H. Gerald	1500 Cayuga Ave.	San Francisco 12
Sacramento Valley	W6GJD	John C. Grien	6006 8th St.	Rio Linda
San Joaquin Valley	W6JFU	Ralph Saroyan	6204 E. Townsend Ave.	Fresno
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South Carolina	W4GQV	Dr. J. O. Dunlap	P. O. Box 447	Rock Hill
Virginia	W4QDY	Robert L. Folmar	1057 Dune St.	Norfolk 3
West Virginia	W8JM	Donald B. Morris	1111 Alexander Place	Fairmont
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Utah	W7QWH	Thomas H. Miller	1255 East 17th St.	Salt Lake City 5
New Mexico	K5IQL	Newell F. Greene	504 West Second St.	Roswell
Wyoming	W7AMU	L. D. Branson	342 South Elk	Casper
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Western Florida	W4RKH	Frank M. Butler, jr.	494 Elliott Rd.	Fort Walton Beach
Georgia	W4CFJ	William F. Kennedy	1687 Fairway Hill Drive, S.E.	Atlanta 17
West Indies (Cuba-P.R.-V.I.)	KP4DJ	William Werner	363 Ramon Lovet	Urb. Truman
Canal Zone	KZ5TD	Thomas B. DeMeis	P. O. Box 1111	Rio Piedras, P. R.
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Arizona	W7QZH	Kenneth P. Cole	4132 North 18th Ave.	Phoenix
San Diego	W8LRU	Don Stansifer	1427 Pescadero	San Diego 7
Santa Barbara	K6CVR	Robert A. Hemke	728 W. Mission	Santa Barbara
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Oklahoma	W5DRZ	Adrian V. Rea	917 Osage	Muskogee
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Yukon	VE4JY	M. S. Watson	249 Lanark St.	Vancouver, B. C.
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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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



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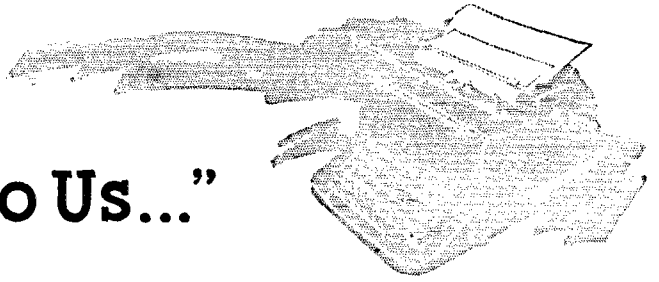
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"It Seems to Us..."



THE YEAR IN REVIEW

Father Time's note pad for 1960 is again a story of unlimited horizons stimulating the imaginative interests of amateurs, with v.h.f.-u.h.f. records and communication at the top of the list.

Heralding a challenge, amateur groups climaxed weeks and months of detailed and careful preparation by creating a DX record that's going to be hard to beat! For the first time, amateurs achieved two-way contacts by bouncing signals via the moon, July 21, on 1296 Mc., between San Carlos, Calif., and Boston, Mass. Spanning the two points 2700 miles distant, but with a half-million mile roundtrip for the signals, team-working hams of the Rhododendron Swamp V.H.F. Society (W1BU) and the Eimac Radio Club (W6HB) are credited with the first contacts. The moon-bounce QSOs came just 10 years after the first moon experiments by hams on 144 Mc. Another entry went into the DX record books, too, when a 265-mile QSO was carried out on July 31 between W7JIP/7 and W7LHL/7 on 10,000 Mc.

Continuing this accent on v.h.f. are W6NLZ and KH6UK, who were presented the 1960 ARRL Merit Award for pioneering work on 144- and 220-Mc. tropospheric propagation. Last summer, the two continued attempts at 432-Mc. contacts between the mainland and Hawaii but equipment failure at one end prevented an actual completion of another startling record.

One of two FCC decisions during 1960 also dealt with v.h.f. amateur bands, creating c.w. sub-band segments at 50.0-50.1 Mc., and 147.9-148.0 Mc. In another Commission action, phone sub-band privileges were granted at 14,300-14,350 kc. Still awaiting FCC decision are proposals involving Extra Class license incentives and a change in the rules to make it easier for American citizens living overseas to obtain Conditional Class licenses. Canadian amateurs received welcomed news of expanded phone sub-bands, from 7 Mc. through 28 Mc., after a survey of the desire of Canadian amateurs by their Department of Transport.

Amateur license applications get a "new look" during 1961 with revision of FCC Forms 610 and elimination of the old Form 405-A. FCC license exams also got the new look, too: applicants from now on will be marking IBM

answer sheets for faster grading. Under the new system, applicants will have to recognize circuits and catch errors or omissions in diagrams, on a multiple-choice basis, instead of actually drawing the schematics.

FCC announcements during the past year also made it easier for amateurs in another way: new agreements with Venezuela, Honduras, Haiti and Paraguay bring to 14 the number of countries with which U. S. amateurs are permitted to exchange third-party traffic.

In other international matters, the government of Iran at mid-year withdrew its objections, filed with the ITU ten years ago, to communications between its amateur and those of other countries, and was removed officially from the banned countries list. Laos, however, was returned to the banned list.

ARRL General Manager Budlong, acting in his capacity as Secretary of the IARU, attended the fourth Region I IARU conference at Folkstone, England during June. Already concerned with the outlook for the next international radio conference, the IARU gathering discussed European amateur allocations, governmental liaison, ITU's forthcoming Panel of Experts (to study allocation methods) and a general review of the recently concluded Geneva conference.

Americans can be proud of the election of Gerald C. Gross, W3GG/HB9LA, as Secretary-General of the International Telecommunications Union, the first amateur to hold this key administrative post.

Other American amateurs pitched in to help, internationally. *Project Hope*, a mercy ship and floating hospital, began visiting foreign countries giving free medical aid; the ship is outfitted with amateur gear and operates on 14 Mc./MM under special FCC authority, with W8OLJ at the mike.

Turning again to stateside matters, dramatic evidence of the ingenuity of two teen-age hams was the bouncing of 15-meter signals off passing earth-satellite trails. Over the New York-to-Bethesda (Maryland) path (about 200 miles), K2QBW and K3JTE claim two-way contacts through aid of satellite trail "scatter," possibly involving the "Kraus effect."

As Old Father Time ticked along, he also encountered vicious Hurricane Donna which lashed the entire Eastern seaboard. Amateurs

from the Florida keys through New England offered emergency communication facilities and handled emergency traffic. Mother Nature taught Father Time another lesson in the disastrous Southern California forest fires, where hams again provided valued assistance.

These emergencies proved the continuing need for AREC and the RACES programs with membership in both groups reported up again over the preceding year. At year-end, there was also the steady-pace growth in traffic nets with net registrations at ARRL mounting to an all-time high.

Participation in the annual Field Day, ARRL DX Contest and Sweepstakes responded to growth in the amateur ranks, but less spectacularly as we drift toward the downward side of the sun-spot cycle. DX-hunting was heightened by the addition of

12 new countries to the ARRL DX Countries List, more than double the usual number during a normal year. Award-hunters continued in great numbers with the Rag Chewers Club certificate still the front-runner in demand, especially among newcomers.

Checking off the items for 1960: It was notably a year of teamwork-experimentation with many forward strides in our growing hobby. Recounting the u.h.f. records gives gratifying proof that amateurs have only begun to tap the potentialities of that spectrum. Amateurs will try new modes to make the new year another history-making period, with plans well along for amateur transmitting and transponding gear in an earth-orbit satellite.

A hearty wish for another productive and rewarding year, OMs and YLs! QST

OUR COVER

Tune in next month for a discussion of some practical operating hints for 1215 Mc. W1HDQ has been working up some good dope that you megacycle men will enjoy, and the story may even excite the imagination of some of you who hang around on the so-called "d.e." bands. Our cover this month shows some of the antenna gear that W1HDQ and W1CUT have been playing with. And our photographer had a great time with this month's table-top photography.

Strays

Here is the January schedule for the Air Force MARS Eastern Technical Net, meeting on Sundays at 1400 EST (1900 GMT) on 3295 7540, and 15,715 kc.

- Jan. 8 — Exotic Applications of Semiconductors.
- Jan. 15 — Passive Satellite Communications.
- Jan. 22 — Some Aspects of Extra-Terrestrial Communications.
- Jan. 29 — Plasma Physics.
- Feb. 5 — Titration With H.F. Radiation.
- Feb. 12 — The Electron Emission Microscope.

— —

The Third Army Technical and Educational Net will meet on 5850 kc. at 0000 GMT on the following dates.

- Jan. 7 — Radiotelephone Procedure.
- Jan. 14 — Operating Procedure on a C.W. Net.
- Jan. 21 — Procedure for Radioteletype for MARS/Amateur Operation.
- Jan. 27 — What Makes a Good Net Operator.

— —

A 1960 replica of a 1903 Oldsmobile has embarked on a 3300-mile endurance test from Los Angeles to New York. K8KEC is accompanying the expedition, traveling in a separate house trailer and operating on 14,310 kc., and he will be relaying reports on the progress of the antique replica. The 425-pound vehicle is equipped with a four h.p. engine and will do 25 m.p.h.



Florida — The Tropical Hamboree of 1961 will be held on January 14 and 15 at the Bayfront Park Convention Auditorium, 5th and Biscayne Blvd., Miami, sponsored by the Dade Radio Club. The headquarters hotel is the Biscayne Terrace, 340 Biscayne Blvd., one block from the auditorium. This is a combined ham equipment show and hamfest, with many equipment displays and all sorts of contests, technical talks, open forums, and a ham auction. Activities go on each day from 0930 to 1700. There will be a banquet Saturday evening at the hotel, where W4BPD is scheduled to describe his recent DXpedition. Hamboree registration is \$1.00, while banquet tickets are \$5.00. Obtain reservations by writing to the Dade Radio Club, P.O. Box 104, Miami 1.

This issue of QST will reach you during the Christmas holidays, and it brings you the best wishes of all the gang at Headquarters for a joyous holiday season and for a happy 1961. Our deep thanks to all of you who have helped to fill our lobby with Christmas cards again this year.

"Bud" Retires

ARTHUR L. BUDLONG, W1BUD, Secretary and General Manager of the League and Editor of *QST*, is retiring at the end of 1960 after a period of League service spanning 37 of the ARRL's 47 years of existence. In an unprecedented action, the League's board has specified that he be designated as secretary and general manager *emeritus*, and page 8 of this issue of *QST* reflects this directive.

Bud has seen the League grow from 16,000 members to 100,000; its headquarters staff from 19 to 65; its operating gross from \$150,000 annually to ten times that figure. A large part of this progress took place under his own supervision as Secretary and General Manager the past twelve years.

Such growth is, as he is the first to contend, the product of many hands at 38 La Salle Road. But mere energy without direction gets nowhere, and no one knows better than we at Hq. the vital importance of the leadership and guidance which our "boss" has supplied, the application of experience and outstanding creative thinking to provide the right decision at the right time — whether they be crucial moments involving the safeguarding of amateur frequency allocations, or in the daily routine involving the activities of an operation grossing some 1½ million dollars annually. It has been a steady and capable hand at the helm.

Few can match his half-century experience as a ham. A native of Washington, D. C., in 1911 Bud became interested in a magazine article concerning "wireless"; he scraped up enough money to buy a silicon crystal, from which he then constructed a detector, a single headphone

and the wire and brass strip for a single-slide tuner (using, believe it or not, the then traditional rolling-pin!). With this gear he listened faithfully but fruitlessly every night until he was finally rewarded when NAA began putting out a whopping signal from nearby Arlington. He had already built a Ford spark-coil rig and was on the air signing — but for a while not working — with the call "AB." Eventually, the contacts came along and he was in business. In March of 1917 he was persuaded by a friendly Department of Commerce official to take the examination for the relatively new government amateur license; his first-class operator ticket came through promptly but World War I was declared while his separate application for a station license was being processed in Baltimore.

With every expectation of pursuing a newspaper and writing career Bud joined the staff of the Technical News Service in Washington in the early '20s; in his spare time he wrote several articles for *QST*, based on home experimentation. He became assistant division publicity manager for the Washington area in the League's famous "Inkslingers", a volunteer group of writer amateurs dedicated to publicizing amateur radio's feats. When the League needed an editor for its new syndicated newspaper column "Current Radio" it turned to the young Washington newspaperman and brought him to Hartford, in February, 1924. Unfortunately, press interest in radio was then on the decline, after a temporary surge with the initial broadcast boom, and the project was soon dropped. Bud, for a brief period, was acting traffic (communications) manager; a particular accomplishment, started while he was

Arthur L. Budlong, W1BUD
Secretary and General Manager
Emeritus, ARRL

This photo was taken in the office he has occupied for the past 12 years, surrounded by mementos of 37 years of service with the League.



still in Washington, was the organization and supervision of the PRR Emergency Net for the Pennsylvania railroad — the first amateur net devoted solely to emergency communications preparedness and still remembered by those in it for its stiff requirements and high morale. (It was in this group that QRR — now QRRL) came into being as the amateur's land-SOS signal. When then-assistant secretary Charles Service (now W4IE) resigned in 1926 to become a Floridian, Secretary Kenneth Warner picked Bud as his new assistant and right-hand man. On Warner's death, in September, 1948, Bud became Secretary and General Manager.

Probably no amateur is more widely traveled. Bud, until his retirement, set an example in his oft-expressed belief that the best way to keep in touch with amateur radio is to visit amateurs. He has spoken before convention and club groups in every state of the Union, Puerto Rico, Guam, Mexico, several South American countries, most of Canada, Ireland, England, Germany, France, Italy, and Switzerland; in the process he has also been present, in his capacity as secretary of the International Amateur Radio Union, at three of the four conventions of the Region 1 (Europe and Africa) section of the Union. The guy gets around!

Although constantly supervising the general activities of the League and its Headquarters, Bud's extra-special field has been international regulation of radio and frequency allocations — the latter perhaps the single subject most important to the amateur radio service. He has been involved, one way or another, in every international radio conference since the opening of the short waves in the middle 1920s, and first represented the amateur service at the Inter-American Radio Conference in Chile in 1940. This sort of background ticketed him, in World War II, for the post of Chief of the Frequency Allocations Section of the U. S. Coast Guard, when he was commissioned in that service (his preference was for a deck officer's assignment, and to that end his application gave the address of a relative in another USCG district where he hoped the name Budlong would not ring a bell — but in vain). During the war he was a member of the allocations committees of the Joint and Combined Chiefs of Staff and, perhaps more significant, a member of the all-important Inter-department Radio Advisory Committee (IRAC) and for his last two years of service Chairman of its Technical Subcommittee, which established the basic pattern for the 1945 general reallocation of the frequency spectrum and, in effect, became the Atlantic City world allocations table (in which, among other things, we gained our 21-Mc. band). During the war, he attended the Bermuda Telecommunications Conference, 1945, was a government delegate to the London conference on Radio Aids to Marine Navigation and, using some of his accumulated leave, was a member of the U. S. delegation for ARRL to the 1945 inter-American conference at Rio de Janeiro. Postwar, for ARRL, he participated in the Moscow Five-

Power Radio Conference in 1946; the Atlantic City Radio Conference, 1947; the fourth inter-American Radio Conference at Washington, 1949; the Extraordinary Administrative Radio Conference, Geneva, 1952; and the Geneva Radio Conference which ended a year ago, once again with remarkable results for the amateur radio service in that every frequency privilege U. S. and Canadian hams now enjoy is provided for in the basic international table.

We're sure that Bud, a man of many interests and skills, won't have an idle retirement. Recently, he mentioned he already had a variety of projects lined up that will occupy his time for at least the next five years. He's going to get back to hamming, for one thing. There's work on his place on Long Island Sound and his house there (every inch of which, incidentally, he designed and which he and his wife then built with their own hands); a sailing enthusiast all his life and an expert sailor and deep-sea navigator, he hopes to get some real use out of his boat which has lain dormant on land much too long because of the demands of League duties in recent years. When it comes to other activities, we hesitate to speculate: one of the most widely-read people we've ever known, his interests range in many directions: he's made free-fall parachute jumps, is a crack shot (he was on the State small-bore military championship team), draws and paints with more than average ability, has raised a variety of livestock from mink and rabbits to bees, is an expert cook, once "crammed" on the one-hand sign language in order to be able to converse over a long week end with a deaf-mute host on one of his trips, and probably will take up a few additional languages to add to the French in which he is already reasonably proficient. (In this connection, Canadian League members will recall his recent "farewell" speech at the Montreal convention, where he delivered his address in English, then proceeded to repeat it in acceptable French; our favorite story, however, concerns his welcoming address at the 4th Inter-American Conference to one of the series of fabulous League international convention dinners when, knowing no Spanish, he delivered his remarks in that language, amid much hilarity and a complete breakdown of formality!).

His interest is in people as well as things; at ARRL he is responsible for putting through the 5-day week (although his actual weekly hour schedule is longer!), extra vacation time for long-term employees, our pension plan, a sliding-scale annual bonus plan for all employees (except himself) and yearly comprehensive medical exams for key personnel — some of these long before they became accepted business standards.

In the late 1920s, Bud served as Radio Aide of the First Corps Area organization of the Army-Amateur Radio System. On his retirement from that activity, New England ham members of AARS presented him with a certificate proclaiming him "Onehelllofaswellguy."

We of the Hq. staff couldn't put it better ourselves.

QST

A Parametric Amplifier for 1296 Mc.

Try This on Your Crystal Set!

BY

W. O. TROETSCHEL,* K6UQH, ex-W7LVO

AND H. J. HEUER,** KH6CYI

At 1296 Mc. few vacuum-tube r.f. amplifiers show much improvement over a crystal mixer, but this paramp will literally bring in signals you never knew were there. Seldom do we have the opportunity to describe a device which offers so much for so little. By using a surplus klystron pump oscillator and sections of X-band waveguide, cost and metal work are kept to a minimum. Since the design has been successfully duplicated by at least 25 California u.h.f. men, you can consider the construction and adjustment techniques well proven.

IF YOU are interested in parametric amplifiers, or have some sort of 1296-Mc. receiving capability, this article is for you. It describes an easy-to-build parametric amplifier for 1296 Mc. that will provide at least 25-db. gain with a noise figure less than 2 db. Two of these amplifiers are currently operational at the authors' respective stations.

While present-day theories of parametric amplifiers are heavily encrusted with mathematics, certain general rules are evolving for an intuitive understanding of what goes on. Previous articles¹ have gone into the theory and are recommended reading. The amplifier to be described here uses

* 3405 Kenyon Drive, Santa Clara, California.

** 616 Sperry Loop, APO 915, San Francisco, California.

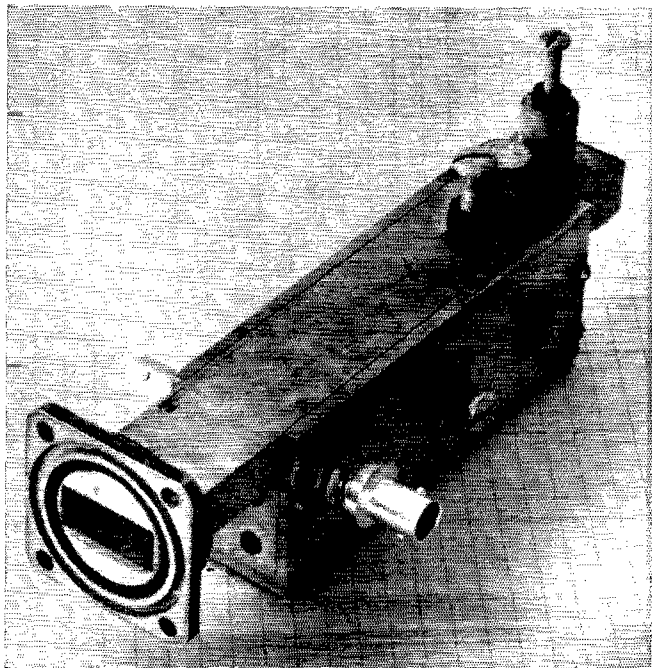
¹ Bateman and Bain, "New Thresholds in V.H.F. and U.H.F. Reception," *QST*, January, February and March, 1959.

a few little tricks to get around the points that generally reduce the enterprising ham to a frustrated madman. The following rules merit your careful attention:

1) A well-designed parametric amplifier should have mechanical as well as electrical stability and simplicity, ease of tune-up, and smooth control. An amplifier that does not have these characteristics may work, but it does not represent a practical communications device.

2) The ultimate noise figure possible to achieve in a parametric amplifier is determined essentially by the ratio of the signal frequency to the idler frequency. Since the signal frequency plus the idler frequency is equal to the pump frequency in amplifiers of this type, the rule is then the higher the pump frequency, the better the noise figure. Good practice and practical considerations indi-

The choke flange at the left end of the amplifier connects to the pump unit, and the 9200-Mc. pump signal enters the guide at this point. The screws on top tune pump and idler cavities which are formed by irises fitted into slots in the guide and a plate across the far end. Between the pump and idler tuning screws is the cap which holds the varactor crystal in its mounting. Below the guide section is the signal tank. The BNC fittings are for the input and output signals, which is used for which doesn't matter (until the amplifier is tuned up, that is!). The fine tuning screw is near the middle of the tank, and hidden on the other side is a screw for coarse tuning. Farther down the side of the tank is the feed-through capacitor at which bias is applied. Two of the four screws holding one end-plate bypass can be seen just below the waveguide.



cate that the choice of a pump frequency on the order of 6 to 10 times the signal frequency is desirable.

3) Best noise figure and amplifier stability occur in the amplifier when *all* tuning adjustments are in the direction of reducing pump power for a given gain value. A recommended "round-robin" tune-up procedure will be described. Since the pump power is an important tune-up indicator, a good method for attenuating pump power is essential. Simply coupling a grid-dip oscillator to the circuit is the way to madness.

From these general rules we see that in order to amplify at 1296 Mc. we need a pump frequency of at least 7800 Mc. The 2K25 (723A/B) reflex klystron available on the surplus market can provide 10 milliwatts output at 10,000 Mc. In testing this klystron we found a mode which tunes nicely through 9200 Mc. Choosing 9200 Mc. for the pump frequency then establishes that our idler frequency will be approximately 7900 Mc.

The heart of the parametric amplifier is, of course, the diode. There are several diodes on the market which operate nicely on this amplifier. The authors recommend the Microwave Associates MAH-U diode² as the least expensive approach. Other good diodes (but expensive) are the

MA 450C, D or E and the 460C, D or E. One of the new Sylvania diodes was tested and found to work very well. Other diodes such as the Hughes HPA series were tested but cannot be used in this amplifier design. They are self-resonant at approximately 1600 Mc., and require pump powers greatly exceeding the capability of the 2K25 klystron.

Pump and Power Supply

The klystron is mounted on a 10-cm. length of standard X-band waveguide (1 × 1/2-inch outside dimensions) with one end closed and the other equipped with a flange for connection to the amplifier. This waveguide section is mounted on top of the 3 × 5 × 10-inch power-supply chassis near one end as shown in the photos. The klystron probe should project into the waveguide 1.1 cm. from the closed end. The probe has a metal jacket which covers all but about 1/4 inch of its length. The end of this metal jacket should be just flush with the inside surface of the waveguide. The jacket is above ground by the +B voltage, so cover it with insulating sleeving where

² Available to hams only for \$10.00 from Microwave Associates, Burlington, Mass. Be sure to specify the MAH-U along with your amateur call.

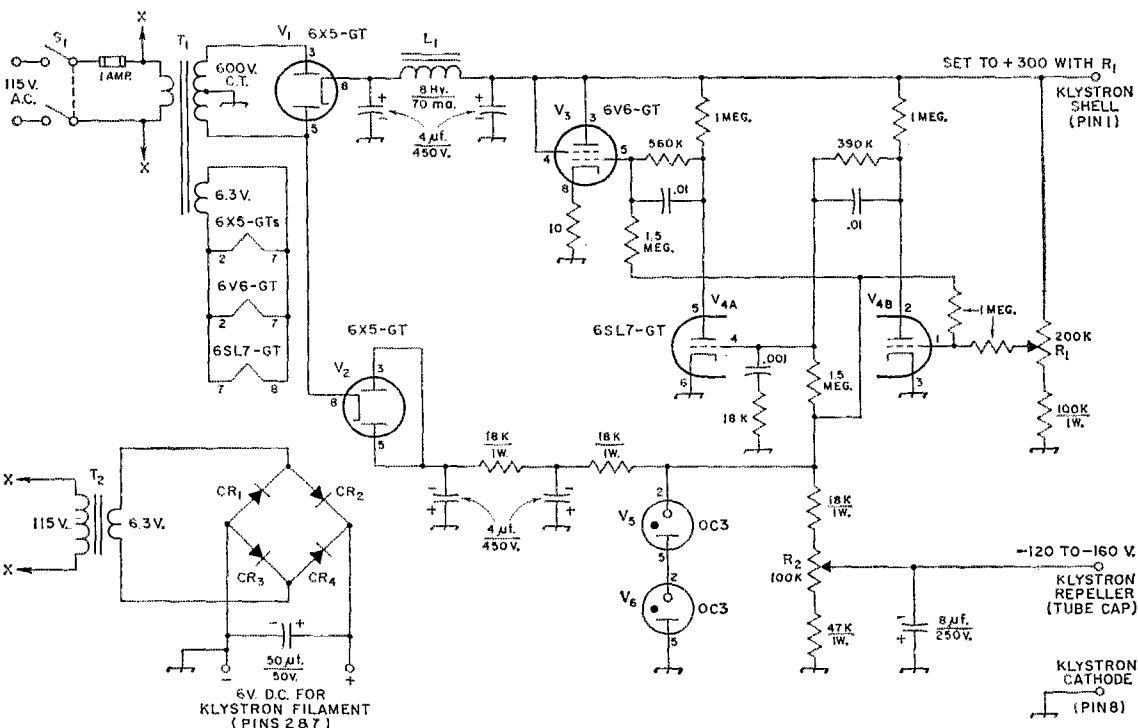


Fig. 1—Circuit of the power supply for the klystron pump. Capacitances are in μf ; capacitors marked with polarity are electrolytic, others are paper. Resistances are in ohms, and resistors are 1/2 watt unless otherwise specified.

CR₁, CR₂, CR₃, CR₄—150 ma., 100 p.i.v. germanium diode (G.E. 1N91).

L₁—Filter choke, 8 hy., 70 ma. (Stancor C1355 or similar).

R₁—0.2-megohm, 2-watt control, audio taper.

R₂—0.1-megohm, 3- or 5-watt, 10-turn control, linear taper (Borg Model 1111B or 205 "Micropot").

S₁—D.p.s.t. toggle.

T₁—Power transformer, 600 v. c.t., 70 ma.; 6.3 v., 2 amp. or more (Thordarson 22R02 or similar).

T₂—Filament transformer, 6.3 v., 1 amp. (Thordarson 21F08 or similar).

it passes through the guide wall.

If you don't have a klystron socket, use an octal socket and drill out Pin 4 to accommodate the probe. Make a copper or brass cylinder which fits around the socket in order to mount it the proper distance above the waveguide. Heater and shell connections are made to the socket through holes in this cylinder. Be sure to provide some sort of shield around the klystron, as its outer shell is about 300 volts above ground. The pump power attenuator consists of a piece of resistance paper³ which is inserted in a slot in the waveguide. The amount of insertion is adjusted with a small planetary dial. The slot is cut in the upper surface of the waveguide and runs lengthwise along the guide. It should begin 5 mm. back from the flange and be about 1 mm. wide by 35 mm. long. The resistance paper is shaped like the rotor plates of a straight-line frequency capacitor so that insertion area is nearly a linear function of rotation angle. Shape the paper so that 180 degrees of rotation results in complete penetration. A flexible coupling between the dial and the $\frac{1}{4}$ -inch shaft will compensate for slight irregularities in the alignment of the supporting brackets. The resistance paper is cemented to a $\frac{1}{4}$ -inch shaft coupling which facilitates assembly and adjustment.

The power supply diagrammed in Fig. 1 provides all necessary voltages for the klystron. One point of interest is the use of d.c. on the klystron filament. Klystrons at their best are noisy oscillators, and all this noise shows up when you attempt to obtain the maximum gain that is available from the parametric amplifier. We found that much of the noise was being coupled to the electron beam from the filament circuit, so 6 volts d.c. was obtained from four germanium diodes in a full-wave bridge operating from filament transformer T_2 .

³ Suitable paper is commercially available but hard to locate. Old or surplus attenuators are one source. Ramage & Miller, Inc., 3221 Florida Ave., Richmond, Calif., will sell to hams an X-band attenuator which uses nonstandard waveguide for \$4.00. This attenuator will provide two carbon-deposited vanes or might be used directly with some hard work in changing from one waveguide size to another. We have also had some luck in rubbing a soft lead pencil on a piece of paper and then coating the deposit with Krylon. This works all right since accurate calibration of the attenuation is not required. The problem is getting the graphite on heavy enough and holding it on so that the attenuation value doesn't change.

The output voltage from T_1 and full-wave rectifier V_1 is electronically regulated by V_3 and V_4 and applied to the klystron shell. R_1 sets this voltage to 300 volts, the desired value. Half-wave rectifier V_2 , working from half the secondary of T_1 , operates VR tubes V_5 and V_6 which provide a reference voltage for the electronically-regulated supply. R_2 is connected as part of a voltage divider across the VR tubes and used to adjust the negative voltage on the klystron repeller. The 10-turn potentiometer specified for R_2 is strongly recommended since its high resolution makes tuning up the amplifier much easier. However, if cost is very important, a standard 2-watt composition potentiometer can be substituted at the expense of more critical adjustment.

Construction of the power supply is not critical — just a little crowded with the chassis size specified. Power leads are brought out through the top of the chassis and terminate at a barrier strip for convenience.

Amplifier Construction

The amplifier is made from $\frac{1}{8}$ -inch brass stock and X-band waveguide. Lighter brass stock can be used, but we do not recommend thicknesses less than 1/16 inch because of mechanical and thermal instability. Silver plating is not required for good operation, but if you have the facility, go ahead; it won't hurt a thing. Figs. 2, 3 and 4 show the construction details, and the photographs show the appearance when completed.

The waveguide section is 6 inches long and equipped with a choke flange at one end for connecting to the pump waveguide. A choke flange is one that has a $\frac{1}{4}$ -wavelength groove cut around the rectangular opening in the face. The groove is to prevent r.f. leakage out of the joint when a flange-to-flange connection is made. Actually, only a very small leakage will be experienced at this power level, and two plain flanges will work nicely, but the choke type costs little more and was used for the sake of purity.

The 9200-Mc. pump energy is transferred from the transmission line part of the waveguide into the pump cavity by means of a resonant iris. The diameter of this iris is $5/16$ inch and is quite important. If you choose a pump frequency other than 9200 Mc. you will probably want to experiment with different size irises to minimize the

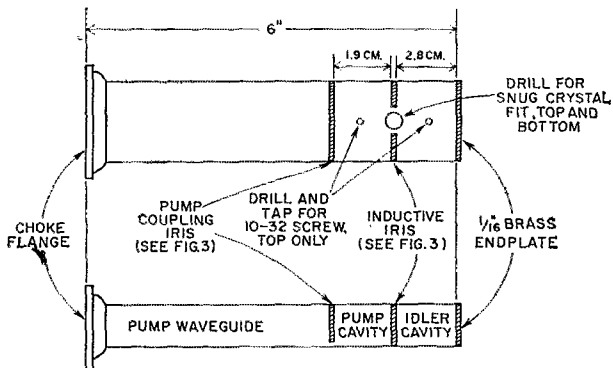


Fig. 2—Top and side views of the waveguide section used in the amplifier assembly. Note how the guide is slotted from the top to accept the pump-coupling iris and from the sides to take the two halves of the inductive iris. The latter slots should end between $1/32$ and $1/16$ inch from the crystal mounting holes. The holes for the tuning screws should be centered in their respective cavities. Cavity dimensions shown are for standard X-band waveguide ($1 \times \frac{1}{2}$ inch outside) and must be modified as explained in the text for guides of a different size.

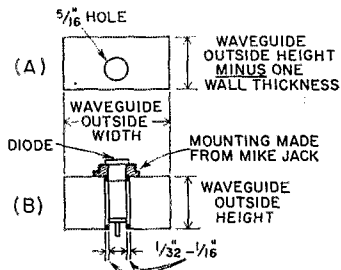


Fig. 3—(A) The iris used to couple pump energy into the pump cavity. The 5/16-inch hole is centered horizontally and off-center vertically by one wall thickness. (B) Details of the crystal mounting and the inductive iris used to couple the crystal to the pump and idler cavities. Both irises are 1/32-inch brass.

v.s.w.r. between the pump generator and the pump cavity. Alternate methods of adjusting the line v.s.w.r. are all right, but the fewer knobs you have to adjust during alignment the better.

The pump cavity is made slightly less than a guide half-wavelength long at the pump frequency to allow tuning with the No. 10 screw plunger. If you use standard X-band waveguide, the pump and idler cavity dimensions shown are valid.⁴ If you use other size guide, the guide wavelength can be found from the formula

$$\lambda_g = \frac{\lambda_0}{\sqrt{1 - \left(\frac{\lambda_0}{\lambda_c}\right)^2}}$$

where λ_g is the guide wavelength, λ_0 is the free-space wavelength, and λ_c is the guide cutoff

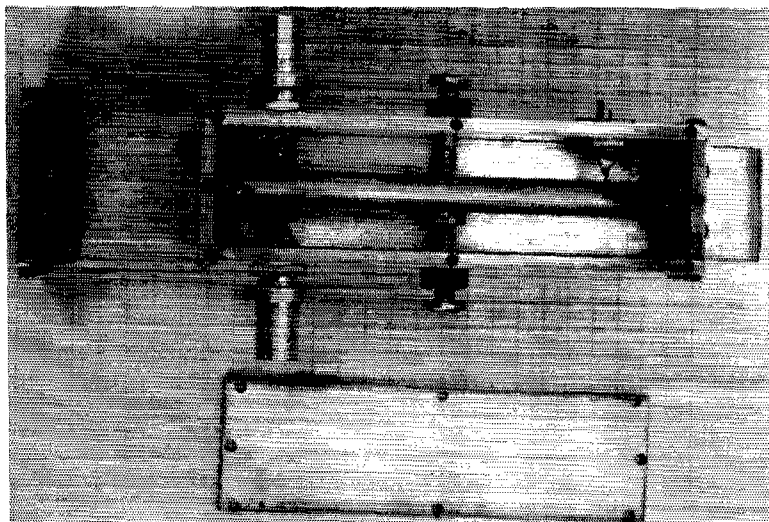
⁴ Standard 1 × 1/2-inch guide has a cutoff wavelength of 4.57 cm. and a guide wavelength of 4.65 cm. at 9200 Mc.

wavelength. The latter is equal to twice the longer inside transverse dimension of the waveguide for the TE_{1,0} mode used here. The same units should be used for all three wavelengths in this expression.

As an example, another available X-band waveguide measures 1 1/4 × 5/8 inch outside and has a 1/16-inch thick wall. The cutoff wavelength is therefore $2 \times (1\frac{1}{4} - \frac{1}{8}) = 2\frac{1}{4}$ inches, or 5.72 cm. The free-space wavelength corresponding to 9200 Mc. is $30,000/9200 = 3.26$ cm. From the formula above, $\lambda_g = 3.97$ cm., and the cavity lengths should be adjusted accordingly.

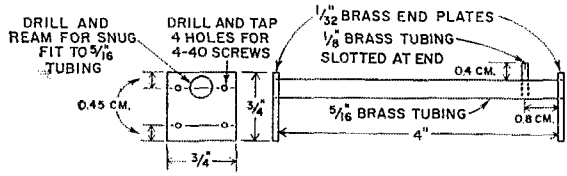
At the back of the pump cavity the parametric diode is centered in an inductive iris which couples the diode to both the pump and idler cavities. This iris should clear the crystal by at least 1/32 inch and not more than 1/16 inch. These dimensions represent rather loose coupling, which is desired. This contrasts sharply with other amplifiers which have been described and is probably the key to the ease of tune-up, stability and the very small amount of pump power required for proper operation. The loose coupling allows excellent Qs to be attained in all of the tuned circuits. Four different amplifiers have been built and tested with operating powers on the order of 8 db. below a 10-milliwatt level.

The crystal holder was made by drilling out the center of a microphone jack to a snug fit for the crystal cartridge. The jack must also be cut and filed down until only the flange and a couple of threads remain, so that the bottom end of the brass ferrule of the crystal comes just flush with the inside surface of the waveguide. This will provide the necessary clearance at the other end of the crystal where the tip goes through into the signal tank. The fitting is then soldered to the



Bottom view of the amplifier with the signal tank cover plate removed. The input and output connectors are near the left end, and the tuning screws are in the middle. The lower screw with the nut soldered to the end is used for coarse tuning, and the upper screw gives a fine adjustment. The 500- $\mu\mu$ f. feed-through capacitor and the 1500-ohm 1/2-watt resistor for supplying bias to the diode are near the right end.

Fig. 4—Details of the signal-tank inner conductor and end-plate bypasses. This assembly should be mounted in the signal tank so that the center of the inner conductor is 0.8 cm. below the bottom surface of the waveguide section. The piece of 1/8-inch brass tubing soldered into the inner conductor slips over the tip of the diode.



guide. A "cap" to hold the crystal in place can be made from a nut which will screw onto what's left of the mike connector. Solder a washer into the threads of the nut where it will bear on the end of the crystal when the nut is screwed in place. The rear end of a BNC screw-type chassis connector can be similarly manhandled to provide an alternative mounting.

Particular care should be used when constructing both the resonant iris and the inductive iris to be sure that no burrs or filings are left in the cavities. After soldering and cleaning, run a sharp-tipped screwdriver or scribe point along the solder bead to verify that you have a clean metallic joint rather than a film of solder flux.

In back of the inductive iris is the idler cavity with its tuning screw. This screw is shown mounted on a machined r.f. choke which would be hard for most builders to duplicate. However, the simple screw and locking nut used for the other adjustments will work fine here, too. Do not solder the end plate on the idler cavity until you are satisfied that the iris and the crystal mounting are completely satisfactory. Hold the end plate *tightly* in place with tape until you have tested the amplifier; then solder it in place.

The signal-frequency tank is the part of the amplifier built from sheet stock and mounted below the waveguide section. The side pieces of the tank are soldered to the sides of the guide, and the bottom surface of the guide becomes the top of the tank. The tank ends and bottom plate are fastened to the side pieces with screws as shown.

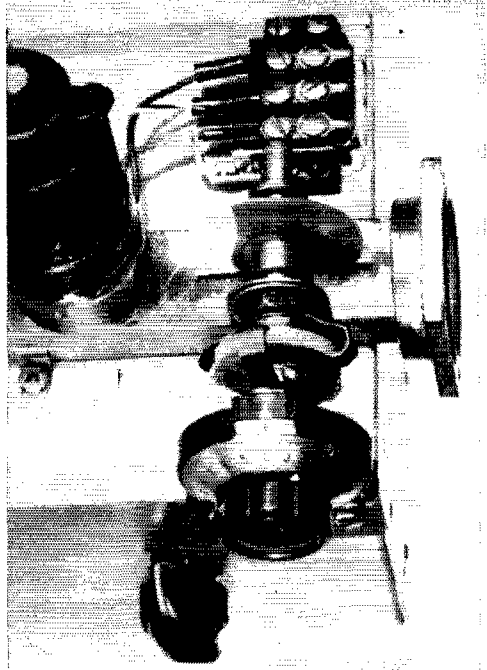
The diode is coupled into the signal tank through a hole the diameter of the crystal body in the bottom of the waveguide. When properly positioned, the part of the brass tip which connects to the ceramic body of the crystal cartridge should just clear the bottom of the waveguide. This is critical since it is a part of the r.f. choke which prevents the pump energy from getting into the signal tank.

The tank inner conductor is made of 5/16-inch diameter brass tubing (available from hobby shops) and is mounted off-center to contain the field as far up in the tank as possible. This allows adjustments to be made with the bottom plate off. A 3/4-inch square brass plate is soldered to each end of the tubing. These plates, separated from the ends of the tank by 0.01-inch Teflon or Mylar, form bypass capacitors and ground the inner conductor at each end for r.f. In the original amplifier, four 4-40 nylon screws were used to hold each bypass "sandwich" together. If such screws cannot be obtained, use metal ones with insulating washers where they pass through the end walls of the tank.

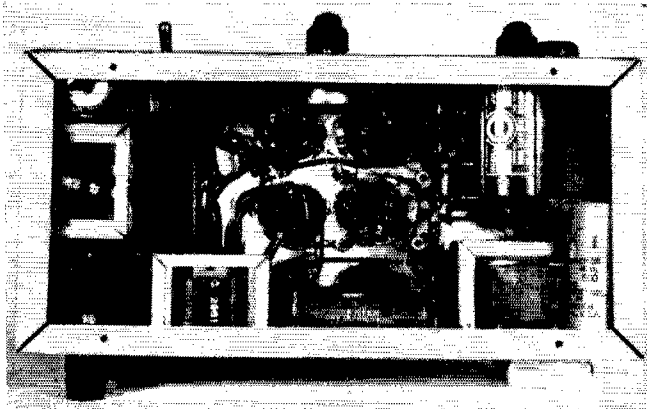
Since the line is insulated from ground for d.c., biasing voltage for the diode can be applied to one of the end plates. The resistor that feeds the bias to the line is a combination non-critical r.f. choke and an important diode protector in case you accidentally apply an improper amount of bias voltage.

The diode tip is connected to the inner conductor with a short piece of 1/8-inch diameter brass tubing. One end of this tubing is soldered into a hole drilled into the inner conductor, and the other end is slotted to fit snugly over the brass tip on the crystal.

The tuning screws for the signal tank are located at the center of the tank (r.f. voltage maximum point) and tune the tank capacitively. One screw has a nut soldered on the end and is used for coarse tuning. The other, left plain, provides a fine adjustment.



Close-up of the pump klystron and attenuator mounted on one end of the power-supply chassis. The flange connects to a similar one on the amplifier unit. The resistance paper vane, shown partially inserted in the waveguide slot, is supported between brackets in front and in back of the guide and is adjusted with the planetary dial (Lafayette F-348) fastened to the front of the chassis. The other knob is for setting the repeller voltage. Power connections are brought out to the barrier strip, and from there wires run through holes in the brass cylinder used to mount the klystron socket above the guide.



Bottom view of the pump and power-supply chassis. From left to right across the front panel (top) are the power switch, control R_1 for setting the klystron shell voltage and the 10-turn "Multiplot," R_2 , for adjusting the repeller voltage. The fuse holder is on the rear panel. Parts placement is not critical, but the upper surface of the chassis at the right end must be left clear for the klystron and attenuator. In this version, the power transformer is at the left, and the six rectifier and regulator tubes are grouped in the middle. Chokes L_1 and L_2 are mounted below chassis on the left end and on the rear apron next to the fuse. Filament transformer T_2 appears in the lower right corner.

The input and output links are placed at the opposite end of the tank from the diode for symmetry. At these frequencies it is possible to excite various undesirable modes of operation, and lack of symmetry may suppress the very mode you want. The links are mounted on the BNC screw-type input and output fittings (Amphenol 31-102) and should be $1/16$ to $3/32$ inch from the inner conductor. The fittings screw into threaded holes in the sides of the tank 1 cm. from the inside surface of the end plate and allow adjustment of coupling during alignment. Then they can be secured for normal operation by tightening the mounting nuts. In general, you will find that the antenna coupling must be a little tighter than the output coupling. Don't be misled by appearances, though, as a slight difference in the positioning of the links can mean a vast difference in the degree of coupling.

Tune-Up and Operating Procedure

First you must determine whether or not the klystron pump generator and the pump cavity are compatible. To do this install a test diode such as a 1N21 in the amplifier. Measure the rectified diode voltage with a v.t.v.m. connected to the bias feed-through capacitor. The pump cavity screw should tune well out of the cavity when you are close to 9200 Mc. with the klystron. The exact frequency used does not matter except that the difference between it and the signal frequency must be within the tuning range of the idler cavity. Adjust the pump cavity tuning and the klystron tuning (repeller voltage) for maximum diode voltage. This should be 5 volts or more, depending on the test diode used. The exact value is not important; all you are after here is to check the pump generator for output and the pump cavity for tuning.

Now replace the 1N21 with the parametric diode and repeat the tuning process. No external bias is used yet. You should note two things at this time: (1) The diode voltage is quite low, on the order of 0.3 to 0.7 volt. This is all right — you have a poor rectifier, but possibly a good voltage-tunable capacitor. (2) The pump cavity probably had to be retuned considerably because of the capacitive reactance of the diode.

Now with everything tuned up for maximum diode voltage, carefully tune the idler cavity through its range. At some point the voltage should kick up to between 0.9 and 2.0 volts. If it doesn't kick up, try another combination of pump frequency and pump cavity settings because it is likely that you are out of the range of the idler cavity tuning (assuming that the diode is not defective). Set the idler tuning at the kick point for now. Some diodes have a sharp kick, while others have a generally broad rise in voltage as the idler is tuned. Either indicates that the signal circuit is oscillating, and if it is not operating at an undesirable mode it should be oscillating around 1300 Mc. At this point you should be able to connect your present 1296-Mc. crystal set to the paramp and hear the oscillation as a loud, rasping buzz.

A signal source, preferably tone-modulated, is needed for the next step. If you don't have one, simply follow standard operating procedure for the 1296-Mc. band and telephone one of your friends for an appointment to turn on his transmitter for you.

Connect the antenna or signal source to the paramp input and your present equipment to the output. Apply bias to the diode, using a reverse-bias voltage of approximately 0.7 volt. The bias supply can be a 10,000-ohm 10-turn potentiometer (similar to R_2) connected as a voltage divider across a 1.5-volt battery. Again a regular composition potentiometer can be substituted if necessary. With no pump power applied (maximum attenuation) adjust the signal tank coarse-tuning screw for maximum signal in the receiver. Now increase pump power to maximum and carefully tune the idler cavity until you hear oscillations in your receiver. Reduce pump power until oscillations just stop, and then retune the idler cavity for oscillation again. At this point you must start a systematic round-robin procedure or you will get lost. Refer to Rule 3 near the beginning of the article and proceed as follows:

(All adjustments are for either oscillation or for a given value of signal gain with reduced pump power.)

Retune idler

— reduce pump power

- Adjust bias toward zero — reduce pump power
- Adjust repeller voltage — reduce pump power
- Retune signal tank (fine tuning screw) — reduce pump power
- Adjust input and output links — reduce pump power
- Retune pump cavity — reduce pump power

At some point in these proceedings you may find that the gain is still rising and that you have reached zero bias voltage. Simply reverse your bias polarity and continue the round robin, slowly increasing the bias voltage in the forward direction. The value of bias voltage that you end up with is a function of many things; you just have to find it for the diode you are using and the amplifier you have built. Typical values for approximately 15 diodes tested ranged from 0.3-volt forward bias to 0.7-volt reverse bias.

When you have reached the point where no further adjustments cause a gain in signal or a reduction of pump power for a reference signal, you are done. Now the pump power attenuator is your gain control. You should notice that an increase in pump power produces an increase in signal gain. A further increase in pump power will result in a small drop off in gain, and then as the power is further increased, the amplifier

will break into oscillation. This gain reversal is quite convenient, as it allows a nice broad operating point and permits stable operation with minor variations in klystron pump power. Minor adjustment of the diode bias may be needed for *maximum* amplifier gain as the pump power is increased.

Once tuned up, this amplifier will remain stable over long periods of time without any adjustment other than the repeller plate voltage. Next time you set up the unit it will only be necessary to adjust the bias to the correct voltage, ride herd on the repeller voltage, and adjust pump power to the desired value.

This amplifier will provide a dramatic experience the first time you put it ahead of your crystal-mixer converter. With 25 db. plus of stable gain, the noise figure of your receiving setup is that of the parametric amplifier. Our units are currently providing a 5 S-unit gain on 75A-2 and 75A-4 receivers. If that looks like nearly 30 db. of gain, you are correct. Local Bay Area tests by K6UGH with W6OHO and K6ONM have been very gratifying. Combined with a little transmitter power and a high-gain steerable antenna, this little gem should be just the thing for moon bounce.

QST

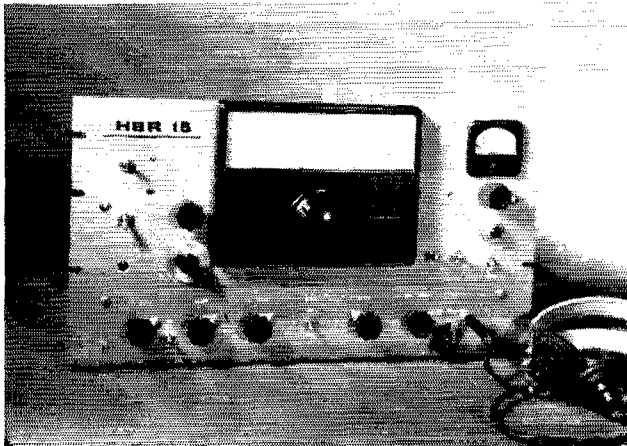
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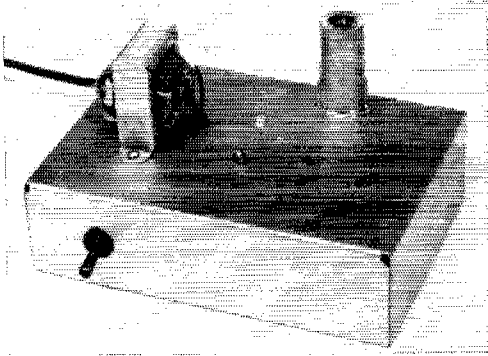
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When old-timer 7WD got interested in ham radio again, his first project was to build the HBR receiver described in *QST* by W6TC back in July of 1957. (Apparently 7WD added something, because the original was called an HBR-141!) Next step was to study up for the General Class license and apply for K7WD, which he now holds. Nice piece of construction, isn't it! (It would be interesting to know how many fellows have built some version of the HBR receivers. If each one of you who has would send a QSL card to WILKE, we could tally up the score — and perhaps have a pretty interesting display of QSLs for future use in *QST*.)



• Beginner and Novice



This photograph shows the completed unit. The only components mounted on the top of the chassis are T_1 and the 6AH6. At the left front is S_1 .

More Operating Convenience for Your Station

BY LEWIS G. McCOY,* W1ICP

A Novice T.R. Switch

DURING last Field Day the writer had occasion to use a transmitter with a built-in t.r. switch that was designed by Ed Hart, W2ZVW. Never having used a t.r. switch to any great extent, it was interesting to note how smoothly this particular unit worked. What was of even greater interest was the simplicity of the t.r. circuit. Here was something any Novice could build, didn't cost much, and would simplify the operating controls of his station.

How the T.R. Switch Works

It is always to the amateur's advantage to use the same antenna for both transmitting and receiving. Many amateurs accomplish this with switches or antenna change-over relays. This, in turn, calls for a manually-operated switch which actuates the relay when going from transmit to receive. A t.r. switch is an electronically-operated device requiring no manual operation.

Fig. 2 shows how the t.r. switch is used in two types of installations. One method shows how the unit is installed in a system where an antenna coupler is used. The other setup shows the installation of the t.r. switch where coax is used directly between the transmitter and

antenna. Now look at Fig. 1, the circuit of the t.r. switch.

The operation goes like this: When the transmitter key is closed, a signal is sent out along the coax line. Attached to the line is the t.r. switch. A portion of the r.f. voltage appearing on the line drives the 6AH6 grid positive. The rectified voltage then biases the 6AH6 so very little power is fed to the receiver. When the key is opened, any signal coming down the line from the antenna is not strong enough to cause bias to be developed. The 6AH6 then acts as a cathode follower feeding the signal into the receiver. A cathode follower, while not having any gain, does have a broad-band characteristic in its output circuit which is ideal for this application.

Construction Details

The unit shown in the photographs was built on a $2 \times 5 \times 7$ -inch chassis. The t.r. switch described here has its own power supply. However, many receivers and transmitters have power takeoffs, and if yours does, the cost of the t.r. switch can be lessened by eliminating the power supply. Power requirements for the 6AH6 are approximately 100 volts d.c. at about 10 ma. and 6.3 volts at 0.45 amp.

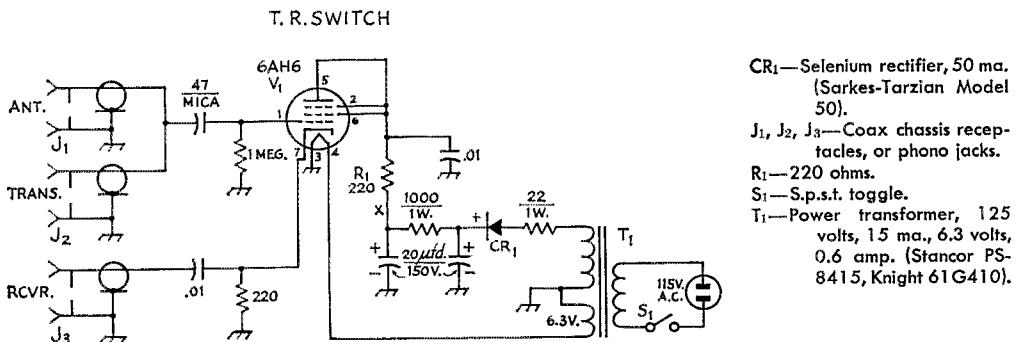


Fig. 1—Circuit diagram of the t.r. switch. Unless otherwise indicated, decimal values of capacitance are in μf , others are in $\mu\text{m}\text{f}$, resistances are in ohms, resistors are $\frac{1}{2}$ watt. Capacitors marked with polarity are electrolytic.

If you decide to use an external power source, the plate voltage should be fed into the 6AH6 at the point marked X. The resistor R_1 serves the same purpose as an r.f. choke, but is, of course, much cheaper. In connecting an outside power source you'll need three leads, one for the plate voltage or B plus, one for a ground connection, and a lead for the 6.3-volt heater line.

When installing the socket for the 6AH6 mount it as close to the terminals J_1 and J_2 as possible. This is done in order to keep the lead length between J_1 and J_2 to the grid of the 6AH6 as short as possible. This reduces the chances for stray pickup of r.f. which may tend to "block" the receiver when transmitting. For the same reason, a short length of shielded wire is used between the cathode, Pin 7, and a tie point mounted at J_3 . The 0.01- μ f. capacitor is connected between the tie point and the terminal of J_3 , keeping the capacitor leads as short as possible.

Regular coax chassis terminals were used for J_1 , J_2 , and J_3 . However, phono jacks can be used instead, thereby cutting the cost of the unit.

Installing the T.R. Switch

Fig. 2 shows two examples of how the t.r. switch should be installed. There is one important point to keep in mind about the t.r. switch. If the voltage appearing at the grid of the 6AH6 is too high there is a danger that the tube can be ruined. For this reason, the standing-wave ratio on the coax line should not be over 2 or 3 to 1 for Novice powers of 75 watts input or less. In any event, it is always a good idea when using a coupler to have an s.w.r. bridge¹ installed in the coax line to show when the coupler is correctly adjusted. The t.r. switch can be used for power inputs up to about 300 watts if the line is well matched.

If your system has direct coax feed from the transmitter to the antenna, the t.r. switch should be installed close to the transmitter. If you live

¹ See measurements chapter, *The Radio Amateur's Handbook*.

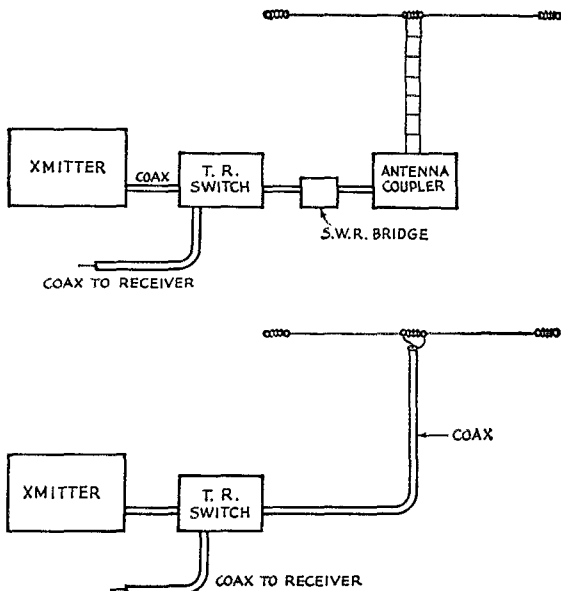


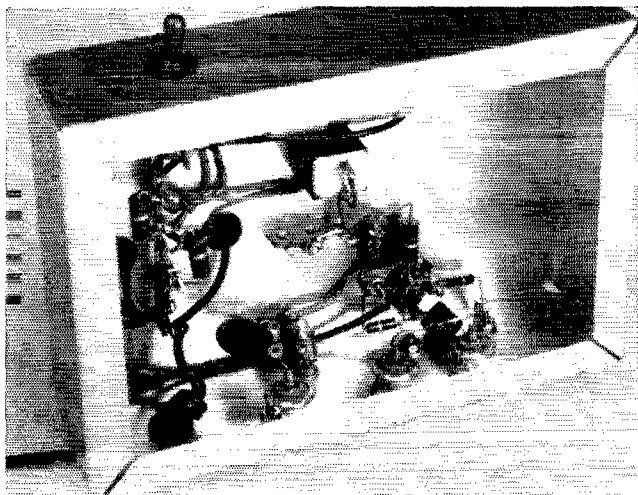
Fig. 2—Two methods of installing the t.r. switch in your station.

in an area where TVI is a problem (who doesn't!), a low-pass filter should be installed on the coax line between the t.r. switch and the antenna. Most t.r. switches are harmonic generators and this one is no exception.

The t.r. switch described here was tried with three or four different makes of receivers. In no case did the signal pickup block the receiver when the transmitter was keyed. The signal was loud enough so that it was more comfortable listening with the r.f. gain reduced during transmission, particularly if the listening was done on the same frequency as the transmission. An ideal system would have means for receiver muting whenever the key was closed. However, any such system would be more complex than the simple t.r. switch shown here.

QST

Note that the 6AH6 socket is mounted close to the coax terminals. This is done to keep the lead lengths short. CR₁ is the rectangular object at the top center. Just above the rectifier is the dual 20- μ f. electrolytic capacitor, mostly concealed by the chassis flange in this view.



Not Just a Novelty

The Secret of Mobile C. W. Operation

BY DAVIS A. HELTON,* W0PME

OVER the past few years there has grown quite a crowd of active mobile 40-meter c.w. men. I know I haven't worked them all, but I think I've worked my share — W2BO, W0DIC, W0BNQ/W5BMI, W5BXN, W8NZ, W9MIO/W9EDO, W5EZG, W9EVA, W5MU, K5VLG, a few W6s, and even a couple of Novices. Most of them work c.w. as easily from a car as they would from a fixed station and even manage to keep schedules while in motion. The surprising thing isn't how well they get out, but how many times they have to answer the question, "How in the world do you manage to key and drive, too?," from otherwise competent c.w. men.

For the benefit of those who are interested in handling a mobile c.w. rig, I'd like to pass on a few hints on how to rig the mobile station for ease of operation. Behind these kinks are more than 50,000 miles of mobile c.w. work on 40 meters. I doubt if most of the mobile c.w. gang will agree with all of my theories on the subject, but I do believe that they will agree with most points.

Keep Things Simple

First, if you are building up the rig from scratch, keep everything simple. Preferably, the only controls on the receiver should be the r.f. gain control and the dial knob. If the transmitter has a number of tuning adjustments on the front panel, the change-over switch should have a much larger knob than any of the other controls to facilitate locating it without taking one's eyes off the road. If you are of the type that *must* dip the final every QSO, you will find that a pilot light in the final B+ lead makes a much better tuning indicator than a meter, since you can see it from the corner of your eye while driving.

V.F.O. vs. Crystal

Most of the mobile c.w. gang prefer the v.f.o., but I still stick with crystal control since I run a fair amount of power and can punch through anything but the kw. gang on the low end of 40. By using crystal control one can save the power drain of a buffer and the VR-tube bleeder, and thus run a little more input to the final. Crystal control has the added advantage of keeping your transmitter where you think it is, no matter how rough a road you're traveling. It also means that there is no v.f.o. dial to watch when you should be watching the highway ahead.

* Radio Division, Missouri State Highway Patrol, Jefferson City, Missouri. (ex-D4AGC, DLACX)

This article is a compilation of various bits of pertinent information gathered in over 50,000 miles of successful 40-meter mobile c.w. operation. It covers everything from the antenna to the log book.

Transmitter

The circuit diagram of my 100-watt mobile 40-meter c.w. transmitter is shown in Fig. 1. It consists of a 12BY7 in a grid-plate oscillator circuit driving a pair of neutralized 1625s in parallel, with low-impedance link output coupling. The neutralizing capacitor C_7 consists of a strip of aluminum approximately $\frac{1}{2}$ inch wide and 2 inches long, bent $\frac{1}{2}$ inch from one end to form an angle. A hole is drilled in the short end and the angle is mounted on a ceramic feed-through insulator placed in the chassis at a spot midway between the two 1625s and slightly to the rear of center. The surfaces of the two tube plates serves as the other member of the capacitor. The bottom end of the feed-through insulator is connected to the oscillator plate tank circuit mounted on the underside of the chassis.

Excitation may be adjusted by varying the screen voltage of the oscillator. The rig is keyed in the cathode circuit of the amplifier. It will be noticed that there are no meters; a dial lamp in series with the plate-supply circuit and a neon bulb coupled to the output tank coil serve us as indicators for output adjustment.

The control and change-over functions are performed by a three-position six-pole rotary switch, S_1 . The first position is "off." In the second position the transmitter filaments are turned on. In the third position, the plate and screen voltages are applied, the antenna is transferred to the transmitter and the receiver gain is reduced. The circuit arrangement for the latter is included in Fig. 1.

A good addition to the mobile station is some sort of field-strength meter. If your mobile rig has grid-drive control, the best procedure is to tune the final for maximum output and then adjust the drive control for maximum output. Then, after you become accustomed to the normal field-strength reading at a certain distance outside the car window, you can recognize certain characteristic troubles, such as a slipped contact in a variable-tap mobile loading coil, a damp loading coil, intermittents, and others.

Antenna

The secret of any good mobile signal lies in the antenna system. If you're married, use the biggest "hat" capacitance the XYL will allow; if you're fortunate enough to be single, use a hat about twice as big as any you have seen on anyone else's rig. In addition to the hat, use

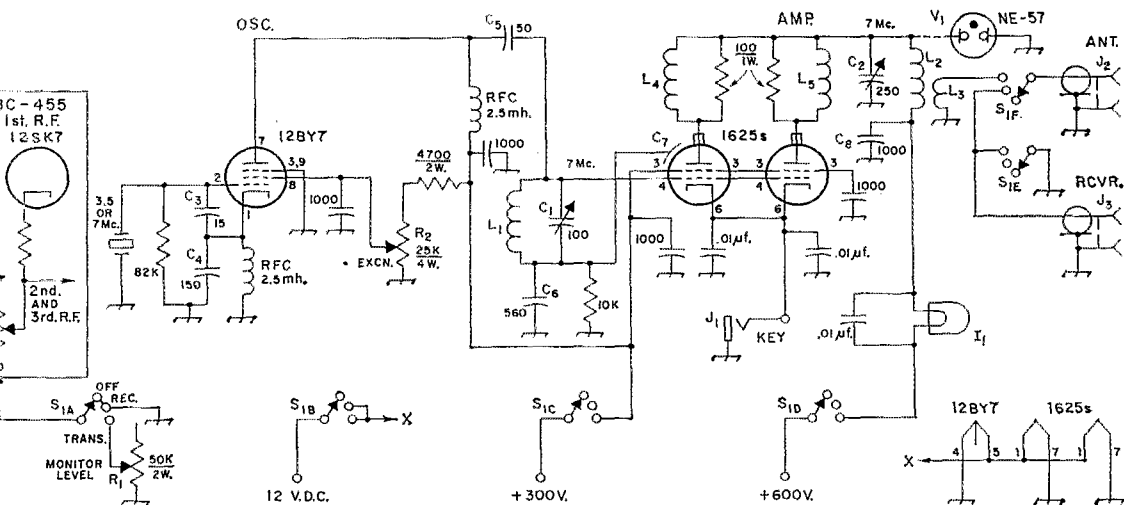


Fig. 1—Schematic of the simple mobile transmitter. Unless indicated otherwise, resistances are in ohms, capacitances are in μmf , and resistors are $\frac{1}{2}$ watt. Capacitors not listed below are disk ceramic.

- C₁—Midget variable.
- C₂—1000-volt variable.
- C₃, C₄, C₅, C₆, C₇, C₈—Mica.
- C₁—Neutralizing capacitor (see text).
- L₁—150-ma. dial lamp shunted with 47-ohm $\frac{1}{2}$ -watt resistor.
- J₁—Open-circuit jack.
- J₂, J₃—Chassis-mounting coaxial receptacle (SO-239).
- L₁—18 turns No. 24, $\frac{3}{4}$ -inch diam., $\frac{1}{16}$ inch long (B & W 3012 Miniductor or Air Dux 632).
- L₂—10 turns No. 14, $1\frac{1}{2}$ -inch diam., $\frac{1}{2}$ inches long (Air Dux 1206).
- L₃—3-turn link at ground end of L₂.
- L₄, L₅—5 turns No. 16 wound on associated resistor.
- R₁—50,000-ohm 2-watt control (Ohmite CU5031 or similar).
- R₂—25,000-ohm 4-watt control (Mallory M25MPK).
- S₁—3-section 6-pole 3-position rotary switch (CRL 2525, 3 of 5 positions used).
- V₁— $\frac{1}{4}$ -watt neon bulb mounted near hot end of L₂.

some sort of impedance-matching network between the base of the antenna and the coax feeder. My matching network for 40 is shown in Fig. 2. It consists of a 2-inch-diameter coil, 8 turns per inch, with one end grounded to the car, with the base of the antenna tapped about 4 turns up from ground, and the coax line tapped about $1\frac{1}{2}$ turns up. It is doubtful if this particular combination would work for all cars, but it gives a general idea of what to expect. With a Heath reflectometer in the coax line, the entire system was resonated for 7040 kc. At 7005 kc. the s.w.r. was 1.35:1, and at 7100 kc. it was 1.5:1. At 7150 kc. the s.w.r. had jumped to 2.5:1. Thus, it may be seen that the bandwidth restrictions are not nearly so severe on 40 as on 75 meters.

For those who aren't happy until they have the ultimate in radiation efficiency from their mobile antennas, a worthwhile improvement over the conventional 8-ft. center-loaded whip was found

by replacing the common 39-inch lower antenna section with one made from a 39-inch welded to one of the 18-inch types. This raises the loading coil farther from the car body, and increases the radiation resistance on the lower-frequency bands.

Since the amount of loading inductance required is largely determined by the size of the top section and capacitive hat, there will be very little change in loading-coil adjustment when this change in antenna length is made.

In the few months that the new antenna (about 11 ft. over all, including the loading coil and mounting spring) has been in use, it has been found that it improves signals, coming or going, by about one S unit. Several of the 40-meter c.w. gang in the midwest have volunteered the observation that the signal from WOPME/M is the strongest mobile signal they have ever heard on the band.

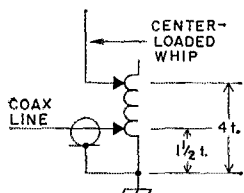


Fig. 2—Antenna-matching circuit. Taps may have to be adjusted for specific installation. See text for coil dimensions. System is maintained at resonance by adjustment of center loading coil.

Receiver

Now for the receiver: Probably some of the best single-band mobile receivers are conversions of the ARC-5 series. My receiver is a much-modified BC-455 that, in its present form, will copy a 0.5-microvolt signal if I'm parked in a quiet space, and which has sufficient audio output to override the wind and motor noise in a small foreign car while traveling at the speed limit. In addition, it has a crystal-lattice i.f. filter with about a half-ke. bandwidth to enable me

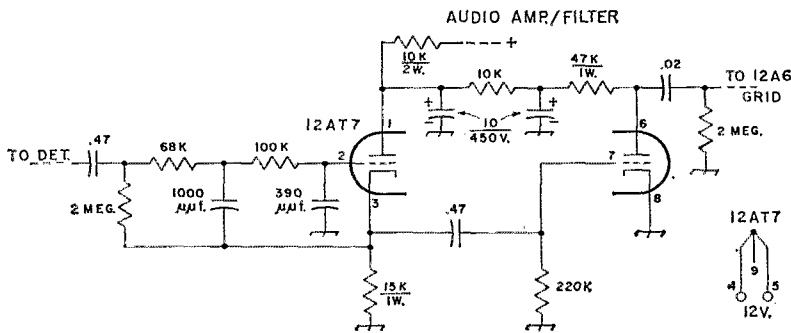


Fig. 3—Circuit of the audio filter-amplifier stage added to the BC-455. Unless indicated otherwise, resistances are in ohms, resistors are 1/2 watt, and capacitances are in μ f. Capacitors marked with polarity are electrolytic; use paper or ceramic for others.

to sort out the signals on the low end of 40 with no more effort than would be required on some of the more expensive ham receivers.

The receiver conversion followed the best points of a number of conversion articles. All but two rotor plates in each section of the tuning capacitor were pulled. Each capacitor section was then shunted with a zero-temperature-coefficient 50- μ f. ceramic trimmer. The realigned receiver covers 7000 to 7700 kc.

Audio

An audio filter-amplifier stage was added between the detector and 12A6, and the audio output transformer was replaced with one of the "6V6-to-voice-coil" variety. This revision is shown in Fig. 3. The filter has a design cutoff frequency of 2200 cycles.¹

B.F.O.

It was found that while the drift of the h.f.o. in normal operation was but a couple of kilocycles, the b.f.o. drifted several kilocycles while warming up and wandered about under primary voltage fluctuations as the engine speed varied. Therefore, the b.f.o. transformer assembly was removed and the b.f.o. circuit was changed to a Pierce crystal circuit as shown in Fig. 4.

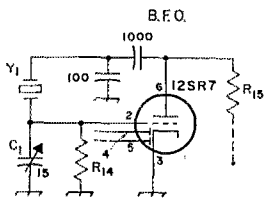


Fig. 4—Circuit of the crystal-controlled b.f.o. Capacitances are in μ f. C_1 is an air trimmer. R_{14} and R_{15} are original BC-455 components. See text for Y_1 .

Crystal Filter

A 2831-kc. half-lattice crystal filter was constructed following the general circuits presented in earlier issues of *QST*.² The circuit is shown in Fig. 5A. Rather than become involved in a lot of r.f. measurements, I purchased about a half dozen surplus 2831-kc. rocks³ and made some rough

¹ Fryer, "How To Design Low Cost Audio Filters," *Electronics*, April 10, 1959.

² Vester, "Surplus-Crystal High-Frequency Filters," *QST*, January, 1959.

³ Advertised in *QST*.

frequency measurements. The lowest-frequency crystal was used in the b.f.o. Of those remaining, the two with the greatest frequency difference (actually a fraction of a kc.) were selected for the lattice. In operation, a double hump appears in the response characteristic, but it is so slight that it was not felt necessary to etch one of the rocks. In individual cases, it may be beneficial to alter the value of the filter load resistor (shown as 2700 ohms in Fig. 5-A), going as low as 470 ohms, if necessary, to reduce the humps. The lattice filter is fed from a link, L_A , wound over the cold end of the coil in the tuned circuit in the first i.f. can in the BC-455, as shown in Fig. 5B. The output of the lattice is used to drive an added i.f. stage which more than makes up for the insertion loss of the filter. The output from this stage is used to drive the original first i.f. stage in the 455. The lattice assembly and the added i.f. tube were mounted in a small Minibox which was mounted on the side of the receiver adjacent to its first i.f. can. Connections between the i.f. and filter links are made with shielded wire run through slots in the i.f. can and the receiver cover.

Most authors of recent crystal-filter articles seem to write with the impression that a good r.f. toroid coil can be found in any respectable ham junk box. Mebbeso, but I had to make my own. To make a couple of cheap toroids for high-frequency lattice filters, obtain a slug from the final tank coil of a Command transmitter. This slug is about 5/8 inch in diameter and 3/8 inch long. Slice this in half, as shown in Fig. 6A. Drill out the hole in each of the resulting wafers until the toroid has an approximately square cross section, as shown in Fig. 6B. Dope the toroid well and, after it has dried, wind on a bifilar winding of about 75 turns of Litz wire taken from an old r.f. choke or r.f. transformer, as shown at B. After this winding is complete, add a 10-turn link at the ground end of the winding. It's the cheapest toroid you can find. L_1 was made by scramble-winding Litz wire from an old r.f. choke on the core of a Miller 4.5-Mc. sound trap. The number of turns was adjusted until the circuit resonance checked at 2830 kc. on a grid-dip meter. Any other convenient type of winding may be used in the same manner.

Some purists might add a noise clipper to the converted receiver, but with the extreme skirt selectivity from the lattice filter, it is my opinion

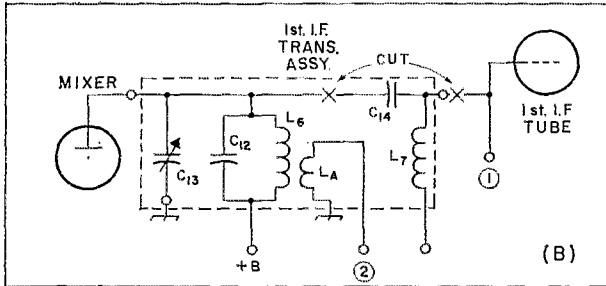
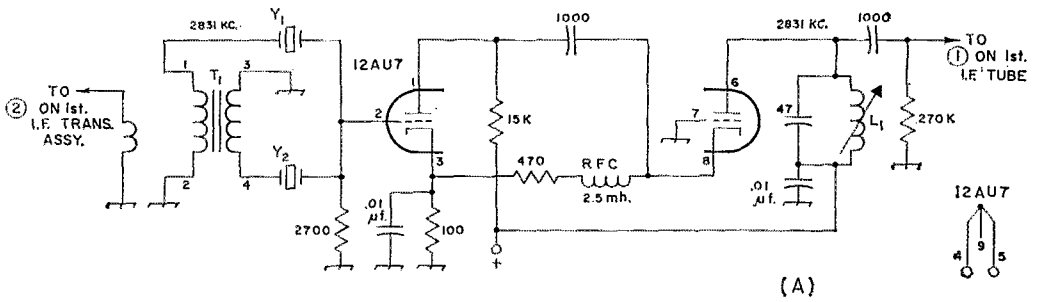


Fig. 5—(A) Circuit of the crystal half-lattice filter. Unless indicated otherwise, resistances are in ohms and capacitances are in μmf . Resistors are $\frac{1}{2}$ watt. See text for L_1 , T_1 , Y_1 and Y_2 . Terminal numbers on T_1 refer to Fig. 6. (B) Revision of first i.f. transformer assembly in BC-455. L_A is a 4-turn link at the B+ end of L_6 . L_6 , L_7 , C_{12} , C_{13} and C_{14} are BC-455 original components.

that a limiter just isn't necessary. When one is driving along a truly noisy R.E.A. line with a 12-volt Ford following, no limiter will help, anyway.

Since one needs single-switch change-over control with a mobile rig even more than in a fixed-station, the monitoring system should not require adjustment. The simplest system consists of an auxiliary r.f. gain control, mounted in the transmitter, which is shorted by the change-over switch in the receiving position (see R_1 , Fig. 1). This control can be of the screw-driver-adjusted type, and can be mounted almost anywhere, since it will seldom require adjustment.

The Answer

When I first began mobile c.w. operation, nearly all the active boys used straight keys mounted either on the steering post or on small shelves hinged from the center of the dash. Since a couple of hitches in the Army cured me of any desire to use a straight key anywhere, I decided that a bug lying on the seat cushion would be the answer. After consulting several experienced 40-meter mobile operators, I learned that this was impractical and would likely cause the bug to dive through the fire wall at the first fast stop. Because I still disliked straight keys in any form, I went ahead and laid the bug out across the seat cushion in such a position that my right arm would be supported by the cushion when keying. Not only has this been satisfactory, but I find that the weight of the bug causes the feet to sink far enough into the seat cushion so that any tendency of the bug to jump off is curbed. Eventually I acquired a Dow-Key which features

the rotating head. This allows me to adjust the weight of the dots while driving down a road by rotating the head of the key until the lever is working in a level plane. The adjustable head also proved to be an advantage when traveling on country roads with a high crown where the bug would normally be tilted to the right enough to prevent the dot contact from closing.

About the only places I have found where this arrangement is unsatisfactory is in working through some tight switchbacks in the mountains in the West. Around left-hand turns, the centrifugal force may prevent the dot contact from closing. Since this condition probably would be seldom encountered, it is doubtful that it would be considered an inconvenience. In adjusting a bug for mobile use, it should have the contacts opened to at least twice the normal gap—preferably more. Then, the spring tension on both dit and dah sides should be increased to the point where you can still send even code while driving down a rough gravel road. The increase in contact gap and heavier springing will prevent the dot side from making up its own code on rough roads.

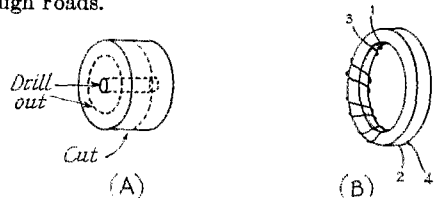


Fig. 6—Sketches showing (A) how the toroid core is cut from an iron coil slug, and (B) how the bifilar winding is made.

Logging

If you keep a complete log, as I do, you will find the ARRL mobile log book a little small for entering all of the desired information. A good substitute is the standard ARRL book. This one won't fill so quickly, and the "other data" column can be ruled off on the right edge to record such items as your location and route. In addition, to prevent filling the log with unsuccessful

CQs, you can rule off the bottom margin to log these times. However, if you pay sufficient attention to your antenna installation, you won't often find this necessary.

For those of you who begin your QSO with any mobile c.w. station with "How in the world do you do it?", that's how. I hope that I am fortunate enough to QSO you from somewhere on the highway. QST

Transistor Antitrip for the 20-A

Simple Unit of Small Dimensions

BY R. L. ANDERSON,* WA2JDF, ex-W8KZM

As most s.s.b. operators know, a voice-controlled change-over system requires some means of preventing the loudspeaker output during the receiving period from feeding back into the microphone and thus operating the change-over system. The simple unit described here requires only a handful of inexpensive components.

THIS article describes an antitrip circuit for the 20-A s.s.b. exciter. It contains only a single n-p-n transistor, two diodes, a capacitor, transformer, and a handful of resistors. The circuit can be built in a more compact package than the conventional type using one or more vacuum tubes. The author constructed the circuit in a standard $2 \times 1\frac{1}{2} \times 2\frac{3}{4}$ -inch Minibox, which plugs into the socket provided in the 20-A exciter for the C.E. QT-1 unit.

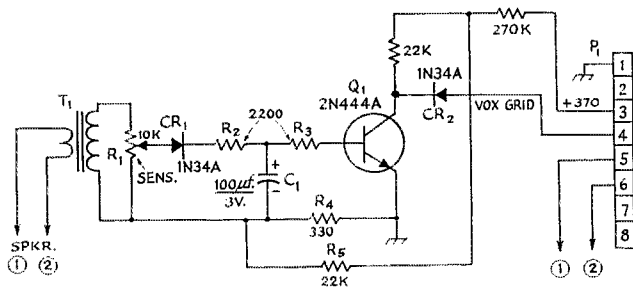
The circuit, shown in Fig. 1, operates on a different principle than the vacuum-tube version, and is nothing more than a limiting circuit whose limiting value depends on the collector voltage of Q_1 . The circuit contains a gate or "clamping" diode that is connected between the VOX-tube grid and the collector of Q_1 . The transistor is off when a signal does not appear across the speaker terminals. Under these conditions, the collector

voltage is approximately 20, and the diode CR_2 is reverse-biased for all voltages on the grid of the VOX tube not exceeding +20 volts. The 20-A VOX circuit will operate normally, since it requires approximately +11 volts on the grid of the VOX tube to operate the VOX relay.

When a signal appears across the speaker terminals, it is rectified by CR_1 , filtered and applied to the base of Q_1 as a d.c. signal which is proportional to the speaker output. If the input level is high enough, Q_1 conducts, the collector voltage is reduced to below 11 volts, and the input to the grid of the VOX tube is clamped by CR_2 .

The circuit time constant of approximately 0.15 second is provided by R_2 , R_3 , and C_1 . The bias network, resistors R_4 and R_5 , reduces the amount of dead band (minimum base voltage at which Q_1 will start to conduct) in the input circuit. The base-to-emitter voltage of the average transistor is 0.6 volt. The bias network was de-

* Electrical engineer, General Electrical Co. Home address: 122 West End Ave., Binghamton, New York.



C_1 —Polarized capacitor (Aerovox PWE-3100).

CR_1 , CR_2 —1N34A germanium diode.

P_1 —Chassis-mounting octal plug.

Q_1 —2N444A n-p-n transistor (CBS).

R_1 —Carbon control.

R_2 , R_3 , R_4 , R_5 —10 per cent tolerance (see text).

T_1 —Output transformer: 825 ohms to 3.4 ohms (Thor-darson TR-29 or equivalent).

Fig. 1—Transistor antitrip circuit for 20-A excitors. Resistors are in ohms and fixed resistors are 1/2 watt.

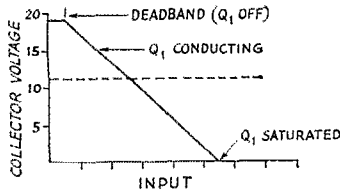


Fig. 2—Graph of Q_1 collector voltage vs. signal input. When the collector voltage is less than 11 volts, the VOX circuit is clamped off. The setting of the sensitivity control (Fig. 1) determines the slope of the conduction line.

signed to give about 0.4 volt of bias, thereby reducing the dead band to 0.2 volt. The network also prevents the collector-to-emitter voltage from exceeding its maximum rated value (40 volts). The sensitivity of the circuit is set by R_1 , which determines the slope of the conduction line in Fig. 2.

Fig. 3 shows a sketch of the unit. The octal plug is mounted at the bottom end of the aluminum box, and the sensitivity-control potentiometer on top where it is conveniently accessible for adjustment.

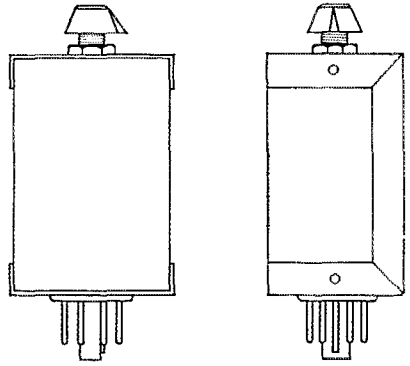


Fig. 3—Sketch showing the mounting of the plug and sensitivity control on the transistor antitrip unit.

Adjustment of R_1 is relatively simple. First, the VOX gain on the 20-A is set in the desired position, and then R_1 is turned so as to increase the circuit sensitivity until it is no longer possible to trip the VOX by audio output from the station receiver.

QST

• New Apparatus

Mobile Burglar Alarm

THE photograph below shows an alarm system manufactured by Zimeco Alarms, 2005 Atlantic Ave., Brooklyn 33, N. Y. It can be mounted in any vehicle for the protection of expensive radio equipment. The alarm consists of a siren which is mounted in a rugged cast aluminum bell; six push-button switches that can be mounted on the doors, hood, or trunk; a key-operated switch; and sufficient wire for an average installation. The system is wired so that a siren will sound if any of the push-button switches are keyed by opening a door, hood, or trunk. A latching relay located in the siren housing keeps the siren

running, even if the push button that triggers the alarm is returned to the off position. The only way the siren can be turned off is by use of the key-operated switch which is usually mounted on a fender. This same key switch is used to put the system in a "ready" position. About the only thing the alarm does not do is remind the owner to switch the system off when returning to his vehicle. He may get caught in his own trap!

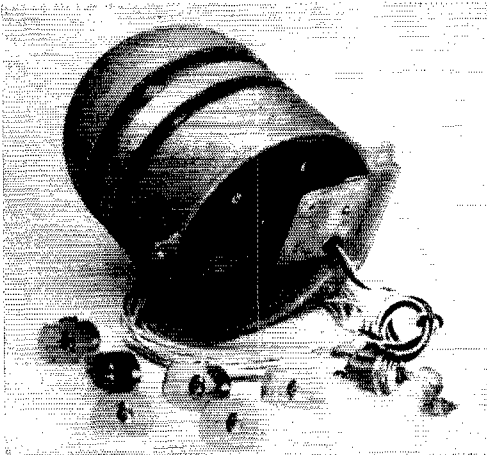
— E. L. C.

Strays

A newspaper account of the W1BU-W6HB moon-bounce experiments explained that its success lay in the fact that the upper sideband oscillated with the lower sideband to produce TVI harmonics and therefore amplify the signal to produce the wavelength.

— . . . —

A group of American amateurs will be touring Europe this spring, visiting six countries between April 22 and May 10. They will be greeted by many European amateurs, and a number of parties, receptions, and other personal QSOs are being planned. There will also be tours of industrial sites, and in addition a Parisian style show for the XYLs. The total price for the trip is \$1065, and a postcard to Hugh Tinley, KØGHK, 6741 North 35th St., Omaha, Nebraska, will bring you a brochure with complete details.



S.C.F.M. — An Improved System for Slow-Scan Image Transmission In Two Parts

Part I — Slow-Scan Modulation Tests and Proposed Standards

BY COPTHORNE MACDONALD,* WA2BCW

S.C.A.M. vs. S.C.F.M.

In the author's original slow-scan system, a 2000-c.p.s. subcarrier was amplitude modulated with video information and sync pulses. Since then he has developed subcarrier frequency modulation gear for doing the same job more effectively. That it does is rather well demonstrated in the tests reported here. Suggested standards for s.c.f.m. slow-scan image transmission are also included. A succeeding article will cover circuit details of the modulating and demodulating equipment.

To resolve the subcarrier question, a three-phase test program was initiated. Ed Piller, Director of the First Army MARS Technical Net, is interested in slow-scan as an aid to on-the-air technical talks. He handled phase one of the program. Slow-scan tapes were recorded by WA2BCW and aired over Ed Piller's station, A2KPQ, on 4030 kc. after the regular net sessions. These transmissions were received and taped by amateurs in various parts of the country. The tapes were then sent to WA2BCW for evaluation.

The second phase involved FCC-sanctioned 10-meter test transmission by WA2BCW. In the third phase, the two systems were compared in the laboratory by observing performance when measured amounts of random noise and heterodyne interference were added to the signals.

A word about the system parameters used in the tests: In general, the greater the deviation in an f.m. system, the better the signal-to-noise ratio in the presence in a given amount of interference. The maximum allowable deviation is determined by the bandwidth available and the maximum modulation frequency. Commercial facsimile operations have standardized on a frequency shift from 1500 to 2300 c.p.s. to represent the transition from black to white. When used with radiotelephone equipment having essentially flat response from 1200 to 2500 c.p.s., modulating frequencies from 0 to 900 c.p.s. can be reproduced. If the "white" frequency is made much higher than 2300 c.p.s., it will be attenuated by the audio cutoff characteristics of some transmitters and receivers. If the "black" frequency is made much lower than 1500 c.p.s., the number of subcarrier alternations per picture element drops to too low a value, and horizontal resolution is lost. 1500 and 2300 c.p.s. were therefore adopted as the standard "black" and "white" frequencies with shades of gray being represented by frequencies in between.

One problem not encountered in conventional facsimile is the transmission of sync pulses. To retain the advantages of amplitude limiting for the transmission of sync as well as video, a sync frequency, 1200 c.p.s., was employed. A horizontal sync pulse was transmitted as a 5-millisecond burst of 1200 c.p.s. tone, and a vertical sync pulse as a 30-millisecond burst. To permit the transmission of horizontal resolution equivalent to 120 lines, a horizontal sweep rate of 15 c.p.s. was selected. To give a 120-line raster, a vertical scanning rate of 8 seconds was used. The

As mentioned in previous articles,^{1,2} the video output of a slow-scan flying-spot scanner or camera has important frequency components close to d.c. Therefore, this signal cannot be fed directly to the usual ham modulator which has poor low-frequency response. Instead, the video must be used to vary the amplitude or frequency of an audio tone situated within the pass band of the modulator.

There has been considerable doubt that the subcarrier a.m. system used in previous amateur slow-scan work was the best method of processing the video for transmission. For one thing, fading produced streaking and shading in the picture. Secondly, to maintain anything like consistently good synchronization in the presence of fading, the black level had to be limited to about one half the sync level. The transmitter was modulated only 50 per cent, at most, between sync pulses, and the peak video sideband power was thus only 25 per cent of what the transmitter was capable of producing.

Since interest in amateur slow-scan is growing rapidly, it is important to establish standards as soon as there is a sound technical basis for doing so. The main question to be resolved has been the method of subcarrier modulation. Recently a number of tests were made to compare the subcarrier a.m. (s.c.a.m.) and subcarrier f.m. (s.c.f.m.) methods of modulation for amateur slow-scan. The results of these tests and the proposed slow-scan standards follow. The circuitry used will be described in a succeeding article.

* Westinghouse Electric Corporation, P.O. Box 284, Elmira, New York.

¹ Macdonald, "A New Narrow-Band Image Transmission System," *QST*, August and September, 1958.

² Macdonald, "Slow-Scan Image Transmission: A Progress Report," *QST*, April, 1960.

same sweep rates and sync pulse lengths were employed with s.c.a.m., but in this case the sub-carrier was a 2000-c.p.s. tone which was varied in amplitude at the video rate. In most tests, black level was set at 50 per cent of sync level.

Test Transmissions from A2KPQ

The A2KPQ MARS transmissions on 4030 kc. were made during March, April and May, 1960. Among the amateurs who recorded the signals were K1MID, W1CUT, WA2CAQ, WV2HLY, K5UYF, K9AUE, W9NTP, K2KAQ/9, K80HO and W0PB.

A2KPQ was located in New York City and ran a power input of 1 kw. Test transmissions were made with s.s.b. suppressed carrier and single sideband a.m. (carrier inserted). As expected, the suppressed carrier s.s.b. was superior in all cases. A condition not discovered until the test series was completed served to invalidate a direct comparison of s.c.a.m. and s.c.f.m. It was finally learned that because the tapes were recorded on one machine (WA2BCW's) and played back on another (A2KPQ's), the level at which a 2300-c.p.s. tone was transmitted was 10 db. less than the transmitted level of a 1200-c.p.s. tone. The signal-to-noise ratio in the white areas of the picture was thus 10 db. less than when the correct level was transmitted.

The effect of 10 db. less signal strength in the white areas is shown in Fig. 1. At frequencies such as 4030 kc., in the evenings, a transmitted signal may arrive at a distant point by a number of routes. The signal received by the most direct route is usually the strongest and, of course, arrives first. A number of echoes follow. In Fig. 1 the echoes of the 1200-c.p.s. sync pulses (left-hand edge) were often greater in amplitude than the 2300-c.p.s. white signal. When this situation existed, the 1200-c.p.s. echo "took over" the limiter, and the reproduced image shows black. Note that 1500-c.p.s. black echoes also took over in some areas of the picture.

Fig. 1 — Image reproduced from a recording by WA2BCW of a 4030-kc. s.c.f.m. transmission from A2KPQ. The white frequency was being transmitted 10 db. down in level from the sync frequency, causing the black echoes at the left edge. The wavy right edge was caused by wow in the tape recorder.

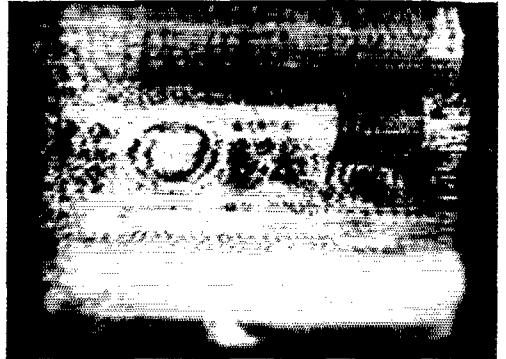
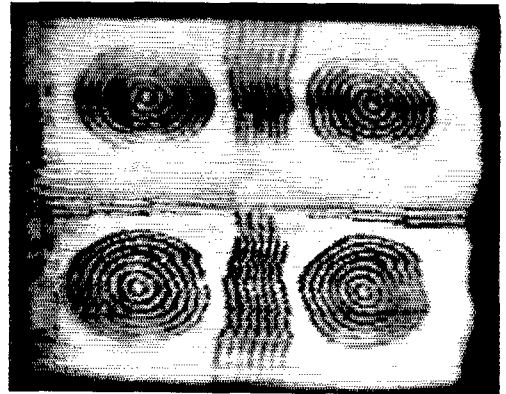
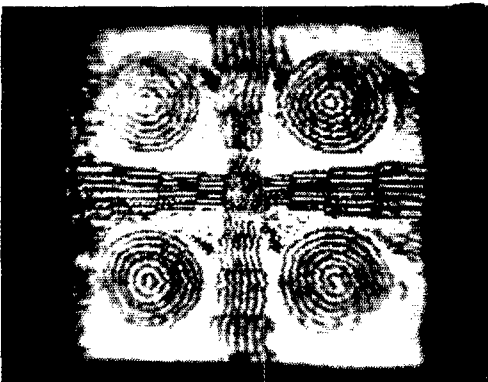


Fig. 2 — S.c.a.m. signals transmitted by A2KPQ as received by K1MID. The sync pulse echoes on the left in the upper photo are the result of multipath propagation, and the white bar in the lower one was caused by a severe fade. Tape recorder wow produced the wavy edges.

The tape made by K1MID, Hillsboro, N. H., illustrates the effect of fading and multipath propagation of s.c.a.m. In Fig 2 (Top) the sync pulse echoes and shading variations are quite apparent. Multiple images and a severe fade (white bar) can be seen in Fig. 2 (bottom).

In several tapes the signal-to-noise ratio of the received signal was too low to produce a recognizable image. For instance, the tape sent by K5UYF, Albuquerque, N. M., showed only sync pulses on a "snowy" background.

While the MARS tests did not provide a valid comparison of s.c.a.m. and s.c.f.m., valuable information was gained about the effect which multipath has on s.c.a.m. The need for transmitting all s.c.f.m. frequencies at the same amplitude was also pointed up.

10-Meter Tests by WA2BCW

The 10-meter transmissions from WA2BCW did provide a good comparison of the two systems. The transmitter ran 25 watts input and was plate modulated. The antenna was a three-element beam. During the transmissions a 10-second segment of s.c.f.m., a 10-second segment of s.c.a.m. and a 10-second voice announcement were alternated. This "program" was recorded on a continuous tape loop which repeated the entire series every 30 seconds. The fact that a



Fig. 3—(Left) S.c.f.m. and (right) s.c.a.m. transmissions from WA2BCW on 10 meters as received by K9UTI. Power input was 25 watts.

complete s.c.f.m. frame and a complete s.c.a.m. frame were transmitted every half minute meant that any slow shift in conditions would not favor one or the other as might happen if, for instance, five minutes of s.c.f.m. were followed by five minutes of s.c.a.m. The s.c.a.m. black level was set at 40 per cent of sync level. K9UTI, Metropolis, Ill., recorded eight minutes of the May 14 transmission. He made the recording by picking up the sound coming from the speaker of his receiver with the tape recorder microphone. Fig. 3 (left) shows a typical s.c.f.m. frame from his tape, and Fig. 3 (right) shows the s.c.a.m. frame which followed immediately after. An analysis of the tape shows that 70 per cent of the s.c.f.m. frames were equal to or better than the s.c.f.m. frame in Fig. 3 (left) while only 20 per cent of the s.c.a.m. frames appeared as good as or better than the s.c.a.m. frame in Fig. 3 (right). During the eight-minute tape, the worst single s.c.f.m. frame was about the same quality as the best single s.c.a.m. frame. S.c.f.m. synchronization reliability was about 95 per cent while the s.c.a.m. reliability was only about 50 per cent.

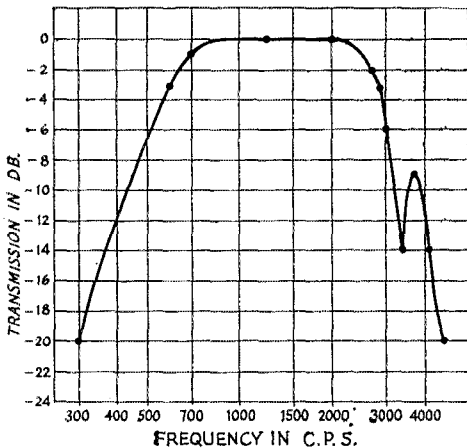


Fig. 4—Attenuation characteristics of the band-pass filter used ahead of the slow-scan monitor in the closed-circuit tests to simulate the response of typical phone transmitters and receivers.

Closed-Circuit Tests

A number of closed-circuit tests were made to determine the effect of random, or "white," noise and audio tone interference on the two systems. In all tests, a filter with the attenuation characteristics shown in Fig. 4 was used at the input of the slow-scan monitor to simulate the band-pass characteristics of typical radio equipment. Resistance-type isolating networks were used so that the desired amount of noise or tone could be added to the slow-scan signal without affecting its level.

Fig. 5 (left) is s.c.f.m., and Fig. 5 (right) is s.c.a.m. In both cases the r.m.s. random noise level is 17 db. below the maximum r.m.s. subcarrier level, as measured at the filter output. The s.c.a.m. black level is 50 per cent of sync level.

Fig. 6 shows the relative severity of the interference caused by a tone 20 db. lower in amplitude than the maximum subcarrier level. The designations of "light," "medium," etc., were, of course, subjective. Fig. 7 illustrates the effect of such a tone at a frequency of 1400 c.p.s. As can be seen from the graph, the s.c.f.m. photo (Fig. 7, left) illustrates what this observer considers to be "medium" visible interference, and the s.c.a.m. photo (Fig. 7, right) shows the degree of degradation corresponding to a "heavy" rating.

The test results just presented clearly point up the superiority of the s.c.f.m. system. The advantages gained in performance are:

- 1) A better quality picture in the presence of heterodyne interference.
- 2) A less "snowy" picture during weak signal conditions.
- 3) Relative immunity to fading.

Proposed Standards

An intensive effort was made to select standards which would give the best possible slow-scan system for amateur use. The history of commercial facsimile standards was thoroughly explored, from the original a.m. days, through the pulse-width modulation of the '20s and '30s, to the s.c.f.m. and radio-frequency carrier-shift techniques employed today. The reports of the National Television System Committee were read. These reports covered the development of

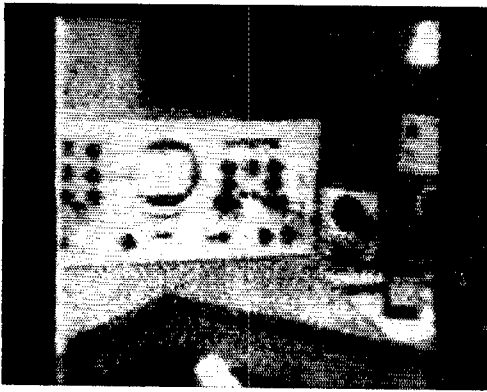


Fig. 5—Closed-circuit comparison of (left) s.c.f.m. and (right) s.c.a.m. with a random noise level 17 db. below the maximum subcarrier level.

TABLE I

Proposed Amateur Slow-Scan Standards
(120-Line S.C.F.M.)

	60-Cycle Areas	50-Cycle Areas
Sweep Rates:		
Horizontal	15 c.p.s. (60 c.p.s./4) 8 sec.	16 2/3 c.p.s. (50 c.p.s./3) 7.2 sec.
Vertical		
No. of Scanning Lines	120	120
Aspect Ratio	1 : 1	1 : 1
Direction of Scan:		
Horizontal	Left to Right	Left to Right
Vertical	Top to Bottom	Top to Bottom
Sync Pulse Duration:		
Horizontal	5 millisecc.	5 millisecc.
Vertical	30 millisecc.	30 millisecc.
Subcarrier Frequencies:		
Sync	1200 c.p.s.	1200 c.p.s.
Black	1500 c.p.s.	1500 c.p.s.
White	2300 c.p.s.	2300 c.p.s.
Required Transmission Bandwidth	1.0 to 2.5 kc.	1.0 to 2.5 kc.

the present U. S. commercial television standards and discussed many things germane to the slow-scan standards problem. Economic and regulatory factors were considered since no system is feasible if the equipment is too expensive or if the slow-scan operation would cause undue interference to other amateur activities. When the standards began to jell, many tests were run, some on the air and some closed-circuit. A few of the more significant tests have been reported above. The end result of the over-all effort is Table I. Headings will be discussed individually.

60-Cycle Areas, 50-Cycle Areas: It is desirable to have the sweep oscillators at the transmitting location synchronized with the local power line,

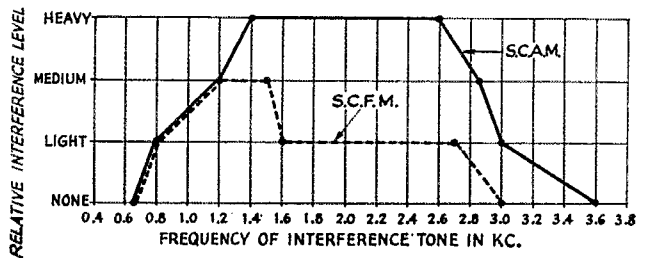
not only because the power line provides a convenient frequency standard, but because ripple in the video equipment or the transmitter will have least detrimental effect. Most of the world is divided into areas of 50-cycle power and areas of 60-cycle power. It is essential that an amateur in a 50-cycle area be able to receive transmissions from a 60-cycle area and vice versa. With the standards selected, the only change which a receiving station must make in going from a 60-cycle area signal to a 50-cycle area signal is a slight readjustment of the horizontal hold control.

Sweep rates: The horizontal sweep rates are submultiples of the local power-line frequency. The vertical rates are selected to give a 120-line raster. With the 1:1 aspect ratio used, the horizontal resolution is also in the neighborhood of 120 lines. With a 7- to 8-second scan, the brightness of a particular point on a P7 screen drops to a marginally useful level just before the point is rescanned. This is a desirable situation for transmitting information which is apt to change from frame to frame, such as a person's facial expressions; also, there is little carry-over of QRM effects from one frame to the next.

Aspect ratio: With a limited resolution system such as this, the tendency is to transmit images of objects or small groups of objects rather than panoramic views. The 1:1 aspect ratio gives equal picture detail in the horizontal and vertical directions and is ideal for the "spotlight" type of viewing which is done with slow-scan.

Direction of scan: The direction of horizontal scan is rather unimportant, and the universally-used left to right was arbitrarily picked. The direction of vertical scan was the subject of ex-

Fig. 6—Relative severity of interference to s.c.f.m. and s.c.a.m. caused by tones of various frequencies when 20 db. below the maximum subcarrier level.



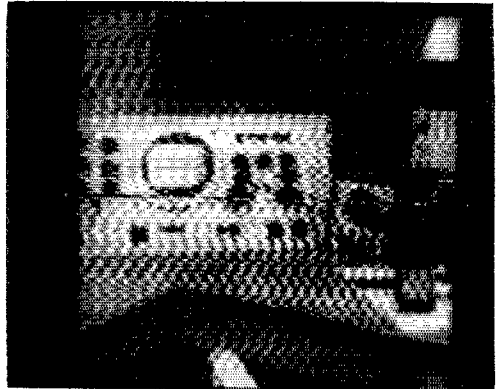
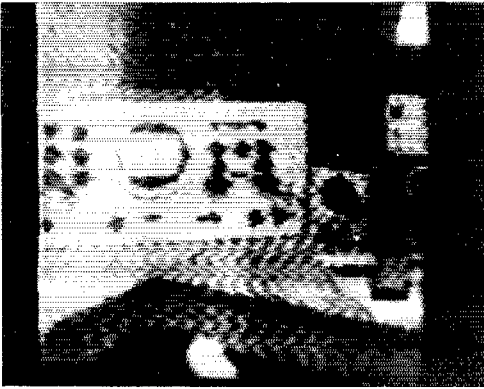


Fig. 7—Interference to (left) s.c.f.m. and (right) s.c.a.m. images from a 1400-c.p.s. tone 20 db. below the maximum subcarrier level.

perimentation. At rather rapid scan rates (1-to-2-second vertical period) Bill Stapleton of Dublin found the bright "writing line" of the P7 phosphor to be less distracting if the picture was scanned from bottom to top. At the slower sweep rates, however, a top-to-bottom scan seems more satisfactory, especially with written material, since this is the normal reading order.

Sync pulse duration: The 5-millisecond horizontal pulse is a satisfactory compromise between several factors. A sync discriminator bandwidth of 300 c.p.s. can be obtained with an inexpensive inductor, yet this bandwidth is narrow enough to give good sync in the presence of noise and QRM. The sync pulse must be long enough to build up to maximum amplitude in the tuned circuit of the discriminator and short enough so that retrace time is not excessive. The 30-millisecond vertical pulse is six times the length of the horizontal pulse and is thus easily separated. It is also much shorter than the duration of a horizontal line and therefore will not disrupt the following horizontal sync pulse. The vertical pulse starts at the beginning of the first line of the raster.

Subcarrier frequencies: The reasons for choosing these particular subcarrier frequencies have already been discussed.

Required transmission band: The over-all amplitude response of the amateur transmitter and receiver should be flat to within a few db. between the frequencies of 1000 and 2500 c.p.s.

Tolerances: The various sweep frequencies are not at all critical and may be plus or minus 10 per cent or more without seriously affecting the usefulness of the picture. For best results the sync frequency should be kept within 50 cycles of 1200 c.p.s. The "black" and "white" subcarrier frequencies may be off 100 c.p.s. without causing trouble. A plus or minus 20 per cent tolerance on the sync pulse durations should be all right.

Acknowledgments

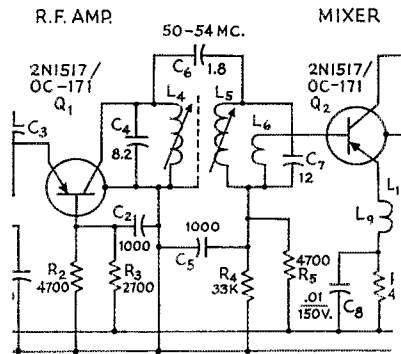
In addition to those already mentioned, thanks are extended to a number of hams, including

G3AST, VP9XX and K4KYY, who were, for one reason or another, unable to receive the test transmissions.

The actions of the FCC and MARS Director First Army, Captain Joseph Fischler, in permitting the test transmissions on amateur and MARS frequencies, are sincerely appreciated. QST

FEEDBACK

The diagram on page 40 of the December issue of *QST* showed C_5 and R_4 shorted out by an erroneous connection between L_4 and L_5 . The diagram below shows the corrected portion of Fig. 2 on page 40 of December.



ALL VALUES OF CAPACITANCE ARE IN μF ;
 $\mu\mu\text{F}$ IS ARE IN $\mu\mu\text{F}$, EXCEPT AS INDICATED.



In the letter from Julian F. Oberg which appeared in the December issue, the call of Pat Husk was erroneously given as K9EUG. It should have been shown as K9EUQ.

The formula for frequency on page 38 of the November, 1960, issue of *QST* gives f in c.p.s. instead of Mc. as stated.

Here the 4-400A amplifier and its control unit are mounted in a 21-inch gray hammertone rack cabinet (Bud CR-1727). Shelf brackets (Bud SA-1350) are mounted on both sides of the cabinet to hold the amplifier chassis. The meters are for grid, screen and cathode currents and plate voltage. Below them, from left to right, are the filament pilot light, key-type a.c. switch, Class AB₁ /C bias switch, screen autotransformer, plate switch and plate pilot light.



Something Different in High-Power Tank Circuits

BY KENNETH C. LAMSON,* WIZIF

A 4-400A Amplifier for C.W., S.S.B. or A.M.

How long since you've seen a kilowatt pi network that *didn't* use a commercial rotary or switched coil assembly and maybe a costly vacuum variable capacitor besides? This rig's plate circuit combines a novel home-brew switching system, two air variables and a store-bought coil set into a tank that's economical as well as efficient. Bias and screen supplies, plus control and metering circuits, are all included. All you have to furnish are the h.v. and a few watts (or volts on s.s.b.) of drive.

HAVE you been looking for a kilowatt final that doesn't take 100 watts of drive? So many amplifiers today are of the grounded-grid type and require large exciters. Any transmitter delivering about six watts will drive the amplifier described here to rated output on all h.f. bands. When used as a linear for side-band, a peak driving voltage of about 150 is required, and a 10B, 20A or similar exciter will provide adequate drive.

The amplifier can be run at a kw. input on c.w., 880 watts input on a.m., and about a kw. input p.e.p. as a Class AB₁ linear. (Maximum input with a two-tone test signal is 650 watts.)

The plate tank circuit of the amplifier is made from readily available parts. No expensive plate inductor or vacuum variable capacitor are required. The amplifier is fairly economical to build and operates with excellent efficiency. Bias and screen supplies plus all the necessary control circuits are included.

4-400A Amplifier

Checking Fig. 1, it can be seen that the amplifier uses the conventional grounded-cathode, tuned-grid configuration. The grid tank consists of a link-coupled, parallel-tuned circuit, switchable from 80 through 10 meters. S_{1B} shorts out the unused part of grid coil L_2 , and S_{1A} modifies

the input link, L_1 . C_1 peaks the input circuit within each band. A Harrington Electronics subassembly was used in the original rig, but an equivalent circuit can be built from standard parts if desired.

The amplifier is neutralized by the capacitive bridge system with neutralizing capacitor C_2 connected from the plate of the amplifier tube to the bottom of the grid circuit. C_2 and C_3 form a capacitive voltage divider, and their ratio determines the amplitude of the feedback voltage used in neutralizing. C_2 must have adequate insulation to withstand full peak plate voltage.

The amplifier output circuit is a shunt-fed pi network capable of working efficiently into 50- or 70-ohm loads on all bands from 3.5 through 30 Mc. A choice of two different tuning capacitors is available; the smaller capacitor, C_{10} , is used on 20, 15 and 10 meters, and the larger one, C_{11} , is paralleled with it for tuning 80 and 40 meters. Having two plate-tuning capacitors allows a desirable L/C ratio to be maintained at all frequencies without having to resort to a vacuum variable.

The output side of the pi network has a 650- μf . variable loading capacitor (two 325- μf . variables gauged) and three additional fixed micas which can be paralleled to give an additional 1000 μf . The r.f. "safety" choke shunted across the output is to short the plate voltage to ground in the event blocking capacitor C_7 should

* 53 Poquonock Ave., Windsor, Conn.

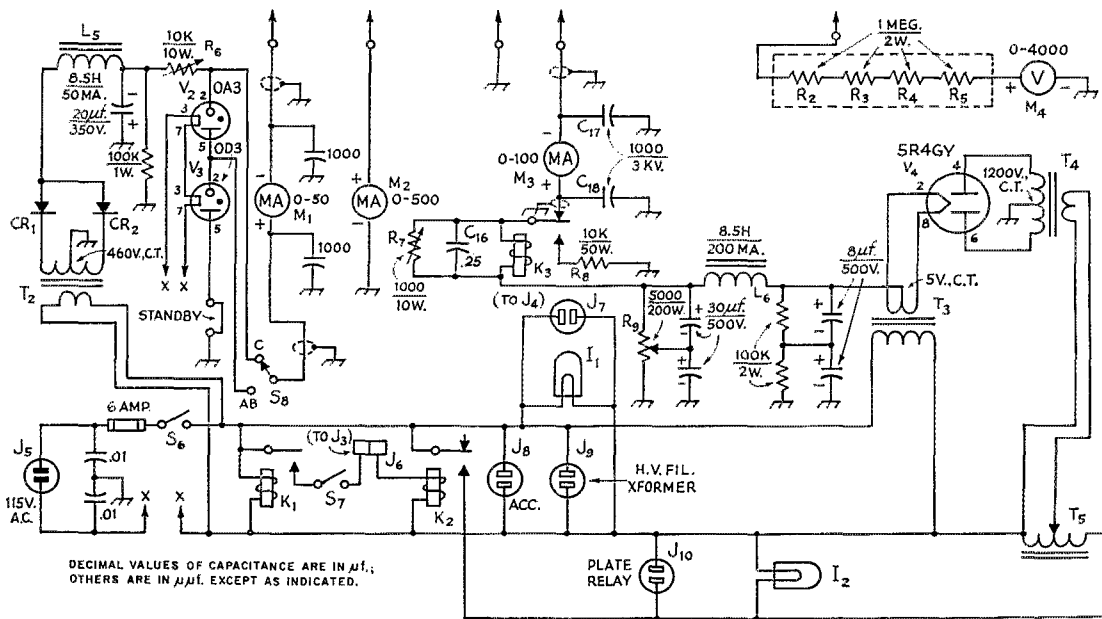
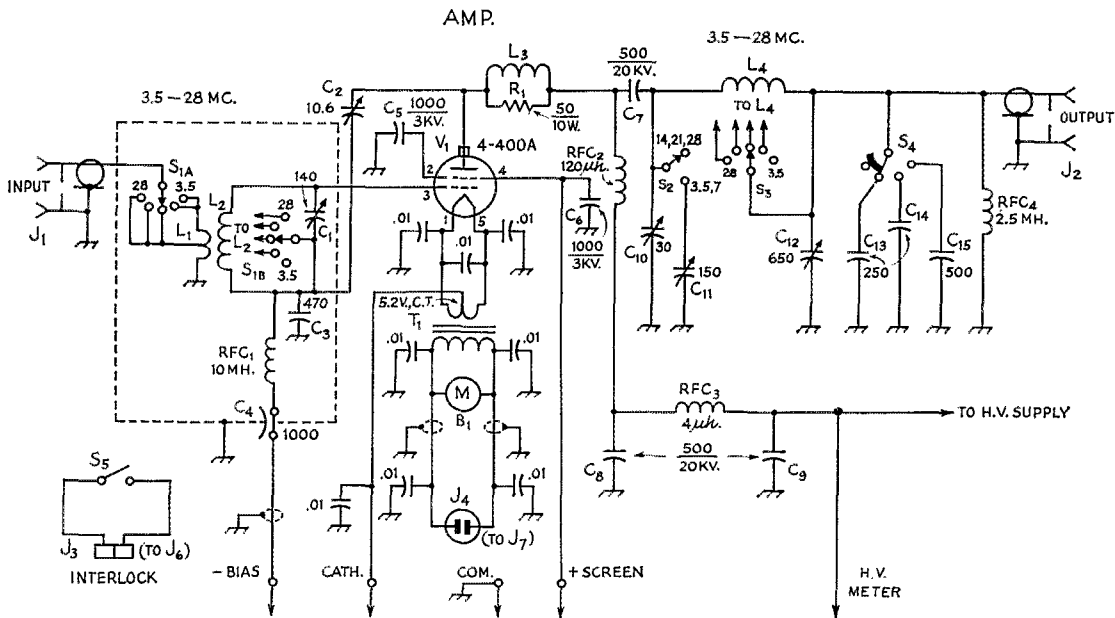


Fig. 1—Circuit of the amplifier (upper part of the diagram) and power supply/control unit. The grid circuit, C_1, L_1, L_2, S_1 , can be made up from the parts specified, or a Harrington Electronics GP-20L can be used. Interlock switch connectors J_6 and J_3 are connected by a length of line cord with a Cinch-Jones P-202-CCT plug on one end and an Amphenol 61F11 socket on the other. Millen 37001 safety terminals are used for the h.v. connections. Resistances are in ohms, and resistors are $\frac{1}{2}$ watt unless otherwise specified. Capacitors not listed on the facing page are 600-volt disk ceramic except those marked with polarity which are electrolytic.

fail. This insures against d.c. appearing on the pi network or feed line.

A 17-c.f.m. blower supplies adequate forced air cooling to the 4-400A base and plate seals. The blower is connected across the 4-400A filament transformer primary and operates whenever the filament is energized.

Control Circuitry

Included with the amplifier but mounted on a separate chassis are all required control and metering circuits. Meters are provided for amplifier grid current, screen current, cathode current and plate voltage. To comply with the FCC rule regarding measurement of input powers over 900 watts (section 12.131), the control grid and screen currents should be subtracted from the total cathode current, and the result is multiplied by the plate voltage to determine the plate power input.

The amplifier is fixed biased at -225 volts for Class C and -150 volts for Class AB₁ operation. VR tubes hold the bias voltage constant. The full-wave rectifiers in the bias supply are silicon diodes, so there is no warmup time involved and full operating bias is applied to the amplifier when the power switch, S_6 , is closed. Time-delay relay K_1 operates K_2 , which is in series with the screen supply primary. Thus

there is a 60-second delay before screen potential can be applied to the amplifier tube. The screen supply rectifier (V_4) filament is not controlled by the time-delay circuit.

Likewise, the accessory a.c. socket, J_8 , and the high-voltage filament transformer socket, J_9 , are energized as soon as power switch S_1 is closed. The h.v. plate transformer is turned on by a relay plugged into J_{10} and controlled by the time-delay relay. With this arrangement, it is impossible to apply a.c. to the plates of the high-voltage rectifiers before the filaments have had a chance to warm up.

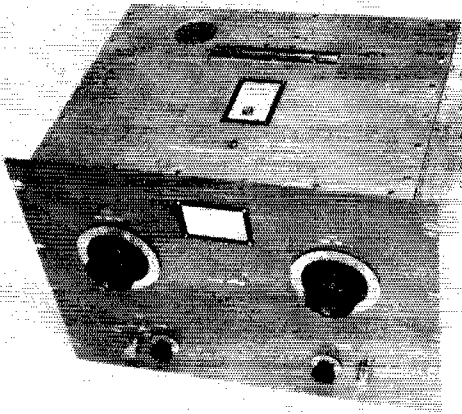
A variable autotransformer in series with the screen-supply primary allows the screen voltage to be adjusted from zero to about 800 volts under load. This makes a convenient arrangement not only for resetting the screen voltage when changing from Class C to Class AB₁ or vice versa, but also for adjusting the power input of the amplifier.

A screen overload protection circuit is also included. If excessive screen current flows, K_3 is energized and is kept energized by the current through R_8 .¹ To reset the relay the screen voltage must be momentarily turned off so that the relay will return to its unenergized condition.

¹ A somewhat more foolproof protection scheme was described by W9HRH in *QST* for October, 1960. — Ed.

- B₁—Blower-motor assembly, 17 c.f.m. (Ripley, Inc., Middletown, Conn., type 8433).
C₁—140- μ mf. midget variable (Hammarlund APC-140-B).
C₂—10.6- μ mf. neutralizing (Johnson N250).
C₃—500-volt mica.
C₄—0.001- μ f. feed-through (Centralab FT-1000).
C₅, C₆, C₁₇, C₁₈—0.001- μ f., 3000-volt disk ceramic (Centralab DD30-102).
C₇, C₈, C₉—500- μ mf., 20,000-volt ceramic (Centralab TV-207).
C₁₀—30- μ mf. variable, 0.25-inch spacing (Barker & Williamson CX-30C butterfly, one section used).
C₁₁—150- μ mf. variable, 0.25-inch spacing (Johnson 150D90).
C₁₂—650- μ mf. variable (two Hammarlund MC-325Ms ganged and paralleled).
C₁₃, C₁₄ C₁₅—2500-volt mica (Aerovox 1652L).
C₁₆—200-volt molded paper.
CR₁, CR₂—500-ma. 600-volt peak inverse silicon diode (Sarkes Tarzian F-6).
I₁, I₂—115-volt pilot lamp.
J₁, J₂—Coaxial receptacle, chassis mounting (SO-239).
J₃, J₄, J₅—115-volt plug, chassis mounting (Amphenol 61-M1).
J₆—2-contact socket (Cinch-Jones S-202-B).
J₇—J₁₀, inc.—115-volt socket (Amphenol 61-F1).
K₁—S.p.s.t., 115-volt 60-second time-delay relay, normally open (Amperite 115N060).
K₂—S.p.d.t. relay, 115-volt a.c. coil (Potter & Brumfield KA5AY).
K₃—S.p.d.t. relay, 2500-ohm 7.2-ma. coil (Advance GHE/1C/2500).
L₁—3 $\frac{3}{4}$ turns No. 18 insulated wire on cold end of L₂; tapped 2 turns from ground end.
L₂—50 turns No. 24 tinned, 1 $\frac{3}{4}$ inches long on $\frac{3}{4}$ -inch diam. ceramic form; tapped 5, 8, 13 and 25 turns from grid end.
L₃—3 turns No. 10 tinned, $\frac{5}{8}$ -inch diam., 1 inch long.

- L₄—Pi-network coil assembly (Air Dux 195-2 available from Ilumintronics Engineering, Sunnyvale, Calif.); see text.
L₅—8.5-hy. 50-ma. filter choke (Knight 62G136).
L₆—8.5-hy. 200-ma. filter choke (Knight 61G409).
M₁, M₂, M₃—D.c. milliammeter.
M₄—D.c. voltmeter; includes R₂-R₅, inc. (milliammeter can be substituted; see text).
R₁—50-ohm 10-watt noninductive wire-wound (Sprague 10N1T).
R₂-R₅, inc.—Part of M₄ if voltmeter is used.
R₆, R₇—10-watt adjustable.
R₈—See text.
R₉—200-watt adjustable; set tap at midpoint.
RFC₁—10-mh. r.f. choke (National R-50-I).
RFC₂—120- μ h. plate r.f. choke (Raypar RL-101).
RFC₃—4- μ h. r.f. choke (National R-60).
RFC₄—2.5 mh. r.f. choke (National R-50).
S₁—Miniature ceramic rotary, 2 poles, 6 positions, 1 section, shorting, 5 positions used (Centralab PA-2002).
S₂, S₃—Homemade, see text and Fig. 2.
S₄—Ceramic rotary, 9 positions, 1 section, progressively shorting, 4 positions used (Centralab PSD section and P-270 index assembly).
S₅—S.p.s.t. snap-action (Unimax 2HBW-1).
S₆—S.p.s.t. lock switch (Arrow-Hart & Hegeman 81715-L).
S₇—S.p.s.t. toggle.
S₈—Ceramic rotary, 1 pole, 6 positions, 1 section, non-shorting, 2 positions used (Centralab 2501).
T₁—Filament transformer, 5.2 volts c.t., 24 amp. (Triad F-11U).
T₂—Power transformer, 460 volts c.t., 50 ma. (Stancor PC-8418).
T₃—Filament transformer, 5 volts c.t., 3 amp. (Thordarson 21F03).
T₄—Power transformer, 1200 volts c.t., 200 ma. (Thordarson 22R36).
T₅—Variable autotransformer, 0-132 volts, 1.75 amp. (Superior 10B).



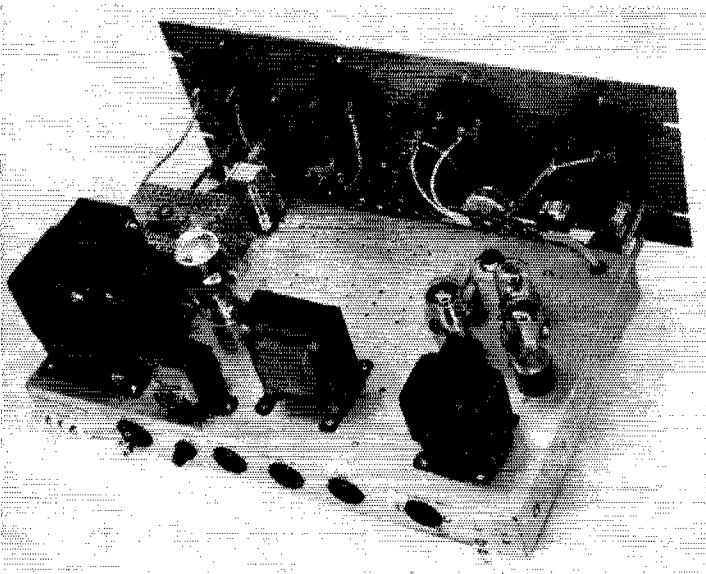
This view of the amplifier shows the band-switch trap door, air-exhaust port and hole (center, left) for adjusting neutralization, all in the top of the shielding enclosure. The large knob on the left of the panel is for the 20/15/10-meter plate tuning capacitor, and the matching knob adjusts the capacitor used on 80 and 40. Farther down, from left to right, are the grid band switch, grid tuning control, variable loading adjustment and loading switch.

This can be done by opening t.r. switch S_7 . The current at which the overload relay throws is set with shunt resistor R_7 .

The plate voltmeter can be purchased as such or made from a milliammeter. The voltmeter circuit shown in Fig. 1 consists of a 0-1-ma. meter in series with four 1-megohm resistors. The meter resistance is very low in comparison to megohms, so with 4000 volts across the series combination, the current will be very nearly 1 ma., and the meter will read full scale. The meter reading can be multiplied by a conversion factor (4000), or the meter face can be recalibrated to read 0-4000 volts.

Amplifier Construction

The amplifier is built on a 4 × 13 × 17-inch chassis and uses a 14-inch rack panel. All major components are visible in the photographs. The Harrington grid circuit, output loading capacitors and switch, and filament transformer are all below the chassis. Mounting the filament transformer in the center helps keep the weight evenly distributed.



The control unit. On the chassis, counterclockwise from the upper left, are the screen overload relay, cage containing voltmeter multiplier resistors, screen power transformer, filament transformer for the 5R4 screen rectifier, 5R4, screen filter choke, bias transformer, bias VR tubes, bias supply choke, time-delay relay and jack for the leads from the interlock switch. On the rear of the chassis, from left to right, are a terminal strip for ground, screen and grid connections, a.c. input plug, fuse holder, a.c. output for the h.v. rectifier filament transformer, a.c. socket for the amplifier filament transformer, accessory a.c. socket, a.c. socket for the h.v. control relay and standby terminals. The free terminal on the second meter from the left connects to the amplifier cathode.

tight seal with minimum air leakage. The four-inch square of cork stock used in making the gasket should be obtainable from most automotive supply stores where it is sold for gaskets, or from a floor-covering supply store which carries cork tile. A 3-inch-diameter hole covered with perforated sheet aluminum ("do-it-yourself" type) is located directly above the 4-400A tube, in the shielding enclosure. This hole allows the cooling air to escape from the enclosure.

The blower is mounted on the rear apron of the chassis by four 6-32 spade lugs attached to the walls of the blower output housing. A $1\frac{1}{4} \times 1\frac{1}{8}$ -inch hole must be cut in the rear apron of the chassis to accommodate the blower, and another cork gasket is used here between the plastic blower housing and the amplifier chassis.

The chassis should be as airtight as possible to provide maximum air flow to the 4-400A tube. This requires sealing any small holes such as exist in the corners of the chassis. These holes can be covered with tape or filled with Duco cement. The bottom plate must, of course, be solid (not perforated) aluminum for the same reason.

Plate Tank and Enclosure

The plate tank coil, L_4 , band switch, S_3 , and plate tuning capacitor switch, S_2 , are mounted on two Lucite plates in the center of the chassis. The tank coil comes prewound on one Lucite plate which is positioned $3\frac{1}{2}$ inches above the chassis on ceramic spacers. Mounted $3\frac{1}{2}$ inches above this, again on ceramic spacers, is the $4\frac{1}{8} \times 8$ -inch Lucite band-switch plate detailed in Fig. 2. When drilling this plate be sure to use a slow speed; otherwise, the Lucite will soften and produce irregular holes. Hard rubber washers

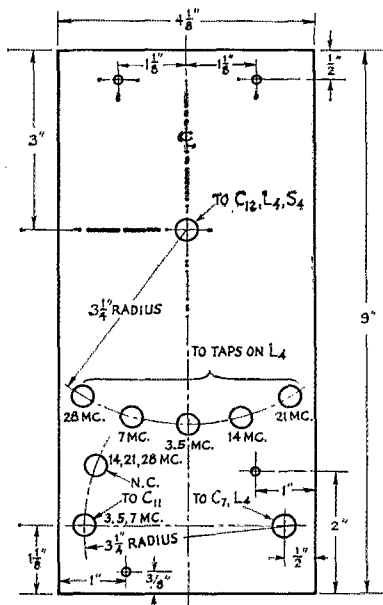
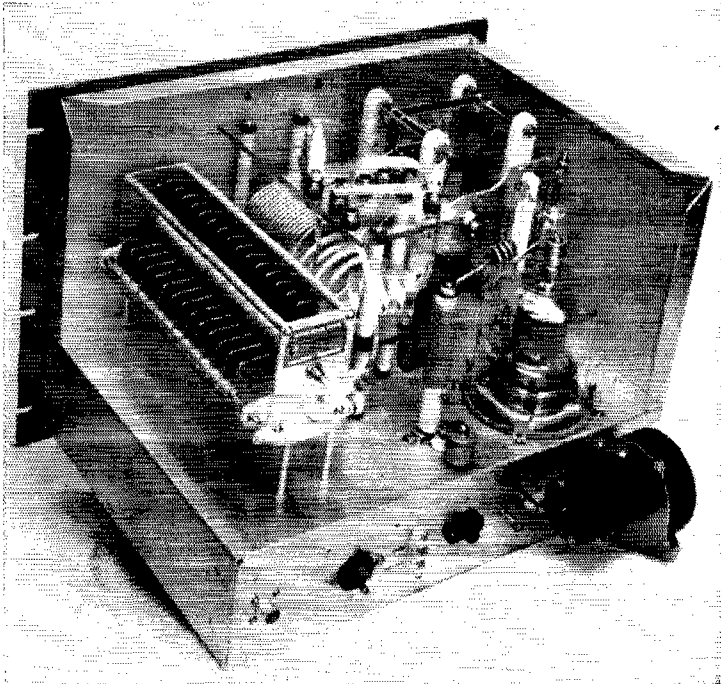


Fig. 2—Layout of the $\frac{1}{4}$ -inch Lucite or Plexiglas plate used to mount the band switch and capacitor switch. Suitable material can be obtained from most plastic supply stores. The large holes are $\frac{3}{8}$ -inch diameter, and the small ones are drilled to pass 6-32 screws. Holes for stator jacks (marked with frequencies) are spaced $\frac{7}{8}$ inch apart along their respective arcs.

(the type used for packing faucets) are inserted between the ceramic spacers and the Lucite plates to provide a tight fit.

The actual band switch is made from a $3\frac{1}{4}$ -inch

Most of the enclosure has been removed here to show the low- and high-frequency plate capacitors (left and right), the coil and band-switch assembly (center) and the 4-400A in its glass chimney. The neutralizing capacitor is behind the tube in this view. The cork gasket can be seen between chimney and chassis. Across the rear apron are the output jack, filament a.c. plug, cathode and ground terminals, high-voltage connector, ground post and blower; the latter hides another barrier strip (for bias and screen connections) and the input jack.



aluminum utility handle (Bud UH-71A), two jumbo banana plugs (Johnson 108-770) and six banana jacks (Johnson 108-760). The capacitor switch is of similar construction, using one utility handle, two banana plugs, and three banana jacks. In order to strengthen the soft aluminum utility handles used for the switches, cross supports are run from one end of each handle to the other.

Counting from the blocking capacitor end, the plate coil is tapped at 4 turns (0.4 μ h.) for 10 meters; 7.5 turns (1 μ h.) for 15 meters; 10.5 turns (2.33 μ h.) for 20 meters, 14 turns (5.2 μ h.) for 40 meters, and 24 turns (16.4 μ h.) for 80 meters. (All the figures include the 4-turn coil made of $\frac{3}{8}$ -inch strap.) The lugs provided with the tank coil assembly should be securely soldered to the coil at these points. Strapping should then be run from these taps to the appropriate band-switch terminals. It should be noted (Fig. 2) that the band-switch terminals do not progress in consecutive order, but rather are arranged to provide the shortest possible lead lengths.

One end of the blocking capacitor, C_7 , is threaded onto the stud that anchors the free end of the 4-turn 10-meter tank coil, and the other end of C_7 is connected to the plate r.f. choke with strapping. The output end of the tank coil assembly is connected via a feed-through bushing and more strapping to the variable loading capacitor.

One precaution — be sure no iron or steel hardware is used in the band-switch assembly, or for that matter, anywhere in the plate tank circuitry of the amplifier. Each piece of hardware should be checked first with a magnet to insure that it is neither iron nor steel before being used in the plate circuit.

The shielding enclosure is made from aluminum

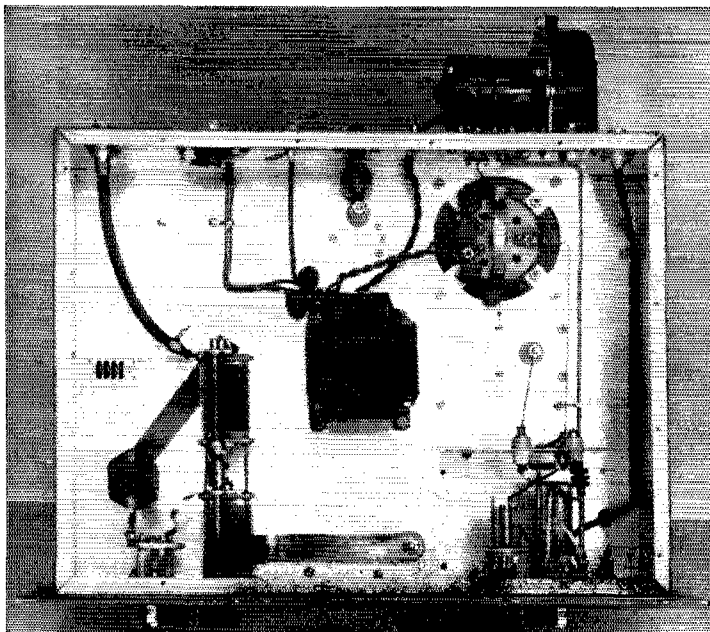
sheet and angle stock. The two side pieces measure 10 by 13 inches, the top 13 by 17, and the back 10 by 17. The back, top and sides of the enclosure are fastened together with lengths of the angle stock (Reynolds Item 6A) drilled and tapped for 6-32 screws. The enclosure is also secured to the chassis and front panel backing plate by 6-32 screws. This arrangement makes a tight enclosure with minimum leakage.

The mounting feet of butterfly capacitor C_{10} are screwed to the side of the enclosure. Long screws and spacers (like the ones used to mount C_{11}) connect the front plate of C_{10} with the panel.

In order to get to the band switch and capacitor switch, a trap door is provided in the top of the enclosure. Snap-action switch S_5 is installed so that it is actuated by the trap door. The four screws holding the microswitch can be seen directly behind the trap-door hinge. The leads from S_5 are brought out to a jack, J_3 , located on the back wall of the enclosure. A plug-in cable connects J_3 and J_6 on the control unit. Lifting the trap door makes it impossible for the screen or plate supplies to be energized. The trap door measures $6\frac{1}{4}$ by 7 inches and the rectangular cut-out in the top of the enclosure is $4\frac{3}{8}$ by $6\frac{1}{4}$ inches. This provides adequate overlap to prevent any leakage of r.f.

The Control Unit

Construction of the switching/metering/power unit is pretty much conventional. The front panel is spaced $2\frac{1}{2}$ inches out from the chassis to provide room for mounting the auto-transformer and plate and filament pilot-light assemblies. For the most part, component placement is noncritical. Screen-supply bleeder R_5 gets rather hot and should be isolated from other components. Ventilation holes are drilled in the chas-



Bottom view of the amplifier. At the lower right is the Harrington grid circuit with the Minibox shield cover removed, and to the left are the loading capacitors, switch and "safety" choke. The filament transformer is in the center. At the upper right is the amplifier tube socket mounted on four tabs spaced evenly around the cutout in the chassis.

sis above R_9 and also above screen overload resistor R_8 to help provide cooling. Multiplier resistors R_2 , R_3 , R_4 and R_5 are mounted on a phenolic board and enclosed in a metal cage as a safety precaution. The voltmeter input connector is mounted on top of the cage.

Adjustment and Operation

First, determine that the control unit is operating correctly. Apply 115 volts to J_5 , insert the tubes, and turn on the key switch, S_6 . The green filament pilot light, I_1 , should go on immediately. There should also be power at receptacles J_7 , J_8 and J_9 . J_7 and J_9 are for the amplifier and plate supply filament transformers; J_8 , an accessory socket, is provided so that external equipment such as the station receiver can be controlled by S_6 . There should be no power at J_{10} , the plate transformer control socket.

Next, adjust R_6 until the VR tubes just begin to glow. Be sure the standby terminal jumper from Pin 5 of V_3 to ground is in place. Operating S_3 should change the bias from -150 volts in the Class AB₁ position to -225 volts for Class C in the other. With S_8 in the linear position, and a voltmeter on the output of the bias supply, temporarily lift the standby jumper from ground. The output voltage should rise from -150 to approximately -300 volts. The standby terminals provide a convenient way to bias the 4-400A beyond cutoff during standby and receiving periods. This will prevent any annoying diode noise generation.

Open S_6 and connect an a.c. voltmeter to J_{10} . Put a temporary jumper between the two contacts of J_6 . Close S_6 and S_7 , and after 60 seconds there should be power at J_{10} and the red plate pilot lamp should light. Replace the jumper across J_6 with the leads from the interlock switch. Lifting the trap door should de-energize J_{10} , and the plate pilot bulb, I_2 , should extinguish.

Next, connect a d.c. voltmeter to the output of the screen supply. By adjusting T_5 it should be possible to vary the output from 0 to approximately 850 volts. Finally, adjust R_7 so that K_3 trips when 40 ma. is drawn from the screen

supply. This can be checked by connecting a resistor (620 ohms or less at 1 watt) across C_{17} and running the voltage up from zero until the drain is 40 ma. This completes the testing of the control unit.

The amplifier must now be neutralized. Set the grid and plate band switches for 28 Mc., and disconnect the screen and plate leads at the amplifier terminals. Couple a sensitive indicating wavemeter to the output end of the plate tank circuit and apply the required -225 volts of bias. Apply drive, resonate the grid circuit and adjust the output of the exciter for rated 4-400A Class C grid current. Neutralizing capacitor C_2 should then be adjusted for minimum r.f. in the plate tank circuit. The plate tuning capacitor should be retuned for maximum wavemeter reading after each change of C_2 . After rated plate and screen voltages have been applied and the amplifier loaded, the neutralizing capacitor should be touched up so that minimum plate current and maximum grid and screen currents occur simultaneously as the plate tank is tuned through resonance.

Notes

If the amplifier is to be used for s.s.b., the h.v. power supply should have a minimum output capacitance of 8 μ f. For best voltage regulation, the plate transformer should have a 220-volt primary. The output of the h.v. power supply should include a $\frac{1}{2}$ -ampere fuse to protect the supply from excessive overloads.

If the amplifier is to be plate modulated, a choke, approximately 10 h.y. at 50 or 100 ma., should be inserted in series with the screen lead of the 4-400A. An external switch can be used to short out the choke when using the amplifier for c.w. or s.s.b.

The high voltage lead from the plate supply can be made from RG-8/U, which is readily obtainable and has a 4000-volt d.c. rating.

Even though the transmitter is adequately shielded to prevent direct harmonic radiation, it is a good idea to use a low-pass filter to minimize the harmonics getting out via the transmission line.

QST

Strays

The Arctic Amateur Radio Club of Fairbanks, Alaska, will hold a "49 Below for the 49th" Winter Field Day on January 7 and 8. The customary ARRL Field Day rules will apply. Fairbanks calls will be either KL7AD or KL7KC. Stations will be operated from 1800 GMT on Jan. 7 until 2400 GMT on Jan. 8, using all bands 80 through 6 meters. Certificates will be awarded to "first state contacts" contacted by the Fairbanks club, and other clubs in Alaska are being urged to participate in the same fashion.

Yes, the temperature really does get down to 49 below, and then some!

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Timing Adjustments in a Sequenced Change-Over System

BY GRADY B. FOX, JR.,* W2VVC

A PREVIOUS article by the author¹ included some discussion of the contact performance of relays. Graphs were presented which illustrated the influence of contact bounce on the time which must be allowed for the contact to establish a solid connection. It was pointed out that failure to make due allowance for bounce may be responsible for arcing at the antenna relay contacts if transmitter power is applied before firm contact is set up at the antenna relay. Also, unnecessary pops and clicks may be introduced in the receiver if the receiver is not silenced before other change-over operations take place.

It seems obvious that these problems may be overcome simply by operating the relays in proper sequence and making the delay interval between the operation of one relay and the next sufficiently long to assure that one operation is complete before the next one is started. However, if one wants a VOX-operated change-over system that does not clip the initiating speech, the delay time must be cut to the minimum required for proper sequencing. The adjustment of timing then becomes a matter of accuracy that cannot be attained without the employment of some method of checking having a capability beyond that of any of the five senses.

In making the timing graphs that were a part of the previous article, a Tektronix 535 scope was

In an earlier QST article, the author pointed out the importance of operating change-over relays in proper sequence to avoid unnecessary noise in the receiver and arcing at the antenna-relay contacts. If one is to arrive at the minimum delay intervals required for fast VOX operation, some method of checking the timing is an invaluable aid. The latter is the subject of this article.

used. This scope has a long-persistence screen and a sweep whose speed is accurately calibrated. With this scope and a few resistors, a good check of the relays in the adapter was obtained.

However, the number of amateurs who have Tektronix 535s at their disposal must be quite low. So it was decided to see what could be done with an instrument which is more common in amateur stations — the v.t.v.m. Using the test circuit to be described, the period of time between the closure of a relay contact, after bounce has stopped, and the time when the next relay starts to operate can be measured. This is the critical period to be checked to make sure that proper sequencing is obtained.

Test Circuit

Fig. 1 shows the test circuit connected to the relays in the unenergized, or listening, condition. The test circuit, as shown, is connected so as to

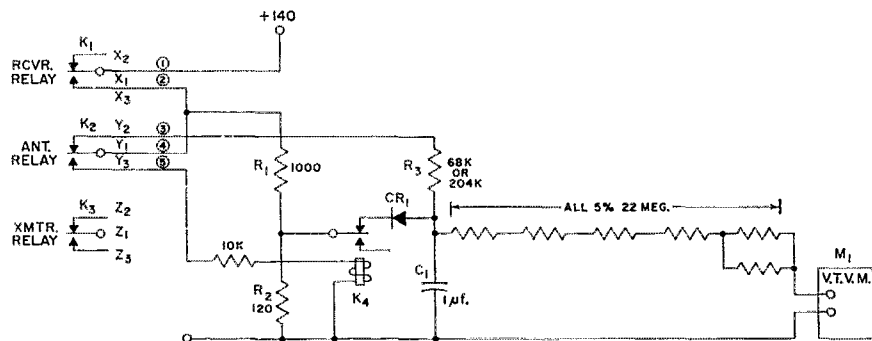
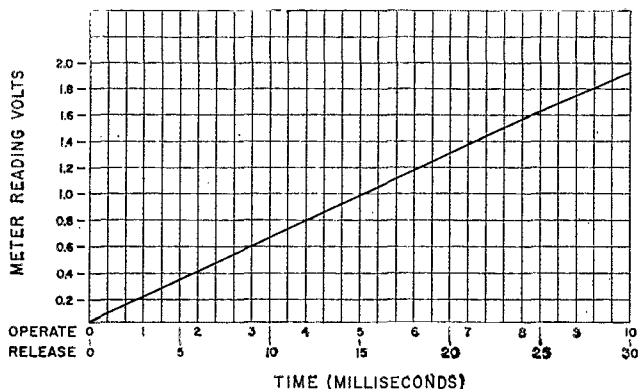


Fig. 1—Circuit used in testing relay sequencing. Resistances are in ohms, and resistors 1/2 watt unless indicated otherwise below.

- C₁—1- μ f. 200-volt paper, 10 per cent.
- CR₁—Silicon diode: 360 p.i.v., 200 ma. (Sarkes-Tarzan K-200).
- K₁, K₂, K₃—Relays under test (see Footnote 1).
- K₄—S.p.d.t. 6000-ohm coil (Sigma 11F-6000G/SIL).

- M₁—Conventional v.t.v.m., 11-megohm input.
- R₁—20 watts.
- R₂—2 watts.
- R₃—5 per cent (see text).

Fig. 2—Graph showing the relation between relay-functioning times using the circuit values of Fig. 1. The upper time scale applies when R_3 is 68K, and is used in checking the "operate" time. The lower scale applies when R_3 is 204K, and is used when checking "release" time. See text.



measure the period of time between the complete and solid transfer of the receiver-relay contact (X_1 of K_1) and the start of the antenna-relay contact (Y_1 of K_2) movement. The period to be measured corresponds to the time between the instant that contact X_1 arrives at the X_3 contact and stops bouncing, and the instant that contact Y_1 leaves contact Y_2 .

A time measurement occurs as follows: When contact X_1 reaches X_3 , 140 volts through contacts Y_1 , Y_2 and the timing resistor R_3 starts to charge C_1 , the timing capacitor. C_1 will charge until K_2 operates and Y_1 breaks contact with Y_2 . The voltage which appears across C_1 during this period is a function of the period of time which we want to measure. The period of time which this voltage represents can be calculated, since the charging voltage of 140 volts, the value of R_3 , and the value of C_1 are all known.

Eliminating Effects of Bounce

The unfortunate fact that X_1 bounces when it makes contact with X_3 complicates an otherwise simple measurement. The period of time we want to measure starts when X_1 stops bouncing. The purpose of diode CR_1 is to discharge any voltage on C_1 that accumulates while X_1 is still bouncing. To understand how CR_1 does this, note that when 140 volts is applied to R_3 and C_1 , a bias is also applied to CR_1 through the voltage divider R_1 - R_2 . This bias prevents conduction of CR_1 , except for an unimportant leakage current. Now if X_1 should bounce even for a few tenths of a millisecond, the bias will be removed from CR_1 and C_1 will now be discharged through CR_1 - R_2 . (C_1 will discharge to about 0.5 volt, which is the threshold voltage of CR_1). The fact that CR_1 will not completely discharge C_1 makes the measured timing periods just slightly longer than the actual value, but this inaccuracy is absorbed in the tolerances allowed for R_3 and C_1 .

K_4 is necessary because the leakage through CR_1 , even when the latter is biased off, is large enough to affect the voltage on C_1 during the period of time required to read the voltage on the v.t.v.m. K_4 opens the circuit between C_1 and CR_1 (via R_2) when Y_1 makes contact with Y_3 .

Time Calculation

The period of time which the voltage on C_1 represents is calculated by the equation

$$t = -2.30258 \log_{10} \left(\frac{140 - 10e}{140} \right) R_3 C_1,$$

where

- t = time in seconds
- e = v.t.v.m. reading
- $R_3 = (0.068) (10^6)$ ohms (for 10 ms. timing) or
- $= (3) (0.068) (10^6)$ ohms (for 30 ms. timing)
- $C_1 = (1) (10^{-6})$ farads.

Fig. 2 is a graph of time (t) plotted against the v.t.v.m. reading, using the values shown in Fig. 1. Two time scales are shown. The 10-millisecond time scale is for use when making relay operating-time measurements.¹ For these measurements R_3 should be 68K ohms. The 30-millisecond time measurement is for timing the release periods,¹ and three resistors each having 68K ohms are used in series for R_3 .

The resistors associated with the v.t.v.m. give a 10:1 voltage step-down for the conventional meter which has an input impedance of 11 megohms when the one-megohm probe isolating resistor is included. The voltage plotted in Fig. 2 is for the actual reading using this divider.

In measuring the operating-time difference between K_2 and K_3 , connections 1 and 2 go to Y ; and Y_3 , and 3, 4 and 5 go to Z_2 , Z_1 , and Z_3 , respectively. In measuring the release time between K_3 and K_2 , connections 1 and 2 should go to Z_1 and Z_2 , while connections 3, 4, and 5 should go to Y_3 , Y_1 , and Y_2 , respectively. In checking the release time between K_2 and K_1 , connections 1 and 2 should go to Y_1 and Y_2 , while connections 3, 4, and 5 go to X_3 , X_1 , and X_2 , respectively.

In checking the release times, it should be pointed out, the timing capacitor will receive an initial charge if the 140 volts is applied to the circuit before the relays are energized to set them for a release measurement. Either the relays should be energized before applying the 140 volts, or the timing capacitor should be shorted to discharge it after the relays have been energized, just before making a measurement on release time.

The power supply used to operate the relays is the source of the 140-volt test voltage. Since this is a transformerless type of supply, care should be used during the test to be sure that the case of the v.t.v.m. does not become hot with respect to ground. Proper polarizing of the a.c. power plug will solve this problem. QST

Some Applications of the Semiconductor Diode

Simplified Keying and Control Circuits

BY JAMES G. LEE,* W6VAT

ANYONE who scans literature in the electronic field soon becomes aware of the rate at which new uses are being found for semiconductors. Their small size and weight, low operating temperatures and freedom from the need for a filament supply make them attractive in a multitude of applications. Particularly when modifications are to be made in a piece of existing gear, it may prove worthwhile to consider the possibility of substituting semiconductors for vacuum tubes, since they do not require the cutting of new socket holes and in other ways often facilitate a job that would otherwise be impossible to accomplish.

One example of the many ways in which advantage may be taken of these features is the combined differential keyer and automatic power-

control circuit shown in Fig. 1. The differential keying system (A) is based on a circuit described a few years ago by W5JXM.¹ In this instance, one of the vacuum-tube triode sections has been replaced with a 1N91 junction rectifier, CR₁, while the v.t. triode section it replaces has been put to use in the power-control system (B).

With the key open, bias on V_{1A} is adjusted by means of R₂ so that V_{1A} draws plate current through R₃ to cause a voltage drop across this resistor sufficient to cut off the oscillator. Capacitor C₁ in the amplifier grid circuit charges to full supply voltage which is adequate to cut off the amplifier tube.

When the key is closed, current from the supply flows through R₃, all but a small portion of it via CR₁. This increases the drop across R₃ sufficiently to cut off V_{1A}, the drop across R₂ disappears, and the oscillator is turned on. R₂ is now merely a part of the oscillator grid leak. Activation of the amplifier is delayed because C₁ must discharge through R₅.

At the instant of opening the key, C₁ will start to charge, the principal charging path at this instant being R₃, CR₁ and R₅. The charging current is in such a direction as to tend to maintain cutoff on V_{1A}. However, as the voltage across C₁ rises toward the supply value, the charging current will decrease and V_{1A} will start to draw plate current which, of course, flows through the cathode resistor R₃. This develops a voltage drop across R₃ which is in opposition to the voltage charging C₁. However, CR₁ isolates the charging circuit from this opposing voltage to the extent that after a point in the charging cycle is reached where the voltage across R₃ exceeds the voltage across R₄, all charging current will flow through R₄. Prior to this, charging current will flow in the two parallel branches in inverse proportion to their effective resistances. (The effective resistance of the CR₁-R₃ branch includes the effect of the opposing voltage due to V_{1A} cathode current.) By suitable adjustment of R₁, the proper delay between amplifier cutoff and oscillator cutoff may be obtained.

Control Circuit

Another interesting application of the semiconductor diode is in the power-control circuit of Fig. 1B. Assuming C₂ to be charged to a voltage that will cut off V_{1B} with the key open, C₂ will be discharged immediately upon closing the key, the discharge current flowing in such a

¹ Puckett, "De Luxe Keying Without Relays," QST, September, 1953.

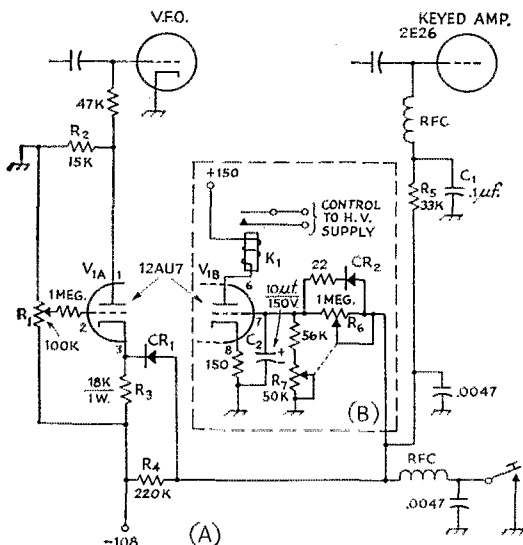


Fig. 1—Circuit of W6VAT's differential keying and control circuit. Capacitances are in μf .; resistances in ohms. Resistors are $\frac{1}{2}$ watt unless indicated otherwise.

C₁—Paper or ceramic.

C₂—Electrolytic.

CR₁—1N91 germanium rectifier (G.E., Sylvania).

CR₂—Silicon diode, 10 megohms or more back resistance (Hughes Aircraft HR10211).

K₁—10,000-ohm d.c. relay (Potter & Brumfield type LM).

R₁—100,000-ohm control.

R₂, R₃, R₄, R₅—See text.

R₆—1-megohm control.

R₇—50,000-ohm control.

V₁—See text.

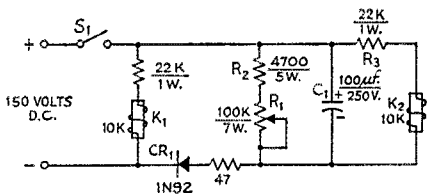


Fig. 2—Delay control circuit. K_1 operates instantly on both make and break. K_2 operates instantly on make, but the delay on break may be adjusted by R_1 . Resistance values are in ohms.

C_1 —100- μ f. 250-volt electrolytic.
 CR_1 —G.E. 1N92 germanium junction diode.
 K_1, K_2 —10,000-ohm d.c. relay (Potter & Brumfield type LM).
 R_1 —100,000-ohm 7-watt wire-wound control (Mallory E100MP).
 R_2, R_3 —See text.
 S_1 —See text.

direction that CR_2 is conductive. The power relay therefore operates immediately. Upon opening the key, however, C_2 must charge through R_6 , since the charging current is in such a direction that CR_2 will not conduct. Therefore, the key must remain open for a certain length of time before K_1 is de-energized. In this instance, CR_2 must have a back resistance high compared to the value of the shunting resistance R_6 . The delay time may be adjusted over a wide range by means of R_6 . Since this adjustment will also affect the voltage to which C_2 will ultimately charge, R_7 is used to compensate for this. With R_6 and R_7 ganged to a single control, the capacitor voltage will remain more or less constant with adjustment of the time delay.

Simple Delay Circuit

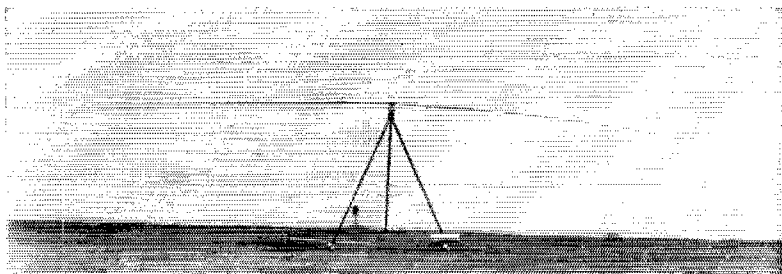
Another circuit for which many uses may be found is shown in Fig. 2. In this circuit, both relays will be energized immediately when the switch is closed. However, upon opening the switch, K_1 will be de-energized immediately, but

K_2 will not release immediately because C_1 must discharge through R_1 and R_2 (with R_3 and the resistance of K_2 in parallel). The discharge current of C_1 flows in such a direction that CR_1 will not conduct, and therefore K_1 is isolated from the delay circuit. The delay is adjustable from about one-half second to three seconds. If S_1 is one pole of a keying relay, K_1 may be used for muting the receiver in a break-in system, while K_2 may be used for controlling the power supply.

There are many other ways in which the crystal diode may be used, one of the more recent examples being the differential keying system described by W2HUG² in *QST* for April, 1959. And don't overlook the possibility of applying these devices in other circuits than those designed for keying and control. Their characteristics make them very useful in almost any circuit of the "go-no-go" type. QST

² Reich, "Diode Time-Sequence Keying for the DX-100," *QST*, April, 1959.

The "Brief-Case" portable antenna with sections extended.



A Brief-Case Portable Antenna

Loaded Dipoles for 80 Through 10 Meters

BY JO EMMETT JENNINGS,* W6EI

MANY books and articles have been written on just as many types of antennas for portable use. The answer to the need for a truly portable antenna having wide frequency capabilities and being very small was not found in conventional designs. Although the whip antenna as used in mobile equipment has done a remark-

ably fine job, it still does not lend itself to truly portable operation such as in hotels, in the rural areas, or in areas where a vehicle is not available. The antenna to be described fills the need for this type of service.

Loss Factors

The design for this radiator (see photographs and Fig. 1) does not follow the general pattern.

*970 McLaughlin Ave., San Jose, Calif.

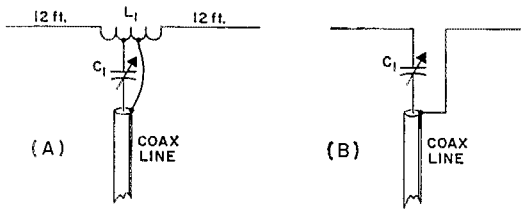


Fig. 1—The loaded arrangement shown at A is used on 80, 40 and 20 meters. The loading coils, L_1 , for all of these bands are wound with No. 12 or 14 wire, 4 turns per inch. The 80-meter coil has 80 turns, 3 inches in diameter (two full lengths Air Dux type 2404T), the 40-meter coil has 40 turns, 2½ inches in diameter (one full length Air Dux type 2004T), and the 20-meter coil has 10 turns, 2 inches in diameter (Air Dux type 1604T). In all cases, the outer conductor of the 50-ohm coax line is connected to the center of the coil. The capacitor C_1 (a 100- μ f. air or vacuum unit) is tapped on at 8 turns for 80 meters, 4 turns for 40 meters and 2 turns for 20 meters from the center. Loading coils are not used on 10 and 15 meters, the capacitor C_1 serving as a matching capacitor.

Although a radiator with the center loading inductance was not recommended as being satisfactory, the first model made with an open loading coil proved to be very effective, and steps were taken to dress up the unit by putting on a plastic housing as well as a plug-in mounting for each coil. After construction was completed, accompanied by an increase in eye appeal, the antenna was connected to the same exciter, whereupon an attempt was made to establish contact with other stations. The results were most disappointing. The few stations hearing the signal complained of an extremely weak signal, while others couldn't hear the signal at all. The revision was discarded in favor of the original open design. Tests were carried on with the coil

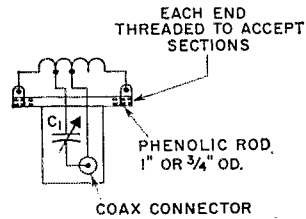
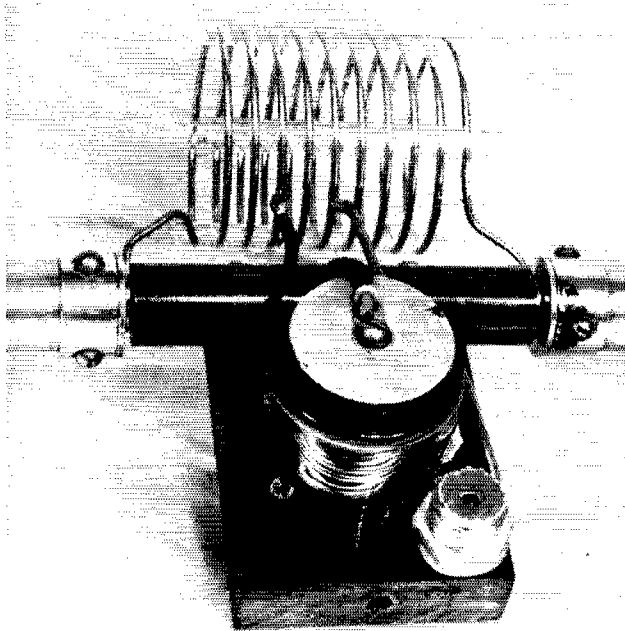


Fig. 2—Sketch showing details of the antenna coupling unit. One of these units is provided for each band, except in the case of 10 and 15 meters, where the coil is omitted and the same unit is used for both bands with the connections shown in Fig. 1B.

in its original condition to assure us that all was working as well as before. From these experiences it was clear as to what had happened. Loss in efficiency was attributed to the capacitive loading of the enclosure and mounting. It also became evident that the loading coil was the critical component in the system. The loading coil should be free from other objects, either conductors or dielectrics. Loading capacitance from end to end was also important, as was the capacitance between turns. If such an antenna is to function effectively, the ideal condition would indicate the use of a large inductor with wide spacing between turns and as long as possible. This latest bit of information explains why many antennas have not been satisfactory when the loading coils used in short versions of an antenna have been accompanied by external or internal capacitive loading.

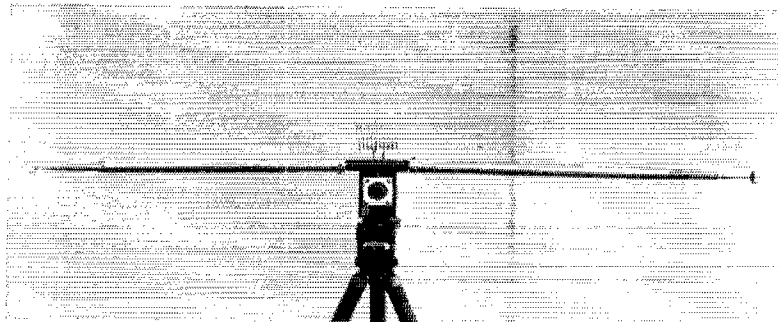
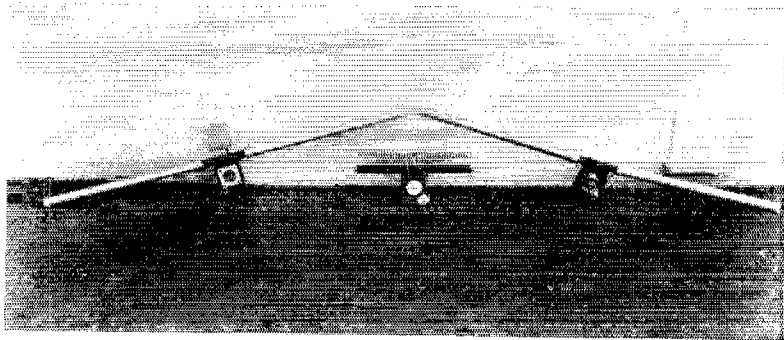
Adjustment

In the tuning adjustment, a first requirement is that the antenna be in exact resonance at the



Close-up view of the 20-meter assembly.

Antenna tuning units with and without the telescoping antenna units attached. The units, from left to right, are for 20 meters, 40 meters and 10/15 meters.



The antenna sections collapse into 15-inch lengths. This view shows the 20-meter tuning unit in place.

transmitter frequency if a low s.w.r. is desired. Also, a small capacitor is used in series with the center conductor of the coax line. As can be noted in the diagram, the shield of the coax is firmly grounded to the center of the inductor, while the center conductor of the coax connects through the series capacitor to a tap on the coil. The position of this tap is not critical and generally two or more turns are employed, depending upon the frequency. The lower frequencies, of course, require more turns than the higher frequencies. The series capacitor is adjusted to bring the s.w.r. to its lowest point. After a few attempts at tuning, the operator will find it simple and fast to make adjustments on any frequency, since tuning procedures are the same for each frequency. It is very common to get minimum readings where the meter will not move on the reflected power side, but will show full power in the forward position.

Antenna Sections and Capacitor


The sections of this particular antenna were taken from surplus equipment and bear the designation AN29. They are made of aluminum and collapse down to 15-inch length. Extended they are approximately 12 feet long. Our models use a small adjustable vacuum capacitor known as the GSLA 120 (Jennings), having a maximum capacitance of 120 μf . For those not having such a capacitor available (and probably no one else does), a small air variable capacitor having a maximum rating of 300 to 400 volts will work very well in this service. Approximately 80 μf is required for tuning. We have examined a collapsible whip antenna made by Kaar Engineering in Palo Alto, which is much stronger than the

AN29, but considerably heavier. It extends to about 15 feet and is available, we understand, in Palo Alto.

Various insulating materials may be used to support the antenna inductor assembly. In fact, the voltages developed on the higher frequencies are extremely low, but as the frequency decreases the voltage obviously will increase quite rapidly. We have operated these antennas up through 40 meters, and although they will operate on 80, much more care and skill is required in the tune-up. The Q on this frequency becomes much higher and with it a much narrower frequency range is permissible.

Operation

After using a portable antenna inside as well as outside of buildings, and at various locations, with different operators making the adjustment, this method seems to present a practical and interesting approach to portable antennas for those who cannot take the time, or tolerate the weight or space required for conventional jobs. One of the big advantages, of course, is that no ground is required on this system and, should the operator be on top of a building he can, in a few minutes, set up to operate a transmitter and compete with many other stations on the air, with satisfactory results as compared to conventional stationary equipment. It is believed that an antenna could conceivably be used outside of a steel building and produce a curtain effect. Someone may find this out and report later as to results.

It is actually a pleasure to use a brief-case portable. I have worked across the continent as well as to the Islands with a 100-watt exciter. 

• Recent Equipment —

National NC-270 Receiver



ALL too often in the past, receivers which cover all amateur bands through 54 Mc. have been deficient in image rejection, stability, sensitivity, tuning rate, and freedom from hum modulation on 6 meters. Double conversion, improved tubes and components, and the tendency toward limited-coverage receivers have combined to bring usable reception on 50 Mc. within the realm of practicality for the receiver designer. This is not to say that all receivers that make a stab at tuning the 6-meter band do it in an acceptable manner, but several models now on the market do. The NC-270 is certainly one of these.

The new "Cosmic Blue" National NC-270 is a double-conversion ham-band receiver that not only tunes the usual 80- through 10-meter range, but also includes the popular 6-meter band. It is housed in a blue-with-red-trim cabinet that measures only 8 $\frac{3}{8}$ inches high, 15 $\frac{3}{8}$ inches wide and 9 inches deep. At the base of the cabinet is a unique "Flip Foot" device which swings out from under the base and tilts up the front of the receiver. You can tuck the "foot" back under the cabinet and the set then rests in a flat position. The receiver also features a patented filter using ferrite-core coils, along with a more conventional T-notch circuit. Together these provide a degree of selectivity which should fit the needs of c.w., sideband and a.m. enthusiasts.

The block diagram in Fig. 1 shows the lineup of the receiver, which is designed for low-impedance unbalanced input on all bands. A 100-kc. crystal calibrator, V_{8A} , which may be turned on or off from the front panel, is connected to the antenna input circuit. Signals from the antenna are first amplified in the 6BZ6 r.f. amplifier, V_1 .

Next, they are converted to the first i.f. of 2215 kc. in the first converter, V_2 , a 6BE6. The oscillator, which is above the signal frequency by 2215 kc. on all bands except six meters, contains temperature compensating components for stability. All tuning, including that of the r.f. amplifier, first mixer and first conversion oscillator, is done with the single main-tuning control, which is a large knob centered on the NC-270 panel. The knob's rotation is stepped down in a 12-to-1 ratio with a rim pinch drive. This drive in turn moves the three-gang tuning capacitor. The tuning mechanism is also string-coupled to the pointer on the slide-rule dial, which is calibrated for the six amateur bands. The actual tuning range of each band is 3.5 to 4.0 Mc., 7.0 to 7.3 Mc., 14.0 to 14.4 Mc., 21.0 to 21.5 Mc., 28.0 to 29.7 Mc., and 50.0 to 54.0 Mc.

The 2215-kc. signal from V_2 is converted to the second i.f. of 230 kc. in the crystal-controlled 6BE6 second converter, V_3 . From the second converter, the 230-kc. signal is coupled into the filter, FL_1 , mentioned earlier. A simplified circuit of this filter, which consists mainly of two tuned circuits, Z_1 and Z_2 , is shown in Fig. 2. The inductors in these circuits are constructed of special materials which give them extremely high Q s — in the order of 500 at 230 kc. A front-panel selectivity switch, S_1 , controls the coupling between these two tuned circuits (S_{1B}) and also switches in capacitance to change their resonant frequencies (S_{1A} and S_{1C}). This gives stepped tuning through the pass band for convenient upper- or lower-sideband selection and, in addition, gives the following degrees of selectivity: 600 cycles, 2.5 kc., 3.0 kc. and 5.0 kc. at 6 db. down.

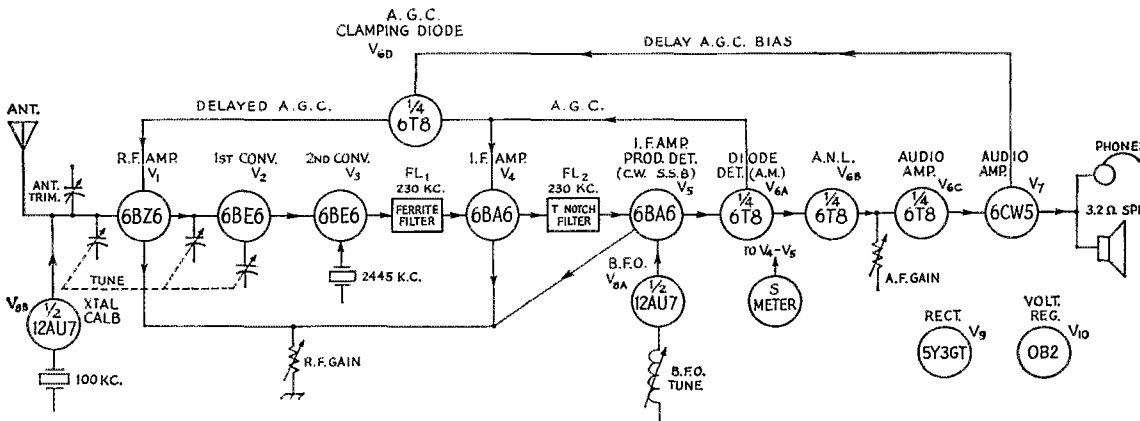


Fig. 1—Block diagram of the NC-270 receiver.

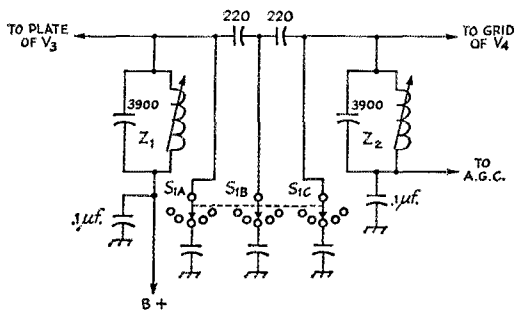


Fig. 2—The 230-kc. filter, composed primarily of two tuned circuits, provides four steps of selectivity and instant sideband selection in s.s.b. reception. Unless otherwise indicated, all capacitances are in μmf .

The sideband switch mentioned in the caption for Fig. 2 is possible only in the 2.5-kc. selectivity position.

After leaving the filter, the 230-kc. signal is amplified in a 6BA6 i.f. amplifier, V_4 , and is fed into a T-notch filter, FL_2 . This circuit has its familiar NOTCH and DEPTH controls accessible on the front panel. When in the a.m. mode, the output from FL_2 is amplified in a second i.f. amplifier, V_5 , and then demodulated in a diode detector, V_{6A} . However, when in the c.w. or s.s.b. mode V_5 , a 6BA6 pentode, functions as a pentode product detector with oscillator injection furnished by the b.f.o., V_{8A} . The b.f.o. is automatically switched on when the mode switch is turned to s.s.b./c.w.

An S meter is part of the circuit of V_4 and V_5 and is calibrated in the usual S units. Although the instruction manual states that a 50- μv . signal will give an S9 meter reading, the model we had registered an S9 (on both 28 and 50 Mc.) with a much smaller signal.

A.g.c. voltage is applied to the i.f. amplifier, V_4 , and the r.f. amplifier, V_1 . However, in the case of the r.f. amplifier, an a.g.c. clamping diode, V_{6D} , is used to give a delayed a.g.c. action. Positive bias, supplied from the cathode resistor of audio amplifier V_7 , prevents the clamping diode, V_{6D} , from conducting and, with the absence of a.g.c. voltage, the r.f. amplifier runs wide open. However, when sufficient a.g.c. voltage is developed to overcome the positive bias, the diode will conduct and the a.g.c. voltage will be applied to the r.f. amplifier. This allows the amplifier to work at maximum gain under weak-signal conditions but with a.g.c. protection under strong-signal conditions.

Following the a.m. detector, V_{6A} , is another diode, V_{6B} , which functions as an automatic noise limiter. This limiter can be turned on and off from the front panel by means of the mode switch.

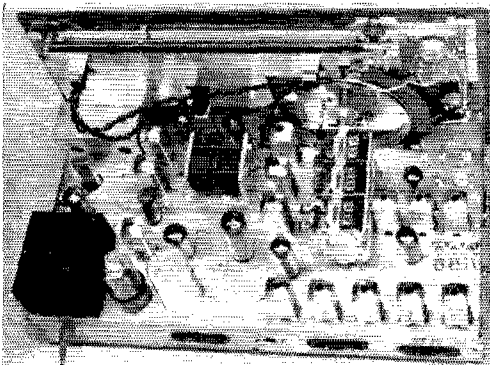
Signals from either the a.m. or c.w./s.s.b. detector are amplified in two stages of audio amplification, V_{6C} and V_7 . An audio gain control is located in the grid circuit of the first audio amplifier. Maximum audio output is rated at 3 watts, or at about 1.5 watts with 10 per cent distortion.

The NC-270 power supply delivers 105 volts regulated for the first converter and b.f.o., about 145 volts for the remaining stages, and the necessary heater voltages for the tubes. Power requirements are 105 to 125 volts, 50-60 cycles, 75 watts.

Front-panel controls on the receiver include an R.F. GAIN control, DEPTH and NOTCH controls (for adjusting the T-notch filter), B.F.O. pitch, ANTENNA trimmer, STANDBY/RECEIVE switch (which silences the receiver during transmit and has a spare set of contacts for controlling an external circuit or relay), earphone jack (which silences the speaker when an earphone is inserted), crystal CALIBRATOR on-off switch, and the dial SET control, which provides for lateral motion of the entire dial scale to bring the tuning pointer and calibration mark directly in line. On the rear of the chassis are the line cord, terminals which connect to the panel standby/receive switch, S-meter adjustment screw, 3.2-ohm speaker terminals, and terminal strip and phono fitting for connecting the antenna.

Performance on 6 Meters

From on-the-air use and laboratory tests, the performance of the 270 on 50 Mc. shapes up well. With the conversion frequencies used, the image responses are from signals 4430 kc. below the indicated dial settings. This separation is enough to keep amateur images out of the band, but a strong local station between 45.57 and 49.57 Mc. might ride through in the band, even with the NC-270's rated 30-db. image rejection figure. Images can be reduced greatly by the addition of a low-pass filter, or even a simple antenna-coupler circuit ahead of the receiver. The image in the second mixer is 460 kc. below the dial setting, but as it is 57 db. down, it will cause no trouble unless there is a service in the 49- to 50-Mc. region very close by. (Rejection of com-



Top view of the National NC-270. The r.f. input coils are housed in the square cans located along the right edge of the chassis in the foreground. The dark cylindrical object in the center of the photograph and to the left of the 3-gang tuning capacitor is the special ferrite-cored filter. Power-supply components are grouped at the left. Antenna input terminals and coaxial fitting are at the right rear of the chassis, and to their left are the speaker terminals, S-meter adjustment screw, external-relay control terminals and line cord.

parable images on the 10-meter range of the NC-270 increases to 37 and 70 db., respectively.)

Stability, both mechanical and electrical, is exceptional in the 270, and the sensitivity on 50 Mc. is more than adequate. Tuning rate on six meters is probably as good as can be obtained on a range that covers four megacycles. The c.w. note, while not absolutely T9, is good enough to satisfy all but the most critical c.w. men. There is no audible hum modulation on phone signals.

The NC-270 works well enough on 50 Mc. to encourage a v.h.f. enthusiast to design his converters for the higher bands so that they will work into the 6-meter range rather than into lower bands. This would give him full coverage of the 144-Mc. band and a four-megacycle spread in any of the bands from 220 Mc. up that he may care to explore, and he can skip the construction of a 50-Mc. job. The NC-270 should do all he'll need in that range. — E. P. T./E. L. C.

The Heath Model VHF-1 Transmitter



ONCE upon a time, v.h.f. men had to build their own gear from scratch; there wasn't any other way to enter the world above 50 Mc. Surplus and, more recently, the marketing of a certain one-package station changed all that, of course. Those interested mostly in talking bought transceivers and were happy. Technically savvy fellows continued to roll their own. With a few exceptions the great swing to kit construction seemed to bypass v.h.f., and what units were put out in kit form were usually also available ready-made. Many of us felt that v.h.f. gear was just too critical to put on a "yellow wire to pin 7 of V_{II} (NS)" basis.

The number of Heath Model VHF-1 Senecas one hears on 6 and 2 these days (you can't miss identifying their controlled-carrier phone) would seem to prove that a fellow can put together a successful medium-power v.h.f. transmitter on the kitchen table. The Seneca is more than that really, for it has a few wrinkles most home con-

structors would think twice about including. Everything — r.f. section, power, audio, metering circuits and even a v.f.o. — is built into one $16\frac{5}{8} \times 10\frac{1}{8} \times 10$ -inch deep package. Such construction isn't the usual thing at v.h.f., nor is one-knob band switching between 50 and 144 Mc., at least not in rigs that can run 140 watts c.w. input on 6 and 110 watts on 2.

Circuit Information

The v.f.o. is an electron-coupled Clapp using a 6AU6, V_1 in Fig. 1. The oscillator has two separate tuning ranges, 8.333–9.000 and 8.000–8.222 Mc., for the 6- and 2-meter bands. A single coil wound on a heavy ceramic slug-tuned form is used for both ranges. The tuning capacitor is a dual unit with dissimilar sections, and each section is shunted with fixed and variable padding capacitors. One of these parallel combinations is switched in series with the coil for 6 meters, and the other is used on 2. The output of the v.f.o.

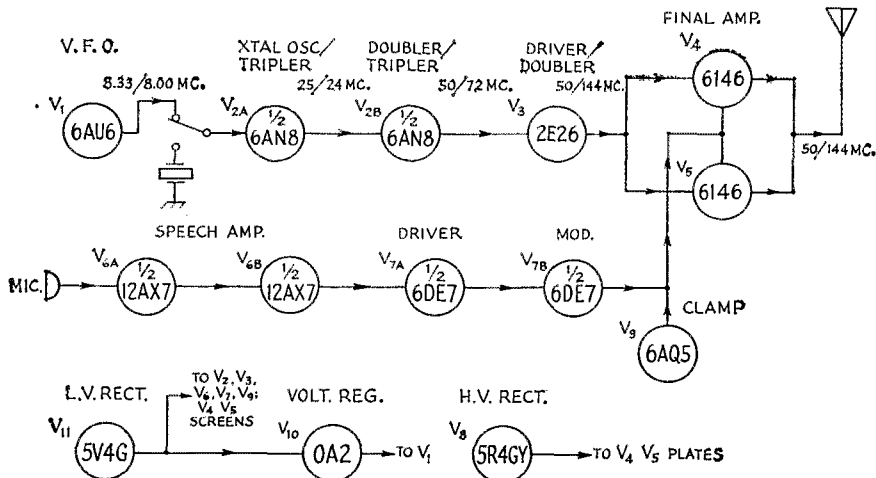


Fig. 1—Block diagram of the Heath Seneca transmitter.

is also switched between two slug-tuned coils. A 47-ohm resistor in series with these coils lowers their Q s enough so that v.f.o. output is fairly constant across the band.

To minimize temperature variations the v.f.o. is built in a separate chassis with the tube outside and the chassis itself mounted as far as possible from other heat sources. A negative-temperature-coefficient capacitor mounted on the grid coil helps compensate for temperature changes that do occur.

The next two stages are mounted in another small subchassis and connected to the v.f.o. output with a short piece of coax. V_{2A} , the pentode section of a 6AN8, triples the v.f.o. output to the 24-Mc. region or functions as a crystal oscillator/tripler. A five-position switch connects the v.f.o. or one of four crystal sockets to the V_{2A} grid and shorts out an r.f. choke in the cathode circuit when the stage is not supposed to oscillate.

The output of the oscillator/tripler is tuned by a panel-mounted capacitor and capacitance-coupled to the triode section of the 6AN8. This stage either doubles to 50 Mc. or, when the rig is working on 2 meters, triples to 72 Mc. Another band-switch section puts one of two plate coils across a second panel-mounted variable capacitor. Both 6AN8 sections are cathode-biased for protection in case excitation should fail.

The 50- or 72-Mc. output from the 6AN8 is capacitance-coupled through a length of coax to

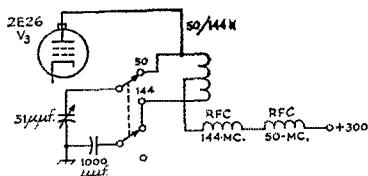


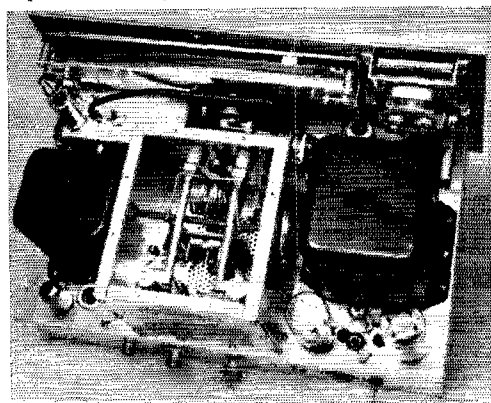
Fig. 2—The arrangement used to switch the 2E26 driver plate circuit from a parallel-tuned 50-Mc. tank to a series-tuned 144-Mc. one.

the grid compartment of the 2E26 driver. This stage is mounted in a compartment underneath the main chassis. The 2E26 works straight through on 50 Mc. or doubles from 72 to 144 Mc. Fig. 2 shows how one coil and capacitor are switched from a parallel-resonant tank for 50 Mc. to a series-tuned one for 144 Mc. Working straight through would give much more output than doubling, of course, so the band switch cuts the screen voltage in the 6-meter position to prevent damaging the final amplifier grids. The driver has cathode bias, also, to limit its no-drive plate current. C.w. keying is done in the 2E26 cathode circuit.

The push-pull 6146 amplifier grids are switched between self-resonant coils for 50 and 144 Mc. This is done by the same switch wafer that handles the driver plate circuit, and both grid coils are inductively coupled to the plate coil of the 2E26.

The 6146 plate band-switching system is similar in principle to the one used in the 6146 6- and 2-meter amplifier described in the 1955 through 1958 editions of the ARRL *Handbook*. Lengths of silver-plated $\frac{1}{4}$ -inch tubing function as leads to the 50-Mc. plate coil or as quarter-wave lines when the coil is shorted out. The shorting operation is performed by a special knife-type rotary switch which is also silver plated. Plate voltage is applied through a 6-meter r.f. choke to the center tap of the 6-meter coil, and the coil itself acts as a 2-meter r.f. choke. A single butterfly capacitor, connected plate-to-plate and mounted on an insulating board, tunes both bands. The swinging output link is a hairpin with a single turn coil in the middle and couples to both the quarter-wave lines and the 6-meter coil. This link can be adjusted from the panel via a cord and several pulleys, and a panel-operated loading capacitor is also provided.

Neutralizing 6146s on just one v.h.f. band is sometimes a task, and Heath has come up with a novel way of doing it simply on two bands. The self-resonant frequency of the 6146 is around 100 Mc., so 50 and 144 Mc. require different types of neutralization. At 50 Mc., cross neutralization (capacitance from each grid to the plate of the other tube) will do the trick. At 144 Mc., adding additional grid-plate capacitance to each tube will cancel the effect of screen lead inductance and stabilize the amplifier. How to get both? Just provide *two* wires running up alongside each tube where they can "see" the plate and connect the grids to either the crossed-over or non-crossed wires with another switch section!



Top view of the Seneca out of its cabinet. The meter, mounted behind the panel, is at the upper right, and the mechanism running the rest of the way across the panel is part of the v.f.o. dial and drive. Below it at the upper left is the v.f.o. subchassis. The length of coax connects it with the oscillator/multiplier subchassis below the meter. On the top surface of this subchassis are four crystal sockets. The enclosure near the middle of the main chassis houses the p.p. 6146 amplifier tubes and plate circuit. The tubes are at the lower end with the neutralizing switch and wires between them. The knife-type rotary band switch is at the opposite end of the plate lines. The pulleys and cord outside the amplifier enclosure allow the swinging link to be adjusted from the panel. The large black components are the power transformer (right) and h.v. filter choke. The audio tubes are at the lower left, and the rectifiers, VR and clamp tubes are to the right. On the rear apron are mike and output connectors, a ground post, the key jack and a socket for remote and relay control.

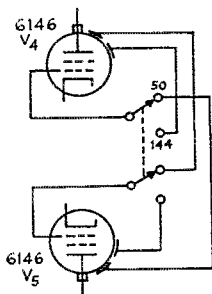


Fig. 3—The two-band neutralizing system. Curved lines represent lengths of solid wire which run up alongside the tube envelopes and couple capacitively to the plates.

The scheme works, too, and it proved quite simple to achieve good neutralization on both bands.

A 6AQ5 clamp tube, V_9 , is connected so as to draw heavy current through the 6146 screen-dropping resistor when excitation is removed from the final. This drops the screen voltage to a low value and protects the 6146s.

On phone, final-amplifier screen voltage is derived from the cathode circuit of the carrier control tube, V_{7B} , as shown in Fig. 4. V_{7B} is the section of the 6DE7 which has 7 watts plate dissipation. The lower-rated triode section is used as a direct-coupled driver. V_{7B} is biased sufficiently to limit its conduction (and the 6146 screen voltage) to a low value; this results in a low resting carrier level. When audio from the 12AX7 speech amplifier is applied to V_{7A} , the conduction of V_{7B} is varied in accordance with the average voice level. This gives the controlled-carrier effect, and at the same time the audio signal is superimposed on the screen voltage.

A single power transformer is used for both low- and high-voltage supplies. The l.v. supply delivers 300 volts at 125 ma. to the modulator and all r.f. stages except the final. A VR tube operating from this supply fixes the v.f.o. screen voltage at 150. The h.v. supply (choke input, 62.5 μf . of output capacitance) delivers 600 volts at up to 250 ma. for the 6146s.

The panel meter can be switched to measure (with suitable shunts and a multiplier) doubler/tripler grid current, driver grid current, final grid current, final plate current and final plate voltage. This is everything one needs to know to tune the rig up and measure power input to the final.

On-off, t.-r. and mode switching are handled with a single four-position function switch. The

positions are OFF, C.W., STANDBY and PHONE in that order, so that once the rig has warmed up with the switch on STANDBY, c.w. or phone operation can be selected by throwing the switch to the left or right. The 6146 screens are then connected either to a dropping resistor or the modulator, and 115 v. a.c. is applied to a relay which grounds both power-supply center taps.

A spring-loaded push-button spotting switch which turns on just the l.v. supply is also provided. This switch is handy for tuning up the rig through the driver plate circuit and for checking the v.f.o. frequency without putting the rig on the air. The same switch also grounds the driver cathode so that its function will be the same if an open key is in the keying jack.

The rear-mounted accessory socket provides 115 v. a.c. which can be used to actuate a receiver muting or antenna relay during transmissions. Two other terminals are shorted by the function switch in the Seneca on standby and opened when the switch is in the phone or c.w. positions. Shorting two more terminals puts the rig on the air for phone operation when the function switch is in that position.

Construction

The Seneca's 102-page manual is awe-inspiring at first, but getting through it is just a matter of following one step after another for 35 to 40 hours of construction time. The instructions are quite specific for the most part, but it pays to cross check with a diagram wherever possible. The exact lead lengths which are given for all connections should be especially helpful to the beginner. It doesn't pay to skip the couple of hours it takes to check the parts against the parts list; there probably won't be anything missing, but the experience helps one to reach unhesitatingly for a dual linkage plate or a pinion gear stop later on.

The first bit of actual construction is the v.f.o. subassembly. Wiring is a little tight, but parts are assembled on "L"- and "U"-shaped pieces which then go together to make a box, and this helps keep things out in the open. Heath was smart to have constructors start off with the v.f.o. while they were fresh and alert. Not only is it the most critical part of the rig, but it is practically inaccessible once all the subassemblies are fastened and wired together. For the latter reason,

SPEECH AMP.

DRIVER

MOD.

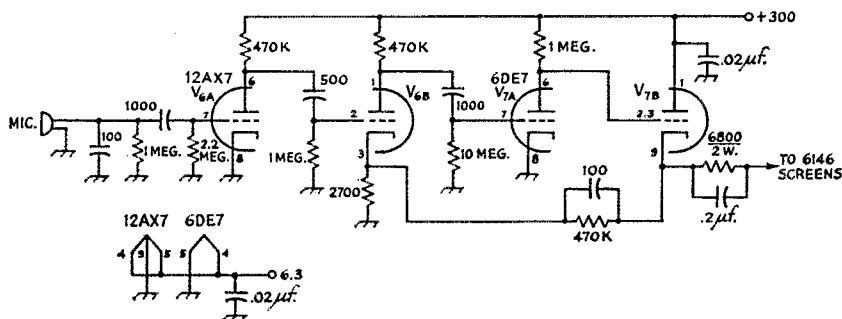


Fig. 4—The two-tube audio section used in the Seneca for controlled-carrier a.m. Resistances are in ohms; unless otherwise indicated, resistors are 1/2 watt and capacitances are in μf .

we suggest connecting filament and +B voltages to the v.f.o. as soon as it is done and checking it out then and there. If there are any faulty components or wiring errors, it will be *much* easier to correct them at this stage than later.

Next comes the multiplier subassembly which makes up into a small box much like the v.f.o. Following through with the subassembly technique, the builder then wires the driver mounting bracket and puts together the final amplifier housing. Then and only then does he start in on the main chassis. After the sockets and such are mounted, one wires the 6146 sockets and the audio section and power supply. We hit our first snag when the flexible coupling on the driver plate tuning capacitor failed to clear the bottom surface of the main chassis. This meant filing down the bakelite disk of the coupling until it rotated freely. Then the two forward set screws of the coupling had to be shortened (with a file) to clear the nut holding a spade lug to the driver housing.

Our other mechanical difficulty came while assembling the ingenious system of linkages which enables one knob to throw hand-switch sections scattered all over the Seneca. The 6-32 \times $\frac{3}{8}$ -inch screws just wouldn't catch on their nuts when the called-for lockwashers and plain washers were sandwiched together with the spacer, linkage plate and linkage arm. Perhaps this was because the washers called for in the parts list (and supplied in the kit) were $\frac{1}{2}$ -inch o.d., $\frac{5}{32}$ -inch i.d., while the linkage diagram specified No. 6 washers. Anyway, we could have substituted $\frac{1}{2}$ -inch screws, but it was Sunday and the stores were closed. Instead, we filed down the $\frac{1}{2}$ -inch spacers until the screws would catch.

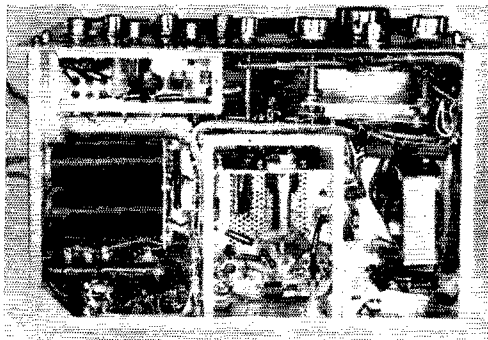
The v.f.o. dial and drive assembly is put together next. This goes smoothly until one gets to stringing the 50 $\frac{1}{2}$ -inch dial cord. At this point, make up the bent wire stringing tool and get off in a quiet corner with the tool, the dial cord and the v.f.o., and don't come out till you've mastered them all.

From then on the Seneca takes shape rapidly. The v.f.o. and multiplier subchassis and the meter are mounted on the panel, and one end of the elaborate wiring harness is used to hook them all together. Next, the panel and chassis are joined, the harness is led around the chassis and wired in at numerous points, and the rig is finished.

Adjustment and Calibration

The step-by-step adjustment procedure given in the Seneca manual is complete and easy to follow. If you have upper and lower band-edge crystals for 6 and 2 meters, you can use them to tune up the rig and save the v.f.o. calibration until last. Otherwise, start off by getting the v.f.o. on frequency. The manual tells how to do it using a frequency meter, a crystal calibrator or whatever 6- and 2-meter crystals are available. The table of fundamental vs. output frequencies comes in handy here.

Initial tune up is mostly a matter of seeing that



Bottom of the Seneca with shield covers removed. The 2E26 driver and its plate circuit are in the bottom center compartment along with the 6146 sockets and grid coils. The audio section and l.v. filter choke are at the lower right, and to the left are power-supply filters and bleeder resistors. Above them is the oscillator/multiplier subassembly. Visible to its right are a dial cord for tuning the 6146 plate capacitor and part of the elaborate band-switch linkage. That lengthy wiring harness comes ready to install.

the various tuned circuits cover all of the band or bands they're supposed to. If not, you stretch or squeeze the air-wound coils until they do. This wasn't necessary in our case, although we did have to move both 6146 grid coils slightly away from the driver plate coil to get optimum coupling.

The final is neutralized by coupling a grid-dip meter or indicating wavemeter to the 6146 plate circuit, applying drive and bending the neutralizing wires for minimum indication on the meter. This proved to be as simple as it sounds. Then all that remains is to put plate and screen voltages on the 6146s and practice tuning up the final, using a dummy load.

Operation

One thing about the Seneca which seems to impress users of home-brew v.h.f. gear (besides the handsome two-tone green packaging) is the ease with which one can change bands. It takes longer to change the antenna than it does to throw the band switch, retune the multipliers and driver and redip the final. At least that's true if you're on v.f.o. or have the crystal you want loaded in one of the four sockets. We thought till we tried it that changing crystals through the trap door in the top of the cabinet would be impossible. Actually, the operation is merely difficult, calling for long-nose pliers to position the rock and a blunt object to shove it in.

The Seneca v.f.o. will satisfy some and displease others. Those who want their 2-meter signals to sound like the better h.f. ones won't be satisfied with anything but crystal control or a heterodyning or VXO frequency shifter. Remember that an 8-Mc. signal must be multiplied six times to get to 50 Mc. and 18 times to get to 144, and you will see that getting an absolutely stable, buzz-free, f.m.-free signal from a conventional tuned-circuit v.f.o. is well-nigh

(Continued on page 154)

Communication on 52,000 Mc.

W2BXX and W2BXX/2 Work 500 Feet on Highest Frequency Yet Used by Amateurs

BY M. C. GALE,* K2VND

AT 2:50 P.M. EST, November 4, 1960, we copied the words, "According to late news Khrushchev is out of office — how copy now?" The "news" amazed us no more than the fact that we had done it. We had copied an unarranged message on 52,400 Mc. In the next twelve minutes, allowing 60 seconds for manual switching, we sent and received three messages altogether, at about 7 to 10 words per minute. Other means of communication were not used during the QSO: we copied all messages 100 per cent.

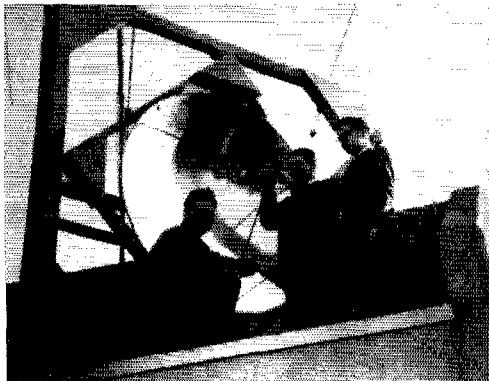
"We," in this case, were the Polytechnic Radio Club, W2BXX, situated in our own shack eight floors above street level at the Polytechnic Institute of Brooklyn, and W2BXX/2, on the sixth floor of Microwave Research Institute, about 500 feet away. (With the antennas used, this meant we were operating within the Fresnel region.) The frequencies used were 52,400 Mc. at W2BXX, and 51,500 Mc. at W2BXX/2.

Background

On July 27, 1958, Dr. A. H. Sharbaugh, W2UKL, and R. L. Watters, W2RDL, worked two-way (phone) at 50,000 Mc. over a distance of 150 feet.¹ In the fall of 1959, the Polytechnic Radio Club, W2BXX, under the skillful prodding of Profs. Charles A. Hachemeister and Saul W. Rosenthal, determined to extend the record both in frequency and in distance. The combined facilities of the Polytechnic Institute of Brooklyn and Microwave Research Institute were made available to the club. The first two problems were

* W2BXX, Polytechnic Institute of Brooklyn, 333 Jay St., Brooklyn 1, New York, N. Y.

¹ Sharbaugh and Watters, *The World Above 20,000 Megacycles*, May, 1959, QST.



The 5-foot parabolic reflector used for 50,000-Mc. communication at W2BXX. Workers are, left to right, John Anderson, David Zink, K2VOL, and Richard Barth, W2BWZ.

to get a signal on the air at MRI and to get a dish on top of the shack at W2BXX.

W2BXX "Fixed Portable"

The transmitting equipment was first set up on the fifth floor of MRI, with the antenna inside the room facing the window. (The window was open during all tests.) In the late spring of 1960, however, it was necessary to abandon the fifth-floor site and move the equipment up to the sixth floor. Dave Zink, K2VOL, and several of the other hams in the club lent an active hand in securing the equipment table firmly to the floor, so that it would be absolutely rigid during all tests, and in moving the equipment and setting it up. The wavelength used was so small (about 6 mm. or $\frac{1}{4}$ inch) that the slightest movement of the equipment would cause variations in the transmitted signal. By the end of June, 1960, the power supply, modulator, klystron, associated hardware and 3-foot (diameter) dish antenna were mounted firmly in place, and W2BXX/2 was on the air.

The Big Dish

Prof. Rosenthal had already procured a chrome-plated copper searchlight reflector, five feet in diameter and with a focal length of $25\frac{1}{2}$ inches, measured from the center of the dish to the focal point. It was now necessary to design and build a framework to support the dish on the roof of the shack, nine stories above street level, capable of withstanding heavy winds and at the same time permitting the dish to be moved up and down, and sideways, so that the dish could be precisely aimed at the other antenna. The writer was given the job of designing the wooden antenna-supporting structure. After the drawings had been made, Profs. Hachemeister and Rosenthal, who assisted throughout, arranged for needed materials. Within weeks, the lumber appeared in the PIB carpentry shop, and MRI gladly furnished hardware. Other expenses were paid by the Student Council.

The antenna support was built in the spring of 1960 by Fred Brenker, a school carpenter, with the willing assistance of the club members, and was carried to the roof for assembly. The hams then gave the structure two coats of gray paint, and in June the dish was carried over from MRI, skidded up to the roof, and bolted in place.

These dishes have been used as solar furnaces. We had to be careful, when working in front of the dish, not to get too close to the focus. The dish had to be protected from the weather, so a tarpaulin was used to cover it when not in use.

Horizontal or Vertical?

It was then found that although vertical polarization was used at MRI, the horn at the PIB end was horizontally polarized. K2VOL drilled the necessary holes in the rim of the dish at PIB (W2BXX) and rotated the tripod horn mount 90 degrees. With both antennas now vertically polarized (the long dimension of the waveguide and of the horn was vertical), it was possible to begin tests.

The Early Tests

At both locations, the horn was located at the focal point of the parabolic dish, facing it, so that a narrow pencil beam could be aimed from one dish to the other. At the W2BXX end, an E-H tuner was bolted to the horn, and a 1N34 crystal was connected to the tuner. An amplifier meter amplified the rectified square-wave output of the crystal diode. A surplus scope, donated by Barry Schindler (no call), was also used to display the 1000-cycle square-wave modulating signal directly.

The dish at W2BXX was aimed first optically, using a clear 200-watt bulb at the focal point (the image of the filament could be seen clearly on the other building), and then more accurately by observing the meter on the crystal amplifier while a signal was being sent from the other end. An inexpensive telescope, bolted to the frame on which the dish was mounted, was used to check alignment.

Successful one-way tests were made during the summer. K2VOL had to get the klystron operating properly at MRI (and sometimes this could take hours), then walk over to W2BXX and copy his own signal. He measured the path loss, plus transmitting-antenna insertion loss, and found it to be 8 to 9 db. This meant that the power at the receiving end was a little more than one tenth the power fed into the transmitting antenna. He also calculated the theoretical gain of the three-foot transmitting dish and found it to be 51 db. over an isotropic source, or approximately 48 to 49 db. over a dipole.

Several times during the summer other members of the club visited the shack and observed the crystal amplifier meter and the scope themselves. At one point, with all the attenuators at the transmitting end out, we read 100 volts on the meter. This meant that the received signal strength, at the detector, was approximately one millivolt! Considering that the rated output of the Raytheon QK295 reflex klystron used at MRI is 2 milliwatts (2 milliwatts peak power or 1 milliwatt average power using square-wave modulation), we were doing pretty well.

Two-Way Communication at Last!

In September and October, John Anderson (no call) assembled the setup used at W2BXX. Preliminary tests showed that though the klystrons were "identical," the one used at W2BXX/2 tuned best at 51,500 Mc., and the tube used at W2BXX delivered the most power at 52,400 Mc.

Tests conducted in October showed that two-



The other end of the 500-foot path, W2BXX/2. At the extreme left is the audio amplifier, atop the klystron power supply. The author is switching the antenna waveguide from transmitter to receiver. K2SFZ is at the key. Equipment shown includes speaker, monitor, tuned amplifier, crystal-bolometer-amplifier for tuning the klystron, blower, klystron and plumbing and dish.

way communication was possible. Since the klystron power supply and modulator weighed 200 pounds, it was not feasible to take it to the roof of the shack. The power supply was left on the roof of the eight-story building, and an 8-wire harness was run from the supply to the klystron and receiving equipment, located on the roof of the shack near the dish. Telephones in the shack and at W2BXX/2 at MRI provided liaison during the preliminary tests and immediately before the November 4 QSO.

The QSO

During the November 4 QSO, Dick Barth, W2BWZ, keyed the W2BXX transmitter, while John Anderson (no call) made the change-overs from transmit to receive between transmissions. Bob Reasenber, K2SFZ, keyed W2BXX/2, and K2VND switched the equipment during the 60 seconds (previously agreed on) between transmissions. A magic-tee directional coupler, which ideally acts like a t.r. switch at microwave frequencies, was tried during the tests and it was found that it introduced so much loss that the received signal was below the noise level. To minimize noise when receiving, the gain of the second amplifier at W2BXX/2 was set at a

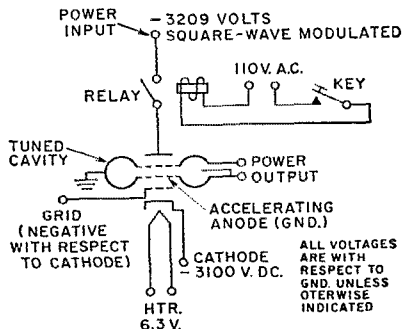


Fig. 1—Schematic diagram of the 50,000-Mc. klystron, showing voltages used at W2BXX/2. Beam (cathode) current was 19 to 20 ma.

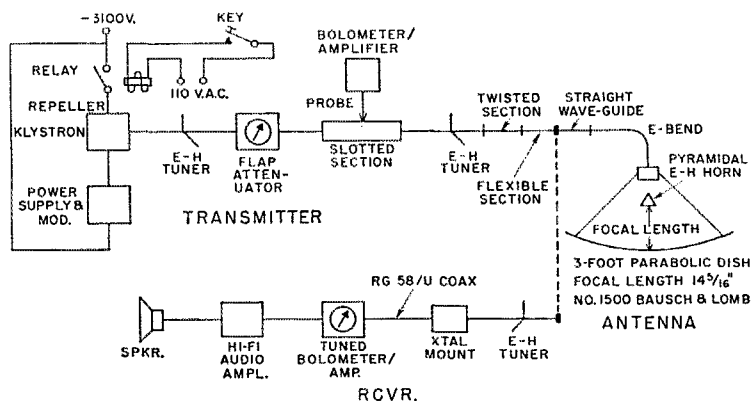


Fig. 2—Block diagram of W2BXX/2. Equipment at the fixed station was similar, except for the use of a 5-foot dish, and an isolation transformer for keying. Dashed line shows point where waveguide connection was made mechanically to either transmitter or receiver.

low value (approximately one fifth maximum) and the first-amplifier gain control was used to bring the signal up to the desired level. The messages were sent and received at 7 to 10 w.p.m., although speeds up to 20 w.p.m. were readable. Reception was a solid S9 at both ends.

Technical

Raytheon QJK295 reflex klystrons were for transmitting both ends. A reflex klystron is a microwave oscillator. A schematic diagram of the klystron is shown in Fig. 1. The repeller (or reflector) voltage was modulated by a 1000-cycle square-wave signal generated inside the power supply/modulator. The square-wave modulation was detected by a 1N34 crystal diode at the other end, and then amplified in a tuned amplifier and fed into a loudspeaker.

Because the two stations were only about 500 feet apart, noise was not a problem. Therefore, no noise-limiting filters had to be used ahead of the detector, and fairly wide frequency sniffs could be tolerated. The actual frequency drift during the tests was less than one part in one thousand, but at 50,000 Mc., this could mean a drift of as much as 50 Mc.

It is not difficult, then, to transmit a steady tone (1000 cycles). In order to send information, however, it was necessary to key the klystron. This was accomplished by breaking the line between the repeller and the power supply and inserting a key in series with a 110-volt relay. At W2BXX, a 1:1 isolation transformer was used between the relay and the key to prevent sparking at the key.

RG-98/U waveguide, operating in the TE_{10} mode, was used to couple the klystron to the pyramidal horn at the focal point of the reflector. E-H tuners were used in the line to insure maximum transmission of power to the antenna. In addition, an attenuator was used immediately after the klystron to prevent any reflected power from feeding back to the klystron oscillator. Its purpose is similar to that of a buffer stage in a v.f.o.-controlled transmitter, but it does not provide amplification. At W2BXX/2, a slotted section, a probe and an amplifier meter were used to tune the oscillator for maximum output.

The transmitter at W2BXX was pretuned at W2BXX/2, so that the probe was not needed.

Switching the antenna from transmitter to receiver was accomplished manually. Stout metal clips were used to hold the waveguide sections together at the break point, instead of the usual screws. Sixty seconds were allowed between transmissions for switching.

The receiver consisted of an E-H tuner, a crystal, coax, a tuned amplifier and a loudspeaker. At W2BXX/2, a hi-fi amplifier was used after the tuned amplifier.

Acknowledgment

The club members who participated in the project were: Dick Barth, W2BWZ, president; John Anderson, no call; Howie Blonder, K2OIX; Steve Fabricant, K2RDP; Dave Goldman, K2YOW; Ed Pearlman, K2YAE; Bob Reasenberg, K2SFZ; Fred Reed, K2RHG; Barry Schindler, no call; Dave Zink, K2VOL; and K2VND. The experiment would not have been possible without the help of Profs. Saul W. Rosenthal and Charles A. Hachemeister, and the school carpenters and others too numerous to mention.

QST

Strays

Remember that cute photograph on page 38 of December, 1960, QST? G. Ross Parsons, the Savannah Morning News photographer who snapped it, got his first exposure to amateur radio when he was assigned to cover the Field Day operations of the Savannah Amateur Radio Club. The "bug" bit him hard, he has become an active member of the Club, and is boning up for his own ticket!

.....

A new edition of the *Ham's Interpreter* is at hand, although its publisher (DL1CU, Box 585, Stuttgart, Germany) does not indicate the price to U. S. buyers. *The Ham's Interpreter* now enables you to carry on QSOs in nine languages — English, French, Spanish, Italian, German, Swedish, Finnish, Serbo-Croat, and Russian.

WØKQZ has done an excellent job in hiding a 1-kw. linear and s.s.b. exciter behind this 10½-inch rack panel. The limits of the uniform tuning ranges were based on a desire to cover the 10-meter band in one range.

New Horizons for Those Who Still Like To Roll Their Own



A Dead Art?

Who builds his own gear any more? Why, the parts alone would cost more than a complete manufactured rig. And look at all of the headaches!

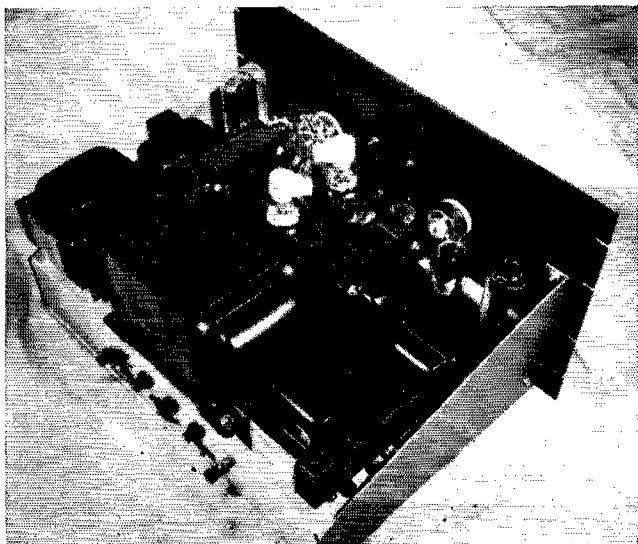
Strange as it may seem to the average operator-type ham, there still remains a sizable group who get more relaxation out of the hack saw and soldering iron than with the key or mike, and more satisfaction from a rig made by their own hands than a wallful of certificates. There is plenty of evidence to show that the do-it-yourself trend is not confined to patios and picnic tables and that the number of hams who do much of their own construction is on the increase again. Even the once-impregnable receiver field is once more being attacked with renewed fervor by those who feel that they can turn out a job that suits them better and at lower cost. And if you've been misled to believe that homebrewing is for Willie and his two-tube blooper, take a good look at the compact kilowatt s.s.b. masterpiece turned out by Harold Bourell, WØKQZ. It was built in what free time he could find outside his regular duties as Engineer-in-Charge at the FCC office in Kansas City, with the aid of little more than an electric drill, a hacksaw and a few files.

Circuit

Before delving into the constructional end, which includes several ingenious innovations, let's look at the block diagram of Fig. 1. The carrier from a push-pull 450-kc. oscillator is suppressed in the bridge-type balanced modulator using four 1N65s. The desired sideband passes through an 8-crystal lattice filter and 6AU6 buffer amplifier to a 12AT7 balanced mixer. (Carrier insertion, when needed, is provided through a 6C4 amplifier which bridges the balanced modulator and filter.)

In the balanced mixer, the 450-kc. sideband beats with the signal from a 6CL6 quadrupler driven by a Collins PTO operating in the range of 1587.5 to 2012.5 kc. The quadrupling provides a 1700-kc. tuning range for each band. The multiplied v.f.o. signal is balanced out in the mixer, and the resulting 7-Mc. beat is fed through successive amplifiers to a Class A 2E26 which drives the parallel 4X250B AB₁ final. To change bands, the signal from a 6AK6 crystal oscillator is mixed with the 7-Mc. signal in the 6X8, the oscillator frequency in each case being suitable to provide a beat at the desired output frequency.

The power chassis contains five separate supplies, one delivering 2000 volts for the final, and two delivering 300 volts for the final screen and exciter, in addition to two bias units.



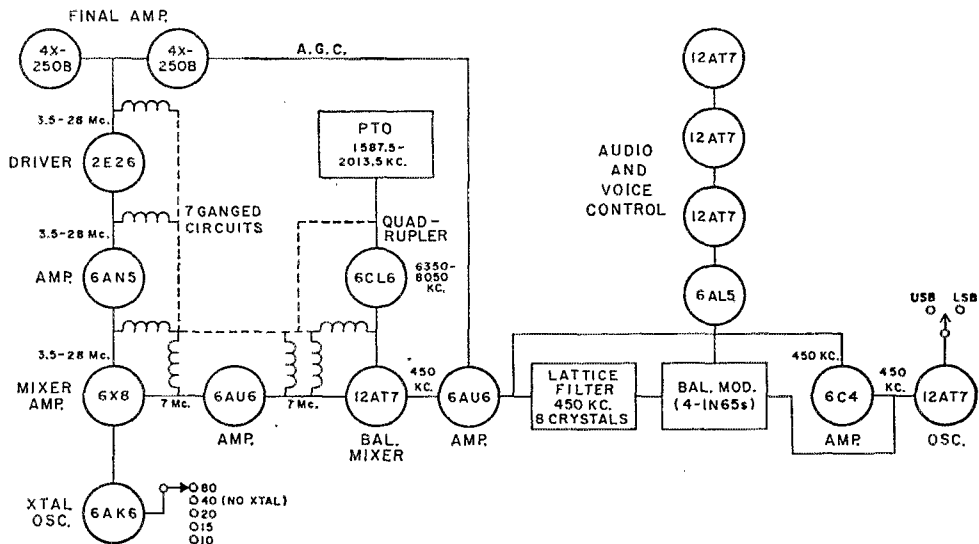


Fig. 1—Block diagram of W0KQZ's s.s.b. transmitter. Details are discussed in the text.

Tuning System

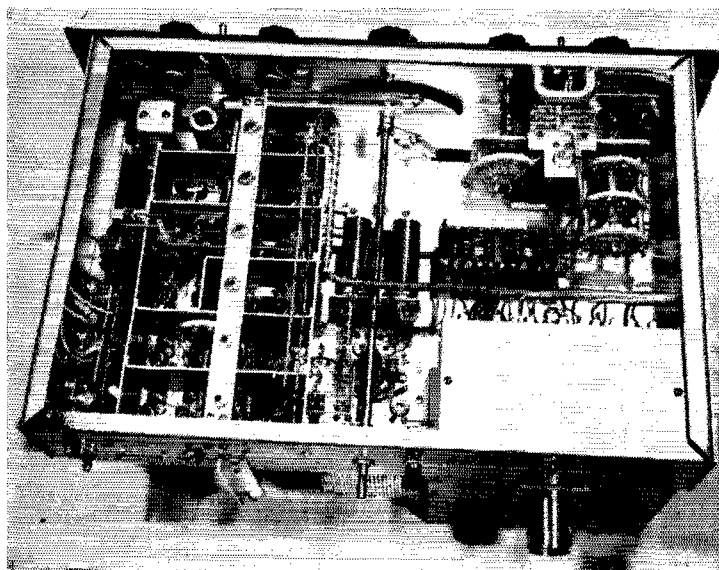
Seven circuits between the v.f.o. quadrupler and the grid of the final amplifier are inductively tuned, the tuning being ganged to the PTO and adjusted to track with it. The three circuits following the 6X8 are basically tuned to the 80-meter band. To tune these circuits to the higher-frequency bands, fixed inductors are switched in parallel with the inductors of the basic circuits. A conventional pi network with tapped coil is used in the output of the final.

A unique feature of the circuit is the automatic drive control shown in Fig. 2. This circuit is similar to one used in the Collins KWS-1. If the final amplifier starts to draw grid current, the

voltage at the tap on the bias-supply voltage divider will increase. This slight increase in voltage will be fed, through an isolating rectifier and time-constant network, to the grid of the 6AUG buffer feeding the 12AT7 balanced mixer resulting in decreased output from the 6AUG and the stages following.

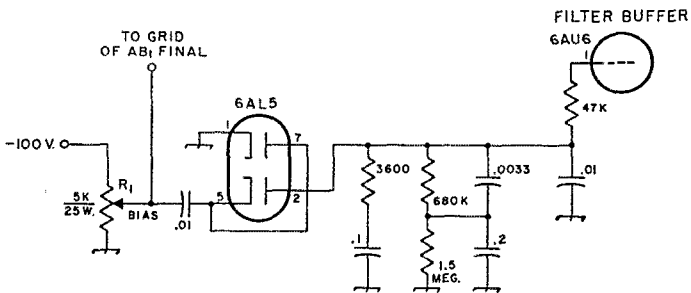
Construction

Most builders would have difficulty in finding room on a standard 17 × 13-inch chassis for a kilowatt final. In this unit, W0KQZ has included the complete v.f.o. and s.s.b. exciter while still avoiding an overcrowded appearance. Some of the mechanical features rival Rube Goldberg's in principle without straying from the strictly



Below deck, the high-frequency stages are individually shielded. The row of banana jacks serve as guides for the bottom ends of the ganged exciter tuning slugs. The long shaft at the center is the band-switch control, mechanically linked to the exciter and final switches near the front, and to the driver switch at the rear of the chassis. The box in the lower right-hand corner contains the r.f. chokes and feed-through capacitors of the filters used in all power leads entering the chassis.

Fig. 2—Automatic drive-control system. If the final is driven into grid current, the voltage change at the bias tap is reflected through the 6AL5 and time-constant network as an increase in bias on the 6AU6, one of the tubes in the exciter chain, and drive to the final is reduced. Capacitances are in μf . and resistances in ohms. R_1 is an adjustable resistor.



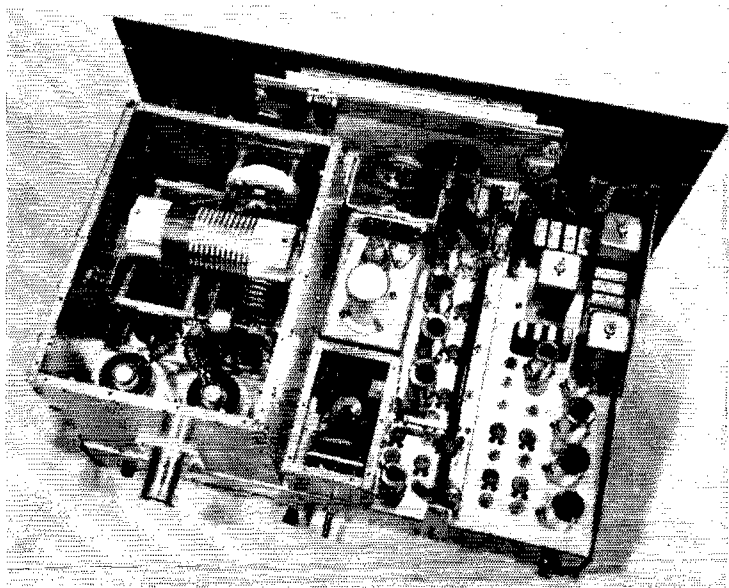
practical in application. The final-amplifier compartment has a 5-prong plug in the bottom, and the section can be removed for easy servicing by simply removing four hold-down screws. The 2E26 driver stage is also removable. Perhaps the most ingenious is the system used for ganging the tuning of the exciter stages with the PTO. Referring to the top-view photograph, the train of gears near the panel, operating from the tuning shaft of the PTO, drives the long shaft to the right of chassis center. This shaft carries a pair of eccentric (for linear tuning at a rate proportional to the v.f.o. tuning rate) pulleys which wind up or unreeel short lengths of dial cord which serve to raise or lower a narrow aluminum rack carrying six of the seven ganged tuning slugs of the exciter. The slugs drop through holes in the chassis into the coils below deck. The rack is visible just to the right of the shaft. A Z-shaped arm attached to the rack, near the rear of the chassis, works through a slot in the wall of the 2E26 compartment to operate the seventh slug which tunes the 2E26 plate circuit. Each end of the slug rack carries a bushing which rides up and down on a 1/4-inch guide post fastened to the chassis. A compression spring between a washer at the top end of the guide post and the

rack stabilizes the arrangement mechanically, and removes all backlash. Tubular housings covering the guide posts and springs may be seen at the ends of the rack. With this system, the r.f. output voltage of the 2E26 varies less than 10 per cent over the complete frequency range of the transmitter, including 10 meters.

The band switches of the final, driver and exciter, part of which are above the chassis and part below, are ganged to a common control shaft through mechanical linkages, all fabricated by hand. An extension of the band-switch shaft at the rear of the chassis permits mechanical coupling to a coaxial switch if a combination of antennas is used in covering the various bands. Still another feature is the hairline indicator on the dial which shifts automatically with the sideband-selector switch to maintain calibration. The slide-rule dial was printed on glossy paper from an electro made from a draftsman's original.

The project consumed spare time over a period of three years and four months, about six months of which was spent in cutting and trying to get the tracking system working properly. The total cost for components was \$640, which is reasonable indeed for a unit of this caliber. QST

The kilowatt final is in the shield box to the left, the pi-network inductor and switch mounted above the input and output capacitors. The fitting at the rear of the amplifier housing is for a blower which discharges into an air-tight subchassis on which the 4X250Bs are mounted. The PTO unit is at top center with the 2E26 driver stage below it. To the right of center are the ganged-tuned stages. Audio, voice-control and low-frequency r.f. circuits are to the extreme right.





Hints and Kinks

For the Experimenter



RACK MOUNTING HEAVY EQUIPMENT

THE sketch shows a method of mounting heavy equipment in standard panel racks to avoid the necessity of fumbling for the right hole while supporting the equipment with one hand. Place the mounting screws in the proper holes but from the rear of the rack. The screws should protrude far enough in front to support the panel and to allow a nut to be placed on them. The head of the screw should be jammed hard against the rack and a lock washer used to prevent it from turning when the nut is tightened on the front. For better appearance, use "acorn" or oval-head nuts.

— *Llewellyn Melbert, W1FSH*

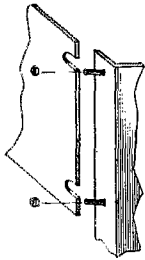


Fig. 1—W1FSH's method of mounting heavy rack equipment.

ADAPTOR PLUG

THE sketch in Fig. 2 shows an exploded view of an adaptor plug which adapts a conventional u.h.f. series connector for mating with a phono jack. To assemble the plug, solder a 1-inch length of No. 12 copper wire to the center conductor of an SO-239 connector. Now, sweat-solder the cap end of a phono plug into the small end of an 83-1H hood. Slip the hood and plug assembly onto the SO-239 connector so that the No. 12 wire inserts in the center conductor of the phono plug. Attach the hood to the connector with machine screws and solder the wire that is in the tip of the phono plug.

— *Robert J. Jurutowski, K9IT'S*

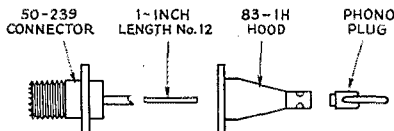


Fig. 2—U.h.f. series-to-phonoplug adaptor.

HIGH-OUTPUT OSCILLATOR

THE circuit shown in Fig. 3 provides a higher output than is normally obtained from a Franklin oscillator. I found that the 6AW8A tube performed best in the circuit and that other triode-pentode tubes, such as the 6AX8, did not

do so well. The 27- μ f. capacitor C_3 has a critical value and, if made any larger, produces squeeging. When connecting the cathodes to ground, connect the lead first to Pin 1, then through the center socket sleeve to Pin 6, and then to ground. With the tuned circuits L_1C_1 and C_2L_2 tuned to 80 meters, the output voltage measured about 40 volts r.m.s. across a 22,000-ohm load. When tuning L_2C_2 to 40 meters, the output voltage measured 15 volts r.m.s.

— *Oscar P. Porth, W3GYR*

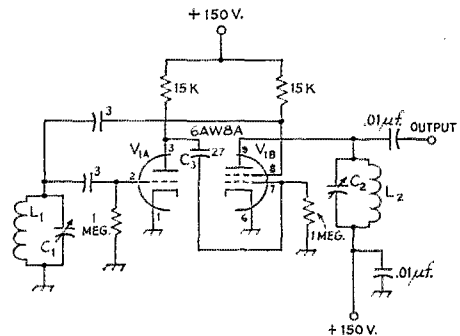


Fig. 3—Modified Franklin oscillator. Unless otherwise indicated, capacitances are in μ f., resistors are $\frac{1}{2}$ watt.

TEMPORARY COAX CONNECTOR

TERMINATING coax to a conventional coax connector is time-consuming and irritating when you are experimenting with different lengths of coax. The sketch in Fig. 4 shows a method for making temporary connections. A binding post is soldered to the center terminal of a PL-259 coax connector and is used to terminate the coax center conductor. A hose clamp holds the shield of the coax.

— *Henry E. J. Smith, W5DAI*

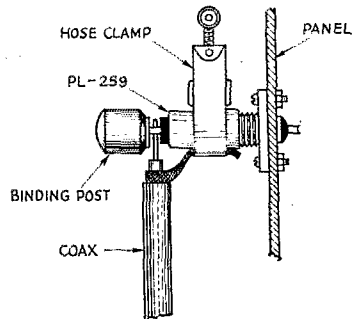


Fig. 4—Temporary coax connector.

EMERGENCY TRANSMITTER OPERATION

OCASIONALLY I have found it necessary to operate my HT-32 transmitter on frequencies for which I do not have an antenna to match the fixed 50-ohm impedance of the pi-section output. Lacking an antenna tuner, I found that the simple arrangement shown in Fig. 5 will work satisfactorily with most random-length antennas.

The normal 50-ohm pi-section output circuit is shorted to ground by means of a shorting plug which is inserted into the transmitter's output jack. This converts the output circuit into a simple LC tank circuit (L_1C_1) which may be tuned to the operating frequency by means of the regular output tuning capacitor, C_1 . The antenna, which in my case consisted of a 10-meter folded dipole with the lead-in wires tied together, is attached to a lug on the hot end of the final tuning capacitor frame. An isolation capacitor, C_2 , is connected between the frame and the antenna. I used a 100- μ fd. mica capacitor, although a variable capacitor could be used. With the antenna connected, the final tuning capacitor is adjusted for peak output. In the case of the HT-32, the output level meter is sensitive enough to give an indication even though the output circuit has been shorted.

It should be noted that the scheme described here may degrade harmonic suppression characteristics. However, in the case of the HT-32, no difficulty was experienced with spurious radiation. Here is another word of caution: The high voltage remains on the plates of the 6146s when the HT-32 is in the stand-by position. Be certain that the transmitter is off before removing the final-amplifier cage!

— Richard P. Burns, W9NVC

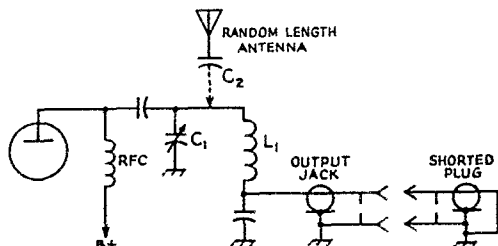


Fig. 5—The pi-section output circuit of the HT-32 is converted into an LC tank circuit by means of a shorting plug inserted into the transmitter's output jack. C_1 and L_1 are the regular capacitor and coil of the original circuit. C_2 is an isolating capacitor and may be a fixed or variable unit.

TOOTHPASTE-TUBE KNOBS

TRY using the lid from a toothpaste tube as an attractive knob. Select a rubber grommet with an outside diameter that will fit tightly inside the toothpaste lid and at the same time will fit tightly over the control shaft, so that the combination will not slip. There are many styles, sizes, shapes and colors of toothpaste lids available.

— Larry W. Cannon, K0SFV

MOUNTING OF SMALL COMPONENTS

WHEN constructing transistorized gear, how often have you looked for a suitable way to support the components and transistors, particularly when the transistors are to be permanently installed in the circuit?

A very simple and effective support can be made using a standard miniature 7- or 9-pin tube socket. Place the component leads in the lugs and after all the wiring is complete, but before lugs are soldered, install the transistors. Hold their leads with a pair of long-nose pliers and then solder all circuit connections. The socket can then be mounted inside the chassis by running a small machine screw through the center hole and fastening it with a nut and lock washer. Here at W2JIO, we've been making some of the newer transistorized gear with this method.

— Bob Gunderson, W2JIO

PREVENT DIAL CORD SLIPPING

Is that dial cord on your receiver slipping? Dissolve a small piece of resin in alcohol and then paint the solution on the cord. The alcohol evaporates; the resin will prevent the cord from slipping.

— Bob Seals, K9AHK

RANGER HEAT REDUCER

TO COMBAT the v.f.o. drift caused by heat from the power supply in my Viking Ranger, I substituted silicon rectifiers for the 5U4 rectifier in the Ranger power supply. I mounted the diodes on a small fiber board which was cut to fit into an old octal tube base that had been removed from a burned-out tube. The diodes were wired as shown in Fig. 6 and connected to the proper tube pins on the base. Then the assembly was plugged in the 5U4 tube socket on the Ranger. The new semi-conductor rectifier reduces the heat by at least 50 per cent and, since the voltage drop through the diodes is very low, the output voltage is higher by about 45 volts. Best of all, the v.f.o. now stabilizes in about $\frac{1}{3}$ the previous time. I used the Sarkes Tarzian 1N2489/60H diodes that have a PIV rating of 600 volts and can handle about 750 ma. The diodes retail for about \$1.83 each.

— Louis A. Gerbert, W8NOH

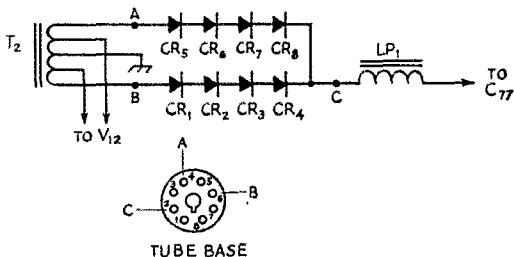


Fig. 6—Heat is reduced in the Ranger power supply by substituting semiconductor diodes for the 5U4 rectifier. Points A, B, and C in the diagram are connected to the corresponding tube pins shown on the tube base. CR_1 through CR_8 are 1N2489/60H diodes.

● Technical Correspondence

"HIGH-FREQUENCY FILTERS FOR S.S.B."

Shawan Road
Cockeysville, Md.

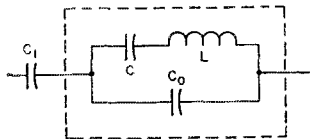
Technical Editor, *QST*:

My good friend Herman Shall, W3BWK, has pointed out an error in my October, 1960, *QST* article.¹ The statement "BT-cut crystals have C_0/C ratios around 4000 minimum" is incorrect. Herman tells me that the high ratios I measured on FT-243 surplus crystals result from the nature of their mounting. Actually, BT-cut crystals can exhibit ratios as low as 400, and some of the FT-243s on the surplus market may be AT cut. AT-cut FT-243s may have ratios around 2000, and AT-cut crystals which are plated can have ratios as low as 250. If the ratio is other than indicated in the article (around 4000) then the termination tuning will be slightly different. However, the range of tuning available with the specified coils should be adequate for any surplus crystals available.

The impedance formula on page 39 should read

$$R_o = \frac{1}{2\pi C_o'} \left(\frac{f_1}{f_1 f_2 - f_o^2} \right)$$

Footnote 9 on that page outlines one way to find the motional capacitance, C . A somewhat better method which I have used consists of connecting a small capacitance, C_1 , in series with the crystal (see accompanying figure), and



measuring the shift in resonant frequency. The resonant frequency of the crystal alone is

$$f_r = \frac{1}{2\pi \sqrt{LC}}$$

If f_{r1} is the resonant frequency of the crystal and C_1 combined, then

$$f_{r1}^2 = f_r^2 \left(1 + \frac{C}{C_1 + C_o} \right)$$

Since $\frac{C}{C_1 + C_o}$ is much less than 1,

$$f_{r1} - f_r \approx \frac{f_r}{2} \left(\frac{C}{C_1 + C_o} \right)$$

or

$$C = 2 \frac{\Delta f}{f_r} (C_1 + C_o)$$

where Δf is the difference ($f_{r1} - f_r$) between the resonant frequencies.

Finally, that long equation from Herzog should read as footnoted below.²

The objective of this article was to provide the ham with a design for a good high-frequency s.s.b. filter using surplus crystals. Other designs would be employed if plated crystals were available. The difference is that the filter described can be built at a cost of less than \$5.00 and an interesting expenditure of time, if one is an old-time-type ham. Modern types who have not operated with tank coils wound of bell wire on shellacked Mother's Oats boxes might be better advised to purchase a crystal filter from one of the several companies making good ones!

— D. J. Healey, W3HEC

¹ Healey, "High-Frequency Filters For S.S.B." *QST*, October 1960, p. 35.

² Attenuation, db. = $10 \log_{10} \left[1 + \left\{ \frac{[q_3 \sqrt{q_2^2 - 1} + q_2 \sqrt{q_3^2 - 1}](S_3 - Z) Z [Z^2 + (2q_{1a} - 1) Z + 2q_{1a}(q_{1a} - 1)]}{2q_{1a}(Z + q_{1a})Z - q_2(Z - q_3)} \right\}^2 \right]$

UNIDENTIFIED NOISE "SIGNAL"

7618 W. Palestine Ave.,
Chicago 31, Illinois

Technical Editor, *QST*:

Here is another "strange signal" report for the file. This signal was quite similar to those described by K1JPH, K4PZJ, K8SHN and others in "The World Above 50 Mc." in the October 1960 issue of *QST*. The main dissimilarity was that it occurred on *ten meters*.

The signal was heard on October 13 between 0145 and 0215 GMT in the Chicago area. It had a well-defined band width of about 2 Mc. and extended from about 28.0 Mc. to 30.0 Mc. There was no carrier since it produced no beat note against by b.f.o. or against the a.m. stations it obliterated. One strong peak was noted at 28.8 Mc. with two weaker peaks at 28.5 and 29.2 Mc. With the exception of these peaks, the signal strength was almost constant. There seemed to be very weak "tones" apparent at the main peak and it had the ability of making even stronger a.m. signals unreadable. My beam antenna showed a *slight* peak in the south. The signal can best be described as sounding like extremely strong thermal agitation or tube noise generated in a receiver.

The noise subsided rapidly, but not instantly, and when the band returned to normal, K6ALL/9 and W9LYP, both 30 miles north of my QTH, were contacted. Notes were compared and it was found that the signal levels were the same and the apparent direction of origin was the same. We decided that if the signal originated locally, the power output must have been tremendous to get the coverage it did. If not local, of course, its origin or reflected origin was in the sky, even though the band was "closed."

I have heard this signal only on this one occasion, but I and the others will be looking for it in the future and hope to make further observations. Other stations that heard and commented on the "strange signal" were K9RSB, W9JAL and K9INW.

— James R. Swanson, K9QEB

RADIO BELOW 500 KC.

926 Woodgate Ave.,
Elberon, New Jersey

Technical Editor, *QST*:

Some months ago, in talking with a group of electronics people, I happened to make a casual remark about radio signals at 16 kc. There was eyebrow raising, and a rather new electronics engineer exclaimed, "16 kc., why, that's audio. There are no radio transmissions on frequencies like that!" This flat statement, coupled with the fact that the v.l.f. regions have recently been the subject of renewed interest — witness the *Proceedings of the IRE* for June 1957 — made me think that a *rehash* of m.f., l.f., and v.l.f. information might be of interest. I also think that the Hallcrafters advertisement in *QST* for July 1960 may have generated some thoughts in the minds of hams about the lower frequencies.

Years ago, most amateurs knew all about the stations operating at the low frequencies ("long waves," as they then were called) in that a considerable amount of time was spent listening in this segment of the spectrum for code practice, press, weather and time signals. Contact any old-timer and he will thrill to tell you how he used to copy NAA, Arlington, Virginia, 2500 meters; POZ, Nauen, Germany, 12,600 meters; YN, Lyons, France, 15,000 meters; GB, Glace Bay, Nova Scotia, 7500 meters; IDO, Rome, Italy, 11,000 meters; and many others.

The first practical radio use of s.s.b. was on the "lows" when the A.T. & T. Company opened up a transatlantic radiotelephone circuit in 1923 on 55 kc. This radio circuit continued after the advent of the high frequencies as an emergency link when magnetic storms would put the short waves out of operation.

In the mad rush to the higher frequencies in the early '20s, the average amateur forgot that activity continued on

the lows, even if in a more limited degree. However, I would suggest that the present-day ham who is interested in copying some good solid long-distance signals listen now and then in the real low end of the radio spectrum.

Let us take a look at what we have available for copy at this time, the latter part of 1960. The lowest group of regularly active stations is in the segment 15 to 20 kc. The lowest station appears to be our old friend NSS at Annapolis, Maryland, who is very busy on about 15.5 kc. and other frequencies within this band. Next, we run into GBR at Rugby, England, who is on 16.0 kc. NBA, Balboa, Canal Zone, on 18 kc. is quite easy to find in that he sends time ticks at one-second intervals 24 hours a day and signs his call on the hour. NPG, San Francisco, is on about 19.0 kc.; and NPM, Pearl Harbor, Hawaii, can be heard on about 20.0 kc. GBZ, Griggion, Wales, has been read on 19.6 kc., and we used to copy FUB, Paris, France, but it has been many months since he has been heard. NKL at Jim Creek (near Seattle, Washington) did appear for quite a period in this band, but has been among the missing for a long spell. I am looking forward to hearing NAA once again, but when he comes on the air his QTH will be Cutler, Maine, rather than Arlington, Virginia. According to the "Berne List," NAA is scheduled to be on 14.8 kc. when he becomes active.

The band from 20 to 100 kc. seems to be quite unoccupied although in the international assignments every existing channel has one or more stations listed. At a favorable location one might hear VHP in Australia sending time signals on 44 kc. NSS runs RTTY at about 65 kc. and regular A1 on about 88 kc. The National Bureau of Standards, Boulder, Colorado operates a standard frequency station, KK2XEL, on 60 kc., but we have not heard it here on the east coast of the United States. There is a Loran C station or stations operating on about 100 kc.

In the band 100-200 kc. there are numerous stations. One can copy NSS on 121.95 and 162 kc., NPG on 144.95, NOM on 130.05 and NBA on 147.85 kc. In this range I used to copy NAF, Newport, Rhode Island, and NAAL, Norfolk, Virginia, but both stations have not been heard in over a year. At times there is a considerable amount of activity with CFH, Halifax, Canada, 115 and 113 kc.; WCC, Chatham, Massachusetts, 130.35 and 147.5 kc.; WSL, Amagansett, New York, 133 kc.; and WSC, Tuckerton, New Jersey, working in this band. These stations handle shore-to-ship traffic, weather reports and press. WCC sends press every day on 147.5 at 0300 GCT. CFH and NSS also transmit RTTY on their regular frequencies. The stations listed above are some of those heard on the northeast coast of the United States, and the list will not necessarily be valid in other parts of the world.

In the range 190 to 400 kc., one will find a large number of marine radiobeacons, aeronautical radiobeacons and aeronautical range stations. These stations transmit a characteristic signal by A1 or A2, and many of the range stations give local weather at intervals using A3. A somewhat unusual station is the CONSOLAN station, TUK at Nantucket, Massachusetts, on 194 kc. CONSOLAN is a long-range navigational aid and one can obtain a bearing from this station by counting the number of dots and dashes received and using special tables as contained in U. S. Navy Hydrographic Office publication H. O. 117 (formerly H. O. 205).

From 400 to 500 kc. one will run into a large number of stations engaged in ship-to-shore traffic. Since 500 kc. is the international calling and answering frequency and distress frequency, it is always active except during the compulsory quiet periods, which are from 15 to 18 and from 45 to 48 minutes after every hour. On clear, cold, winter nights it is possible to hear some real DX on 500 kc.

What does one do for a low-frequency receiver? Well, if he was smart enough to hang on to a set of honeycomb coils, like Joe Vogel at WIAEH, he has it made. Or, if one has a World War I Navy SE1420 receiver with loading coils, like Ed Raser, W2ZI, or Colonel Fred Elser, W6FB, he also is in business. There may be some of the old SE143s around, but I have not seen any. The same applies to the Wireless Specialty Co. IP500, which is the commercial version of the SE1420. Whatever became of the Navy RE receiver which used Western Electric peanut tubes (215A) and tuned down to 10 kc.? This equipment will do a dandy job if it can be found. Most of us can still find World War II surplus receivers such as the Navy RAK and RBL. These equipments cover the range of approximately 15-600 kc. The extremely well-heeled ham could consider the British Racal RA17, which with its l.f. converter RA37 will give him continu-

ous and most excellent coverage from 12 kc. to 30 Mc. And while it may sound like heresy, it is still possible for the average ham to build a one-tube autodyne v.l.f. receiver or a t.r.f. job that will give adequate performance!

One will find that at times there is much more static at the low frequencies than he is accustomed to hearing in the amateur bands. However, some time when aurora borealis or aurora australis puts you out of business on that 40-meter sked, tune down to 16 or 122 kc., and copy some good, solid signals, day or night, summer or winter. What is more important, you will become acquainted with a large portion of the radio field which today is neglected by most amateurs.

— William B. Gould, W1NP

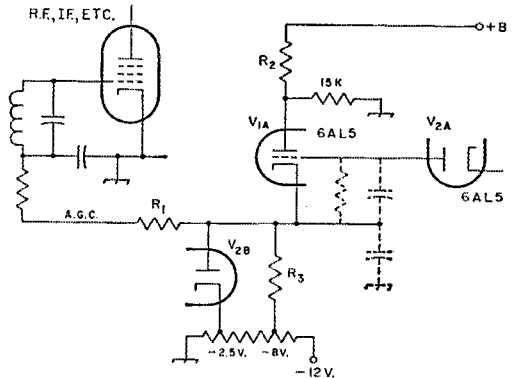
FIXED BIAS WITH AUDIO A.G.C.

87 Cecil Park
Pinner, Middlesex
England

Technical Editor, *QST*:

Regarding the article by W9IK, "An Improved Audio-Driven A.G.C. Circuit," in September *QST*, as an additional advantage this circuit can be modified so as to provide fixed bias to the grids of the a.g.c. controlled stages. This enables the cathodes of these tubes to be directly grounded, thus avoiding the use of cathode resistors and their attendant capacitors, which are only a source of noise. This method of applying a d.c. bias is not new but is becoming more popular; one recent receiver to employ it is the Gelo G200-R.1 However, it is often difficult to apply without a lot of complicated switching and extra components, and this is especially true if separate a.m., s.s.b. and a.g.c. detectors are employed. It is, however, relatively simple to apply if the a.g.c. voltage is generated after the detectors.

In the circuit diagram shown in Fig. 1 of W9IK's article, only one half of a 6AL5 diode is used, and the other half can most usefully be employed to apply a d.c. bias through the a.g.c. line to the controlled tubes. The diode acts as a simple clamp for the cathode of V1A thus ensuring that at no time will the a.g.c. line go more positive than the fixed bias chosen for the tubes.



The take-off point for the a.g.c. can be adjusted to compensate for this added bias by the appropriate change in circuit parameters as mentioned in the article. The accompanying diagram shows these modifications and is self-explanatory.

— K. W. Cranfield

¹ "Recent Equipment," *QST*, July, 1959.

THAT OSCILLATING CRYSTAL

Box 412
Sedona, Arizona

Technical Editor, *QST*:

I was interested to see the letter from K7HQ on page 49 of November *QST*, but think it more likely the oscillation came from a negative-resistance effect with back bias. For example, in Sylvania's "40 Uses for Germanium Diodes," page 34, it is stated, "When a germanium diode is connected in the 'back direction' . . . in a suitable circuit it will oscillate. Sustained operation of the crystal in its oscillating negative resistance condition produces appreciable internal heating and will ultimately destroy the unit. Nevertheless,

(Continued on page 160)

Happenings of the Month

Director Election Results License Application Forms Revised Examination Schedule

ELECTION RESULTS

The 1960 autumn ARRL elections have resulted in the reelection of four directors and two vice-directors, and election of two new directors and four new vice-directors.

John G. Doyle, W9GPI, received 2931 votes in the Central Division director race, as against 1161 votes for Harold Sever, W9FM. **Milton E. Chaffee, W1EFW**, retained the New England directorship with 1367 votes to 808 votes for Ernest A. Coons, W1FOE/W1JLN, and 782 votes for Robert Y. Chapman, W1QV. The Northwestern Division returned **R. Rex Roberts, W7CPY**, as director by 961 to 860 for Harold W. Johnston, W7PN, and 270 for William H. Bennett, W7PHO. In the Roanoke Division, **P. Lanier Anderson, W4MWH**, was reelected by 918 votes to 844 for Bannie L. Stewart, W4CE.

Carl L. Smith, W0BWJ, becomes Rocky Mountain director, defeating Charles M. Cotterell, W0SIN, 612 votes to 185. OM Smith, who lives in Denver, is a pilot and captain with Western Air Lines, Inc. No stranger to League affairs, Carl was vice-director of his division in 1957-1958, and an assistant director 1955-1956. On February 11 he will complete a two-year term as Section Communications Manager (SCM) of Colorado; in 1955 he had served for a time as acting SCM. Carl is a past president of the Denver Radio Club, and was advertising manager of its paper, *The Roundtable* for two years. He is a member of the Amateur Radio Emergency Corps.

In the West Gulf Division, the new director is **Dr. R. O. Best, W5QKF**, of Corpus Christi, Texas. Texas and Oklahoma hams cast 1401 ballots for him and 736 votes for Charles M. Sandidge, W5AZB. Dr. Best, a dentist, has been president and treasurer of the Corpus Christi Amateur Radio Club. A member of AREC, "Jack" Best has served for the past four years as Section Emergency Coordinator for the Southern Texas Section of ARRL. Though he can add "Lt. Comdr., USNR, Ret." after his name, he serves as Texas State Coordinator for Air Force MARS.

Roanoke Division hams reelected **Joseph F. Abernethy, W4AKC** as vice-director, by 1009 votes to 745 for Phil Wicker, W4ACY. **John H. Sampson, jr., W7OCX**, was returned to the vice-directorship in the Rocky Mountain Division, garnering 510 votes to 290 for Lester M. Richards, W0ICR.

Bostonian **Bigelow Green, W1EAE**, won election as vice-director of the New England

Division with 2251 votes compared with 701 for Jeffrey I. Weinstein, W1JMN. OM Green is a technical writer employed by United Engineers, Inc. First licensed in 1927 as W1AKG, he has held his present call since 1931. He is past chairman of the Greater Boston Amateur Radio Society, and holds appointments as Route Manager and Official Relay Station. In the past year W1EAE has organized and helped to instruct several classes for prospective amateurs sponsored by the Boston Museum of Science.

Northwesterners chose **Robert B. Thurston, W7PGY**, for their vice-director, giving him 1291 votes to 797 for Mrs. Elizabeth H. Taylor, W7NJS. A civilian telephone installer and repairman for the Naval Air Station at Sand Point, the Seattle ham has served as treasurer of the North Seattle Amateur Radio Club and is currently its secretary. OM Thurston is on his second two-year term as SCM for Washington, and is PAM for the section. He is manager of an Air Force MARS net, and is also an NCS for RN7 in the League's National Traffic System. A 76-month string of BPL attests to his activity and skill as ORS and OPS. OM Thurston also holds appointment as an Official Observer, and is a member of AREC.

Attorney **Howard F. Shepherd, jr., W6QJW** of Los Angeles, becomes vice-director of the Southwestern Division, having tallied 1938 votes to 728 for Lyle Garner Farrell, W6KGC. Howard has on many occasions assisted amateur radio clubs and their members with legal problems; he currently serves as legal adviser to the Los Angeles Area Council of Radio Clubs and was its chairman in 1957-1958. He has been an assistant director of the Southwestern Division for the past two years, and is a past president and past director of the 50 Club of California, Inc. Very active in emergency work, OM Shepherd is RACES Coordinator for California's Region 9, Deputy Chief Communications Officer of the Los Angeles County Disaster Authority, and chairman of the Civil Defense frequency allocation committee for his region of the state. He is also Los Angeles SEC, and an OBS.

In the West Gulf Division, **Ray K. Bryan, W5UYQ**, unseated present vice-director Robert D. Reed, W5KY, by a vote of 1355 to 790. The Oklahoma City amateur is employed by the Federal Aviation Agency as chief of the radar engineering unit at the Facilities and Material Depot. Ray is on his third term as president of the Aeronautical Center Amateur Radio Club. He is also Oklahoma State RACES Coordinator and ARRL Section Emergency Coordinator for Oklahoma. Since he was first licensed in 1931,

OM Bryan has worn out the calls W6GLT, W3GLT, W4RMW, W8FXJ, and W9NLI. He's Chief Warrant Officer, USNR, Retired, and holds an ARRL Official Phone Station Appointment.

The two-year term of office for these elected officials, as well as those previously declared elected (page 78, *QST* for November, 1960) begins at noon on January 1, 1961.

LICENSE APPLICATION FORMS REVISED

Discontinuance of renewal Form 405-A in the amateur service is the highlight of a number of changes in application forms and procedures just announced by the Federal Communications Commission. The present three-part 405 form, providing a renewal endorsement instead of a new license, has been a headache both to amateurs and to the Commission in the nearly nine years of its use in our service. When the revised system gets underway, a renewal application will be submitted on the usual Form 610 (which is being suitably revised) and a new license will be issued for the new five-year term.

Also discontinued will be Form 602, currently used for applications for amateur stations set up on military posts as a recreational activity.

There will soon be only two forms for amateur applications. One is Form 610, which will be used by applicants for new amateur operator-only licenses, combination operator and station licenses (the usual case), or for a station license when the applicant already holds an operator license only. This form will also be used for applications for renewal or modification of the above types of license.

The second is a new Form 610-A, which will be used by applicants for an additional amateur station, an amateur club station, and for an amateur station for recreational use under military auspices. This form will also be used for applications for renewal or modification of such licenses.

Use of the new forms will commence as soon as they are in distribution, which will be around the first of the year. However, all forms currently in use may continue to be filed until June 30, 1961.

Another important change in rules is the time limit within which an amateur may apply for renewal. At present, an amateur may so apply any time after 120 days prior to the date of expiration of his license. FCC has now changed this to 60 days; in other words, using the *new* Form 610 when available, applications for renewal should not be submitted earlier than two months before license expiration.

"PEAC"

The 1959 Geneva radio conference, like its predecessors, found a major problem to be the allocation of the extremely-crowded frequency range between approximately 4 and 27.5 Mc. That task was so difficult, in fact, that Geneva was unable to solve it directly. Instead, the conference set up machinery for the creation of a

"Panel of Experts", to consist of the heads of the four permanent organs of the International Telecommunications Union (Secretariat, International Frequency Registration Board, CCIR, CCITT) plus up to seven additional highly-qualified technical experts from various parts of the world. This panel is assigned the task of studying the congestion in 4-27.5 Mc. and coming up with proposed solutions. It is now contemplated that this panel, when chosen this coming Spring, will meet in Geneva next September, and again in the autumn of 1962. Its report would then be laid before the ITU Administrative Council for approval, and the possible calling of another radio conference should that be necessary to accomplish the proposed solutions.

For the immediate purpose of nominating one or more U. S. candidates for the Panel of Experts, the Department of State recently extended invitations to a limited group of experienced people to participate in a Panel of Experts Advisory Committee, or "PEAC." General Manager A. L. Budlong, W1BUD, and Asst. General Manager John Huntoon, W1LVQ, were asked to serve on this committee. At this writing, only one preliminary meeting of the group has been held; another was in prospect for December. While the current series of meetings deal primarily with selection of the U. S. candidate for the panel, it is expected that PEAC will develop into at least the core of the group to proceed with further plans, as they may develop, for the next conference. We shall report developments as they take place.

W3PHL LICENSE SUSPENDED

Violations of FCC rules 12.113 and 12.133 at various times between April 26, 1956 and March 20, 1959, have resulted in the suspension of the Advanced Class amateur radio operator license of Frederic C. Doughty, W3PHL, for a six-month period beginning October 17, 1960.

The Commission first ordered the suspension on May 6, 1959, citing the licensee for sideband frequencies extending outside the limits of the amateur band (in violation of Section 12.113); for failure to reduce or eliminate spurious radiations intense enough to cause interference in receivers of good design; and for not employing means to assure that his transmitter was being modulated within the limits of proper technical operation (violation of Section 12.133). W3PHL filed a timely request for a hearing, and the suspension was automatically stayed. Two hearings were held, one in Washington and one in Philadelphia, and both the FCC's Safety and Special Radio Services Bureau and Mr. Doughty filed extensive briefs and proposed findings of fact. W3PHL contended, among other things, that he was using (on 7296 kc.) a special system of high-level modulation with reduced carrier, and that the Commission's monitoring equipment was not capable of accurately measuring his particular type of emission. However, a 21-page initial decision issued by the FCC hearing examiner in

August of this year found that the violations had occurred as charged, and that a six-months' suspension was in order.

At this point Mr. Doughty got in touch with the League's General Counsel, contending that FCC had applied its "commercial" rules to his case; that FCC monitoring equipment could not evaluate his signal properly; and that his oscilloscope should be adequate insurance as to whether his signal complied with regulations. He felt that the results of his hearing constituted an unfavorable precedent which could be used against other amateurs. Counsel, after a thorough examination of all the documents and consultation on technical points with members of the League staff, found that the "commercial" rules were in reality Part 2, which are general regulations for all FCC services; that there was adequate evidence to show that W3PHL had many times transmitted with excessive bandwidths and spurious emissions above 7300 kc.; and that an oscilloscope is *not necessarily* insurance of proper operation — rather, in questions such as whether there is intense spurious radiation outside the amateur band, it gives no indication one way or the other. Counsel therefore found no danger to the amateur service as a whole resulting from the proceeding against W3PHL.

The docket was finally brought to a close on October 12, 1960, when the Commission adopted the initial decision of its hearing examiner and ordered the suspension into effect as of October 17, 1960.

EXAMINATION SCHEDULE

THE Federal Communications Commission will give Extra and General Class amateur examinations during the first half of 1961 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. *Even stated dates are tentative and should be verified with the Engineer as the date approaches.* No examinations are given on legal holidays. All examinations begin promptly at 9 A.M. except as noted.

Albuquerque, N. M.: April 8, at 11:00 A.M.
Anchorage, Alaska, 53 U. S. Post office Bldg.: By appointment.
Atlanta, Georgia, 718 Atlanta National Bldg., 50 Whitehall St., S.W.: Tuesday and Friday at 8:30 A.M.
Bakersfield, Calif.: Sometime in May.
Baltimore 2, Md., 400 McCawley Bldg.: Monday and Friday, 8:30-10:00 A.M. and by appointment.
Bangor, Me.: May 10.
Beaumont, Texas, 301 P. O. Bldg.: By appointment only.
Billings, Montana: Sometime in May.
Birmingham, Ala.: March 1, June 7.
Boise, Idaho: Sometime in April.
Boston, Mass., 1600 Customhouse: Wednesday through Friday 9:00 A.M. to 10 A.M.
Buffalo, N. Y., 323 P. O. Bldg.: 1st and 3rd Fridays.
Charleston, W. Va.: Sometime in March and June.
Chicago, Ill. 826 U. S. Courthouse: Friday.
Cincinnati, Ohio: Sometime in February and May.
Cleveland, Ohio: Sometime in March and June.

Columbus, Ohio: Sometime in January and April.
Corpus Christi, Texas: March 9, June 8.
Dallas, Texas, 401 States General Life Insurance Bldg.: Tuesday.
Davenport, Iowa: Sometime in January and April.
Denver, Colo., 521 New Customhouse: 1st and 2nd Thursdays, 8 A.M.
Des Moines, Iowa: Sometime in March and June.
Detroit, Mich., 1029 Federal Bldg.: Wednesday and Friday.
El Paso, Texas: June 15.
Fairbanks, Alaska: Sometime in May.
Fort Wayne, Ind.: Sometime in February and May.
Fresno, Calif.: Sometime in March and June.
Grand Rapids, Mich.: Sometime in January and April.
Hartford, Conn.: March 15.
Honolulu, Hawaii, 502 Federal Bldg.: Monday through Friday.
Houston, Texas, 326 U. S. Appraisers Bldg.: Tuesday and Friday.
Indianapolis, Ind.: Sometime in February and April.
Jackson, Miss.: June 7.
Jacksonville, Fla.: April 23.
Juneau, Alaska, 6 Shattuck Bldg.: By appointment.
Kansas City, Mo., 3100 Federal Office Bldg.: Thursday and Friday, 8:30 A.M. to 1:00 P.M.
Klamath Falls, Ore.: Sometime in May.
Knoxville, Tenn.: March 22, June 21.
Little Rock, Ark.: February 1, May 3, 1:00 P.M.
Los Angeles, Calif., 849 So. Broadway: Wednesday, 9:00 A.M. and 1:00 P.M.
Louisville, Kentucky: Sometime in February and May.
Marquette, Mich.: May 10, 10 A.M.
Memphis, Tenn.: January 12, April 6.
Miami, Fla., 312 Federal Bldg.: Thursday.
Milwaukee, Wis.: Sometime in January and April.
Mobile, Ala., 419 U. S. Courthouse and Customhouse: Wednesday by appointment.
Nashville, Tenn.: February 3, May 3.
New Orleans, La., 608 Federal Bldg., 600 South St.: Monday through Wednesday; code tests Monday at 8:30 A.M.
New York, N. Y., 748 Federal Bldg., 641 Washington St.: Tuesday through Friday.
Norfolk, Va., 402 Federal Bldg.: Monday through Friday except Friday only when code test required.
Oklahoma City, Okla.: January 18, April 19.
Omaha, Neb.: Sometime in January and April.
Philadelphia, Pa., 1005 New U. S. Customhouse: Monday through Wednesday, code tests 8:30-10:00 A.M.
Phoenix, Ariz.: Sometime in January and April.
Pittsburgh, Pa.: Sometime in February and May.
Portland, Maine: April 11.
Portland, Ore., 201 U. S. Courthouse: Friday, 8:30 A.M.
Rapid City, S. D.: May 13, 8 A.M.
Roanoke, Va.: April 1.
St. Louis, Mo.: Sometime in February and May.
St. Paul, Minn., 208 Federal Courts Bldg.: Fri., 8:45 A.M.
Salt Lake City, Utah: March 10, June 9, 1:00 P.M.
San Antonio, Texas: February 9-10, May 4-5.
San Diego, Calif., Fox Theater Bldg.: Wednesday, by appointment.
San Francisco, Calif., 323-A Customhouse: Friday.
San Juan, P. R., 323 Federal Bldg.: Friday.
Savannah, Ga., 214 P. O. Bldg.: By appointment.
Schenectady, N. Y.: March 15-16, June 14-15.
Seattle, Wash., 802 Federal Office Bldg.: Friday.
Sioux Falls, S. D.: March 21, June, 20, 10 A.M.
Spokane, Wash.: Sometime in April.
Syracuse, N. Y.: Sometime in January and April.
Tampa, Fla., Room 201, 221 No. Howard Ave.: By appointment.
Tucson, Ariz.: Sometime in April.
Tulsa, Okla.: February 16, May 18.
Washington, D. C., 718 Jackson Place, N.W.: Tuesday and Friday, 8:30 A.M. to 5 P.M., Code tests 9:30 A.M. and 1 P.M.
Wichita, Kansas: Sometime in March.
Williamsport, Pa.: Sometime in March and June.
Wilmington, N. C.: June 3.
Winston-Salem, N. C.: February 4, May 6.

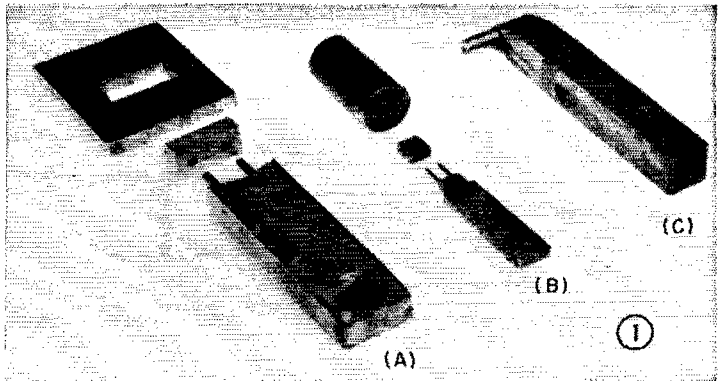
NOTE: Only General Class and Amateur Extra Class license examinations are given at FCC offices and examining points listed above. All examinations for Novice, Technician and Conditional Class licenses are conducted by volunteer supervisors.

(Continued on page 158)

A and B are completed die sets. The set at A has a die made from sheet steel. In B the die is made from steel rod. C shows the completed rivet setter described in the text. The extra hole is not functional.

Special Tools for Cleaner Jobs

BY C. E. MILLER,* W1HSI



That Professional Touch

IN the building of homebrew gear for the ham shack most amateurs strive to achieve the clean appearance of factory-built equipment. Often one of the chief hindrances in attaining this objective is the lack of special tools needed to do a proper job. The trend toward professional-looking construction has been helped a great deal recently by the appearance in wholesale houses of inexpensive hand tools outside the normal line, such as shears, hand brakes, nibblers and other aids of similar nature. Two problems which have received less attention are those of joining sheet metal (as in fabricating a chassis) and of making the small rectangular holes required for transistor sockets, certain types of connectors and other fittings.

Tools to do these jobs can be made quite easily with no more than a drill press and a small assortment of files. Of course, there is little point in spending two or three hours making a tool that will have only occasional use. However, the more ardent in the ranks should find these items well worth the time and effort required to make them.

Joining Sheet Metal

There is no question but that a spot welder is the ideal tool for putting a chassis together. However, steel and aluminum require welders of different types and most of us have access to neither type. Thus we normally resort to machine screws and nuts. These have the disadvantage of size and often require more than desirable clearances. The author has been using rivets in this application for some time now with very gratifying results. Flathead aluminum rivets (tapered head like the head of a flat-head screw) make the job easy and result in a nice clean appearance with a minimum of projection. The rivets are easy to obtain from most surplus outlets at reasonable cost. It was found expedient to standardize on a rivet approximately 0.1 inch in diameter for strength, and 1/2 inch long. They can be easily cut to shorter length if necessary with diagonal cutters.

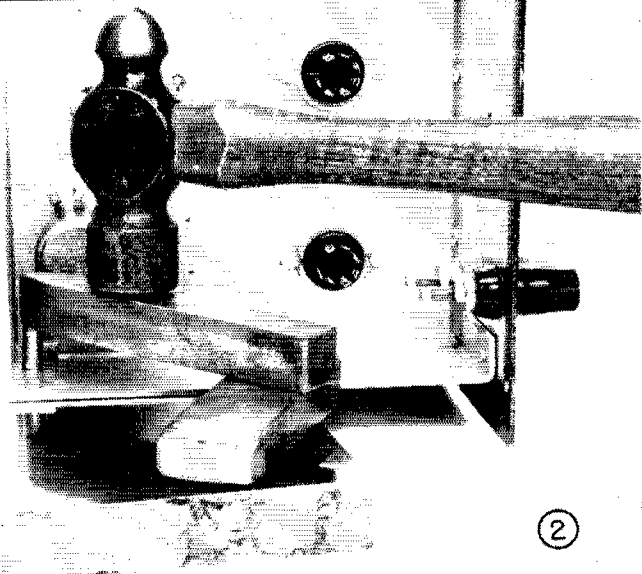
* Engineering Department, General Radio Co., West Concord, Mass.

An easily-made rivet setter is shown to the right in photograph 1C. The shank is a piece of 1/4-inch steel rod one end of which is turned down slightly to form a shoulder. This end is then forced into a hole drilled at one end of a 1/2-inch square steel bar which serves as a holder. The shank end of the holder is filed down to slightly more than the diameter of the shank so that it can be used in cramped corners, as shown in photograph 2. A conical depression is made in the business end of the shank by carefully locating its axial center and then cutting out with the end of a 1/4-inch drill. If a spherical burr of the right size is available, the conical depression can be transformed to one of spherical shape to give the finished rivet a more rounded appearance.

Using the Rivet Setter

The two pieces of material to be riveted together should be clamped to maintain alignment while the rivet holes are being drilled. The rivet holes should not be too snug since the rivet shank will expand as the rivet is being set. Any burr that remains after drilling should be removed. The holes should be countersunk slightly on one side to receive the rivet head, but the countersinking should not be deep enough to bring the head flush with the surface, since this may prevent the rivet from drawing up securely. On the other hand, if the countersinking is too shallow, most of the rivet head may be shaved off, resulting in a weak bond.

After the rivet has been put in place, the assembly should be turned over with the rivet head resting firmly on a flat metal surface while the shank is cut off with diagonal pliers. A little practice will show how long to leave the shank to get a clean result with your setting tool. This length is usually longer than one might at first expect. With the shank of the riveter against the cut end of the rivet, several light blows with a hammer against the shank end of the holder are usually sufficient to set the rivet. The head of the rivet will be forced to conform to the cavity made by the countersink, and any excess is easily carved off flush with a knife.



The rivet setter is designed so that it can be used in cramped quarters. This view also shows some of the completed rivetings.

Cutting Rectangular Holes

Making clean holes in a chassis is sometimes a problem. For round holes there are various punches, cutters and saws available which are quite satisfactory. Such is not the case for rectangular holes, although there is a limited choice of punches for making square holes. Making holes for transistor sockets is particularly annoying. In addition to the work of drilling and filing out the hole, it seems that if the fit is not perfect, the socket either won't go in at all or it falls completely through. The author has developed a very simple yet extremely effective punch for these holes. Two types are shown in photographs 1A and 1B. Both types consist of three parts — the punch with guide pins, a guide block, and the die. The main problem associated with rectangular punches is in maintaining accurate alignment between the punch and the opening in the die. Unless this alignment is accurate, both the chassis and the die may be mangled. The guide block assures this alignment.

In use, two holes are drilled for the guide pins. The ends of the pins are ground to points so that they may be used as a prick punch in accurately spotting the hole centers. With the guide pins inserted in the holes, the guide block is slipped over the pins on the opposite side of the chassis, and then the die is slipped over the guide block. If the die is of the type shown in photograph 1B, it should be placed on a firm flat surface when cutting the hole. If the die is of the flat-plate type, shown in photograph 1A, an opening must be provided underneath for the punch and guide block to pass after going through the die. With either style of die, a single sharp blow with a hammer on the punch end is all that is required to make a clean hole in aluminum of ordinary chassis weight.

Making the Punch

If a piece of bar steel having a cross section of

the same dimensions as the desired hole cannot be found, a piece of larger cross section may be ground and filed down. This was done in the case of the punch in photograph 1B.

A sufficient length should be trimmed down to allow the guide block to be made by cutting it from the end of the punch. This will assure that the punch and the guide block will have the same cross-sectional dimensions which is highly important. The length, or thickness, of the guide block should preferably be approximately the same as the largest dimension of the hole to be cut. This will make the broader sides of the block approximately square.

Before cutting the guide block off, the holes for the guide pins should be drilled, remembering that the holes must have sufficient depth to go well into the punch after the guide block has been cut off. After scribing the line where the cutoff is to be made, make a prick-punch mark on either side of the line to serve as a key in reassembly. With a handmade job like this, parts will seldom fit perfectly except with the original orientation. The pins should have a diameter no greater than half the width of the punch. Steel rod or even the shanks of old drills may be used for the pins. The pins should make a force fit with the holes in the punch. If the fit is so loose that the pins fall out, they can be tightened by flattening them slightly with a hammer and then forcing them into the punch. Prick-punching the sides of the punch, directly over the guide-pin holes, will also help. The guide block should slip over the pins with finger pressure. The holes may be reamed out, if necessary, to accomplish this. If the fit is too loose, the pins may be sprung apart a hair to provide a little friction. As mentioned previously, the pins should be ground to a sharp point before inserting them in the punch.

Particularly for the larger sizes of punches, cutting may be facilitated by filing the cutting face of the punch in slight V shape both laterally and longitudinally. This has been done with the punch in photograph 1A.

The fussiest part of the job is in making the die, although it is not too arduous since most of the cutting can be done on a drill press. The die can be made from sheet steel $\frac{1}{2}$ inch or more in thickness, as shown in photograph 1A, or of large-diameter rod as shown in photograph 1B. The hole outline is scribed on the face of the die and a series of holes is drilled within these boundaries. The remaining metal may then be removed by filing. With a good assortment of files,

this job isn't as difficult as it sounds. Care, of course, should be used when working close to the scribed line, and repeated trials with the punch should be made until a snug fit is achieved. When finished, the punch should pass freely through the die but with no noticeable slop. In the final fitting stage, the punch should be inserted as far as possible into the die. Then if the set is held to a light, the points where binding is occurring may be determined.

When rod stock is used for the die, a similar process is followed, but the bottom end of the die is drilled out with a large drill to within die thickness of the other end, as shown in the sketch of Fig. 1.

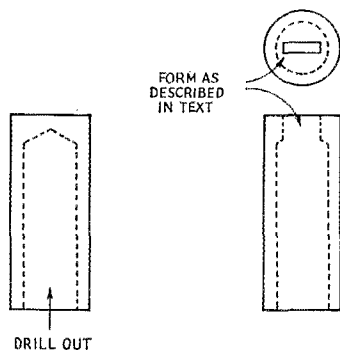


Fig. 1—Sketch showing how steel rod is drilled out before cutting the die opening. The drilled hole should have a diameter slightly greater than the longest dimension (diagonal) of the die opening.

Material

Although the use of hardenable steel might be desirable, the tools shown in the photograph were made of mild steel. This appears to be satisfactory for use on relatively soft materials. Neither punch shows much sign of wear and both are continuing to make clean holes after being used more than 100 times on aluminum. It is felt that the ideas presented here may be improved upon, and it is hoped that others may find these aids as useful as has the author. QST



January 1936

... 28-Mc. activity was at an all-time high, with 21 stations reporting working all continents. W6FQY did it on phone.

... George Grammer described a series of bread-board 28-Mc. rigs of medium power, and it's a good thing there was no TV in those days!

... W9NY won the award for the most valuable and consistent work in the development of the 10-meter band during 1934.

... Technical articles included design notes for speech amplifiers and construction particulars on some pocket-sized superregenerative receivers. One of the hints for experimenters this month showed how to feed a.c. to an antenna in order to melt the ice from it.

... The National Company pasted a real Christmas seal onto its ad on page 49 of every copy of this issue of QST.

Silent Keys

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

- W1CB, Leo H. Daykin, Burlington, Mass.
 K1COV, Harold T. Shervington, sr., Groveland, Mass.
 W2IBS, Ozelious Clement, Brooklyn, New York
 W2QQA, Richard V. Young, Rochester, New York
 K2UTU, Eugene D. Kunzler, Augusta, Ga.
 W3IID, David F. Danner, Lemoyne, Pa.
 W3KTZ, John S. Dickey, Meridan, Pa.
 W3LJO, Alton H. Goud, Willow Grove, Pa.
 W3ROA, Elmer Caldwell, Altoona, Pa.
 K4CPO, Jesse R. Pewitt, Nashville, Tenn.
 W4NW, Harold P. Danforth, Orlando, Fla.
 W4OEV, William H. Echols, Nashville, Tenn.
 K5HEU, Harry C. Fritz, San Antonio, Tex.
 W6ESR, Samuel A. Greenlee, Manhattan Beach, Calif.
 K7DIN, Robert L. Burnett, jr., Portland, Oregon
 W7SUQ, Henry A. Thornton, Seattle, Wash.
 W8BBO, Perrin J. Sines, Toledo, Ohio
 W8MIO, Robert B. Toaz, Detroit, Mich.
 K8NOW, Raymond J. McMahon, Detroit, Mich.
 W8TPT, James P. Fettig, Saginaw, Mich.
 W8YIN, M. P. Unger, Huntington Woods, Mich.
 W9JNP, Sheldon B. Deobler, Chicago, Ill.
 VE2AOK, F. Lefort, Iberville, Que., Canada
 VE3AVS, Dudley E. W. Ryder, Kapuskasing, Ont., Canada
 VE6EY, W. L. Careless, Edmonton, Alt., Canada
 VE6YE, George G. Sparks, Jasper, Alt., Canada
 VE7AR, S. V. Reith, Kamloops, B. C., Canada



Seeing the description of K1IJB's Nuvistor preamplifier in September 1960 QST fired up the interest of VE3DUU in trying to improve his 2-meter reception. But there were problems, not the least being that not a Nuvistor was to be had in the Toronto area. A few nights after his fruitless search VE3DUU was telling his troubles to K3BBO, Erie, Pa., on 6 meters. It turned out that the latter had a Nuvistor that he would be willing to donate to the cause.

Not a man to let an opportunity like this pass, the Jensen family were off on the long jaunt to Erie the next morning — in the rain. On the way back he stopped off in Buffalo to track down a socket for his treasure; no easy task, as sockets for Nuvistors were even scarcer than the little tubes themselves. But finally a socket was located, and VE3DUU hurried back home to spend the rest of the week-end laying out his preamplifier.

There was one more hitch: a small feedthrough bypass was needed, and there were none in the junkbox, so the project was delayed until the local radio stores were open again. Bright and early Monday morning, VE3DUU appeared at the parts counter and — you guessed it — he was greeted with: "Say, weren't you looking for Nuvistors a while back? We got some in Saturday!"

The World Above 50 Mc.

1215-1500 2300-2450 3300-3500 5650-5925 10,000-10,500 21,000-22,000 30,000-9

CONDUCTED BY SAM HARRIS,* W1FZI

WHILE we have been busy trying to instill the spirit of progress in you, we may have overlooked the fact that there is always more than one way to accomplish any given task. While I don't claim to be in complete agreement with the following remarks presented by John Zimmer (W2BVU/K1JIX), I must admit that they do represent a workable theory.

"The stability requirements imposed on transmitters and receivers for effective long-haul communications become prohibitive at frequencies much over 1000 Mc. It doesn't seem reasonable to expect that enough hams will ever be able to put crystal-controlled transmitters and receivers on even 2300 Mc. to make possible the kind of beyond-the-horizon weak signal work we are used to on 144, 220, and 432 Mc. The activity to date on the 2300-, 5650-, and 10,000-Mc. bands has attempted to imitate the lower frequencies but has fallen far short due to the low average transmitter powers and wide receiver bandwidths used. Pulse modulation, however, can provide performance similar to what we are accustomed to on the u.h.f. bands, but with equipment complexity which is less in many respects than what is now being used on 432 Mc. Why is this so? The reason is basically that the receiver bandwidth which gives the best signal-to-noise ratio for reception of a

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

pulsed signal is *wide* (the shorter the pulse, the wider the bandwidth). For a one microsecond pulse, the optimum bandwidth is about *one megacycle*. For such bandwidths instabilities in the transmitter or the receiver local oscillator which cause a frequency drift as great as 100 kc. have little effect on the signal-to-noise ratio.

"But exactly how does the signal-to-noise ratio which can be achieved with pulse modulation compare with a typical c.w. case? This can be accurately determined in a straightforward manner as follows.

"Assume we have a typical 220- or 432-Mc. station with a converter working into a communications receiver using an i.f. bandwidth of 1 kc. Assume also that by using the b.f.o. we are just able to detect a carrier, when the i.f. signal-to-noise ratio is unity (this is about the normal situation). Let's say the transmitter being heard is running one watt. Forgetting that pulse is illegal on 220 or 420 Mc. so that we can use the same antennas and converter noise figure, let's go to pulse modulation now such that the transmitter is putting out 1000 watts in one microsecond long pulses, and there are 1000 of these pulses transmitted each second. The result is, first of all, that the transmitter is still running an average power of one watt since $P_{ave} = 1000 \text{ watts} \times \frac{1}{1,000,000} \text{ seconds/pulse} \times 1000 \text{ pulses/sec.} = 1 \text{ watt.}$

"At the receiver, we must use an i.f. amplifier having a wider bandwidth which, for this case, will be one megacycle. The amount of noise getting through the receiver will now be 1000 times greater than the c.w. case where our bandwidth was 1 kc. The signal, however, is also 1000 times more powerful than before so that the pulse signal-to-noise ratio is also unity. The signal will again be just detectable when using the proper audio circuits (these are simple and will be described later). The fact that the signal is not continuous, but coming as pulses, does not make it harder to detect. The pulse modulation system, then, is capable of getting through as well as the c.w. technique in this example.

"Of course, it's possible to do much better with c.w. techniques by using narrower bandwidths before and after detection than in the case described here. But



Just to prove that the 7's have antennas, too. Reading from the bottom up, 50 Mc., 144 Mc., 220 Mc. This one belongs to K7GGJ.

the point is that until the amateurs can approach i.f. bandwidths of one kilocycle on the bands above 2300 Mc., pulse can give superior performance. The chances of enough amateurs being able to afford to put transmitters with this kind of stability on the s.h.f. bands to make things interesting is unlikely. It's safe to say, however, that any ham capable of putting 50 watts c.w. on 432 Mc. would be capable of putting an effective pulse system on 2300 Mc. or 3300 Mc."

Will ECHO Work for V.h.f. Men?

"Since the first talk of putting reflecting satellites into orbit around the earth, v.h.f. enthusiasts have pondered the question stated above. Educated guesses indicated that, at least for the 100-foot ECHO, trying to bounce a signal back to earth on amateur frequencies, with amateur power levels, and within the practical limits of antenna size for amateurs, was something of a lost cause. Within a few days of the launching Aug. 12 many hams made tests, on bands all the way from 7 Mc. up, for it is in the amateur tradition to try anything.

"There was a rash of 50-Mc. reports at first, but these were mostly charged off as resulting from the presence of the Perseid meteors in the first days of ECHO's swings around the earth. Tests on 144 Mc. and higher frequencies were practically without positive result. Various peculiar happenings on frequencies lower than 50 Mc. were too involved with other forms of long-distance propagation to be readily sorted out. Most of us were content to accept the logical conclusion that use of ECHO was a matter for people with many kilowatts, 85-foot dishes, and things like masers, at their disposal. But not everyone!

"W4ZBQ and K4KYL, Knoxville, Tenn., had noticed many times in the past that, though they are only a few miles apart, they could find beam headings that made their 50-Mc. signals inaudible at the other's station. A high ridge between them contributed to this, and the nulls in their 9-element Yagi were very deep. Thus they occasionally heard one another by P_2 back-scatter, aurora, and various other modes of long-distance propagation, with little or no direct signal. Would not this be a perfect setup for testing the reflecting qualities of ECHO?

"Beginning the night of Aug. 14, the two ran tests regularly at times when the satellite was in the right places. There were some false hopes raised by signal increases that turned out to be due to distant aircraft, aurora, meteors, and the like, but there were also what looked to be the real thing: weak signals on a frequency somewhat removed from that of the direct signal. Here was something to work on!

"By Thursday, Aug. 17, they had Doppler-shifted signals both above (satellite coming toward the receiver) and below (going away) the direct-path signal. Recordings have also been made of continuous combination of direct and

reflected signals (no b.f.o. on) which show steadily rising and falling beatnotes. Samples of the latter are on file at ARRL Headquarters and are presently being subjected to analysis.

"Reception of this kind was achieved several times during the fall. What makes this circuit work? The limited number of schedules thus far kept successfully does not rule out the possibility of some aiding propagation, such as aurora or sporadic-E ionization, but the character of the tape records we have here does not suggest this. We hope to have more on this soon, but meanwhile, we repeat our question: Will ECHO work for amateurs? You tell us! — E. P. T."

50-Mc. DX News

Because of the lack of high m.u.f., F_2 skip, etc., we are not receiving too much six-meter DX news. However, we do occasionally hear from some of the DX boys themselves — the ones that we in the U. S. consider DX, that is. One of these is Bob Crowe, VK6ZCF, who we still hope to work on 50 Mc. at least once during our lifetime. Bob informs us that quite a few of the six-meter boys in VK-land have been fiddling with transistorized transmitters, converters and receivers with amazing results. Principal transistors used are OC170 and OC171. VK6BU (member of the R.S.V.H.F. Society?) maintained contacts on six meters while in the hospital with a transistorized transmitter/receiver. It used a 50-Mc. O.T. crystal and push-pull output, superregenerator and $\frac{1}{4}$ -wave whip. VK6ZCF's efforts so far have been with a two-transistor superregen which was completed during a TE opening to Japan. (Nice timing!) Bob did hear the JAs although at times fade took them below audibility. As for an antenna — Bob is using a standard four-element beam fed with 300-ohm feedline, and according to him does a very good job of listening although only twenty feet high. Always nice to know what the DX is doing, if efforts are along the same lines all over the six-meter world.

Another of our friends from outside the U. S. A. is JA1AAT, Mitsuo, Saito, who contributes some information from Japan. He has worked sixteen countries on 50 Mc. — JA, W, CE, CX, DU, KG6, KH6, KL7, KR6, KX6, LU, PY, VE, VK, VK9 and ZL. Just a little different kind of DX from that we hear in the States, although personally we have heard some of 'em, such as W, VE, KG6, KL7, LU, PY, guess we'll have to listen harder to hear the rest of 'em. Mitsuo has worked seventeen states on 50 Mc. phone and c.w. during the 1957-58 seasons, one of his c.w. contacts being Delaware. As elsewhere on six meters, conditions are very poor during the present season between Japan and North America.

A DX note which makes us sit up and take notice is the news that ZK1BS, Cook Island, has been hearing TV stations in Hawaii with an RCA 8-inch portable TV tied to a Sterba curtain. Occasionally Channel 2 in Los Angeles overrides Channel 2 in Honolulu. Makes very good hearing for the 50-Mc. man in that area.

VE news comes from Geoff, VE2AIO, who is now doing quite a good job predicting openings. Geoff started keeping records the first part of 1960, on aurora and F_2 openings. Says the work is now paying off. Automatic keyer is now "in the works" at his QTH and will be used to keep schedules with VE8BY and also with G-land on 50 Mc. So far results have been negative across the ocean, although the m.u.f. was almost high enough on November 12. VE2UQ is now on 50 Mc. and feeling out the band with a Conset Communicator. VE3RM has bought a KWM-2 and is talking about adding s.s.b. to his 50-Mc. operation. VE2ABE is planning to operate on six meters during his trip to FP8BG next summer.

A prospective "first" on 50 Mc. could possibly be W9APM who has been assigned to Ellsworth Station which is located on the eastern side of the Filchner Ice Shelf in the Weddell Sea area. Ellsworth is just outside of the auroral belt and is located 40 meters above sea level. According to Dave it might not be too good a start for 50-Mc. activity as there are many, many "ifs" concerning the project. "If" the ice-breaker can get into the base, "if" they can obtain the equipment necessary for 50 Mc. operation, "if" they can then

get the equipment to the base when they do obtain it, plus a number of other smaller "ifs." However, Dave seems quite confident that he'll be able to overcome most of the "ifs" in some manner, and of course we're all hoping that he'll be successful.

K4DZP reports that during the last part of October Florida stations had an opening into Hawaii with 89 reports flying back and forth. He himself missed the opening of course, but his states worked total is 35. Report of an opening and back-scatter contacts in 6-land on October 25 (wonder if that was the same opening as the one reported by K4DZP?), with beams on South America. Fives and zeros were getting through. November 12 aurora was the granddaddy of them all in Fresno, according to W6BJI, although no DX was worked. LU3DCA and LU9MA came through to 6-land for nearly an hour on November 16, with good signals, although late in the day as compared to previous years. Gib says the *B_s* has been more prevalent in the last month (Oct. 5-Nov. 20) than in previous years with openings on Oct. 27, 29, Nov. 10, 14, and 18. On November 20 *F₂* rose as high as 46 Mc. and may have hit 50.17 for a few moments around 1045 PST. at that time Gib heard an unidentified signal with *F₂* fade for about 30 seconds.

Remember W7WLV in Salt Lake City, Utah, during the good ole six-meter skip days? Jay moved to California (where there are thousands of 50-Mc. stations) and received the call of K6BNR. He is hoping once again to get his old call W7WLV back on the air and this time from Empire, Nevada — his new location. Elevation at Empire is 5000 feet and Jay hears six-meter skip on an average of three times a week from the southeast and the northwest.

News from New York includes the following information from Bob Ragland, WA2MMW. About 0700 on November 14, W4TDZ was heard calling K1BHY; no response from the W4 when Bob called him. Shortly after 0730 a QSO between K4VZN, W4EFF and a W1 was heard in N. Y. C. but once again Bob could not break the frequency. At 0754 W4EFF finally heard WA2MMW and they exchanged reports, 5-3 to W4EFF and 5-6 to WA2MMW. Bob was also hearing a paging service from St. Petersburg, Florida and comments that these services below the 50-Mc. band make very good beacons to indicate progress of the m.u.f. Other suggestions from WA2MMW — tune more than the first 200 kc. of the band. W4EFF was worked on 50.55, W4EFF on 50.38. Final comment — more than 50% of the stations Bob has heard could easily increase their modulation by at least 10 db., so work on your modulator. K9EID has worked K1OCK for the second week, on schedule, with the band apparently dead otherwise. Bob is always on the air from 0130 to 0300 and from 0900 to 1800, and is open for c.w. or s.s.b. schedules during those periods. K7BBO reports aurora on Oct. 6 when W7EGN in Montana was worked by the Tacoma and Seattle boys. Oregon also worked during this aurora. Dave worked VE60H on c.w. On Oct. 18 he worked WA6FCU in Imperial Beach, California, about two miles from the Mexican border. Report on this same aurora from Kansas and K6GIC who heard Oklanoma, Iowa, Nebraska, Souta Dakota, Illinois and Missouri. Heard K9UDZ calling KL7FLC. (They left Fletcher's Ice Island approximately September 15.) Another aurora report from Don, W7RUX, Arizona, who worked W0LJR during the aurora of November 12, but heard nothing else on either six or two meters. Don usually operates 50.008 Sunday mornings between 0830 and 1000 A1ST with a kw. to an 11-element Spiralray. Stan, WA2BAH, reports new state worked during September 5th aurora was West Virginia. VE4CV was heard, and Stan called W7RT about 0100 with no luck. Heard K11ZM working W7RT. During September 9-11, Mike, K8PUT, was aero-mobile demonstrating amateur radio to the public at the Harvest Home Festival in Cincinnati, Ohio at an altitude of 8500 feet. Afraid that Mike will never be satisfied now until he can get his tower that high. Already has started a 65-foot tower which leaves 8435 feet to go. Good luck, Mike! From Slidell, La., comes the news that George Barry, W5UQR, worked XE1FU on October 1. Heard XE1PFE working the 4th call area and also heard XE1DDD. K5MHH worked into W0 land on October 19. WA6BFC reports working into Mexico on the 20th of October.

Clubs and Nets

In Central Arkansas v.h.f. activity is stirred by the Arkansas VHF Club and its associated nets, the Central Arkansas Emergency Net and its associated club. The

Arkansas VHF Club had its beginning back in 1956. Present president is Ike Roland, K5LOW. Six-meter club net covers from West Memphis to Conway and from Searcy to Texarkana, with relay coverage of the entire state. At present the net numbers 36 members on six meters and nine members on two meters, with 67% "check-in" on six and 50% on two. Frequency, 51 Mc., 145.05.

The Central Arkansas Emergency Net covers Pulaski County and the counties that touch it. At present there are 26 mobile units on n.b.f.m. with almost complete coverage of the area. "Check-in" about 75%. Frequency—50.25, 51 Mc.

In addition to the above there are two A.F. MARS Nets operating in the area on six meters. The 31.0 frequency is monitored almost constantly from 1700 'til 2300.

The Lynchburg Amateur Radio Club of Lynchburg, Va., has completed the second edition of its *Wide Band FM 6 and 2 Meter Nets*. Revised edition may be obtained by sending a stamped self-addressed business envelope to Thomas A. McKee, K4ZAD, 508 Oakridge Blvd., Lynchburg, Va.

220- and 420-Mc. STANDINGS

220 MC			420 MC.				
W1AJR.....	11	4	480	W9JCS.....	5	2	340
W1AZK.....	9	3	412	W9JEP.....	9	4	540
W1HDQ.....	11	5	450	W9OVL.....	6	3	475
W1OOP.....	12	4	400	W9UEP.....	4	4	605
W1RFU.....	15	5	480	W9ZEE.....	10	5	500
W1UTE.....	11	4	385	K0DGU.....	5	3	425
W2AOC.....	13	5	450	K0ITF.....	6	3	515
K2AXQ.....	8	3	230	K1HUK.....	1	1	2540
K2CBA.....	10	4	325	VE3AIB.....	7	4	450
K2DIG.....	4	3	140				
W2DWJ.....	15	6	740				
W2DZA.....	12	5	410	W1HDO.....	8	3	210
K2KLB.....	12	4	400	W1AIF.....	7	3	170
W2LRJ.....	10	4	350	W1RFU.....	7	4	410
W2NTY.....	12	5	300	W1OOP.....	10	3	390
K2PPZ.....	11	4	190	W1AJR.....	8	3	230
W2IAW.....	11	4	400	W1UTE.....	6	4	430
K2JQC.....	13	5	540	W2ADD.....	6	4	290
W3AHQ.....	3	3	180	W2BLV.....	12	5	360
W3EYF.....	10	4	296	W2DWJ.....	10	4	196
W3KKN.....	10	4	255	K2CBA.....	5	3	225
W3LCC.....	8	5	300	W2DZA.....	5	3	130
W3LZD.....	15	5	425	W2NTY.....	3	2	100
W3RU9.....	9	5	450	W2OTA.....	9	3	200
W3JGJ.....	13	5	400	K2UUR.....	7	3	175
W3ZRF.....	5	4	112	K2KLB.....	4	2	100
K4FFU.....	8	4	400	K3EOP.....	6	3	250
W4UYB.....	7	5	320	W3EYF.....	7	2	225
W4UMF.....	11	5	420	W3RU9.....	2	2	96
W4JGJ.....	3	2	1050	W4HEK.....	5	4	350
W5RCI.....	8	5	700	W4VVE.....	6	4	410
W6NLZ.....	3	2	2540	W5HTZ.....	3	2	400
K6GTG.....	2	1	240	W6GTP.....	1	1	180
W6MMU.....	2	2	225	W5RCL.....	9	3	600
K7IDV.....	1	1	250	W7LIL.....	2	1	180
K8AXU.....	10	5	1050	W8HCC.....	3	3	355
W8JGJ.....	9	5	475	W8HRC.....	2	2	250
W8LPD.....	6	4	480	W8JLQ.....	1	2	275
W8NRM.....	8	4	390	W8NRM.....	3	2	390
W8PFT.....	10	5	660	W8RQI.....	4	2	270
W8WVL.....	6	4	520	W8WVL.....	4	4	310
W8AAG.....	9	4	600	W9GAB.....	9	4	600
W9EQC.....	11	5	740	W9AAG.....	5	3	375

144-Mc. News

V.h.f.ers never fade away — they all move to Florida. Latest heard from is our old friend, W9EQC. Dick now resides at RD #1, South Venice, Florida, and is sporting a new call, K4DU. He is on 50 Mc. (250 watts), 144 Mc. (500 watts), and thinking about 432 Mc. Anyone need Florida on 220 Mc.? Drop Dick a line, maybe he's open for schedules.

The first reported instance of meteor scatter contact on 144-Mc. s.s.b. came from KILSY. Joe has been keeping skeds with Red (W4RFR) for several months. The Persids came through with just enough to tease them and on October 22 the Orionids provided a full exchange of signals. KILSY uses a pair of 4X250B's in the final with a home-made 13-element yagi 20 feet off the ground. Hank, W4RFR, is running 300 watts p.e.p. Their success is only the beginning of a new era in meteor scatter. Modern techniques in receivers and transmitters allow frequency setting accuracy sufficient to receive intelligence on the first burst. Voice techniques allow a much faster exchange of information. Congratulations are in order for both Joe and Hank, and I'll bet they are both open for skeds. Speaking of skeds, Gilles (VE2ABF) is looking for skeds on 144.340 Mc. He has been hearing VE1CB on 144.199 Mc. during aurora. Art (W5ML) notes that a little work on the input circuit of his 417A converter did wonders in eliminating TV hash from his 2-meter converter. (Suggest you try a coax filter,

2-METER STANDINGS

W1REZ	32	8	1300	W5YQO	4	3	1330
W1AZK	28	8	1205	W6WSSQ	14	5	1390
W1KCS	24	7	1150	W6WNT	12	5	1410
W1RFU	23	7	1130	W6NDNG	9	5	1040
W1AJB	23	7	1130	W6AJF	6	3	800
W1MMN	21	7	1090	W6ZL	5	3	1400
W1HDD	22	6	1020	K6GTF	4	2	800
W1IZY	20	7	1180	W6MMU	3	2	950
K1CRQ	19	6	800				
W1AFQ	17	6	920	W7JRJ	13	4	1040
K1AFR	17	5	450	W7CJM	15	2	670
				W7LHL	4	2	1050
W2NLY	37	8	1390	W7JJP	4	2	900
W2CXY	37	8	1360	W7JU	4	2	253
W2ORL	37	8	1320				
K2GQJ	35	8	1200	W8KAY	38	8	1020
W2BLV	29	8	1050	W8SDJ	35	8	990
K2LEJ	27	8	1060	W8PT	36	9	1260
W2BLV	20	8	1020	W8IFX	33	8	908
W2AMJ	25	6	960	W8LPC	34	8	1060
W2DWJ	23	6	860	W8SBJ	34	8	1040
K2HOD	23	6	950	W8RMH	32	6	910
W2PAU	23	6	753	W8GGH	32	8	1180
W2ALE	23	7	960	W8SVL	30	8	1080
W2LNG	23	8	1200	W8PHW	30	8	860
W2AMX	23	7	1090	W8LFD	29	8	850
K2CJH	22	6	940	W8WAT	29	8	850
K2LAC	22	6	1160	W8AJX	32	8	960
W2LVL	21	6	700	K8AXU	29	8	1050
K2KIB	21	5	900	W8NOH	26	8	975
W2eHX	20	6	750	W8DX	26	8	720
W2WZR	19	7	1040	W8LVC	25	8	800
W2UPH	19	7	880	W8WV	25	8	800
W2RQV	19	6	720	W8GFN	23	8	540
K2RLG	17	6	980	W8LCY	22	7	680
				W8ATN	21	7	610
W3RUE	33	8	1100	W8PTK	17	7	550
W3GKP	31	8	1180	W8NRM	17	7	550
W3SGA	31	8	1070				
W3LDF	30	6	1125	W9KRL	41	9	1160
W3KCA	28	8	1110	W9WOK	40	9	1170
W3RGA	31	7	700	W9GAB	34	9	1075
W3EPH	22	8	1000	W9AAG	33	8	1050
W3JYF	23	8	1070	W9EAM	31	8	850
W3LNA	21	7	720	W9ZIH	30	8	830
W3NKA	20	7	730	K9AAJ	27	8	1070
W3LZD	20	7	650	W9LVC	27	8	950
				W9BQC	27	8	820
W4HJQ	38	8	1150	W9PBP	27	8	820
W4IHK	37	9	1250	W9MII	26	8	910
W4ZFI	34	8	950	W9ZLL	25	8	700
W4LPU	34	8	1160	W9HPV	25	7	1030
W4AO	30	8	1120	K9AQF	24	7	900
W4MKJ	28	8	850	W9LFE	22	7	825
W4TAF	28	8	1110	W9KPS	22	7	690
W4VLA	26	8	1000	W9CUI	21	8	800
W4EQM	25	8	1040	W9ORV	20	7	850
W4WNH	24	8	850	W9PMN	19	6	800
K4EUS	24	6	765	W9LAF	18	7	800
W4JCJ	23	6	725	W9JFB	32	9	1180
W4VVE	21	6	720	W9SMJ	29	9	1075
W4RMU	20	7	1080	W9LJG	28	8	1030
W4YLA	20	7	1000	W9LFE	26	7	1050
W4IKZ	20	6	720	W9DDH	24	9	1300
W4OLK	20	6	720	W9RUF	23	7	930
W4AIB	22	7	880	W9INE	21	6	830
W4CPZ	18	6	650	W9TGC	21	7	870
W4RFB	18	7	820	W9RYG	20	8	925
W4MDA	17	6	750	W9IC	19	7	1245
K4YUX	18	8	830	W9MDX	19	6	1150
W4LNG	18	7	1080	W9JAS	18	6	1130
				W9AZT	17	6	1100
W5RCI	35	9	1245	K9AJQ	16	6	1120
W5AJG	35	9	1360	W9IFB	16	6	1100
W5LPU	28	9	1300				
W5LPG	25	7	1000	VE3DIR	30	8	1330
W5PZ	27	8	1300	VF3AI	28	8	1340
W5FYZ	25	9	1250	VE3PON	19	7	790
W5KTD	23	8	1200	VE3DR	17	8	1340
W5JWL	29	7	1150	VE3AGQ	18	8	1300
W5M	20	7	700	VE3HW	15	7	1350
W5FSC	12	5	1390	VE2AOK	13	5	550
W5HZE	12	5	1250	VE3BPB	14	6	715
W5CVW	11	5	1180	VE2ABE	9	4	580
W5NDE	11	5	625	VE7FJ	2	1	365
W5FY	10	3	1200				
W5SWV	10	3	800	KH6UK	1	2	2540
W5UNH	6	3	1200				

states may have some bearing on his going QRT at 2345 EST.) Southernmost report comes from W4TLV in Demopolis, Alabama (southern Ala.). W4TLV and W5RCI Mississippi both observed the aurora visually and on 144 Mc. W5AJG recorded number "30" on his meteor scatter contacts, with W0ENC, South Dakota (First Texas/S. Dakota contact). Leroy has his 32-element 432-Mc. antenna up and is ready to zip up to 432 Mc. at a moment's notice. W0ENC gave Ernie (W5FYZ) a new one during the Orionids. Ernie also observed the November 12 aurora in Louisiana. He heard Kentucky (W4HJQ) and Colorado (W6-MOX) but both were busy and faded out before he could nail them. Bob (W7PUA) notes considerable 144-Mc. activity in VE7 land; VE7MV, VE7BBA, VE7BBL and VE7EJ. Don (VE7BBL) runs 15 watts to a 24-element beam and has contacted W7JIP in McMinnville, Oregon, for a 300-mile haul. The 175-mile path from Bob's location at Eatonville to the VE7's is bridged under any conditions.

220 Mc. and Up

W4HHK logged W4TLV on 431,977 Mc. on the evening of November 17 (almost a new state). The rig at W4HHK's is a 4X150 doubler, crystal converter with 416B g.g. pre-amp and a single 13-element yagi at 50 feet. Paul is using a 1N21B diode mixer in his converter, and finds a s.n. improvement of almost 6 db. over his old 6J6 mixer. W4HHK maintains regular schedules with W5RCI and in addition to hearing W4TLV (Alabama) has been hearing W5-JWL and W4RFR. W5RCI has heard signals from W5AJG (425 mi.) and has worked W4HJQ (375 mi.). W5RCI is operating on 432.040 and Paul (W4IHK) is on 432.035 Mc. W3CGV has provided a new state (Delaware) for W2NTY on 220 Mc. and K2KIB on 432 Mc. This brings Larry, W2NTY, up to 12 states on 220 Mc., and Jim to 4 states on 432 Mc.

W6AZT reports four local efforts to get the APX-6 outfits on the air. This should result in some mountain topping next summer from Colorado and environs.

One-way schedules with W1BU transmitting and W8LIO receiving are continuing on 1296 Mc. Signals received at W8LIO are strong enough to rebroadcast on a lower frequency, so that adjustments on the transmitter are possible. So far no successful voice transmissions have been made. Both W8LIO and W1BU are open for 1296-Mc. moon-bounce schedules. W6NLZ has his 3CX100 A5 going on 1296 Mc. and reports good activity on 220 Mc., 432 Mc. and 1296 Mc. in the Los Angeles area. W9APZ reports interest in 1296 Mc. by the Purdue amateur radio club. They have obtained the use of an 8-foot by 20-foot parabola, and the help and advice of some of the faculty (plus machine shop facilities). (I might work a new state yet!) K0RAIQ calls our attention to the lack of information in the ARRL *Handbook* on the design of parabolas. WITQZ has written an article for *QST* on the construction of a suitable parabolic antenna, and it is scheduled for an early issue.

O. E. S. Notes

WA2BDT — No experiments in progress. Operation on six meters indicated normal six-meter conditions.

K4EUS — Working on 432-Mc. converter as per *Handbook*. 828B rig for six meters in "de-bugging" stage. Activity on 144 Mc. netted W1G CZ and W2RTO on November 6.

K2QGD — Active on 144-Mc. band.
WA2ANB — Caught Oct. 6 aurora, managing to contact VE2AX on 2 meters. Looking for skeds about 145 Mc.

K1CIG — Active on both six and two meters. Still working on transistorized six-meter walkie-talkie.

K1KUY — Replacing his beam which blew down in hurricane.

K1AII — Active on 144 Mc. Had good tropo contacts with W8KAY on September 6 and 7. Conducting pen recording tests on 50 Mc.

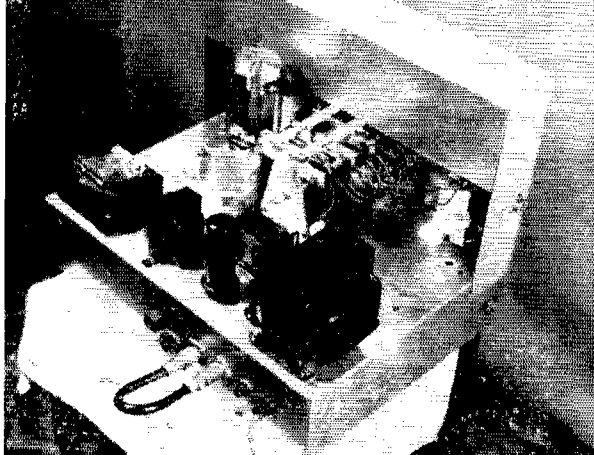
W1NKA — Active on six meters. Took his six- and two-meter beam down for hurricane, going back up higher than ever.

W8FZ — Starting construction on new 144-Mc. transmitter.

K8PBA — Active on 2 meters. Contacted VE2LI on October 6 aurora. Conducting experiments on 40 kMc. in conjunction with W8MNT.

W8PYQ — Working on new 220-Mc. converter. Using 6AM4's with diode mixer. Still holding skeds with W8PT 3 times a week. Anyone in the Michigan area please drop him a card for skeds.

Art.) Somehow Louie (W6MOX) has snuck up to 19 states on 144 Mc. This may not sound like much to someone from Ohio, but from Colorado —!!! Louie caught numbers 18 and 19 (W8PT, Michigan, and W8SDJ, Ohio) on the tremendous November 12/13 session. Band was open from sunset to sunrise for Louie. Jack (W8PT) upped his 144-Mc. total to 36 on this one. Band was open from Massachusetts to Colorado for him. He passes the following frequencies along for your help: W6AZT, Col., 062; K7HKD, Wyo., 127; K6AQJ, Kansas, 040; W5JSB, Okla., 069; and K1LSY, Mass., 096. Chif, W6AZT, was in there pitching on this one, he caught Michigan, Ohio, Kentucky and Illinois to bring his total up to 17. Paul (W4HHK) was in on this one too. He ran into a tropo opening at about 2300 which extended up to northern Ohio, but the auroral signals faded out at about 2200. (The fact that Paul has thirty-seven



Most hams intending to build a 50-Mc. rig for 300 to 500 watts input go for the hottest v.h.f. tube they can find. K8DJK went the other way and used the old familiar 813. With a little care in layout, this inexpensive tube can be made to do quite well on 50 Mc. and it pays an unexpected dividend: its relatively high output capacitance makes for low efficiency at harmonic frequencies, and thus less TVI. K8DJK's layout shown here has an exciter ending up with a 6146, under the chassis. Running 400 watts input, the 813 delivers 200 watts to the antenna in c.w. service on 50 Mc.

W8NOH — Active on 144 and 220 Mc. Working on 3-transistor crystal converter for mobile operation.

K8BGZ — Active on 6 and 2 meters. Working on 2 meter s.s.b. gear.

K3KLN — Active on 50 and 144 Mc. Working on 144-Mc. walkie-talkie.

K3BYD — Working on transistor rig for 6 meters. Active on both 50 and 144 Mc.

K3HDW — Holding meteor schedules on 144 Mc. Results so far very poor.

K4FJZ — Active on 50 Mc. Constructing 3-element cubical quad for 50 Mc. and 200 watt 4X150A grounded-grid linear.

W4CIN — Working on s.s.b. exciter for 50 Mc.

K4IQU — Working on 5-transistor handie talkies. Drop him a card to find out band.

K9OXY — Active on 144 Mc. Is transmitting daily from 1600 CST Monday through Friday and 1000 CST on Saturday and Sunday. Frequency approx. 50.03. Will appreciate any reports.

K9RRS — Active on 50 Mc. Working on new 500-watt final using pair of 811A's.

K9MWQ — Active on 144 Mc. Finished new two-meter transmitter using 829B's.

K4DZP — Working on sideband filter exciter for v.h.f. use. Parametric amplifier efforts temporarily stalled. Managed to contact Hawaii during month of October on 50 Mc.

W0IUF — Active on 50 Mc. Heard HC1FS on 50.001 during the October 6 aurora. Holding Saturday morning skeds with W8GNC, South Dakota. Would be interested in

trying m.s. skeds with stations east and west of Colorado. Working on 417A preamp for six meters.

K5UYF — Active on 50 Mc.

K8RWC — Working on 50-Mc. gear. Two-meter activity very poor in Kansas.

W7ZVY — Working on converting surplus gear for 50 Mc.

W5FPB — Reports W5BFH, K5UNK and K5WGE active on 220 Mc. in New Mexico.

K8GIC — Active on 50 Mc. and 144 Mc. Using BC342 as i.f.

K6GTG — Active on 144 Mc. Had skeds with W0ENC, W0MOX and W7JRG during Orionids Showers, good pings and bursts but no contacts. Had completed automatic 30-second sequencer for m.s. skeds. Drop card for details. Working on new pre-amp for 144 Mc. and up. Using the new 6CW4 nuvistors.

K6SIX — Poor conditions on 50 Mc. during last month but did hear one Texas station. Experimenting with capacity hat on 1/2-wave 6-meter whip.

K6TVC — Operates 50 Mc. around 2200 PST. Where is everybody? Just erected two-element ZL special up 18 feet. Any questions? Drop him a card.

W6FBA — Just completed two-meter transceiver for portable use.

K4KYL — Active on 50 Mc. Caught aurora opening on six and sporadic to midwest on the 16th and 19th of Oct. Still continuing tests Echo 1 reflected signals. Call CQ nightly on 145.015 Mc. with beam east, north, west and south. Starting time 2100 EST.

W4NVV — Heard HC1FS on 6th of October. Caught sporadic opening on the 19th when he worked K0YNW. Constructing 220-Mc. transmitter and converter.

W4GSH — Constructing s.s.b. exciter for v.h.f. bands.

W4ADH — Caught sporadic to Missouri on the 16th and into Texas on the 19th of October on 50 Mc. Working on s.s.b. exciter.

K6RCK — Active on 50-Mc. CD work. Monitoring 50 to 50.1 for c.w. activity. Working on 432-Mc. portable transceiver.

W6LEY — 50-Mc. activity, also 144 and 220 Mc. Building s.w.r. bridge for 220 Mc. Have 432 Mc. and 1296 Mc. converter working.

KN0YWD — Designing new 2-meter antenna.

W9PNE — 50-Mc. activity has netted ground wave signals most evenings but no skip signals during last month. Missed the aurora on the 16th of October.

W6BFC — Observed 50-Mc. band opening toward Mexico on 20th at 1130 p.m. PST. Rebuilding mobile equipment.

K1CRN — Picked up two new states on 2 meters in September 4 opening. Has 220-Mc. transmitter operating into a dummy load. Needs antenna.

W425AH — Working on 220-Mc. rig. Looking for skeds for the January contest. Looking for skeds with a Maine station on 144 Mc.

VE2ABE — Active on 144 Mc., looking for skeds.

W7EGN — Experimenting on home-made 50-Mc. receiver.

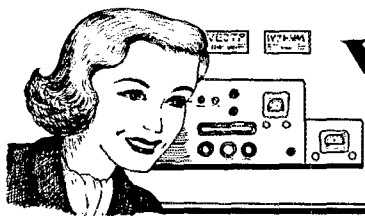
W5UQR — Worked XE1FU on 50 Mc. during October. Heard XE1PFE working fourth call area. Also heard XE1DDD. Active on two meters but needs antenna on mast before good results can be expected.

K8PUT — Working on new tower for v.h.f. beams. New 11-element 220-Mc. beam going on top of 60-foot tower. Looking for skeds. QST

Strays

The Southern California Chapter is sponsoring this year's Quarter Century Wireless Assn. Party scheduled for 1800 PST Feb. 10 through 1800 PST Feb. 12. Logs should show contact number, date, time, station worked, location, frequency, name and QCWA number. Frequencies: 3655, 7005, 14110, 21110, and 28110 kc. on c.w.; 3810,

3950, 7230, 14240, 21340, 28000, and 50200 kc. on a.m.; 3900, 3999, 7204, 7218, 7299, 14345, 21440, 28690, and 50210 kc. on s.s.b.; 7105, 14140, 21150, 28280 on RTTY. A plaque will be presented to the member who contacts the most QCWA members. Logs to: Ted Lowe, K6FH, 425 West Almond Street, Compton 3, Calif.



YL NEWS AND VIEWS

CONDUCTED BY ELEANOR WILSON,* W1QON

EXIT 1960, enter 1961, but for our records, first one backward glance at the state of YL activity during the old year.

Round the world, on the air, in traffic nets, in emergencies, in contests, in clubs, at conventions, on Field Day, the YLs were "there," imparting that unmistakable feminine touch to ham radio. In the year 1960 A.D., having already been accepted in the fraternity of amateur radio operators for almost half a century, it seemed safe to conjecture that YLs might stay in the ham picture in the next half century too, possibly until handom be done!

Without much doubt, most YLs consider themselves amateur radio operators first, and YLs second. This is as it should be. On the other hand, sex is a factor that does come in for consideration, otherwise this very QST department, for example, would not even have been initiated. (First things first, we always say. — Ed.) These truths being self-evident, just what did the girls do in the year 1960 — how did they contribute to the state of the art?

In the field of traffic a YL continued to reap the highest of BPL honors, as she has done consistently since 1949! It seems almost incredible that Mae Burke, W3CUI, attains the staggering traffic totals that she does month after month, year after year. In 1960, once again, she placed first or second on the BPL list each month. Other YLs who made BPL during 1960 are Georgianna Mezey, W2KEB; Bertha Willits, W0LGG; Irene Craft, W0KQD; Clara Reger, W2RUF; Lydia Johnson, W0KJZ; Jeri Bey, W6QMO; Gladys Biggs, K4LVE; and Louise Moreau, W3WRE. (Have we missed anyone?)

From JA1AEQ to W4VCB operating KL7 in the Aleutians to UA3CU to ZS6GH, the girls were heard on all bands. YL activity on six meters seemed noticeably heavier this year. More YLs switched to single sideband and some 25 nets for YLs only welcomed many new check-ins.

KN1MJA was licensed at the age of eight, and W1ZR continued to be active at eighty-four, having been licensed since 1919. W4LZI and K9PDS deflated the notion that a gal might be too busy with a family to get on the air. Frances and Gerry have 23 children between them. K0ILLM certified in the Connecticut Wireless Association high speed code program at 55 w.p.m. W6NAZ was awarded a plaque in appreciation of the four years of schedules she has maintained with the servicemen at KG1FR, Sondrestrom Air Force

Base. In conjunction with the 1959 Edison Radio Amateur Award a special citation was issued to W0KQD for her emergency and traffic organization. K4ICA and W4YFK and others were recognized for outstanding work in emergency situations.

Squaw Valley, Field Day, and the 1960 All-Woman Transcontinental Air Race all drew keen YL participation. Among the assorted hamfests and get-togethers the Third International Convention of the YLRL at Cambridge, Mass. in June, made the most history. Membership in some 25 YL clubs around the globe was growing and several new YL certificates were instituted. The annual YL contests, the YLRL Anniversary Party and YL-OM Contest, thrived.

Immediate prospects for 1961 included a new v.h.f. contest for YLs to be conducted by the YLRL and the answer to the question who will become the 1000th YLRL member.

In all 1960 was a fine year. A page is completed — a new one is turned up. May 1961 be of the best for everyone.

KEEPING UP WITH THE GIRLS

Clubs:

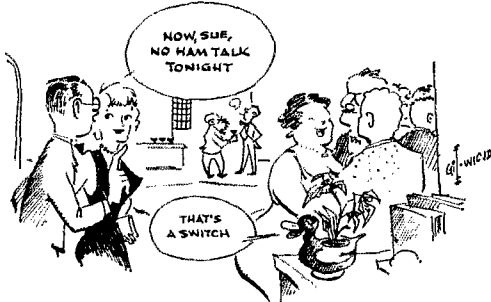
YLRL — W6PJU placed first in the club membership contest. K6EXQ was second, W8ATB third. All three were given Camellia Capital Chirp cookbooks. A special prize will be awarded to the YL who becomes the 1000th member of the club. Membership is up to 877.

Texas YL Round-Up Net — New officers are Pres. W5JCY; V.P. K5IMD; Secy.-Treas. W5ERH; Publicity W5IZD. K5GBX was named custodian of the club certificate. Up-to-date directories may be obtained for 25¢ from K5GBX. W5LGY will edit a club newsletter.

WRONE — New officers are Pres. W1HOY; V.P. K1ADY; Secy.-Treas. W1ZJ8; Membership K11JV; Hospitality K11CW. The club now has 134 members from the six N. E. states.

Georgia Peaches — New officers are Pres. K4LVE; V.P. K4DNL; Secy. K4L1V; Treas. K4BDZ.

PARKA — New officers are Pres. KL7DLA; V.P. KL7BJD; Secy. KL7CHV; Treas. KL7BLL. Evelyn Wikoff, W4VCB/KL7, is the new YLRL district chairman for Alaska. Ev's address is U. S. Station, Box 4, Navy 230, c/o Postmaster, Seattle, Wash.



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

Chicago YLRL Inc. — The club's Dark Eyed Queen's Certificate is now available to SWLs.

GAB — is the name of a new Texas YL club reported by K5BJU. The initials stand for "Gals in Brownfield." No further details yet.

Floridora YLS — New officers are Pres. K4RNS; V.P. K4RED; Treas. K4HSC; Secy. K4OYB; Certificate custodian W3WFD; Publicity K4PPX; Directory K4ANR; Historian W4HRC; Membership W4BIL.

Miscellany:

YLRL Pres. K5BNQ became member #96 of K6BX's Certificate Hunter's Club and the first YL to produce evidence of possession of over 50 amateur achievement awards. . . . In a letter to W4HIF, G6YL, Barbara, confided that she would like to see the whole amateur world give really low power a good try, "especially the U. S. A." . . . Marge, K4RNS, would like to start a six-meter YL net in the Gulf area. Anyone interested? . . . CR7LU, Lucia, is helping with QSL service for Mozambique. . . . WITRE, Barbara, of Topsfield, Mass. is operating as DL4ZO in Germany for a while. . . . VK1YL expects to be at Brookhaven, N. Y., for a year starting in March, the Atomic Energy Commission permitting. Denise's OM is VK1ATR. . . . W4MUY, Dot, whose gift shop at Ft. Meyers Beach, Fla., was almost a total loss after hurricane Donna's visit, has received over 200 cards and letters from well-wishing ham friends. . . . G3IYL's daughter Joan is now GM3NYG. Stella is a hospital X-ray technician in Essex, England. Joan works in Scotland, hence the GM call sign. . . . The first woman to hold the office, W4HYV, Babs, has been appointed Director of the Florida District MARS. . . . K5BJU, Harriett, writes "The Sideband, Sorority" each month in the *Sidebander* edited by Dot, K2NGB, and Irv, K2HEA. . . . K4LGU, Ruth, is general chairman of the Girl Scout Fair Committee for 1961 in her state. The fair, which will involve some 8000 girl scouts of Virginia, will be held during February in Fairfax. Claire, W4TVT, is co-chairman of the Pennant Committee for the same fair. . . . The Philippines' only YL, DU1AJ, operates 14 c.w. and phone. Aleli works as a technician in a Manila



The new Vice President and Secretary of the YLRL for 1961 addressed some 35 YLs gathered for the annual Fall luncheon of the Women Radio Operators' of New England at Framingham, Mass. on Nov. 5. On the left, Vice President Onie Woodward, W1ZEN; Secretary Blanche Randles, K1IZT, is on the right. (photo courtesy K1EKO)



Work six members of the Bay Area YLRC of San Francisco and you will receive the club's new Mermaid Certificate. Esther Given, W6BDE, displayed the certificate at the ARRL Pacific Division Convention at San Mateo, which was attended by about 35 YLs. (photo courtesy W6USE)

electronics firm. . . . Lois, ex-KA2YL, is K4CXJ/Ø, 785 Radar Sq. Finley AF Sta., No. Dakota, and will be glad to confirm her past KA contacts from there. . . . The new call of W1TUD is WA2OKJ. Alice's OAI accepted a new FCC monitoring assignment in Western N. Y. state. . . . Ex-W5EGD, 1960 YLRL V.P., is now K3NLU. Lillian's new address is 923 Kent Ave., Baltimore 28, Md.

More YLRL Certificates

Two more certificates issued by the YLRL can be added to the list of YL certificates and awards available, as published in last month's column.

The Continuous Membership Certificate is issued to any YL who has been a member of the YLRL for 5, 10, 15, or 20 years. Send request giving year which you joined YLRL to custodian Bettie Mayer, K7BED, 2015 S.E. Grand Ave., Portland, Oregon.

The YLRL Affiliation Certificate is issued to YL clubs only. Those YL clubs with at least 50 per cent of their members belonging to YLRL are eligible. Send request with membership list to current YLRL secretary.



Maine YLs are still fairly scarce, but here's an active one. Peggy Harnois, K1GSF, of Westbrook, is on 75 and 10 phone and is a regular of the Cumberland Co. Emergency Net. Peggy, who operates from a wheel chair, recently provided ham radio with some nice publicity via a state-wide TV program.

Howdy Days Results

From outgoing YLRL Vice President Lillian Beebe, K3NLU, come the following results of the 1960 YLRL Howdy Days contest. Harryette Barker, W6QGX, worked the greatest number of YLRL members (52), and Doris Anderson, K5BNQ, worked 22 non-YLRL members. Two points were given for each YLRL member worked; one point for each non-YLRL member. W6QGX will receive either a YLRL pin or club stationery. K5BNQ will receive one year paid membership in YLRL.

Station	YLRL Members Worked	Non YLRL Members Worked
W6QGX	52	7
K4RNS	44	18
K5BNQ	43	22
K5YTB	43	18
W4HWR/2	28	6
W6DXI	26	1
W6GCCR	23	3
K8LHF	21	3
W1ZJN	20	3
K6QQD	18	0
K0HEU	15	1
W5RFK/2	14	4
W7NJS	12	10
W6RVU	12	5
K2TDG	9	3
K1EKO	7	2
K1ADY	3	4

Coming Events

Floridora YL Week — Jan. 8-15, 1961, conducted by the Floridora YLs of Florida. Work as many as possible of the 82 members. The club certificate is awarded for contact with 10 members for U. S. operators, 5 for others.

YL-OM Contest — sponsored by the YLRL Phone section Feb. 25-26; C.W. section March 11-12. See rules below.

TWELFTH ANNUAL YL-OM CONTEST of the YLRL

PHONE Contest —

Starts: Saturday, Feb. 25, 1961, 1:00 P.M. EST
Ends: Sunday, Feb. 26, 1961, 12 Midnight EST

C.W. Contest —

Starts: Saturday, March 11, 1961, 1:00 P.M. EST
Ends: Sunday, March 12, 1961, 12 Midnight EST

ELIGIBILITY: All licensed OM, YL, and XYL operators throughout the world are invited to participate.

OPERATION: All bands may be used. Cross-band operation is not permitted.

PROCEDURE: OMs call "CQ-YL". YLs call "CQ-OM".

EXCHANGE: QSO number, RS or RST report, name of state, U. S. Possession, VE district or country.

SCORING: (a) Phone and c.w. contests will be scored as separate contests. (b) One point is earned for each station worked, YL to OM, or OM to YL. A station may be contacted no more than once in each contest for credit. (c) Multiply the number of QSOs by the number of different states, U. S. Possessions, VE districts and countries worked. Maryland and District of Columbia count as one state. (d) Contestants running 150 watts input or less at all times may multiply the result of item (c) by 1.25 (low power multiplier.)

LOGS: Copies of all phone and c.w. logs, showing claimed score, must be postmarked not later than March 31, or they will be disqualified. Please file separate logs for each mode of operation. Send logs directly to YLRL Vice President Onie Woodward, W1ZEN, 14 Emmett St., Marlboro, Mass.

AWARDS: YL — First Place Phone — Cup
First Place C.W. — Cup
OM — First Place Phone — Cup
First Place C.W. — Cup

The winner of the phone cup is also eligible for the c.w. cup. Certificates will be awarded to high place phone and c.w. winners in each district, U. S. Possession and country.

YL NETS AND ROUND TABLES

C.W.	Freq.	Day	Time	Name and NCS
	3750	Monday	1200 CST	Lark, W9MYC
	7150	Wednesday	0930 CST	K0EDH
	7104	Thursday	0900 EST	K4CZP
	50,160	Thursday	2000 EST	K4PPX
	7185	Friday	1330 EST	KN4ANR
Phone	Freq.	Day	Time	Name and NCS
	3890	Monday	1500 PST	Monday YL, W7HHH
	7225	Monday	0900 EST	Bustle, K41FF
	7235	Monday	0900 MST	Clothes Line, K0MNI
	28,800	Monday	2000 EST	WRONE, W1RLQ
	3900	Tuesday	0830 EST	Blue Ridge, K4CZP
	29,130	Tuesday	1300 EST	Hairpin, K6JPY
	51,000	Tuesday	2000 EST	R.I. YL, W1GSD
	3900	Wednesday	0830 EST	Yankee Lassies, K11JV
	3900	Wednesday	0830 CST	Welcome, W8ATB
	7220	last Wednesday	1100 PST	Rotate NCS
	14,260	Wednesday	1300 CST	SSB, K5BJU
	21,390	Wednesday	1300 CST	Cross Country, KZ5VR, W0ZWL
	146.1 Mc.	Wednesday	1900 PST	L.A. YL, K6BUS
	3915	Thursday	2000 PST	Chirp, K6HHD
	7215	Thursday	0900 EST	Friendly Forty, W3UUG
	7235	Thursday	1000 CST	Texas YL Round-up, K5BWM
	7260	Thursday	0900 EST	Georgia Peach, K4DNL
	14,240	Thursday	1400 EST	Tangle, K0EPE
	7250	Friday	0900 PST	Roundtable, W6QGX
	29,000	Friday	2200 CST	LARK, W9BCA

Strays

If you have any eyelets left over after applying K8MIME's cure for rig fever (*QST*, September, 1960, p. 49), you can use them for a trick that some set manufacturers employ. If the eyelets are set carefully, you'll get a neat hole in the chassis which has no raw edges; in a pinch this will be as good as a rubber grommet for feeding leads through without danger of chewing up the insulation. — W2QPQ

During October W4GPE spent a night at a motel in North Carolina, and discovered that of the 15 cars parked there, two other amateurs were also registered. So W4GPE, K3DHM, and W8RIM had a private little hamfest of their own.

W7GHM would like to hear from any hams who passed their Extra Class test while 16 or younger.

Last August (page 78) we asked for comments on a new type of binding that we tried in the 1960 *Handbook*. We received letters from less than one tenth of one per cent of the people who bought 1960 *Handbooks*, but these comments were very helpful for our future planning. Our 1961 *Handbook*, which is currently being printed, will go back to a type of sewed binding which is almost indestructible.

January 28 through February 12

Tenth ARRL Novice Roundup Competition

THIS is a contest of, by, and for the Novice amateur. The Roundup of Novices begins on January 28, 1961 at 1800 local time. Here's how it goes. Novices are to contact as many other Novices and non-Novices as possible, exchanging QSO number and section. Operating, listening, and logging time must not exceed 40 hours. The contest runs through February 12 at 2100 local time. To get on the bandwagon, just call "CQ NR" or answer such a call.

Scoring

To obtain the final score simply add the total number of your NR QSOs to the highest w.p.m. from your Code Proficiency certificate. Multiply this sum by the number of *different* ARRL sections (page 6) worked during the contest. A check of last year's scores shows that having a CP award determined in some cases who was a section winner, as the scores came that close. So let a word to the wise be sufficient. Besides, what a terrific way to get that code speed up.

Novices should keep a close eye out just above and below the Novice frequencies (3700-3750 kc.; 7150-7200 kc.; 21,100-21,250 kc.; 145-147 Mc.) for the higher power Generals who will be calling outside the Novice bands to help cut down the sure-to-be QRM.

How To Participate

KN5ZMU in the New Mexico section hears KN0VMG in South Dakota calling CQ NR. A correctly negotiated QSO would go something like this:

Sample log form that must be used by all contestants.

STATION KN5ZMU — SUMMARY OF CONTACTS NOVICE ROUNDUP								
Band	Time on or off air	Date, Time of Contact	My NR Sent	My Section	Hrs NR Rcvd	Hrs Call	Hrs Section	Number of each new Section as worked
80	1801	Jan. 28	1	N. Mex.	1	KN5YAA	N. Tex.	1
		1807	2	"	1	KNSOOK	Mich.	2
		1850	3	"	9	W1AW	Conn.	3
40	1915	1920	4	"	6	WV2GQZ	N. N. J.	4
		1930	5	"	5	K2ELU	E. N. Y.	5
		2020	6	"	2	KN7JCA	Wash.	6
15	1200	Jan. 29	7	"	8	K1MOT	Conn.	—
		1215	8	"	12	K7DVT	Utah	7
		1232	9	"	4	KN9SXV	Ill.	8
		1240	9	"	4	KN0VMG	Kans.	9
		1258	10	"	4			

Total operating time: 3 hours 18 min.
Bands used: 80, 40 and 15

No. contacts: 10
CP credit: 10
No. sections: 9

Claimed score: 10 contacts plus 10 CP = 20 × 9 (sections) = 180
I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is true and correct to the best of my knowledge.

Signature:
Address:

ROUNDUP PERIOD

Starts	Ends
Jan. 28	Feb. 12
6:00 P.M.	9:00 P.M.
Local Time	Local Time

CQ NR CQ NR CQ NR DE KN0VMG
KN0VMG KN0VMG K
KN0VMG KN0VMG DE KN5ZMU
KN5ZMU KN5ZMU AR
KN5ZMU DE KN0VMG R HR NR 3 SDAK
BK
KN0VMG DE KN5ZMU R HR NR 5
NMEX BK
KN5ZMU DE KN0VMG R TNX ES 73 SK
DE KN0VMG

That's all there is to it — another point and possibly another section added to your score.

Study the rules below carefully, and drop a line to the ARRL Communications Dept. requesting the free log forms. Good luck in the NR. Don't miss this golden opportunity to *really* have fun!

Rules

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

2) *Time:* All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but must not exceed 40 hours total.

3) *QSOs:* Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80- 40- 15- or 2-meter bands. Crossband contacts are not permitted. C.w. to phone, c.w. to c.w., phone to phone, phone to c.w. contacts are permitted. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section.

4) *Scoring:* Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this QST) worked during the contest is the "section multiplier." A fixed scoring credit may be earned by entrants who hold ARRL Code Proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of qualifying run from W6OWP, January 5 or February 1, or from W1AW, January 20 or February 11. CP credit equals the w.p.m. speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting:* Contest work must be reported as shown in the sample form. Reporting forms and a map of the

(Continued on page 154)

1961 ARRL International DX Competition

Phone: Feb. 3-5 and Mar. 3-5;
C. W.: Feb. 17-19 and Mar. 17-19

CONTEST TIMETABLE

Phone Section:

Time	Starts	Ends
GMT Feb. 3	2400	Feb. 5 2400
AST Feb. 3	2000	Feb. 5 2000
EST Feb. 3	1900	Feb. 5 1900
CST Feb. 3	1800	Feb. 5 1800
MST Feb. 3	1700	Feb. 5 1700
PST Feb. 3	1600	Feb. 5 1600

The second period starts at these same hours Mar. 3.

The second period ends at these same hours Mar. 5.

C. W. Section:

GMT Feb. 17	2400	Feb. 19 2400
AST Feb. 17	2000	Feb. 19 2000
EST Feb. 17	1900	Feb. 19 1900
CST Feb. 17	1800	Feb. 19 1800
MST Feb. 17	1700	Feb. 19 1700
PST Feb. 17	1600	Feb. 19 1600

The second period starts at these same hours Mar. 17.

The second period ends at these same hours Mar. 19.

ATENTION DXers! The 1961 ARRL DX Contest is on the way. This gives the DX stations a chance to complete states for the WAS certificate as well as put their operating skill to the test. U. S. A.-Canada stations will be looking for new countries for DXCC, of course, besides proving their skill in working DX. This 27th ARRL International DX Competition will be held over four week ends, two for phone and two for c.w. Of course, the phone contest is for all brands of voice like s.s.b., a.m., n.b.f.m. etc. Will this be the year the sideband boys out-score the a.m. crew? See above for dates and times.

The rules are unchanged from last year with DX stations out to work as many W-K-VE-VO-KH6-KL7 stations as possible and U. S. A.-Canada stations on the watch for DX contacts.

Certificates are awarded to the top single-operator phone and c.w. scorer in each country and ARRL section. A special category recognizes multiple-operator stations in sections and countries from which at least three such entries are received. Also within ARRL-affiliated clubs, single-operator members may compete for certificates for the highest c.w. and phone efforts. A gavel will again be awarded to the club which compiles the highest aggregate score.

The award and scoring system is designed to encourage the widest use of our bands; so flexibility of operation is the thing (no certificates are offered for one-band work). Repeat QSOs on additional bands are permitted. For example, when W3ECR and G4CP exchange contest information on 10, 15, 20, and 40 meters, the contact-point total, multiplier, and score rise for both entrants. For the DX, the multiplier is the

sum of the U. S. A.-Canada licensing areas worked per band, while the W/VE multiplier consists of the sum of different countries (see ARRL Countries List, p. 80) contacted per band. No credit for W/VE-to-W/VE QSOs is allowed.

It is suggested that W/VE c.w. entrants refer to this tabulation in indicating states and provinces. Overseas competitors may use it as a check-off list of states and provinces and for logging abbreviations.

W1, K1 — CONN MAINE MASS NH RI VT
W2, K2, W12 — NJ NY
W3, K3 — DEL MD PA DC
W4, K4 — ALA FLA GA KY NC SC TENN VA
W5 — ARK LA MISS NMEX OKLA TEXAS
W6, K6, W16 — CAL
KH6 — HAWAII
W7, K7 — ARIZ IDAHO MONT NEV ORE UTAH
WASH WYO
KL7 — ALASKA
W8, K8 — MICH OHIO WVA
W9, K9 — ILL IND WIS
W0, K0 — COLO IOWA KANS MINN MO NEBR
NDAK SDAK
VE1 — NB NS PEI
VE2 — QUE
VE3 — ONT
VE4 — MAN
VE5 — SASK
VE6 — ALTA
VE7 — BC
VE8 — NWT YUKON
VO — NFLD LAB

U. S.-Canadian amateurs have quotas on c.w. (see rule 10) but none on phone. DX amateurs have no quotas; they will QSO as many stations as they can in the 21 W(K) and VE/VO licensing areas on each band.

Be sure to keep a neat and careful log. Send a copy to ARRL, *in the form shown*, at the conclusion of the contest. It must be postmarked by April 28, 1961, to be eligible for awards and QST listing. All reports are welcome. Convenient log sheets are now available free on request from the ARRL Communications Dept.

EXPLANATION OF DX CONTEST EXCHANGES

Stations in U. S. and Canada Send:

	RS or RST Report of Station Worked	Your State or Province (or Abbreviation)
Sample (c.w.)	579	ORE
Sample (phone)	57	Oregon

Stations Outside U. S. and Canada Send:

	RS or RST Report of Station Worked	Three-Digit Number Representing Your Power Input
Sample (c.w.)	579	075
Sample (phone)	57	500

Sample of report form that must be used by W/VE c.w. participants. When a station is worked for less than the maximum number of points allowed, the additional contact to make up the points not earned in the first contact should be entered at the bottom of the sheet. Canadian entrants should allow two blocks for each country, but may record no more than eight contacts therein. A separate set of sheets should be used for each band.

Rules

- 1) **Eligibility:** Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
- 2) **Object:** Amateurs in the United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.
- 3) **Conditions of Entry:** Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Award Committee.
- 4) **Entry Classifications:** Entry may be made in either or both the phone or c.w. sections; c.w. scores are independent of phone scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating functions. Multiple-operator stations are those obtaining assistance, such as from "spotting" or relief operators, or in keeping the station log and records.
- 5) **Contest Periods:** There are four week ends, each 48 hours long; two for phone work and two for c.w. The phone section starts at 2400 GMT, Friday, February 3 and Friday, March 3, ends 2400 GMT, Sunday, February 5 and Sunday, March 5. The c.w. section starts at 2400 GMT, Friday, February 17 and Friday, March 17, ends 2400 GMT, Sunday, February 19 and Sunday, March 19.
- 6) **Valid Contacts:** In the phone section, all claimed credits must be made voice-to-voice. In the telegraph section, only c.w.-c.w. contacts count. Crossband contacts may not be counted.

LOG, 27th A.R.R.L. INTERNATIONAL DX COMPETITION					
Call.....		ARRL Section.....			
Band 14		Sheet 1 of 2			
Band .. Mc.		Sheet .. of ..			
Country	Station Worked	Date	Time (GMT)	Sent	Received
France	F8VJ	2/18	1300	589CONN	479075
	F9ZF	2/18	1345	569CONN	579080
England	G2CP	2/18	1306	589CONN	469150
	G4HJJ	2/19	1245	579CONN	469125
	G2KP	2/19	1255	569CONN	579100
	G3DC	3/18	1430	469CONN	559100
	G6QT	3/19	1822	579CONN	589125
Germany	G5ABG	3/19	1851	469CONN	459075
	DJ2HC	2/18	1315	559CONN	449050
	DL1BZ	2/19	1149	469CONN	559080
	DJ2KR	3/18	1502	559CONN	559015

Sample of report form that must be used by W/VE phone entrants and all participants outside U. S. and Canada, phone and c.w. This example is a U. S. A. phone log. Foreign competitors, of course, would have reverse information in the "Sent" and "Received" columns; their "Received" column would show exchanges like "579CAL," "589ONT" (or, on phone, "46 Vermont," "58 Georgia," etc.), indicating signal reports received and different states and provinces worked; their "Sent" column would carry signal reports and power indicators transmitted.

LOG, 27th INTERNATIONAL DX COMPETITION													
Sheet 1 of 1		Call..... ARRL Section..... or Country.....											
Date & Time (GMT)	Station Worked	Country	Record of New Countries for Each Band							Exchange		Points	
			1.8	3.5	7	14	21	28	50	Sent	Received		
Feb. 4 1315	UR2BU	Estonia								1	56 Maine	57080	3
Feb. 5 1300	PA0HBO	Netherlands									58 Maine	47075	3
1306	G3DO	England						1			58 Maine	46150	3
1345	PA0WWP	Netherlands						2			56 Maine	59080	3
2030	LU1BN	Argentina							3		58 Maine	57750	3
2310	VP9L	Bermuda					1				57 Maine	56050	3
Mar. 4 1020	ZL1NG	New Zealand						2			58 Maine	58075	3
1035	ZL1MQ	New Zealand								1	47 Maine	46100	3
1105	VK3MX	Australia								2	46 Maine	45100	3
Mar. 5 0925	EA3JE	Spain						3			57 Maine	57050	3
1245	G2DYV	England							3		56 Maine	46125	2
1255	G3ACC	England							3		56 Maine	57100	3
1350	G2DYV	England							3		57 Maine	57100	1
2320	YN4CB	Nicaragua					4				58 Maine	58500	3

7) *Exchanges:*
 a) *Amateurs in U. S. and Canada* will transmit a three-figure number, representing the RST report, plus their state or province. (The latter may consist of an appropriate abbreviation.) Phone participants will transmit a two-figure number consisting of the readability-strength report plus the state or province. *Example:* W6YY might transmit "579CAL" on c.w., "57 California" on phone.

b) *Amateurs outside W (K) and VE/VO* will transmit six-figure numbers, each consisting of the RST report plus three "power" numbers; the power indicator will represent the approximate transmitter power input. Phone contestants will transmit five-figure numbers, each consisting of a readability-strength report and the three "power" numbers. *Example:* VK2GW, with 100 watts input, might transmit "569100" on c.w., "56100" on phone. If the input power varies considerably on different bands, the "power" number should be changed accordingly.

8) *Scoring:*

a) *Points:* One point is earned by a W (K) or VE/VO station upon receiving acknowledgment of a contest exchange sent, and two points upon acknowledging an exchange received. Two points are earned by any other station upon receiving acknowledgment of a contest exchange sent, and one point upon acknowledging an exchange received.

b) *Final Score:* W (K) and VE/VO stations multiply total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of W (K) and VE/VO licensing areas worked on one band plus the number of W (K) and VE/VO licensing areas worked on each other band.

Countries will be those on the ARRL Countries List. There are 21 licensing areas: 12 in the United States (W1-0, KH6, KL7), 9 in Canada (VO, VE1-VE8). [See Countries List on p. 80 — Eb.]

9) *Repeat Contacts:* The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.

10) *Quotas:* The maximum number of points per country per band which may be earned by W, K, KL7, KH6 stations in the c.w. section is 18, and contacts made on the same band with the same country after the quota is filled will not count. Thus complete exchanges with 6 stations in one country on one band fill the band quota for that country. The maximum number of points per country per band which may be earned by VE/VO stations in the c.w. section is 24, and contacts made on the same band with the same country after the quota is filled will not count. Exchanges with 8 stations in one country on one band are thus permitted Canadian participants. There is *no quota* for stations in the c.w. section *outside* of the U. S. and Canada. There is *no quota* for any stations in the phone section.

11) *Reporting:* Contest work must be reported as shown in the sample forms. Each entry must include the signed statement. Contest reports must be mailed no later than April 28, 1961, to be eligible for QST listings and awards. All DX Contest logs become the property of the American Radio Relay League and none can be returned.

12) *Awards:* To document the performance of participants in the 27th ARRL International DX Competition, a full report will be carried in QST. In addition, special recognition will be made as follows:

a) A certificate will be awarded to the high-scoring single-operator phone and to the high-scoring single-operator c.w. entrant in each country (as shown in the ARRL Countries List) and in each of the mainland U. S. (plus Alaska and Hawaii) and Canadian ARRL sections (see page 6 of any

(Continued on page 154)

Sample of summary sheet that must accompany all reports.

SUMMARY, 27th A.R.R.L. INTERNATIONAL DX COMPETITION

.....Entry Call.....ARRL Section.....or Country.....
 (C.W. or Phone)

Name.....Address.....

Transmitter Tubes.....Power Input.....

Receiver.....Antenna(s).....

(Logs from W(K) and VE/VO show number of foreign countries worked. Logs from other countries show number of U.S.A. and Canadian call areas worked.)

Bands	1.8 Mc.	3.5 Mc.	7 Mc.	14 Mc.	21 Mc.	28 Mc.	50 Mc.	Total
No. Countries QSO'd		2		4		3	1	10 ¹
No. of Cont. cts		2		4		6	1	13

Number of Different Countries Worked.....Number of Hours of Station Operation.....

Assisting Person(s): Name(s) and Call(s).....

39² 10 390
 (Points) X (Multiplier) = FINAL SCORE

Participation for Club Award in the.....(Name of Club)

I certify, on my honor, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my belief. I agree to be bound by the decisions of the ARRL Award Committee.

Operator's Signature and Call

¹ Figure in this box is multiplier.
² Count 3 points per completed QSO; see rule 8a.

ARRL Countries List — For Use in the 1961 DX Contest Only

AC3	Sikkim	KB6	Baker, Howland & American Phoenix Islands	VP3	British Guiana
AC4	Tibet	KC4	(See CE9, VP8)	VP4	Trinidad & Tobago
AC5	Bhutan	KC4	Navassa Island	VP5	Cayman Is.
AP2	Pakistan	KC6	Eastern Caroline Islands	VP5	Jamaica
BV	Formosa	KC6	Western Caroline Islands	VP5	Turks & Caicos Islands
BY	China	KG1	(See OX)	VP6	Barbados
C9	Manchuria	KG4	Guantanamo Bay	VP7	Bahama Islands
CE	Chile	KG6	Marcus Is.	VP8	(See CE9, VP8)
CE9AA-AM, KC4, LU-Z, VK0	Antarctica	KG6	Mariana Islands	VP8	Falkland Islands
CE9	(See VP8)	KG6L	(See KA0)	VP8, LU-Z	South Georgia Islands
CE9A	Easter Island	KJ6	Johnston Island	VP8, LU-Z	South Orkney Islands
CE9Z	Juan Fernandez Archipelago	KM6	Midway Islands	VP8, LU-Z	South Sandwich Islands
CM, CO	Cuba	KP4	Puerto Rico	VP9	South Shetland Islands
CN2, CN8, CN9	Morocco	KP6	Palmyra Group, Jarvis Island	VP9	Bermuda Islands
CP	Bolivia	KR6	Ryukyu Islands	VQ1	Zanzibar
CR4	Cape Verde Islands	KS4	Serrana Bank & Roncador Cay	VQ2	Northern Rhodesia
CR5	Portuguese Guinea	KS4	Swan Island	VQ3	Tanganyika Territory
CR5	Principe, Sao Thome	KS6	American Samoa	VQ4	Kenya
CR6	Angola	KV4	Virgin Islands	VQ5	Uganda
CR7	Mozambique	KW6	Wake Island	VQ8	Cargados Carajos
CR8	Goa (Portuguese India)	KX6	Marshall Islands	VQ8	Chagos Islands
CR9	Macao	KZ5	Canal Zone	VQ8	Mauritius
CR10	Portuguese Timor	LA	Jan Mayen	VQ8	Rodriguez Island
CR1	Portugal	LA	Norway	VQ9	Seychelles
CT2	Azores	LA	Svalbard	VR1	British Phoenix Islands
CT3	Madeira Islands	LU	Argentina	VR1	Gilbert & Ellice Islands
CX	Uruguay	LU-Z	(See CE9, VP8)	VR2	Ocean Island
DJ, DL, DM	Germany	LX	Luxembourg	VR2	Fiji Islands
DU	Philippine Islands	LZ	Bulgaria	VR3	Fanning & Christmas Islands
EA	Spain	M1	San Marino	VR4	Solomon Islands
EA6	Balearic Islands	MP4	Bahrain Island	VR5	Tonga Islands
EA8	Canary Islands	MP4	Qatar	VR6	Pitcairn Island
EA9	Ifni	MP4	Trucial Oman	VS1	Singapore
EA9	Rio de Oro	OA	Peru	VS4	Sarawak
EA9	Spanish Morocco	OD5	Lebanon	VS5	Brunei
EA0	Spanish Guinea	OE	Austria	VS6	Hong Kong
EI	Republic of Ireland	OH	Finland	VS9	Aden & Socotra
EL	Liberia	OH0	Aland Islands	VS9	Maldive Islands
EP, EQ	Iran	OK	Czechoslovakia	VS9	Sultanate of Oman
ET2	Eritrea	ON4	Belgium	VU	Andaman and Nicobar Islands
ET3	Ethiopia	OX, KG1	Greenland	VU	India
F	France	OY	Faeroes	VU	Laccadive Islands
FA	Algeria	OZ	Denmark	XE, XF	Mexico
FB8	Amsterdam & St. Paul Islands	PA0, P11	Netherlands	XE4	Revilla Gigedo
FB8	Comoro Islands	PJ	Netherlands West Indies	XZ2	Burma
FB8	Kerguelen Islands	PJ2M	Sint Maarten	YA	Afghanistan
FB8	Malagasy Rep.	PX	Andorra	Y1	Iraq
FB8	Tromelin Island	PY	Brazil	YJ	(See F08)
FC (unofficial)	Corsica	PY0	Fernando de Noronha	YK	Syria
FD	Togo	PY0	Trinidad & Martin Vaz Is.	YN, YN0	Nicaragua
FB8	Cameroons	PZ1	Netherlands	Y0	Roumania
FF	Dahomey Rep.	SL, SM	Sweden	YU	Salvador
FF	Mali Rep.	SP	Poland	YU	Yugoslavia
FF	Niger Rep.	ST2	Sudan	YV	Venezuela
FF	Senegal Rep.	SV	Egypt	YV0	Aves Island
FF4	Voltaic Rep.	SV	Crete	ZA	Albania
FF7	Ivory Coast	SV	Dodecanese	ZB1	Malta
FF7	Mauritania	SV	Greece	ZB2	Gibraltar
FG7	Guadeloupe	TA	Turkey	ZC4	Cyprus
FF8	New Caledonia	TF	Iceland	ZC5	British North Borneo
FL8	French Somaliland	TG	Guatemala	ZC6	Palestine
FM7	Martinique	TI	Costa Rica	ZD1	Sierra Leone
FO8	Clipperton Island	TI9	Cocos Island	ZD2	Nigeria
FO8	French Oceania	UA1-6, UN1	European Russian Socialist Federated Soviet Republic	ZD3	Gambia
FP8	St. Pierre & Miquelon Islands	UA1	Franz Josef Land	ZD6	Nvassaland
FQ	Central African Rep.	UA2	Kaliningradsk	ZD7	St. Helena
FQ	Chad Rep.	UA9, 0	Asiatic Russian S.F.S.R.	ZD8	Ascension Island
FQ	Congo Rep.	UB5	Ukraine	ZD9	Tristan da Cunha & Gough Islands
FQ	Gabon Rep.	UC2	White Russian S.S.R.	ZE	Southern Rhodesia
FR7	Reunion Island	UD6	Azerbaijan	ZK1	Cook Islands
FS7	Saint Martin	UF6	Georgia	ZK1	Manihiki Islands
FUS, YJ1	New Hebrides	UG6	Armenia	ZK2	Niue
FW8	Wallis & Futuna Islands	UH8	Turkoman	ZL	Auckland & Campbell Is.
FY7	French Guiana & Inini	UI8	Uzbek	ZL	Chatham Islands
G	England	UJ8	Tadzhik	ZL	Kermadec Islands
GC	Channel Islands	UL7	Kazakh	ZL	New Zealand
GD	Isle of Man	UM8	Kirghiz	ZL5	(See CE9, VP8)
GI	Northern Ireland	UO5	Moldavia	ZM6	British Samoa
GM	Scotland	UP2	Lithuania	ZM7	Tokelau (Union) Islands
GW	Wales	UQ2	Latvia	ZP	Paraguay
HA	Hungary	UR2	Estonia	ZS1, 2, 4, 5, 6	Union of South Africa
HB	Switzerland	VK	Australia (including Tasmania)	ZS2	Prince Edward & Marion Islands
HC	Ecuador	VK	Lord Howe Island	ZS3	Southwest Africa
HCS	Galapagos Islands	VK	Willis Islands	ZS7	Swaziland
HE	Liechtenstein	VK9	Christmas Is.	ZS8	Basutoland
HH	Haiti	VK9	Cocos Island	ZS9	Bechuanaland
HI	Dominican Republic	VK9	Nauru Island	3A	Monaco
HK	Colombia	VK9	Norfolk Island	3V8	Tunisia
HK0	San Andres and Providencia	VK9	Papua Territory	487	Ceylon
HM, HL	Korea	VK9	Territory of New Guinea	4W1	Yemen
HP	Panama	VK0	(See CE9, VP8)	4X4	Israel
HR	Honduras	VK0	Heard Island	5A	Libya
HS	Thailand	VP1	Macquarie Island	602	Somali Rep.
HV	Vatican City	VP2	British Honduras	7G1	Republic of Guinea
IZ	Saudi Arabia	VP2	Antigua, Barbuda	9G1	Ghana
II, IT1	Italy	VP2	British Virgin Islands	9K2	Kuwait
IS1	Sardinia	VP2	Dominica	9M2	Malaya
JA, KA	Japan	VP2	Granada & Dependencies	9Q5	Rep. of the Congo
JT1	Mongolia	VP2	Montserrat	9N1	Nepal
JY	Jordan	VP2	St. Kitts, Nevis	9U5	Ruanda-Urundi
JZ0	Netherlands New Guinea	VP2	St. Lucia		Aldabra Islands
KA	(See JA)	VP2	St. Vincent & Dependencies		
KA0, KG6I, Bonin & Volcano Islands					



CONDUCTED BY ROD NEWKIRK,* W9BRD

Whereas:

Pollyanna usually is the guest of prominence at the birth of any new year. But, patient readers, we must record here the passing of a DX milestone in reverse. Statistics on the monthly quantity of sunspots, those happy phenomena mainly responsible for beefing up our globe-girdling ionosphere and countries totals, show a retreat to the 100-mark after falling monotonously throughout 1960.

Ge — the sunspot tally hasn't been so low since back in February of 1956 when it hit a smoothed 99 en route its positive peak of 201 (winter of 1957-'58). Could be worse, though. Matter of fact, it will be. In a few years the figure is expected to reach a feeble 4 or 5. Practically speaking, band characteristics now are perceptibly "moving down one." Ten meters will try to make like 6 as we now know 6, fifteen and twenty will act somewhat like 10, forty will impersonate 20 to some degree, and so forth. Indeed, if you ignore the markings on your dials, the antennas required for given h.f. propagation results are insidiously growing longer.

This shallow simplification could lead one to surmise that DX possibilities might hold about the same if we all follow the m.u.f. and shift our favored operations to the next-lower frequency band. However, DX logs for the period 1953-'54, while revealing remarkable long-distance work on 40, 80 and 160 during that sunspot minimum, give evidence of clinkers in such a theory. Ionospheric absorptions bite surprising chunks out of long-haul paths when the sunspot count is low; the skip may be right, but where are the signals? Also, the effects of routine ionospheric disturbances are more pronounced.

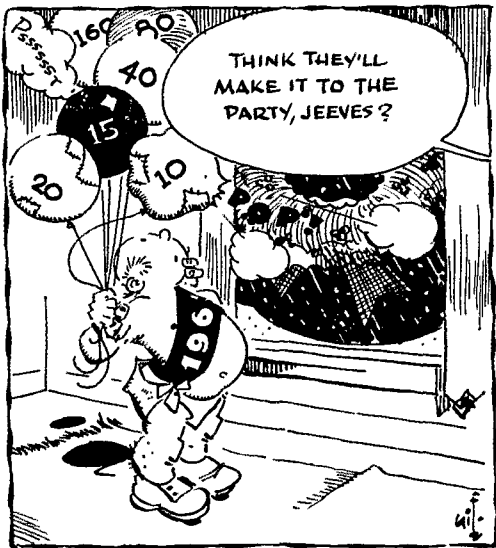
Another thing: There's the steady expansion of world-wide radio communications to deal with. Our bands below 14 Mc. are shared allotments in part, and commercials as well as amateurs will be drifting downward. Portions of poor forty already support a booming broadcast band, and 80 will be under increased legitimate point-to-point attack in various overseas regions. It's obvious that the serious lower-frequency DXer must aim for steep-notched receiver selectivity and rock-like transmitter stability to slash this hash.

Amateur radio's ace lead under these circumstances is a decade's improvement in equipment and technique; our trump card, that old redoubtable ham spirit. The Porter heroine would heartily welcome the coming opportunity to really put these factors to the test. If we don't, particularly — but we'll make out.

What:

Meanwhile, down on the DX ranch, "How's" hands are raking in plenty of long-haul hay. Reminder: In the activity analysis to follow, frequencies, where available, are given in number of kilocycles above the lower band-limit: (27) would represent 14,027 kc. if the paragraph treats on 20 meters. Times appear without parentheses to the nearest GMT whole hour. Saddle up! . . .

20 c.w. ought to commence the new year in its rightful place as kingpin and lead-off, so K1s IMP JTL, W2s GVZ (266/261) countries worked/confirmed, JBL (156/152), K2s TDI UYG, WAKMY (106/80), K3s BVV CUI KHK, W4NO, K4s DFT KYB, K5YAA (56/30), W6s JQB OIV RCV, K6s CJF (115/106), ROU (107/45), WA6-FCX (82/48), W7s DJU POU (74/52), K7s DAS INO, W8s IBX (213/200), KML (297), KX (199/188), YGR, K8s JCB (141/119), QEX TJW, K9PYB (67/43), K0s JPL (98/84), VXU (13/3), VE4JT, EL4A, 11ER and ZS2U give us the goods on AC5PN (65) 13, AP2Q (32) 14, BV1US, BY1PK (67) 13 of Peking, CEs 1AD 3DV 4EC 5EP 9AL (62) 0-2, 9AR 9AV 0AD 5, GM3RM, CNs 8MB 9CK, GOs 2DJ 2PY 3BU (35) 20, CRs 4AH 4AX (60) 3, 6AP 6CJ (54), 7BC 7LU, CTs 2BO (13), 3AV, plenty of CXs, DMs 2AQB 7, 3YDA, DUl 1OR (64) 6TY (79) 13, TSV, EAs 6AZ 6GE 18, 8BF (12) 5, 8CG (43) 2, EL4A, EP5X (5) 4, EQ2AT, FA3LO/sh of the Sahara, FB8s XX ZZ, PF4BC (30) 15, FG7s XA XF (13) 11, FK8AH (36), FM7WF (48) 21, FQ8s HO HP (41) 11, HW (22) 5, FY7s YP (50) 21, YI (10) 21, HA5s FX KDQ, HH2s AR (75) 2, AL (45), OT, HKs 1HV (74), IQQ (20), IRG (36), 3TH 4JC 7ZT, HP1s BR (13), SB, HR1MM, HZIAB (35), IS1ZUI, IT1s AGA AQ CDS, scads of JA friends, JTKAC (97) 13-14 and 23, JZ0PO, K8SLD/KW6, KA2s AB (54), KJ KS YA, K6s 1AA 1BB 1CD 1FD 4AB 6AJT, KM6s BI (9) 6, BT, KR6IQ (65) 13, KV4s AA (81) 22, BQ C1/mm, LJ3G of Norway, LU8 3XO 7ZL, LZ1CF, OAs 4FT (5), 4KF 7F, OD5CQ, OE3VP, OH0NC (25), OR4TX (25) 22-23 of Belgian Antarctica, OX3s AY (20) 0, BQ UD, PJ2s AE ME, PZ1s AG BH BP BR, SM5s BUG KV both /9Q5 (20), SUIAL, SV0s AT/mm WZ/Crete, TF3AF, TFDL, UA9s AA BW (60) 3, CN (14) 3, DN JR, KDL KDM 6, MC SA (77) 14, XG YV, UA0s AZ BI BP (14) 3, CI EQ JB KAE (32) 4, KF1 KID KKS KYB (97) 13, LN RD, UB5s KAB (6) 5, KBO 5, MZ, UG2s AR (5), KAA 1E WP 6, UD6BB, UH8s BI (21) 2, DA (86) 2-3, KAA, UJ8KAA, UL7s AW GY (81) 4, LE (60) 2, UM8KAB (68) 2-4, UN1s AE (67) 0-1, AN, UO5KAA (70) 8, UP2As, UQ2s DF KBA, UT7s CB CC (27) 5, VE8 BRX 0MC, VKs 8EW 9NT 9RH 0IT of Macquarie, 0JM (45) 21 of Davis base, VP8 2AR 2DQ 2MB 2SL 3YC (45) 1, 4TX 6LN (90), 7BK 7BP 8FD 21, 9CX 9EP 9QQ, VQs 2EW 3HZ 4HT (35) 21, 8BC 8BM 14,



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

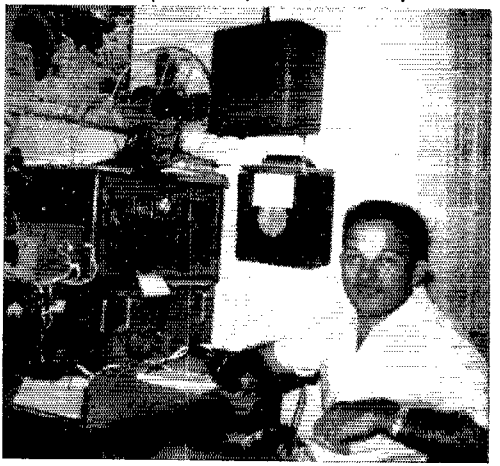
DID
 2CK
 SEP
 FLOW
 7NG
 21
 SVIRN
 TA3AA
 TP3EA
 UA3AF
 UC2CB
 VP5BL
 VP6CDI
 VQ2DH
 VQ3HJP
 VQ4ARL
 VS9AE
 VU2MD
 Y12AM
 YD2BU
 ZD9AA
 YS10
 YU1G
 YZ14GA
 ZC1C1
 ZC4IP
 ZD2CQF
 ZE3JO
 ZL14GA
 ZS2X

9A1W 9HB 17, VR2DK, VR3L, VSs 1ED (15) 16, 1KQ (25), 9AB of the Maldives, 90A, VU2s AJ IR MD (50) 13, NR RA, KE3BL, XZ2TH 18, YAIWB, YN4AB, YOs 3CM (17), 3FP 17, 7DL (30), YS10 (45), YVs 1DP 4BE (40) 2, 5AC 5ANT 6ASY, ZBs 1FA IHC 2AD (15) 21, 2I, ZCs 48S 5AE (80), ZD7SA 8, ZEs 2JC 3JG (50), 8J7 (87) 15-16, 8JV, ZK1AK (35) 5, ZPs 8LS OG, ZSs 3T 7J 15, 4X4s JU AIB YL 18, 5As 3TN 5TA, 6Os 1MT (65) 20, 2GM (76) 3-5, 7G1A 19, 9G1AQ (40) 1, 9Q5EH 16, 9U5s PW and MC 17.

20 phone, where asterisks indicate single-sideband employment, was host to conferences between W2DY, K2TDI*, K4KYB, K5YAA*, K8JCB*, VE4JT and a quality collection of audiophiles, with R. Kemp and KN8VLX listening to BV1UBS, CE2CC*, CN8MB*, COs 2CB* 6FB 4, 7AA*, CP5EA 4, CR4AH*, CT1JV (191), CX2CO*, ELs 2Y* 5X*, 6F5X*, ET2US*, FFs 4AK* 8AU (190) 0-1, GD3ENK*, HC1KA*, HHs 2RD 2V 4, 9L8*, HK7AB*, HR1HP*, Ks 1SDC/CN8* 6CQV/KS6*, KA2-VT*, KC4s USB* (USH* USN* USV* KGs 1AA* 1BO* 1CQ* 1FD* 1FR* 4AD 4, 4AE* 6AJX* 6FAE* 6FAF* 6NAA*, KJ6BV*, KR6MB*, KM6BO*, KV4AA*, KW6s CL* CP*, KX6BQ*, LA1LG/p*, MP4BBW*, OAs 1D 5, 4CV*, OD5CT* OH0NC*, PJs 2AA* 3AJ 2, PZ1s AX* HF* BJ* BR*, SV1AE*, TF2WEZ*, T2WR*, UAs 1AB* (310) 8, 4FE* (310) 8, 4IF (310) 8, UB5KAB*, UD6KAB*, UL7JA*, VK6s GR* RU*, VPs 2AR 23, 2DA 13, 2VA 3, 5DM 5VI 13, 7NB* 9AK 13, 9DC*, VQ5FS*, VR3L*, VS1JV*, VU2s BK NR* RM*, several XE1s, XE2FC*, YN1s MW* TAT*, YVICP 1, YS1MS*, ZK1BS* (310) 8, ZPBb, ZS3s B* 1P*, 5A5TF (189), 9M2s DB* FR*, 9N1s CJ* MD* SAI*, 9G1BQ* and 9Q5US*.

15 phone has a wider spread of "How's" boasters and holds its own as our current No. 1 DX voice range by a narrow squeak over lively 20 and 10. KIIMP, W2DY, K2TDI*, K3KHK*, K4s DFT KYB MPE, K5s OUE YAA*, K6ROU, KYKPM, W8KML, K8s JCB* TJW, KN8VLX auditing, K9s ORC PYB, VE4JT and listener R. Kemp document the 21-Mc. modulations of GE3HZ, CN8-HX (240), CP5EL*, CR9AN (252) 0, CT3A*, DU6IV, ELs 1C* 4L* 8D (240) 23, FFs 4AB (253) 23, 8CK (261) 21-22, FG7XH, FQ8s AE (245) 21, HT (240) 21, FS7RT* (368) 28, GD3ENK*, HC2s LX 21, ND*, HH2ML, HI8-DGC, HPIAP, HRs 2HA* 3PD 1, HV1CN*, HZIAB*, JAs IACB (212) 2, 7AD, Ks 4SDC/CN8* 8SLD/KW6* (455) 2, KC4USH*, KGs 4AT 6FAF* (396) 4, KM6BI*

FF4AB's eighty watts, doublet and HQ-140X make the Ivory Coast available for world-wide countries hunters, 21 Mc. preferred. (Photo via K2UYG)



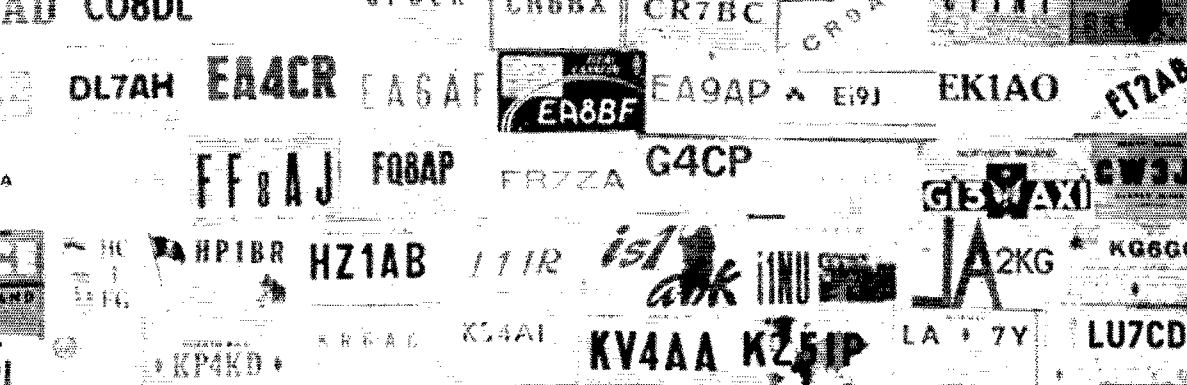
(414), KP6AO*, KR6DI* (396) 23, KV4AA*, KX6BQ*, OA5G*, PJ2s AA* MC (96) 22, PZ1s AR 2, AW 1, BE BP, SVIAR (273) 17, TP2WFF*, TG5HC, TIs 2DLM 2OE 3RO 5RV, UP2KCK, UQ2AN, UR2AR, VE8s AF BL, VPs 2DA (240) 22, 2DQ 2LS 2ST* 3AD (251) 23, 3EFG (250) 23, 6AM 6WR 7BM, VOs 2VZ 3GL* 4RF*, VR2DE, XEs 2WC 8ALP 2, YNs LJK 1, 1TAT* 6HH 0, YS1MM 13, YVs 6AGD AMI, ZBIUSA, ZE7JV, ZK1BS*, ZP6BB* (434) 0, ZS3s S (245) 20, X, 5A2s CV 13, CZ, 6O1TUF, 7G1A, 9G1DH (245), 9M2GA, 9Q5s MP and RU. The stars (*) denote s.s.b. action, as usual.

15 c.w.'s crew of communicational cosmopolites comes through with a strong 21-Mc. vote of confidence. W1OPB, K1s IAP JTL MOD, W2s GVZ WAS, WA2KAY, K3KHK, K4s DFT KYB MPE (105 countries on 15), K5s OUE YAA, W6TCV, K6s CJF ROU, WA6s FGX IVAL, W7s DJU POU, K7s DAS INO KPM, W8s IBX KX YGR, K8s JCB QEX TJW, K9s ORC PYB SPO UKM, VE4JT, EL4A, I1ER and ZS2U compile confabs with CE8s 1BD 4BC, CNs 2AQ 2AY 8CJ, CRs 5AR (54) 18, 6BX (48) 21, 7LU, CT1s JY KD, CX1FB, DL5s AW (40) 19, AY RH, DU7SV, EA6AM, ELs 3B 4A 18, FAs 2VC 3CT 8TT 9RW, FB8XX, FF8BF (30) 21, FQ8s AG HP (53) 20, GD3FBs (70) 19, HAs 1SP 5RW, HCs JJU 2IU, HH2CB, HK7ZT, HM1AD, HZ1HZ, much JA free including JAs DS and FQ, Ks 5ZPK/VO1 21, 8SLD/KW6 (50) 3, KA2RB, KG4AB, KM6BI, KV4s AA (80) 19-20, CI/mm, KW6DF 2, LZ1s KNB KSZ, OA3D, OE's 1HJ 9EJ, OH0s NCNE (95) 13, OR4TX 22, OY1R, PJ2CQ (95) 20, Fernando's PVTJL (55) 18, SV0WQ, TFs 2WFF 3MB, T12s CALF ES LA, UAs 9JR 0EH (25) 1, 0GF (58) 1, UB5s UG WB, UC2s BB CB, UN1AB, UR2KAE, VK9X (30), VPs 7NT 8EH 8EZ (55) 23, 8FD, VOs 2CZ (40) 19, 3HZ 4DW 4GQ 9HB, VS9MB 15, W6UNP/KH6, WH6DPF, WL7DNK, WP4-AVW, XEs 1H 1PJ 2AY 2HU, YOs 2CD 3R1, YV5ANP, ZBs 1FA 1FT 2AD, ZCs AK 16, SC (62) 16, SS, ZD2s AMS ATU (32) 16, GUP (90) 20, JKO, ZEs 3JO 8JD 8JJ, ZK1AK, ZP5s CF 18, LS 17-18, ZS3HT, 3V8CA (18) 20, 5A2AE, 7G1A, 9G1AW, 9K2AD 15, 9Q5s IG LY and US.

15 Novice comers KN5FKD, WV6s HNO and MWG are outnumbered but undismayed by CE4E, CR5AR, CX2AM, DM3KML, numerous 1J DLs, DU7SV, F8VN, G3s KMA NSY, KH6DKI, KZ5s BBN HNN TJ, LU7AU, PY4UAM, UJ1Ks VQR 2QR 2SG 3PT, WH6s 1JND DRT DWT, WL7s DKE DLH DM0 DOB, WF4s AXN AWA, XE1PJ, ZLs 1CA 3GU and 9U5VS. Hmm — are 21-Mc. WN/KN/WV diggers closing the shaft before the mine is worked out?

10 phone, with its global network of eagle-eared operatives determined to squeeze the last DX drop out of painstakingly-wrought 28-Mc. DX installations, finds KIIMP, W2s DY FGD, K2YFE, K3s DLX KHK, K4KYB, YL K5SBN, K6ROU, WA6IVM, K7s INO KPM, W8LXB, K8JCB, KN8VIX a-tuning, K9s PYB SPO, W6TCV, K8TKN, VE4JT and Mr. Kemp logging luscious CE3PY, CN2s AQ AX, CRs 4AX 21, 6AT 19, 6CZ (345) 17, 7CK 19, 7CR (425) 18, 7FR (319) 18, CTs 1EY 1PK 14-15, 1SX 2AH 14, 3AI 14-15, CXs 5BR 6CG, DU3QX, ELs 2U 4M 5A, FA2TW, GBs 2SM 3PBS, GD3s IYV UB, HG4RC, HE9-LAA, HHs 2GR 19, 2JH 2V 5DM, H18s DGH GA, HKs 1XT 13, 4BQ, HPIAP (400) 19-21, JAs in every call area save the 5th plus JA4FM, KAs 2JL 8LF, KGs 4AT 6AIG 6AJT 6AKA 6NAA, KR6s DO IM KC KT, LA1FA, PJ2AL 14, PZ1BK 16, SL6BA of Sweden, SP7LA 16, TGs 5HC 9FI (360) 0, UAs 1AEV 14, 1KAG 3KNB 4KWB, UB5s BBG BWG 14, UP2s AS ONE 14, UR2BU, VE8NH 19, many Vks plus Vk0WII, VPs 1DX 16, 2GAQ 13, 3EMG 14, 5BL 6JC 6TR (370) 16, 8EM 9MM 9WB, VOs 2FC 2JR 2WZ (400), 4DT 4PK 20, VU2BK 13-14, W4ZCB/KH6, XE2s R (465) 15, SO, YN1EDB, YO2BAI 17, YVs 1EE 3DL 5AMI, ZB1HC, ZD2s AMS FNX JKO, ZEs LFN 4JS 7JV 8/H (450) 19, ZSs 3D (450) 18, 3KW 30 19, 3R 7L (275) 19, 4X4s FR JU, 5As 3TL 5TF, 9G1s CW DN (275) 18, DP 21, 9NIGW, 9U5s DM 21 and PD.

10 c.w., when phone frequencies get rough, is always good for casting. KIIMP, W2WAS, K2YFE, WA2-KMY, K3GCS, K4s DFT KYB, W6RCV, K6ROU



WA6IVM, K7INO, K8s JCB QEX, K9s PYB SPO, K0s OGH RNK TKN, EL4A and I1ER hook such iridescent rainbows as CN2AQ, CR4AX, CT1s HX JY, CX2AZ (75) 23, DM2s ACO ATH, EA9AP, EL4A, HAS 5KAG 8CF 17, HE9LAA, HH2LD 0, I1IAGA, JAs 4HM 4KB 5KM and a slew of other Japan entries, K0SLD/KW6 (50) 0, KW6DF, LAs 7Y 8XF, OD5s CN CQ, OE2UR, PJ3AD, curious PX1AI, SPs galore, SV1AA, TF3AB, ample UAs, UB5JR, UC2AA, UH8 BI, a VK or two, VP8s 7NT 9DR, VO3HH, ZE1PJ (25) 2, YN1RH (100) 22, YV5ACM, ZD2JKO, ZE8JG, quite a few ZLs and ZK1Bs.

40 c.w.'s DX propensities are explored by K1IMP, W2WAS, K3s BVV KHK, K4KYB, W6RCV, K6CJF, WA6IVM, W7s DJU LZF, K7s DAS INO, K8s JCB QEX, K9UKM, EL4A and VERON sources who map such landmarks as COs 2PY (9, 20) 4-6, 7N, DU75V, EA7JZ, EL4A (8) 7, EPIAD (10) 3, FY7YF (9) 2, GC2FZC (25) 6-7, HC1JU, I1IAGA, JAs IANO 1BI 1BTH ICZG 1DCY 1OM 1WU 1YL 2BK 2XW 3AKT 3ANH 3TT 5MU 6AOY 7AKQ 8JC 8QN 8VM 8OP 8XG, KR6CA, LA6CF/K 1m in the Pacific, OH0NF (20) 18, TF2WEM, UA0s K/R KID 5, YESSA, a flock of VKs plus VK7MZ, VP7NA, VR2DK (21) 7, VS6BK, VU2CQ, W7QMU/VE8, some XE neighbors, YN1OC, YV2AN (20) 3-4, ZC4IP and a listful of ZL colleagues. . . . Our lone 7-Mc. Novice collaborator this month is W6WGM who gets across to Hawaii and Alaska in the Novice notch up-band. . . . Forty phone treats K8BVV and W8IBX to XE2SG and HP1AC, respectively, W8IBX comments, "I wish the Spanish-speaking stations who hover between 7050 and 7120 kc. would listen in the U. S. forty-meter sector for Spanish-fluent Americans. Perhaps a frequency such as 7280 kc. could be designated for Spanish-speaking W/K/WA stations desirous of DX QSOs with stations in the lower part of the band. If the Latin-American boys knew exactly where to look in the American phone band for Spanish-speaking DXers they might be encouraged to do so more often."

Eighty's DX front is obscure at this writing, but K4LNE, stationed in Scotland with the USAF, consistently copies 75-meter phones from the east half of the U. S. A. Ray notes particularly strong signals from Ws 2LSW and 3SVL, to get specific.

160 c.w. now has a bulwark of DJ/DL actives to help out the British Isles 1.8-Mc. regulars, this thanks to special authorizations reported by DL1FF to W1BB and friends. Long-wires over salt water, kites and monster verticals will be pressed into 160-meter action as the low-band lads prepare to concentrate long-haul efforts in the Transatlantic and World-Wide Tests set for the 8th and 22nd of this month as announced by ringleader W1BB

By the way, check with W8QHW and K7HDB concerning new certifications available to those who demonstrate a necessary amount of 160-meter DX prowess. Have you confirmed, say, ten countries on 1.8 Mc? No? Give 160 a try and find out how easy it isn't.

Where:

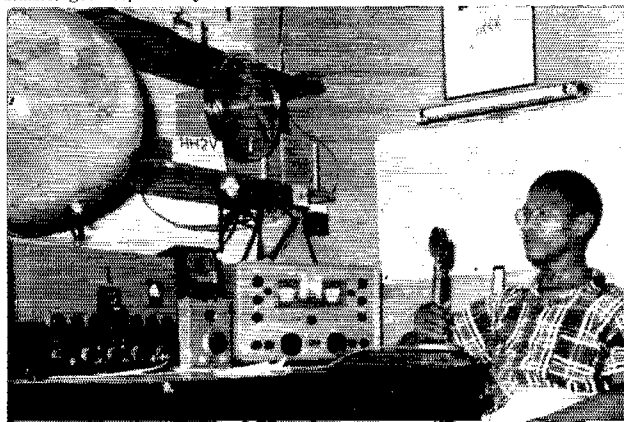
Africa — "As soon as a new order of QSLs arrives from the States ET2US cards will go out to all who await them," assures Kagnev staffman W4GVM. "Unfortunately, all club records and logs prior to February 22, 1958, have been destroyed. We will QSL 100 per cent for QSOs made from that date forward, so long as our logs indicate valid contacts. In the future we intend to answer all cards as received." . . . "I'll have the final log copy for ex-ZD1AW shortly," states Alf's QSL chief, W3KVQ. "I will continue to acknowledge all QSL requests accompanied by the usual s.a.s.e. (self-addressed stamped envelope). With ZD1AW's shutdown, Sierra Leone will still be active through ZD1CM who has about a year to go on his current duty tour."

HH2V of Port-au-Prince is noted for a persistent DX performance on 10 through 160 meters with his Viking, HQ-160 and Mosley array plus long-wires. Victor also serves as secretary, Radio Club of Haiti. (Photo via K2YFE)

W3KVQ also does QSL honors for CT3AV, VP2AR, VU2RAM, ZD1CM and 487WP. . . . K3DLX naturally desires s.a.s.e. in carrying out VQ2FC confirmatory services. . . . K2QXG remarks, "As QSL manager for the ZS1RM/ZS8-ZS10U/ZS8 DXpedition of October 8th-17th, I report that every card has been sent out where a self-addressed stamped envelope was received. Biggest drawback: fellows confusing local 24-hour time with Greenwich Mean Time." . . . "I handle QSLs for EL2Q," confirms K9ECE. "S.a.s.e., please." . . . "In April I go on holiday," exults EL4A (W7VCB), "so there is likely to be delay in response to QSLs arriving here after March 1st." . . . Now via WGDXC: After thirty days without application, W8TMA released 9Q5YM QSLs via the bureau route. Same goes for applicants who failed to supply QSL transportation (s.a.s.e.). . . . K4KYB affirms that ex-VQ3ES-ZS8ES still welcomes K4KYB inquiries via the Canadian QTH specified in last September's "How's" . . . NCDXC, from CR5AE: "My trouble is the QSL handling, although I'm a fine QSLer, 130 per cent; hi! I've sent out over 500 cards within a month, and have 200 to go at present."

Asia — EPIAD advises W1UED of ARRL that his military address turns out to be more expeditious than the club box number previously specified. See following. . . . "JT1KAC just got his cards printed," reports DL4BS, acknowledging joyfully the receipt of Mirek's QSL for a 1960 summertime QSO. . . . XW8AL took a breather during local civil excitement, and his friend K4KTR writes: "I have Phanh's logs for North and South America and U.S. Possessions for all of 1960. I'll QSL on the usual self-addressed stamped envelope basis." . . . "Kindly advise the gang that I now act as QSL manager for VS6AE," says W6DIX. "S.a.s.e. required for all cards." . . . "Please note that VS1JU is closed," communicates G3LK, home from Singapore. "All VS1JU contacts were QSLd, but should anyone who QSO'd me not have received his card, a line to my G3LK address will do the trick." Phil, by the way, once signed EP3H.

Oceania — "VR2AP cards have been handled by me since last July," writes W6UYE. "I have some QSLs on hand made out personally by Al; s.a.s.e. required for forwarding." . . . George Harding, an airman and a future ZL3, regretfully tells us: "VR2DR met untimely death in a shooting accident shortly after his return to New Zealand. So far I have not been able to locate his radio logs. There are a few avenues I have not yet explored, however, and possibly one of these will produce them. I would be most happy to send out VR2DR QSLs when and if I find Bob's records." George can be reached at Ground Radio Section, No. 6 Hangar, RNZAF Station Wigram, Christchurch, N. Z. . . . "I received a declaration from W5GB-KH6DGL-KP6AO that he is the only licensed operator on Palmyra," reports W6RCV. Scratch a few. . . . S.w.I. J. Howard says that W8OLJ/m of Project Hope has a dandy QSL for your collection. . . . "I hope to clear up verification of all contacts as soon as possible," promises KC6GJ of Ponape. Extensive traveling holds him up. . . . Father-and-son team KW6DF-K0SLD/KW6 testify, "We return QSLs 100 per cent via bureaus. Those who supply s.a.s.e. get response by return airmail. Please stress that





postal rates here are the same as in the States. Surface mail, incidentally, arrives *very* slowly by boat. K9VWTM has the logs of KR6s KP and ZT, both having returned Stateside. "I QSL for them 100 per cent, direct where feasible, otherwise via bureaus. Any stations not in receipt of deserved cards by now are invited to apply with s.a.s.e. to K9VWTM."

Hereabouts — "I now act as QSL manager for VP2DU's QSOs since October 1, 1960, and for PY7YI's since November 1, 1960," specifies W3AYD. "S.a.s.e. or International Reply Coupons are necessary for direct reply."

"Before I left the Antarctic I QSL'd absolutely 100 per cent," asserts ex-VP8CE-VP8DN, active on the Grahamland coast from February, 1958, to February of '59. "One large parcel of cards was entrusted to a friend aboard USCGC *Northwind* — one George E. Griffin, P.O. Box 2072, Freeport, Texas. I assumed that these QSLs had been delivered but apparently this is not so, for I now receive cards requesting QSLs. If even a few stations got my QSLs from this batch in question I would know that the package was posted." Anybody know George? — NCDXC's DX'er hints that W1ZZK may be able to assist in PY7AFN

Fernando de Noronha QSL matters if all else fails. — HH2V, says K2YFE, is among Haiti's most staunch card-swappers. — "K6BX's *DX QSL Newsletter* is IT!" applauds K1JTL. — K2SWZ/W3EKK disengages himself from the QSL problems of PJ2ME because of inadequate liaison. He suggests you petition PJ2ME direct. — Hampton Roads Radio Club, K4KTR correspondent, will assist PJ2AF's QSLing for contacts dating after November 15, 1960. K4OGT has responsibility for the isperwork

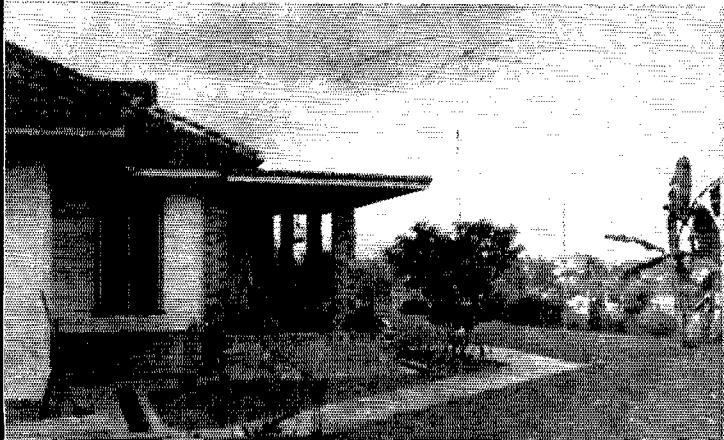
Report from the br-r-r north and VE8 QSL Manager VE8AT: "VE8s ML TU and YT have not sent s.a.s.e. to this Bureau for their QSLs. I have advised them of huge piles on hand for them but they do not appear to want them. I advise DXers to send cards to these stations direct. Also, W/K/VE hams should be reminded that their QSLs are not supposed to go to VE8s through the ARRL Bureau. I'm quite busy enough handling cards properly incoming from DX stations!" — "I'm amazed at the number of contacts claiming me as their first KL7 QSOs," notes KL7DRM. "My military address is cumbersome, so I request QSLs through W0ZQV."

W3IWS is interested in determining just what Leewards island VP2AA operated from in April of 1949. HW? — K2SWZ/W3EKK, K4DWU and K8JWC offer their good offices as QSL agencies for rare-DX operators in bona-fide need of such assistance. — From W1QLT of XE0QLT/XE5: "Our QSLs are late because of delay in getting the special etching completed." Many are itching for that etching. — A salute to W1s UED WPO, K1s IMP JTL LWV, W2s FGD GVZ JBL WAS, K2s TDI UKQ UYG, WA2KMY, K3s BVV CUI GCS KHK, K4s KTR KYB, W5IRJ, W6s JQB NTR, K6ROU, WA6FCX, W7s

DJU LZP POU UVR, K8JCB, K8SVIX, K9s OKD ORC, VE8s 4JT 8AT, DL4BS, KL7PI, ZS2U, s.w.l.s J. Howard and R. Kemp, Hamsters (Chicago) Radio Club *Ham Gab*, International Short Wave League *Monitor*, IRTS (Eire) *News*, Japan DX Radio Club *Bulletin*, MARTS *Malayan Radio Amateur*, Newark News Radio Club *Bulletin*, Northern California DX Club *Paxer*, Ohio Valley Amateur Radio Association *Ether Waves*, RSC (Ceylon) *487 Bulletin*, Universal Radio DX Club *Universalia*, VERON (Holland) *DXpress* and West Gulf DX Club *DX Bulletin* for the following recommendations:

- CE0AD (via CE3HL)
- CO2DO, J. de Dios, 82b No. 520, Miramar, Havana, Cuba
- DL5DU, R. Porter, U. S. Army Area Support Component, APO 757, New York, N. Y.
- EA7JZ, M. Munoz, Box 262, Malaga, Spain
- EL4L, M. Munoz, Liberia
- EL4M, Mary Knowles, Box 80, Monrovia, Liberia
- EP1AD, H. Leith (K4ORQ), M.A.G., APO 205, New York, N. Y.
- ET3MA, P. O. Box 16, Harar, Ethiopia
- FF8AU, M. Grivaud, P. O. Box 971, Dakar, Mali
- FK8AH, R. Garbe, Box 29, Noumea, New Caledonia
- FY7YI (via W3AYD; see preceding text)
- GM3OIO, J. Howie, 11 Chapelton Ave., Bearsden, Glasgow, Scotland
- HC2LX, P. O. Box 195, Guayaquil, Ecuador
- HC7FZ, F. Zander, Box 1007, Quito, Ecuador
- HC8VB (via W8EWS)
- HH2ML, P. O. Box 671, Port-au-Prince, Haiti
- HK1HV, H. Verano, Box 1545, Barranquilla, Colombia
- HK1OO, P. O. Box 342, Barranquilla, Colombia
- HM1AD, Nam-he Oh, 3 Younjidong, Chongroku, Seoul, Korea
- II6VM, M. Yuhofaetto, Zenitsu di Pivade, Treviso, Italy
- JA1FPS, H. Yuhara, 892 Ohashi-ken, Tone-Machi, Ibaraki-ken, Japan
- JY1ZA, Box 25, Amman, Jordan
- ex-JZ0HA, c/o Shell Co., Qatar Ltd., P. O. Box 47, Doha, Qatar, Persian Gulf
- K4CDZ/VE8, F. Ashworth, 120th AC&W Sqdn., Resolution Island, N.W.T., with Montreal, P. Q., Canada
- K4SDC/CN8, Box 6, Navy 214, FPO, New York, N. Y.
- KA2AB, V. Smith, 2875th GEEIA Sqdn., Box 154, APO 323, San Francisco, Calif.
- KA8PB, P. Beal, jr. (WICHL), 1953rd AACCS Sqdn., APO 919, San Francisco, Calif.
- KA9CG, USCG Lorran Stn., APO 181, San Francisco, Calif.
- KC6GJ (direct or via KH6BPF)
- KJ6BV, USCG Lorran Stn., APO 105, San Francisco, Calif.
- KL7DRM (via W0ZQV)
- KP4TIN, R. Taylor, jr., Apartado 216, Aguadilla, P. R.
- KR6IO, I.B.S., APO 239, San Francisco, Calif.

Flavorful Malaya DX atmosphere is provided by these views of the exterior and interior of 9M2EB, Kuala Lumpur. Gear includes a 25-watt Panda Cub, Eddystone 680X receiver, Mosley TA-33 twirler and "G8KW" dipole. You may have worked Eric previously as VS1EB or ZB1EB. When the long skip is right, 9M2EB is workable on 28 through 3.5 Mc.





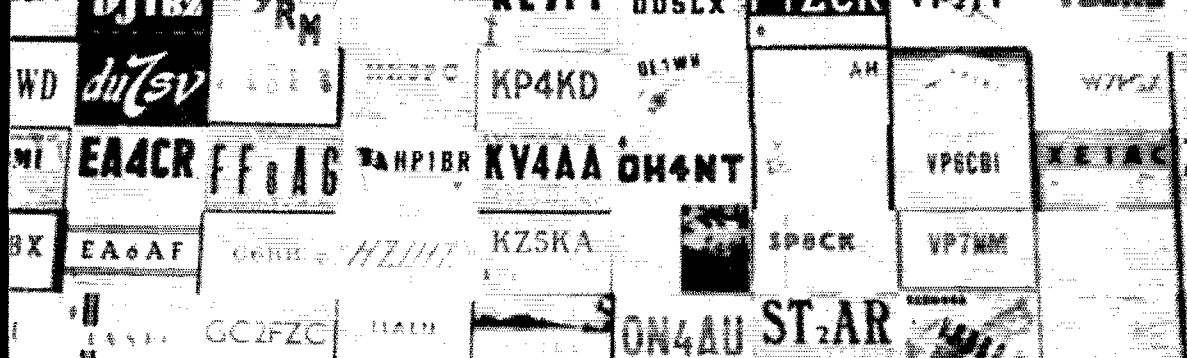
ex-KR6s KP ZT (via K9WTAD)
 KR6KV, R. Duncan, 3rd USASA Fld. Stn., Box 12, APO 331, San Francisco, Calif.
 KW6DF, L. La Baume, Box 68, Wake Island
 KX6BO, Navy No. 572, FPO, San Francisco, Calif.
 LAILL/p, c/o Norwegian Embassy, Reykjavik, Iceland (or via NRRL)
 M1C, P. O. Box 20, Republic of San Marino
 ex-MP4DAA (to 5A3CAA)
 OA7F (via W2CTN)
 OD5GO, c/o U. S. Embassy, Beirut, Lebanon
 PJ2AF (via K1OGT)
 PY4GA, I. Gomes, Box 314, Belo Horizonte, M. G., Brazil
 PZ1AR, P. O. Box 431, Paramaribo, Surinam
 PZ1BK, P. O. Box 160, Paramaribo, Surinam
 PZ1BP, P. O. Box 162, Paramaribo, Surinam
 RAEM, E. Krenkel, Chaplign St., 1/A, kv. 42, Moscow, U. S. S. R.
 SM5BUG/905 (via SSA)
 SP6FZ (via W2JWK)
 SU1AL (via K4IEX)
 TI3GGM, P. O. Box 230, Cartago, Costa Rica
 TI5AX, c/o Sala, Apartado XX, San Jose, Costa Rica
 UA1CN, M. Pugachev, Svyazi 21, Tikhvin, Leningrad, U. S. S. R.
 UA3EG, Box 570, Moscow, U. S. S. R.
 UA3IE, G. Nesterin, B. Pochtuvaia 18/20, Box 11, kv. 57, Moscow, U. S. S. R.
 UA4LE, A. Orlov, Postbox 202, Ulianovsk, U. S. S. R.
 UA6LI, O. Ivanov, ul. Chekova 36, kv. 8, Kostov-on-Don, U. S. S. R.
 UA90KB, DOSAAF Radio Club, u. Yaroslavskogo II, Yarkutsk, U. S. S. R.
 UB5AQ, V. Shpilev, Radio Club, Dnepropetrovsk, Ukrainian S.S.R., U. S. S. R.
 UB5UG, Postbox 55, Kiev 1, Ukrainian S.S.R., U. S. S. R.
 UB5WF, V. Goncharsky, Box 41, Lvov, Ukrainian S.S.R., U. S. S. R.
 UC2AA, V. Banzar, Postbox 41, Minsk City, Byelorussia, U. S. S. R.
 UC055A, A. Sajtjuk, Oknitza, Moldavia S.S.R., U. S. S. R.
 UT5BK, E. Kazakov, Vladimirskaia 15, Kiev 25, Ukrainian S.S.R., U. S. S. R.
 VE4JT, F. Stacey (ex-VE3EIL), 1064 12th St., Brandon, Man., Canada
 VE8DG, D. Gordon, c/o Dept. of Transport Aeradio, Teslin, Yukon, Canada
 VE8XM, H. Doepel, c/o Dept. of Transport Aeradio, Vermillion, Alta., Canada
 ex-VK8GU, H. Meyer, W1MFI, c/o Pickard & Burns, Inc., 240 Highland Ave., Needham 94, Mass.
 VK6s DM 1D JH NB RL (Antarctica; via WIA)
 VP2AR (via W3KVQ)
 VP2DA (via W8DJD)
 VP2DAQ (via K9UTL)
 VP2DU (via W3AYD; see preceding text)
 VP2VH (via W2YTH)
 VP7NA, H. North, P. O. Box 5197, Nassau, Bahamas
 ex-VP8C, E. DN, P. Catlow, 22 New St., Lancaster, Lancashire, England
 VP8FE (via G2RF)
 VQ1B (via W4TO)
 VQ2FC (W/Ks via K3DLX)
 VQ9A (via W4TO)
 VR2AP (via W6UYE)
 ex-VR2AZ, J. Regan, ZL2AXC, 44 Roberts St., Linden, Wellington, N. Z.
 VR6AC (via W6RCD)
 ex-VS1JU (to G3LX)
 VS6AE (via W6DXL)
 VS6EP (via HKARTS)
 ex-VS90C, Cpl. T. Owen (G3KHM), Sig. Section, RAF, St. Mawgan, Newquay, Cornwall, England
 W7QMU/VE8, USCG Lorax Stn., Cape Christian, Baffin Island, APO 228, New York, N. Y.
 W8OLJ/mm, R. Charbeneau, Project Hope, P. O. Box 9808, Washington 15, D. C.

XW8AL (see preceding text)
 YO9IA, B. Cortun, P. O. Box 91, Ploesti, Roumania
 ZB2AD, Officers Mess, RAF, Gibraltar
 ex-ZD1AW (via W3KVQ)
 ZE8JJ (via K5ADQ)
 ex-ZL5AC (to ZL2ACV)
 ZP5HZ, c/o U. S. Embassy, Asuncion, Paraguay
 ZS2U, A. Akers, 53 Clarence St., Westering, Port Elizabeth, S. Afr.
 5A2TZ (via W4OHX)
 5A3CAA, A. Goodwin, P. O. Box 263, Benghazi, Libya
 5A5TA (via K01Q1)
 6O1MT, M. Tessieri, Box 397, Mogadiscio, Somalia
 9G1DP, P. O. Box 1981, Kumuasi, Ghana
 9Q5EH, Box 2124, Elizabethville, Katanga, Congo Republic
 9Q5HF, Rev. E. Schwit, A. I. Mission, Kasengu, Mahagi, Congo Republic
 9U5MC, Box 78, Kigali, Ruanda-Urundi

NOTE: Perhaps some of the forerunning would go well in the April issue, but caveat emptor as usual. Don't forget self-addressed stamped envelopes when seeking the services of Stateside QSL representatives (non-W/Ks supply IRCs). And do *you* have envelopes properly on file with your call area ARRL QSL Bureau Manager?

Whence:

Europe — DARC (Germany) invites amateur radio-telegraphers throughout the world to participate in the Sixth WAE DX Contest scheduled for 0500 GMT, January 14th, to 2300 on the 15th. Non-European stations will swap RST001, RST002, etc., serials with Europeans once per band at one point per contact (two points per 3.5-Mc. QSO). Additional points are yours by sending "QSO reports" (QTC) to European stations at one point per QTC. Each QTC consists of (1) time in GMT, (2) station call, and (3) QSO number of any previous WAE Test contact. For example, W9XYZ raises DJ7JJ and earns a contact point thereby; W9XYZ previously worked G3BS at 1207 GMT for G3BS's 96th Test QSO. So, besides the QSO point for his serial trade with DJ7JJ, another point accrues to W9XYZ if he sends "1207/G3BS/096" to DJ7JJ. W9XYZ can work DJ7JJ again later on the same band, but only for QTC purposes. During the entire Test period each QTC can be transmitted to Europe by W9XYZ but once, and DJ7JJ can accept no more than 10 QTCs per band from W9XYZ. (It figures that the more Test QSOs accumulated, the more QTC are available to parlay into additional points.) scoring: Multiply combined QSO and QTC points collected on all bands by the number of multipliers collected on all bands; the latter deriving from DARC's Worked-All-Europe Countries List — CT1 CT2 DJ/DL/DM/EA/FA/G/BI/FC/G/GG/GD/GI/GM/GW/HA/HB/HE/HV/HS/IT/LA/LX/LZ/MI/GE/OI/OH/OK/ON/OV/OZ/PA/PX/SM/SF/SV/TF/UA1-6/UB/UC/UN/VO/UP/UQ/UR/YO/YU/ZB1/ZB2/3A2/G3/G4/Shepard, LA/p Jan. Mayen, LA/p Spitzbergen, SV Athos Republic, SV Crete, SV Rhodes, TD Europe and UA Franz Josefland. (DARC stresses that UD TF and UG are Asia, not Europe.) Entries go to the DARC DX Bureau, Berlin-Rodow, Germany, postmarked no later than March 31, 1961. The highest scorer in each continent and country (or call area) will earn a certificate of merit; second- and third-place awards also will be considered. By the way, a large self-addressed envelope sent to DARC together with a pair of IRCs (for airmail reply, 5 IRCs) will bring back convenient score sheets for transcript and summary. See you on the North Atlantic path... Say, consult ON4QX regarding rules changes for the WOSA certification issued by the Amateur C.W. DX Club. After a five-year campaign W9EHV finally attached himself to USKA (Switzerland) Helvetic-XXII diploma No. 378 — G3NAC (G3NGZ, Central Flying School, RAF, Little Rissington, Glos., writes W1KE: "RAF clubs are always pleased to work into the States; skeds will be welcome. At the moment G3NGZ runs 75 watts to a Mosley three-bander." ... Through K2UKQ and W1WPO



comes YO9IA's plea for QST copies old or new G3KHE sums up the British s.s.b. situation in NCDXC's DXer as mainly homebrew on 20 and 80 meters.

Asia — EPIAD tells WIUHD that a new batch of EP-EQs is hatching. KL7PT's former neighbor, ex-KL7TI, is one of these, having arrived Tehran with a Viking and 75A-1 after grabbing DXCC in Alaska. EPIAD continues to hit the 14-Mc. East Coast around 1300 GMT. Westerners a little later on the other path Listener J. Howard has the WROLJ/mm Project Hope s.s.b. frequencies as 14.345, 21.445 and 28.650 kc. Ralph has a kilowatt aboard the floating medical center, an installation that made quite a hit recently in Indonesia. AC5PN tries 14.06½ kc. around 1230-1300 GMT of a week end but K2UYG observes that boorish swampers regularly drive Chhawna QRT Japan notes: W1CHL and XYL K1JFD fired up KA8PB's BC-610, 51-J4 and doublet on 20 after earlier DX work as KH6AWT and KX6RB. KA2AB is former W4CJD and enjoys 14-, 21- and 28-Mc. c.w. work with an Apache sender. W1TS advises K6CJF to watch his JA-collecting laurels. Don has 221 worked, 152 QSLd and 38 prefectures confirmed. The tree-propped ground-plane and Valliant combo of W1TS accounted for its 500th Asian QSO recently. "Hurricane took my radials down and, being too lazy to get out the ladder, I just tied them up at arm's reach. Seems to work just as well." WA6IVM estimates his own JA collection at over 300, mostly on 7-Mc. c.w. VERON DXprepper boosters are all set for the lacedadives DXcursion of VU2NR which may come off any time now under the call VU2NRM.

Africa — EL4A (W7VCB) has something to whet the interest of club activities chiefs: "I'll visit eastern U.S.A. in late April, hoping to meet some of the many fellows I've worked from Liberia. With me will come 5000 color slides of Africa and several thousand feet of 16-mm. color film (I formerly worked as a professional photog)." Ken hopes to visit ARRL Hq., the New York area, Washington (D.C.) and W9/K9-land — conventioners and hamfest chairmen please note W8KML and others would be delighted to see some emphatic DX action from the Dahomey, Niger and Voltaic republics. DXpeditionary or otherwise CR7CI, a pilot on the CR7-VQ2-ZE-ZS circuit, intends to add single-sideband to his already extensive 14-Mc. c.w. program. This via W9NLJ Ex-ZD1AW, relaxing back home in Belfast, advises W3KVQ of another DX assignment upcoming in May. "Alf may return to Sierra Leone, but nothing definite as yet. ZD1AW was closed down with considerable regret after thirteen months of DX pleasure." If you've a hankering to catch Eritrea on 80 meters, W4GVM of ET2US can arrange schedules K2UYG remarks, "9U MC is the only regular 14-Mc. c.w. man from his area and often shows up Saturdays, 2200 GMT, with leisurely 14,025-kc. c.w. Darned DX hogs rough him up, though." Ex-VQ3ES-ZS3ES is heading for Sierra Leone with his KWM-1, expecting much 20-meter sideband work there," tips K4KYB. Burt signed VE3EPS for a spell before returning overseas NCDXC reports CR5AE sojourning in Portugal near CT1TT, expecting return to Bissau around July. Jose figures to have a new 3-el. spinner to complement his 90 watts and HRO-M According to WGLXC, ZS6IF is contemplating the possibility of moon-bounce exchanges with the North American gang, seeking more worlds (and satellites) to conquer after an outstanding DXpeditionary series.

Oceania — "Since mid-August we have had nearly three kiloQSOs and will continue to help the fellows with Wake Island," writes the father-and-son KW6DF-K6SLD/KW6 combine. "We are active on all bands and will have the rig going in all major DX contests." Young Layne should be signing his own new KW6 suffix by the time this gets around K2QXG enlightens: "My friend VK2VK has been selected for an 11-month tour at Wilkes station, Antarctica. As much spare time as possible will be devoted to hamming. Steve is an excellent operator and hopes to add the call VK6VK to his existing VK2VK-VK4VK status." K2QXG may arrange to handle Steve's QSLs W5IRJ confirms the passing of VR2DR, an RNZAF notice placing the date as April 18, 1960. Meanwhile, W6UYE understands that VR2AP continues as the only Fiji single-

sideband buff, rock-bound on 14,336 kc. LU8BF is limited to listening while stationed at his New Zealand consular post, unable to gain licensing without British citizenship. You may recall Lucho's 1957-58 DX activity as HS1MQ, Bangkok. LU8BF can be reached c/o Argentine General Consulate, P.O. Box 1621, Wellington, N. Z. "ZL2GX expects new Kermadec Islands activity in the near future," cheers K2UYG. And how about somebody to fill ZL4JF's Campbells shoes. Jock? K6BX is apprised that the rapid and sudden turnover in Marianas Amateur Radio Club officers occasionally holds up issuance of Worked-Guam certifications. KG6AJR has the specs on this one, s.a.s.e. with inquiry WGDXC hears that W4RHE is off to Darwin with a KWM-1. That's not far from CR10!

South America — "It is a great pleasure to inform you of the foundation of the Uruguay DX Club," writes CX9-AW. "A meeting of Uruguayan DXers on September 16, 1960, originated this organization which will group almost all our c.w. DX enthusiasts." Provisional officers are CX2CO, president; CX9AW, secretary; CXs 7CO 2AX and 9AJ, reserve. Best wishes to the UDXC gang at Box 806, Montevideo! W6NTR learns that HC7FZ, newly active on 20 c.w., is a missionary pilot who expects to be buzzing the Ecuadorian jungles for the next two years South American tidbits courtesy NCDXC and VERON: PY1CK and colleagues are about to try for St. Peter & Paul Rocks, 'tis said, while PY1BEO and associates aim toward further Trindade doings. YN1s CAA and TAT anticipate renewed San Andres action. VP2VB/

(Continued on page 156)

ZS1OU and wife ZS1RM entertained the DX gang with an extensive operational visit to Basutoland last autumn. Jack and Marge will bear watching for further DXpeditionary developments in the new year. (Photos via KL7PI)





Correspondence From Members-

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

HAM TOWER OKAYED

☞ I wish to express my sincere gratitude to the ARRL for the courteous and prompt assistance given me when the Town of West Orange denied me a building permit to erect an amateur radio tower in the yard of my residence without first obtaining a zoning variance.

The opinion of the ARRL General Counsel, Segal and Marmet, was so well presented and documented, that when presented to the Town Attorney, it resulted in an immediate instruction to the Building Department to issue the permit without resort to a hearing by the Board of Adjustment (Zoning).

Had it been necessary to appear before the Board for a variance, it would have involved a legal notice in a local newspaper, notification in person of approximately thirty neighbors of my intentions, a \$30.00 application fee, legal fees, to say nothing of the possibility of being denied the variance, in which case the only resort would have been to institute a lawsuit.

Only an amateur who has faced this situation, in which an apparently unassailable barrier to the full enjoyment of his radio interest has been raised, can appreciate the full meaning of the comforting assistance rendered by the ARRL at such a time. — *Franklyn M. Grosso, K2MLB, West Orange, New Jersey.*

SOLID MEMBER

☞ . . . I want to take this opportunity to congratulate the League on putting out such a fine publication and for doing so much for the hams fraternity. I squirm when I read about how many people griped when the dues were raised from four to five dollars a year. If the dues went up to ten you would probably find me still among your members . . . — *John Ellis, K0MMI, McCallie School, Chattanooga, Tennessee.*

IMPROVED V-DIPOLE

☞ Thanks very much for K7GCO's article on the inverted V-shaped dipole. I constructed a similar antenna here and it has worked considerably better than the horizontal dipole that I have had up. Mine is cut for 40 meters and I fed it with 300-ohm Twin-Lead. I found that results could be improved if a s.w.r. indicator, such as the Monimatch, and an antenna tuner were used.

I agree with K7GCO that sloping the wire results in a lower angle of radiation but I think it would be of interest to Mr. Glanzer that sloping the wires of a dipole is suggested as an alternative in the *Handbook* if room does not permit a horizontal dipole.

It was not necessary here to make the cage used for broadbanding the antenna because an antenna tuner was used. One unusual thing was noticed: the inverted V-shaped dipole does not seem to be as good a receiving antenna as the regular dipole. — *Mike Doherty, K1MZG, West Hartford, Conn.*

DIVISION OF OPINION

☞ I have a gripe which I feel is very legitimate and likewise feel that ARRL should take up the cudgel for its members and do something about it. Here 'tis.

Since the beginning of s.s.b. there has been more or less an unwritten agreement between the hams particularly on the 14-Mc. band that a.m. would operate 14,200 to 14,250 and the s.s.b. boys would operate 14,250 to 14,300. This arrangement has worked very well in the past. However, since the FCC has allowed phone operation in the 50-ke. area above 14,300, it has been my feeling that the sideband boys would move up to a new area of operation from 14,275 to 14,350 which would allow the a.m. stations the area from 14,200 to 14,275 and would again divide the 20-meter phone band into equal sections.

The sidebanders have not as yet been gracious enough to move all their operations to the area above mentioned and I feel it's high time a movement was started to bring the light to s.s.b. operation as above mentioned.

Another gripe which I think will bring agreement from all voice operation, both a.m. and s.s.b., is phone nets identifying themselves with MARS operating within the confines of the amateur frequencies when special frequencies outside the ham bands are provided for such operation. This operating procedure occurs on all the bands as I have been requested more than once to "please stand by" or "please move to another frequency as we are handling traffic on this frequency." When I learn that a couple of the boys are handling traffic (no net) or if it is a civilian net I accede to their wishes to keep from deliberately interfering with their operations but I will not stand by or QSY for a MARS-type net. How do you fellows feel about the situation? — *Arthur W. Plummer, W3EQK, Baltimore, Maryland.*

☞ . . . Enjoyed the editorial in October *QST* regarding self-policing in the 20-meter band. I hope that many amateurs read it. — *A. J. Kuzniewski, K9MNZ, Milwaukee, Wisconsin.*

☞ Whether you like to work DX or not, I'm sure that if you look at the problems objectively, you will agree that if a very small portion of the 20-meter band were set aside for exclusive use of foreign s.s.b., it would do amazingly wonderful things for the betterment of international contacts, without depriving the Americans of any significant portion of the band. The 5 kc. between 14,295 and 14,300 could be devoted to this worthy purpose, provided all American amateurs (especially those not primarily interested in DX) could be persuaded to cooperate.

I have volunteered to observe and promote the following operating practices on 20-meter sideband. Furthermore I am making at least 10 copies of this letter and mailing it to "W" sidebanders I have heard on in the past month. I sincerely hope you will do the same; it would be difficult to find a worthier cause in the interest of harmonious 20-meter s.s.b. operation.

1. Starting immediately I will consider the region 14,295 to 14,300 kc. exclusively for the transmitting use of s.s.b. amateurs outside the continents of North and South America. It will therefore be my listening region for good, QRM-free DX, including DXpeditions, 24 hours a day.

2. This segment is selected in preference to 14,345 to 14,350 in order to provide two hand edges for calling.

3. I will never transmit in this region, nor will I ever operate so close to it that my sidebands QRM the region (particularly my upper sideband when I am below 14,295). I will call and contact foreign s.s.b. stations by setting my transmitter frequency above 14,301 or below 14,292 kc.

4. I will voluntarily honor this reservation as proposed by the Mark IV DX Assn 24 hours a day even though at times at my QTH I can hear no activity in this section of the band. It is understood that nothing is implied in this arrangement which will prevent s.s.b. DX from using other transmitting frequencies, if they so desire.

5. If I find occasion to ask a brother American ham to QSY out of this DX reservation, I will do so with all the politeness and diplomacy at my command. — *Dale Kentner, W2ZX, Marlton, N. J.*

CLEAN-CUT HAM ON 160

☞ Have we lost 160 meters, completely? According to the new equipment advertised in *QST*, we have. I hope someone writes to the active 160-meter stations and let us know if

(Continued on page 180)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
GEORGE HART, WINJM, Natl. Emerg. Coordinator
JOHN F. LINDHOLM, WIDGL, Ass't. Comm. Mgr., C.W.

ROBERT L. WHITE, WIWPO, DXCC Awards
LILLIAN M. SALTER, WIZJE, Administrative Aide
ELLEN WHITE, WIYYM, Ass't. Comm. Mgr., Phone

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FCC Exam Failures Running High. Many hundred examinations for General Class Amateur License are conducted by FCC each year. Many given at amateur conventions courtesy of the Engineers-in-Charge as well as at scheduled cities and FCC offices. The *License Manual* includes a schedule and list of regular FCC examining points. The Commission tell us informally of one fairly typical General Class exam in which 92 amateurs turned up for the test. Twenty passed; 61 failed the code test, and 11 the technical part.

Now this gives pause for thought. Sixty-six per cent failures is just too much. Note that two out of every three failed the code test, and this was at a mere 13 w.p.m. It is rather silly, we think, to turn up for examination, if one had not made suitable preparation. If the figures were in reverse with 60 to 70 passing, that would be more like it. This business of getting the code down pat really is just a matter of adequate practice. The Novice who sticks at his key on 40 or 80 meters and goes after his WAS can often qualify for his General in half his apprentice year. WIAW puts out a whole hour of tape-sent practice, nightly. WIAW's Official Bulletins (18 w.p.m.) are sent simultaneously on all our frequencies, an hour and a half before, and again two and one half hours after the start of the code practice.

Further Commentary on This Code Business May Help.

(1) No, 18 w.p.m. isn't too high a speed to listen to after you have memorized the code sounds. Copying at speeds higher than that which permits copying consecutive characters is the best way to speed up one's copying powers. (Thousands learned their code well in those days when all there was to copy was commercial and government transmission that seldom slowed below this speed.)

(2) Some of those exam failures were on *sending* tests. You must be able to send good code as well as receive it. That means that you must practice good sending of characters and words. Practice sending: it will speed up the process of receiving well also.

(3) Practice, and more practice, with regular operating on the air is the way to make the code language your very own.

(4) To avoid wasting time in flunking the exam, here are some final finals in the suggestion department.

- Get an ARRL CP-15 or even CP-20 certification before you take a General Class or Conditional examination.
- Test yourself for perfect copy two or three times on the 15 w.p.m. WIAW runs. This should save you from losing out if you get exam jitters.
- Have a good operator give you frank criticism on your sending and some advice on handling a key. Send in step with WIAW on those dates where specific practice text is followed.

See page 96 this *QST* for code proficiency data. Avoid being like some newcomers who can hardly send their own calls properly.

A Challenging 1961! In the new year will you complete WAS? Is your code ability certified all the way to CP-35? Are new DX cards on the way to achieve your DXCC or another sticker for ten new ones? Are you reporting to your SCM? Are you ORS, OPS, or OES yet? What about that SCM appointment based on your station work that you never quite got around to last year?

Operating activity, once you get your FCC amateur ticket, is an open road to increasing proficiency and radio accomplishment. Each earned appointment and award helps test and perfect one's station. AREC and NTS are practical ARRL communications frameworks to shape patterns for greatest success in handling emergency and every day traffic. Participate in the field organization of the League by registering in the Emergency Corps, reporting into your Section Net, or holding one of the Station Appointments. Get personal credit and give amateur radio a boost as well.

Get into radio events and accept operating opportunities "as they come in 1961." Regarding each 1961 operating activity, compare how we stood last year with how we stand this year, to progress ahead. Shall we see the ARRL Activities Calendar and other League references, and get with it?

On Giving Novices a Lift. Ed Wolfe, KNØYQU, writing for SS blanks, also expresses thanks for local help he received.

"After a 35-minute rag-chew on 40 c.w. KØKRT. Willie, called me by telephone. We had an hour informative chat. KØKRT makes a practice of calling all new Novices he can work locally to give encouragement and help Novices get their Generals. Now if some of the hams that are hasty to condemn the Novice license *also* would help a Novice to advance, I think they could get quite a bit of enjoyment."

Several old timers have written in this past year to tell ARRL of some prime satisfactions in life from their current work with new operators. In their view it is a rare privilege to work with unsophisticated, appreciative Novices, Tech's, or any persons wanting to enjoy all facets, and work all bands, rather than be confined to Tech-Novice horizons.

Ours is a full and satisfying hobby. We do hear this also from club workers assisting newcomers. All praise to these men and clubs, especially for conducting classes and examinations. We must all be mindful of the importance of maintaining properly high standards in the conduct of operating exams, such as given in FCC's behalf! This is as much a benefit to the person being examined, as to the fraternity he is joining. A wish expressed in at least one letter was "to return in some measure the know-how in amateur operating and something of the band capabilities and history and tradition, received from others . . ." We suggest that old timers share their amateur background, lore, and abilities with newcomers. This can be, for many OTs, a brand new and wholly good and interesting experience.

Dates, in GMT Logging. K2IHW and W5CA mention the matter of changing the DATE indication in one's log, whenever (in whatever brand of time) he completes one day at 2400, simultaneously starting the next day with 0000. Only time *and* date tell the whole story, a point to be considered when you read W1AW's dates for sending Code Practice. Mon., Wed., Fri., Sun. are the days for slow speed practice in GMT, but listeners receive this on Sun., Tues., Thurs., Sat. nights in terms of EST-CST-MST-PST. J. C. Ward, W2ITX, who can speak with authority in the field of either navigation or radio net operating, stresses that any GMT time specification should always be accompanied by the GMT-date. He suggests obtaining a Standard Time Chart of the World, H.O. 5192, as published by the U.S. Navy Hydrographic Office, Washington 25, D. C. at 60¢. This helps in date matters, and is a reference to all the time zones of the world; each is designated by zone number and letter, between 15° meridians, east and west of Greenwich.

GMT has already been put into wide use for amateur operation in accord with the Board's recommendations. We were surprised to find a full 85% of our first-week November SS exchanges in terms of GMT. This is readily understandable, if you note that times-of-QSO as part of an exchange compare "on the nose" when expressed in GMT, wherever in the nation one lives in terms of time zones. It is harder to compare across the

zones when people insist on speaking in different time-zone languages.

In August 1960 *QST* we included with some other remarks on GMT, a useful time conversion table. The November issue of *QST* took the subject a step further; the fall *CD Bulletin* pointed out for ease of logging that the simplest scheme of all is to put one's station clock right on GMT. The 4-figure designations make for straightforward log entries. In summary, for log keeping purposes, a fellow starting to log in GMT notes his transition from any one day of the week to the next, and enters the new date as the time goes through 2400/0000. Also in setting up skeds by radio, it becomes quite important, to make it clear that you are talking a GMT-date as well as giving the time in GMT, to make sure you both get together!

Be Truthful in RST Reporting. May we call to mind Mark Twain's admonition: "When in doubt, tell the truth." Our dictionary says truth is complete conformity to fact or reality. Perhaps some of us are plain prevaricators or feel it should be a matter of opinion as to how to use the truth? Our RST reporting system is a sharp, practical system; it is built on definite and exact R-S-T meanings for each point of readability, strength, tone scales. Use Operating Aid No. 2, The R-S-T System, available from ARRL on request by radiogram or otherwise, and you can hardly go wrong.

We get letters railing at dishonest reporters and those who misuse the tone indications particularly. 'Tis increasingly apparent that the report which through carelessness or flattery is dishonest, is a disservice to the man who receives it . . . also to the one who gives it. Let's all cease lulling fellow amateurs into complacency. It is a rude awakening indeed, when an FCC citation for a poor note or otherwise defective signal arrives? Keep those RST definitions before you, as you operate. Consult them. Give honest reports, and you can render your fellow amateurs and yourself a real service.

V.H.F. SS and Coming Events. The V.H.F. Sweepstakes dates are January 7-8. If you can work on any frequency above 50 Mc. we suggest you refer to the contest rules on page 70 of December *QST*. This is an opportunity to look for some new states and ARRL sections, as well as to give your v.h.f. station and any new antennas a real workout. For v.h.f.ers out in the remote areas, and those on the lookout to work them, the SS is always welcome. Take part and send in your reports, large or small.

ARRL's International DX Competition (the 27th running) comes in February and March. The announcement and rules run on page 77 of this *QST*. Intensive spadework has been completed in mailing direct advance information to IARU societies and to some rare DX stations that we hope can be in the fray. There's just about time to complete any final setting up or overhaul of equipment to be ready for the DX Test. Don't miss out.

—F.E.H.



This is the impressive setup at W3GQF, Johns Hopkins University, that produced a record phone CD Party score. Multi-oping it were K3GJD at the mike (in photo) and W3WZL assisting to a claimed score of 50,960 points. Bravo!

RESULTS, OCTOBER CD PARTIES

The CD Party has always been a chance for stations to swap appointment exchanges with other appointees. Of course, these appointments are identified with the station and operator. Therefore, the CD Party has always been an affair of single operator competition with only a smattering of multiple-operator entries. The latter usually were from club stations that found a group of CD appointees all eager to participate with but one rig available. Such is the case of many appointees away from home attending college. Thus the college club station gets a real workout. These were exactly the type of stations that produced the top scores in the October CD Party.

M.I.T.'s W1MX with K2KIR and W1WAJ, old CD addicts, teamed up to key 622 QSOs in 65 sections for the top score of 204,100. On phone a similar story from Johns Hopkins University, W3GQF, where W3WZL and K3GJD registered the highest score ever produced in a phone CD party with 191 QSOs in 52 sections (1) for 50,960 points. So bent was this duo in scoring a high section multiplier that easy Eastern Pennsylvania was the 50th section worked out of 52. Likewise multiple-operators W9YT at Wisconsin U. and W1YK at Worcester Tech. scored 36,750 and 34,320 respectively.

In the regular single-op category W1EOB getting in practice for Sweepstakes hauled home 622 QSOs in 64 sections to lead the c.w. scorers with 201,280. Next in line were K5ZBS, W4DQS, W9RQM, and W3DQC.

Activity on phone was phenomenal. A year's campaigning finally drove home the idea that 29.6 and 21.3 Mc. are the meeting places on Sunday afternoon. This time it finally paid off as juicy sections never before heard in the phone CD Party were on. K2EIU took full advantage of this to cash in the top score with a record 206 QSOs (first to break 200) in 44 sections to score 46,640 whalloping points. Fellow Eastern New Yorker WA2EKE was back somewhat with 30,030 followed by W8NOH, K4UBR, and K2QDT. Note that W7BSW from Washington state made the high claimed list by a comfortable margin. The list below has representatives from every call area but the 5th and 6th. Who will be the first from those areas to make the list? The Phone Party finally has taken on a nation-wide aspect! Sideband is also coming into more prominence, although there were a.m.

stations who should have listened on the "low end" just a little closer to discover the sidebanders *were* in the CD Party.

The following are the high claimed scores. Figures show the score claimed, number of QSOs, and the number of different sections worked. Final and complete official standings will appear in the January CD Bulletin. — W1DGL

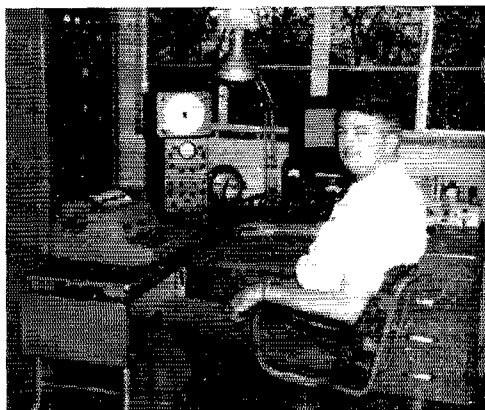
C.W.	PHONE
W1EOB	201,280-622-64
K5ZBS	199,040-615-64
W4DQS	186,165-584-63
W9RQM	170,880-527-64
W3DQC	166,780-534-62
W9YT ¹	160,020-504-63
K4RAD	159,705-502-63
W6BES	159,520-501-63
K8MTL	158,100-505-62
K5BSZ	155,245-504-61
W3GYF	150,255-472-63
W3YOZ	147,915-514-57
K4BAI	146,100-480-60
K1JDN	145,000-500-58
K4PUZ	142,780-480-59
K6LUZ	135,780-438-62
W4YE	134,805-466-57
W3MSR	133,920-425-62
W9MAK	126,170-400-62
K4CFD	126,040-400-62
W9QQG	125,850-401-62
K5UYI	124,000-400-62
K11FJ	123,250-419-58
K2IMK	120,615-404-59
K8JLP	120,610-410-58
K6ORK	118,125-369-63
W4MLF	117,705-394-59
K6SNG	117,150-355-66
K5ABV	116,730-381-61
W4BZE	115,995-402-57
K7CHH	115,710-401-57
K4TEA	114,000-376-60
W4PNK	109,725-389-57
W1EIT	108,585-375-57
W6PHR	107,700-352-60
W1TS	104,265-324-63
W4RUO	103,840-348-59
K9RFW	100,500-329-60
W1MX ²	204,100-622-65
K1MHM ³	126,150-430-58
K2EIU	46,640-206-44
WA2EKE	30,030-150-39
W8NOH	25,530-106-46
K4UBR	24,860-106-44
K2QDT	24,820-146-34
W1QQC	22,750-127-35
W4BGP	21,470-113-38
K9RFW	21,000-114-35
K1BCT ⁴	20,000-118-32
W1DXS	20,000-125-32
W7BSW	16,465-84-37
W9PNE	14,105-84-31
W4JUJ	13,500-83-30
WA2BAH	13,000-100-26
K4PUZ	12,245-75-31
K4HXG	11,850-74-30
W2EEN	11,550-73-30
W3DQC	10,080-80-24
W1EJJ	9,720-75-24
W1NJL	9,560-72-24
K2JTU	9,560-75-24
K6SNG	9,150-61-30
K6LUZ	8,530-63-26
W3MSR	8,450-58-26
W8NYH	8,100-68-24
K6EPT	7,500-56-27
K8HTD	7,320-56-24
K6LGG	7,280-52-25
W1AW ⁵	6,300-53-21
W8RFX	6,195-54-21
K1KSH	6,175-60-19
W4LCK	6,090-58-21
W1DGL	5,420-53-18
K8MTL	5,375-58-25
W8ACU	5,040-41-21
K4LPR	5,000-40-25
W3GQF ⁶	50,960-191-52
W9YT ⁷	36,750-175-42
W1YK ⁸	34,320-169-39

¹ K9ELT, opr.; ² K2KIR, W1WAJ, oprs.; ³ K1MHM, K1BYL, oprs.; ⁴ W1ECH, opr.; ⁵ W1WPR, opr.; ⁶ K3GJD, W3WZL, oprs.; ⁷ K9LQB, K9ELT, W9SZR, oprs.; ⁸ K2-PHF, K1AII, oprs.

BRIEF

Unconfirmed report has it that by DX Contest time, Nigeria will change its prefix from ZD2 to 5N2.

One of the more prominent CD Party c.w. sigs is K5ZBS whose big scores are made with this 4-400A kw, and 4146 exciter. A Gonet 3-element tribander and 80- and 40-meter dipoles take care of the radiating chores. Earl is formerly W6WNI.



NATIONAL RTTY CALLING AND WORKING FREQUENCY

3620 kc. 7140 kc.

With the AREC



Much of the information we receive on work done by amateurs is extraneous. This is perfectly all right, except when it detracts from the subject at hand; what the amateurs did. Quite frequently, we get clippings or articles dealing with an entirely non-amateur subject, sent to us only because amateurs sometimes have a communications connection with these subjects. For example, a complete description of a Weather Bureau communications setup, or page after page of pictures of a hurricane's destruction, or details of the Red Cross's blood donor program, or civil defense projects and problems which may include communications but have nothing to do with amateurs.

Although personally we may find these things interesting, officially the only thing of interest to us is amateur radio. The line must be drawn, somewhere, to exclude diversionary material. This line is not always sharply defined. Suppose, for example, a group of amateurs operate Forestry Department equipment on non-amateur government frequencies. Is this amateur radio? Of course not, and logically it is of no more official interest to us than participation by people who happen to be radio amateurs in a camera club activity. We'll never forget the fracas we got into with an EC who wanted to offer a Public Service Award to an amateur who used his personal boat to rescue a number of families in a flood. His argument was that the guy had rendered a public service and that he was an amateur, therefore he should receive an award; we contended that although his was a very definite public service, it was not an amateur radio service and we had no business trying either to recognize it or take credit for it. Later, it turned out that he had used amateur radio in his boat, but this was incidental to the real service he rendered — the use of his boat at great personal risk. (P.S.: He got his PSA.)

Yes, things like this keep life as NEC from becoming dull. We frequently have to ask ourselves: is this something to do with amateur radio, or isn't it? The answer is not always clear cut and definite, but usually hinges on whether or not the service was performed in the name of amateur radio, by licensed amateurs on amateur frequencies; for we are not civil defense communicators, nor Red Cross communicators, nor Weather Bureau or Post Office or CAP or military or police or Forestry Department communicators, and it always burns us to a crisp to see amateur operation on amateur frequencies referred to in the name of some agency instead of in the name of amateur radio.

But it's entirely our own fault. Many of our amateur leaders are amateurs only incidental to their occupational pursuits of an allied field, or a field that becomes allied through circumstances — or they become amateurs when it appears that amateur radio can be used for some selfish organizational purpose. In most cases, there is no doubt of their sincerity; but amateur exploitation has been largely a result of divided loyalties, of the fact that we have never developed sufficiently our sense of unity. All amateur organizations are of necessity voluntary in nature, and a great many of us dearly love to wear quasi-official "hats."

There are many who wear ARRL "hats," too, and wear them proudly. This is not only gratifying, but we could not long endure as a membership organization without it. Every amateur's outside activities are his own business; all we ask is that when operating in the amateur bands you wear your "amateur hat." ARRL has long worked to make this hat a proud one to wear, but in the final analysis the pride with which we can wear it is directly proportional to the magnitude of the service for which it stands. We at headquarters can compile and display the overall results ever-



New Mexico has lost its SEC, Len Norman, W5CIN, who served as N. M. SEC for two and a half years, and did an excellent job, has moved to California and will make his home in Santa Barbara. Look for him at W6JLY.

lastingly to prove our values and virtues to the public and to the government, but you fellows in the field have to do the leg work for amateur radio to create and maintain the strength and reputation of our Amateur Service which makes this possible. — WINJM.

— * * * —
 Addenda: In the floods of March 28, around Sioux City, Iowa, the following amateurs took part in addition to those listed on page 83, July 1960 QST: W0s AYD CXN FBY GVX BQG EFG GQE WWM CRF FZO KYQ BGB. K0s AHV UIS LXC UAH WIZ WVS DON YGN EQN ISU SVD UAE DPH GBL QKX WLX EJS JUK MFY UAF WVS WVR. — K0EXN, SEC Iowa.

— * * * —
 The SET in Corpus Christi, Texas, was in competition with a real emergency situation arising out of tornadoes in the area. More about the SET elsewhere. Throughout the morning of Oct. 16 four tornado clouds were sighted in the Corpus Christi area, resulting in the Red Cross disaster chairman declaring a state of emergency at 1305 and alerting the EC for Nueces County. Mobile stations were put into action on 3885 and 146,802 kc, and equipment was put into operation at Red Cross headquarters. Contact with mobiles was conducted from W5AQQ and W5SIL. W5MS was activated at Red Cross headquarters at 1330, and assumed control on 3885. Both W5AQQ and W5SIL lost commercial power, but both continued on emergency power, as did W5MS. W5INN was assigned auxiliary control and W5RPH, on emergency power, was standing by to take control if necessary. At 1415 W5RPH reported water rising in his shack and that he was preparing to secure; but later the water receded and thanks to emergency power he never left the air. At 1345 W5MS assumed control on both 3885 and 146,802 and AREC proceeded to assist in providing communications for first aid and evacuation activities.

W5HQR/mobile and W5INN/mobile established a 2-meter link between the weather bureau at the airport and Red Cross headquarters to provide continuous weather service. As much as 13 inches of rain fell during the day in some areas. W5QKF/mobile coordinated movement of supplies between evacuation centers and Red Cross headquarters.

At 1730 W5HQR was secured at the weather station and transferred to an evacuation center, from which communication was maintained with net control W5MC until 2015, when telephone communication became adequate and the AREC secured. W5GMT activated and managed the net



The Kern County Amateur Radio Club, W6LIE, recently conducted an emergency test. November QST showed their truck installation, but we couldn't resist this encore of their entire setup.



The Mobile Control Center of Burlington County, N. J., RACES, K2DGE. The crew shown, left to right, are K2MOV, K2HJY, K2JAK, W2WKI and K2VKS.

control station, W5MS.

Because of severe atmospheric noise caused by the thunderstorm activity, communication was much better on 2 meters than on 75. Also noteworthy is the fact that the AREC in Corpus Christi is so well organized that it was able to conduct its scheduled SET at the same time it provided adequate emergency communication for the Red Cross in a real emergency.

From the Oak Ridge "ROC," a bulletin put out by the Oak Ridge (Tenn.) Radio Operator's Club, we hear that an explosion at the Tennessee Eastman plant in Kingsport in early November brought the amateurs into action. Perhaps we will have more information on this in a future issue, but the story we get from the ROC is that SCM W4UIO headed up a group of amateurs on 3980 to handle personal welfare and emergency traffic. Six amateurs were so involved in Kingsport, with many others assisting both inside and outside the state, but we have no further identifications at this writing.

Western Florida amateurs obtained medical aid and other assistance at the scene of a highway accident on U. S. Highway 98 between Pensacola and Fort Walton Beach on Nov. 6. The emergency interrupted a transmitter hunt of the Whipsnappers, a mobile radio club, when the hidden transmitter, K4LOL/mobile, heard W4EWG/mobile, who was on the way to join the hunt, reporting that a car had overturned just ahead of him and one person was seriously injured. K4LOL/mobile, not himself in a position to help, contacted K4PIQ/mobile, who stopped and telephoned the Highway Patrol. W4EWG remained at the scene until police and an ambulance arrived. Operation was on 29,560 kc., communication between W4EWG/mobile and K4LOL/mobile being a distance of about 25 miles. — W4RKH, *SCM Western Florida.*

The Florida State Road Department has agreed to make available to AREC, on loan, for emergency use, gasoline generators rated from 1 to 5 kw, subject to limitations imposed by their own requirements for use of the generators. A regular procedure has been set down for application, delivery and pickup of the generators in cooperation between the FSRD and the section AREC and is administered by the SEC and one of the local ECs.

This is mentioned here in the hope that other ECs and SECs may be able to make similar arrangements with their state highway agencies to improve AREC efficiency in emergencies.

Twenty-four SECs reported for September, representing 9353 AREC members, a considerable drop from last September's record of 33/11,375. Los Angeles reported for the first time in 1960, bringing the number of different sections for the year to 41, one section more than last year at this time. Other sections reporting: Md.-Del.-D. C., E. Mass., S. Texas, NYC-LI, Ga., Mich., San Joaquin Valley, Nevada, E. Bay, Ind., Wash., Okla., Iowa, Maine, Ohio, Ore., Santa Clara Valley, E. Pa., Ala., Colo., Utah, Wyo., S. Dak., Minn.

RACES News

Amateurs in Burlington County, N. J., participated, June 4 and 5, in one of the largest c.d. evacuation drills ever attempted. Over 250 families had to be evacuated

from their homes to a point over 40 miles away. The c.d. control station, K2QGE, was activated at 0800 on June 4 on 2, 6 and 10 meters. Mobiles were activated in each municipality in the county and maintained contact with the control station and with each other, and each convoy was thus always in touch with control. Ten of the mobiles were supplied by W2RG, c.d. radio co-



ordinator for Camden County. Burlington County C.D.'s mobile control center was driven to the reception center at Chatsworth and set up to maintain contact with main control at Mt. Holly; this consisted of two 2-meter stations, a 6-meter station and a 10-meter station, antennas on a crank-up tilt-over 70-foot tower mounted on the back of the van. After all convoys had arrived, they were dispatched to campsites to stay over night, and the mobile control center was dismantled and moved to its over-night location, where it was set up again. Much traffic was handled regarding food, cots, gasoline, emergency police protection, bug bombs and medical supplies. Six meters proved the best band for consistent coverage.

On Sunday morning all camps reported in to the mobile control center and arrangements were made for the return trip. In this phase of the exercise no convoys were used and cars returned singly, so communication was not a part of the problem.

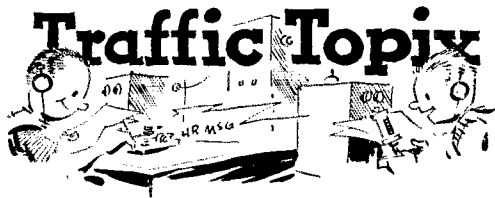
K2CMN, to whom we are indebted for a fine, detailed report of this extensive operation, included several pages of valuable critique which we wish we could reproduce in full. Under the circumstances which exist, the best we can do is summarize them in this fashion: (1) Ten meters was not too successful, and two meters little more so; communication on six meters was by far the most consistent. (2) Linear finals on the commercial equipment used were not 100% satisfactory. (3) Ground plane and coaxial antennas might better be replaced with "J" or collinear types for more gain. (4) Tighter tolerances on oscillator frequencies are required; even with 0.005% crystals in "identical" equipment, constant scanning across a portion of the band was necessary.

An operation as extensive as this requires a lot of planning and hard work. Greatest credit is due W2WKI, K2HJY and W3DEP for the effort they put into both planning and operation.

RESULTS, SEPTEMBER FREQUENCY MEASURING TEST

The September 16-17, 1960 FMT, open to all amateurs, brought entries from 260 participants who made a total of 1013 measurements. Of these, 133 ARRL Official Observers submitted 594, and 127 non-OOs made 419 readings. All taking part have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement. February QST will announce details on the next ARRL FMT

Observers	Parts/ Million	Non- Observers	Parts/ Million
W8CUJ	0.0	W8GQ	0.2
W8GBF	0.0	W1PLJ	0.3
W4CVO	0.0	W3SPL	0.3
W4JUI	0.0	W6KT	0.3
W5NKH	0.1	W8VLL	0.4
W3EIS	0.4	G6JJ	0.5
W1VW	0.5	W7LTK	1.3
K6RTD	0.6	W9TZN	1.4
K9OVQ	0.7	K4HOB/DL4YR	2.1
W2AIG	0.9	K6IKG	2.7
K6EC	1.7	W8EZE	2.9
W6GQA	1.7	K6HI	3.1
W2RSU	1.9	W6YAW	3.7
VE6HM	4.2	W4OOS	4.0
W7FIS	5.2	W8JLI	4.5
W6HU	5.3	W2DGQ/DL4VQ	4.9



The extent to which Greenwich Mean Time (GMT) has been accepted by the amateur fraternity in general and by the traffic fraternity in particular is amazing. Probably this is simply because amateur radio communication is definitely not a local proposition. Certainly, the general public has not yet accepted it; in fact, the general public hasn't even accepted standard time, judging by the way most people change the hands of their clocks whenever this becomes the local fashion.

Those who oppose its use oppose it most vociferously, and some of their arguments are valid. But there is always some confusion when changes are made, and it must be said that those amateurs who oppose the use of GMT appear to be a minority. In the sweepstakes contest, about four out of five

exchanges used GMT rather than local time. In the net directory, now being compiled, a large percentage of net times given are in GMT *only*. In traffic preambles, more and more filing times are in "zulu" time. It's definitely taking hold, and we predict that before long it will be almost universal, if it isn't already.

Some of those who appear willing to use GMT, however, do so incorrectly. Occasionally we find cases in which the local time is merely expressed in 24-hour terms without being converted to GMT, which is *always* expressed in 24-hour terms. Even more often we find cases of incorrect conversion brought about by the addition or subtraction of the wrong number of hours.

Probably not too many traffic men are bi-lingual or multi-lingual, but one of the best ways of learning to speak or read a foreign language is to learn to think *directly* in that language, without having to go through the extra mental step of translating it to English. The same principle applies to GMT. If you really want to use GMT, you forget, temporarily, what time the local clocks say and get used to thinking directly in terms of GMT. For example, if you live in the midwest, you start thinking of rising time as 1300 (not 0700 or 7:00 a.m.), of lunch time as 1800 (not 1200 or 12:00 noon), of bedtime as 0500 (not 2300 or 11:00 p.m.). Your traffic schedules are made and kept on the same basis. If the people around you change their living schedules and require you also to do so, by arbitrarily moving the hands on their clocks, you simply move your schedule up an hour where or as necessary (there is no Greenwich "Daylight Saving" Time). But, if you insist on converting your local time to GMT, or vice versa, each time, you're going to be a confused kid, kid!

Yes, it takes getting used to, and this can't be accomplished over night. Give it time, let it jell. So what if the date does change at what you customarily think of as seven o'clock in the evening? In time, you'll get accustomed to changing the date at 2400 (0000) Greenwich, regardless of what time your local clocks say, even though it may still be daylight. Sure this seems strange, at first — but is not the adoption of one standard in place of 24 worth it? Come on out of your goldfish bowl and swim in the ocean for a while; the water is fine! —WINJ.M.

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for October Traffic:

Call	Per%	Recd.	Rel.	Del.	Total
W3CUL	572	2931	2102	794	6399
W6WPF	104	1140	1116	24	2384
K6BPI	42	927	835	92	1896
W0BDR	164	775	642	9	1590
W0LGG	405	578	525	35	1563
K6MCA	40	696	684	11	1431
K5ONK	125	615	588	27	1355
K4AKP	90	616	589	27	1322
W6SCA	20	648	627	2	1297
W6RSY	29	577	416	56	1078
W0LCCX	12	524	462	62	1060
W7BA	8	503	491	12	1014
W7DZX	8	489	429	48	974
W9IDA	106	429	425	0	960
W4PL	7	458	411	25	901
W1SMU	16	363	394	13	786
W3IVS	64	355	338	17	774
W0DYG	31	384	321	28	764
W5ZHN	51	358	279	65	733
K0CLS/6	50	359	304	14	727
W8DAE	42	347	253	52	694
W0TUS	57	224	272	39	692
K4SJH	202	262	193	18	675
W6GYH	199	235	217	16	667
K2UAT	238	140	144	39	666
K0ORL	38	310	284	26	658
W2ZEB	13	311	277	34	653
W3VR	76	291	256	5	628
W42CG	39	280	278	3	600
W40GG	52	265	251	13	581
K2RBW	295	134	114	20	563
K9BTE	13	273	275	2	563
W8UPH	14	274	226	47	561
W42COO	10	230	279	12	531
W6EOT	10	275	210	32	527
K6EPT	7	255	127	128	517
W9ZYK	18	252	205	28	503
K7IEY	26	249	225	0	500
Late Report:					
VE2AZL/W1 (Sept.)	28	845	823	18	1714
W5ZHN (Sept.)	39	257	173	84	553

More-Than-One-Operator Stations

Call	Orig.	Recd.	Rel.	Del.	Total
W6IAB	66	1141	1109	32	2348
W6YDK	1438	236	209	22	1905
Late Report:					
K4UO (Sept.)	233	412	17	414	1076

BPL for 100 or more *originations-plus-deliveries*

W4ODR 398	W7QMV/VER 139	W1TXL	107
K7BKH 188	K6WAH 136	W42CCF	105
K2UBG 168	K4BSS/5 131	K2UPT	105
W9GJ 150	K8KMQ 125	K0RRL	104
W2EW 147	W9DGA 124	K1CCE	101
K2DEJ 143	K1LAL 122	Late Reports:	
K0LTL 141	W3TN 113	W0FEO (Sept.)	102
K4FSS 140	W9TT 108	W42EBR (Aug.)	101

More-Than-One-Operator Stations

W4NDJ 287 W1AW 175 W2DMJ 140

BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: K2UFT, W4BAZ.

The BPL is open to all amateurs in the United States, Canada, Cuba 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 48 hours of receipt, in standard ARRL form.

We quote from "QNC," the bulletin of the Eastern Area Slow Speed Net, edited (we think) by K2ZHK: "Please begin to perambulate toward the immediate vicinity of the area in which I am standing." That sure is a hard way to say 'come here.' That's how *not* to operate in a net. Remember that a net is not a scheduled meeting of the Rag Chewers Club, but rather an institution for the promotion of traffic handling as fast from one place to another as possible. When the NCS calls, you don't have to go into a soliloquy, just send 'C' to indicate yes or 'N' to indicate no, or whatever the answer is, keep it short. When you check in, use 'BK' to get the attention of the net control and wait for acknowledgment, then sign your call. It is not necessary to identify yourself every time you make a dit. Every time you go to send something, think of a shorter way to send it, then send it shorter than that."

October net reports.

Net	Sessions	Check-ins	Traffic
Mike Farad E & T	51	520	1071
Eastern Area Slow	31	259	126
Dixie Early Birds	31	651	241
Early Bird Transcon	31	...	225
N. E. States Traffic	30	307	220
7290 Traffic	38	1167	400
N. E. Barnyard	24	524	13
Interstate SSB 75 Meter	..	1171	419

National Traffic System. We want you to meet the leaders of NTS at region, area and TCC level. They do change from time to time, and the average NTSer can't keep up to them. Some don't know their own leaders. Some of the leaders don't even know each other. This is bad. NTS is supposed to be a group of nets that work closely together.

At area level we have W8SCW (Eastern), W9DYG (Central) and K0EDK (Pacific). At region level we have WIBVR (1RN), W2PHX (2RN), W3UE (3RN), K4AVU (4RN), W5GY (RN5), W6RSY (RN6), W7QLH (RN7), W8DAE (8RN), W9ZYK (9RN), W0LCCX (TEN), VE3BZB (ECN) and K0EDH (TWN). And at TCC level, we have W1SMU directing the Eastern Area, W0BDR directing Central Area and W6EOT directing Pacific Area.

These amateurs are what you might call the "general staff" of the NTS. Each is concerned primarily with his own functions and his own net, but secondarily all are concerned with the operation of every other net in the system.

We have often thought that there isn't enough contact between NTS net managers at these "higher" levels for them to be familiar with each other's problems and situations. Of course all are included on the LO list and eligible to participate in LO Parties, but perhaps it would be a good idea to have occasional get-together so we could get to know each other, swap ideas, cry on each others' shoulders, etc.

NTS also has net managers at section level. There are too many of them and they change too fast for even us to keep up with, but they are definitely a part of the team, as are the net participants at all levels. Thus, NTS is a tightly-knit group of traffic handlers who are proud of their accomplishments and ever on the alert to improve themselves. October reports:

Net	Sessions	Traffic	Rate	Representation	
				Average	(%)
1RN.....	83	949	.324	11.4	77.1
2RN.....	62	686	.545	11.1	94.5
3RN.....	62	543	.377	8.8	95.2
4RN.....	62	531	.223	8.6	87.1
RN5.....	62	819	.404	13.2	84.1
RN6.....	59	975	.362	16.5	86.4
RN7.....	60	540	.262	9.0	32.9
SRN.....	61	359	.589	5.9	90.2
9RN.....	61	626	.413	10.3	68.4
TEN.....	90	906	.493	10.6	68.1
ECN.....	19	37	.102	1.2	57.9 ¹
TWN.....	31	317	.271	10.2	74.1 ¹
EAN.....	30	1212	.807	40.4	97.2
CAN.....	31	1304	.829	45.2	100.0
PAN.....	31	1576	.890	50.5	100.0
Sections ²	973	5451			
TCC Eastern.....	102 ³	993			
TCC Central.....	93 ³	1155			
TCC Pacific.....	123 ³	1041			
Summary.....	1777	20020	PAN 9.5	CAN/PAN	
Record.....	1742	24452	.928	12.3	100.0

¹ Region net representation based on one session per night. Rest are based on two or more sessions.

² Section nets reporting: VFN (Va.); SON (Calif.); BUN (Utah); WSSN & WIN (Wis.); MDDSD (Md.-Del.-D. C.); NJN (N. J.); EMIN (Mass.); CCW (Colo.); ILN (Ill.); NEB (Nebr.); MSPN Eve, MSPN Noon, MJN, MSN, (Minn.); KPN, KYN, MKPN (Ky.); NJQ (S. Dak.); S. Dak. 75, S. Dak. CW; QMN (2 Mich. nets); FMTN, FPTN, TPTN, GN (Fla.); AENT, AENP Morn, AENB, AENP (Ala.); NEN (N. H.); CPN (Conn.); WSN (Wash.); WVN (W. Va.); SGN (Me.).

³ TCC functions performed, not counted as net sessions.

Well, it finally happened. We finally failed to break a total traffic record for a month. October's high NTS traffic total was made in 1959, 450 higher than the total in October, 1960. We barely eked out a record number of sessions and also fell short in record rate and average per session. Although Oct. 1959 was one of the most active NTS months we have ever had and for that reason our failure to exceed it in 1960 was understandable, it is nevertheless logical to assume that from now on, with operating conditions on the downgrade, we are going to have continued trouble breaking previous records.

W1BVR advises that 1RN is now running two phone and two c.w. sessions per night; attendance on the late c.w. session is very low. A 1RN certificate has been awarded to W1DXS, W42COO has received his 2RN certificate. W3WRE and W3EML are doing a big job of filling 3RN vacancies; MDDC has degenerated from the best representation to the poorest. W4MLE, K4QWQ and K4FUO have received their 4RN certificates. W5CEZ is acting manager of RN5 until Doc, W5GY, gets back on the air. Nevada representation is 'way down on RN6; the rest of the sections are holding up well. As his last official act for SRN, W8DSX, now established in Calif., has issued region net certificates to the following: For 1959, W3s QQQ FWQ OCC DAE QLJ PALJ ZYL BZK, K8s JLF HFL HGI HHD. For 1960, W3s FWQ OCC JKX DAE PALJ BZX, K8s JLF OTJ HGI HHD. TWN held double sessions during the holiday season only, to help clear up the Christmas traffic. A CAN certificate has been awarded to W2MTA/9, and K7AXF has received a PAN certificate.

Transcontinental Corps. The boys on TCC are having pretty rough going in the magnetic storms we've been having, but the traffic is still moving. A principal difficulty is in getting the traffic from the west coast to the east coast in good time. At present, most of it is being relayed through midwestern stations, but since this is against the "flow of time," delays are encountered. Thus, more stations "D" are required. October reports:

Area	Functions % Successful	Traffic	Out-of-Net Traffic	
Eastern.....	102	91.2	1441	993
Central.....	93	93.5	2364	1155
Pacific.....	123	91.9	2051	1041
Summary.....	318	92.1	5856	3189

The TCC roster: Eastern Area (W1SMU, Dir.) — W7s AW EMG NJM OBR SMU WEF, VE2AZI/W1, K2s UFT FEB, W42s APY COO, W3WQ, K4KNP, W8UPL, Central Area (W0BDR, Dir.) — K4AKP, W9s DO CXY ZYK, W0s LCX SCA BDR, K9ORK. Pacific Area (W6EOT, Dir.) — W4DNU/6, W5ZHN, K6s TPL (GD, W0s EOT ELQ HC WPF QMO, W46s ATB NCE, W7s GMC BDU ZB DZX, K6s CLS/6 EDH EDK, W0s FVD/7 WME KQD.

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.

DXCC NOTES

Announcement is hereby made of the addition to the ARRL Countries List of Kaliningradsk Region. A territory of the Russian Socialist Federated Soviet Republic, Kaliningradsk Region is situated between Poland and Lithuania. This addition is in accordance with Point 3 of the country criteria as explained in the April, 1960, issue of QST on page 80. DXCC credit claims may be made for this addition starting March 1, 1961. Confirmations for contacts with Kaliningradsk Region must be dated November 15, 1945 or later. DXCC claims received for Kaliningradsk Region before March 1, 1961, will be returned without credit.

In the September, 1960, issue of QST, announcement was made regarding the addition to the ARRL Countries List of the Mali Federation. In view of the short existence of the Mali Federation, we are deleting the listing of Mali Federation and replacing it with the two listings of Mali Republic and Senegal Republic. These two Republics are the ones that made up the Mali Federation. (The Mali Republic was formerly known as the Sudanese Republic.)

If DXCC credit already has been given toward the Mali Federation listing, credit will be automatically transferred to the appropriate listing. For example, if credit has been given toward the Mali Federation listing for a contact with FF8CK, then that credit will be entered as credit toward the Senegal Republic. However, in this particular example, no new credit can be claimed for a contact with the Mali Republic until March 1, 1961. Contacts in both cases must have been made June 20, 1960, or later.

W1AW OPERATING SCHEDULE

(All times are in Greenwich Mean Time — GMT)*
W1AW is now on its Fall-Winter operating schedule. General operation covers all amateur bands on which

W1AW has equipment. Novice periods include operation on 3.5, 7 and 21 Mc. (see footnote 2 in box, page 88, Nov. QST). Printed master schedules showing complete W1AW operation will be sent to anyone on request.

Operating-Visiting Hours:

Monday thru Friday: 2000-0800 (following day).
 Sunday: 0000-0730 and 2000-0330 (Mon.).
 Exception: W1AW will be closed from 0730 Jan. 1 to 2000 Jan. 3 in observance of New Year's Day, and from 0800 Feb. 22 to 3000 Feb. 23 in observance of Washington's Birthday.

A map showing how to get from main highways (or from Hq. office) to W1AW will be sent to amateurs advising their intention to visit the station.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules.

Frequencies (kc.):
 C.w.: 1820, 3555, 7080, 14,100, 21,075, 28,080, 50,700, 145,800.

Phone: 1820, 3945, 7255, 14,280,**21,330, 29,000, 50,700, 145,800.

Frequencies may vary slightly from round figures given: they are to assist in finding the W1AW signal, not for exact calibration purposes.

Times:

Monday thru Saturday: 0100 by c.w.; 0200 by phone.

Tuesday thru Sunday: 0430 by phone; 0500 by c.w.

General Operation: Use the chart on p. 88. Nov. QST, for times and frequencies for W1AW general contact with any amateur.

Code Proficiency Program: Practice transmissions at 15, 20, 25, 30 and 35 w.p.m. on Tuesday, Thursday and Saturday, and at 5, 7½, 10 and 13 w.p.m. on Monday, Wednesday, Friday and Sunday are made on the above-listed frequencies (except 1820 kc.). Code practice starts at 0230 each day. Approximately 10 minutes of practice is given at each speed. On Jan. 21 and Feb. 12, instead of the regular code practice, W1AW will transmit certificate qualifying runs. On Feb. 16, W1AW will transmit a frequency measuring test in place of code practice.

* W1AW schedule is shown in GMT per recommendation of ARRL Board of Directors that use of GMT for amateur communications be encouraged. For AST subtract four hours; for EST subtract five hours; for CST subtract six hours; for MST subtract seven hours; for PST subtract eight hours; for Alaska time (central part) and Hawaii subtract ten hours. Don't forget to change the *day* (to previous day) when subtracting takes you through 0000.

** Single sideband.

DX CENTURY CLUB AWARDS

HONOR ROLL

ZL8GX 300	W1ME 296	W1GKK 293
W1FH 300	W4DQH 296	W2BXA 293
W9NDA 299	W6EBG 296	W7AMX 293
W3GHD 299	W9YFV 295	W6ADP 293
W8HWV 299	W6ENV 295	CE8AG 292
W6AM 299	W7GBW 295	W8UAS 292
PY2CK 297	W7GVV 294	W5ADZ 292
W4BFD 297	W5ASG 297	W6BVC 292
W8JIN 297	W8DMD 294	ZS6BV 292
W2AGW 297	W8BKP 294	W3BEE 292
W2HUQ 297	W9RBI 294	W6NNV 291
W8BBA 297	W3KTT 294	W6TPT 291
W65YG 297	ZL1HY 294	G4CP 291
KV4AA 297	G3AAM 293	W4TMT 291
W6CJQ 296	G2PL 293	LUGJX 291
W3JNN 296		W8KIA 290

Radiotelephone

PY2CK 297	W1FH 289	W6AM 287
WQ4ERR 292	W8HWV 288	W8KML 286
ZS6BW 292	W9RBI 288	4X4DK 286
W8GZ 292	W6YJ 288	W7PHO 285
W8BF 292	W8YQ 287	GX2CQ 285
W3JNN 290	ZL1HY 287	W4NDA 283
W3RIS 289		W9DQH 279

From October 1, to November 1, 1960 DXCC Certificates and endorsements based on postwar contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

W4LRN 172	W5LJT 107	W6BE 102
W7OC 123	W6HVN 107	K2UVV 101
DJ2US 123	K8IUZ 107	K2RZO 101
DL6TQ 121	G3BEJ 107	W3JO 101
DL6WD 116	DJ5GG 105	W38TA 101
K6LGH 113	OD5CT 105	K7ADD 101
CE1DC 112	S78EV 105	K9LR 101
KP4AS 113	W2DVC 104	K6WQL 101
OH7PJ 113	W4ALJ 104	D13BR 101
YU4XZ 113	COT4H 104	DJ4SP 101
W78TC 112	DJ2EO 104	FM7WU 101
W7UVR 112	P49NIR 104	WA2AYM 100
G3MLX 112	S2BEF 104	WA2BQX 100
VE7BW 111	K9CJA 103	K4EDJ 100
W1RFQ 110	K9JQA 103	W4EYF 100
W4TIDZ 110	J1ABNK 103	K7CEH 100
K6RQR 110	W1DOZ 102	W8LUZ 100
K0DSL 110	K4ZVA 102	W0TRF 100
W3COG 107		YU3ML 100

Radiotelephone

K9CJY 122	U12AH 102	F9SR 101
K1EXO 116	W3COG 101	S85VL 101
W7OC 111	W6KUT 101	W2MOF 100
E18P 105	W6UOQ 101	K4MTG 100
DJ3WW 103		K5BHV 100

ENDORSEMENTS

VK3KB 281	W5PQA 268	PA6FX 257
W3ECR 280	F8BS 264	W0QGI 255
W6POZ 273	W8NGO 261	W6LTX 251
W2CNT 270	W2YFH 260	K8EC 250
W6VJ 268	W6WWQ 260	W6SYK 246

W4AIZS 241	K2LGN 173	W9TMU 142
W1LZE 240	W2ZKQ 173	W1DBM 141
W6LN 240	W5RHV 173	K0RAL 141
W9ANF 240	W5FJE 172	W1UQP 140
IT1TAL 235	W9KJD 172	WA2DIG 140
W1GYE 234	Y628Z 171	W8JFK 140
W2GNQ 231	W2GUR 170	W9P0R 137
W1LJB 229	W8SLB 170	K4TEA 134
W9HKL 224	W4UO 170	W1AJZ 132
G8EYN 224	SM5AJU 170	W4LJC 132
W0UQU 223	W9R8Z 169	11ZCN 132
W4WV 220	G8VNX 168	W1ICV 131
W4JJJ 220	ZP5LS 166	K8GHG 131
W7AQB 218	W1AZW 163	W9GJH 131
ZS1RM 217	W6KXG 163	W9VZA 131
ZS1OU 212	SM3AZI 163	K9DJN 130
W3ZCQ 211	K1EFT 162	DJ3GX 130
W9ERU 211	W3PN 160	9C1BQ 130
SM5BCE 211	K40MR 160	K4GLA 128
W4UKA 210	K4RJR 160	W7WDM 128
W7ACD 209	G8QZ 150	W0QKC 125
F9RAM 207	DL3JV 159	EL4A 124
K3DJL 205	DL8CJ 157	J49AC 124
W1BGY 200	Y180V 156	RZGCMF 123
K4KOY 200	W3HTF 153	W6GRX 122
K48XR 200	W9NLS 152	W9LJR 122
W1FQA 198	W1KMY 151	K7GCM 120
DL1EE 196	W2WMG 151	DL1CF 120
K2DCT 195	W8BEF 151	E43IE 120
W6QDE 192	W2GND 150	Y130S 119
W9ZRG 192	K4TFI 150	K3AMH/4 118
G4M2T 192	W4UHC 150	W6DTH 118
VK5RX 190	WA6AMZ 150	F18AB 116
W9MZX 184	W8BQV 150	W0HNA 114
DL32I 183	VE3BHR 150	K5BHV 113
SM7TG 183	K44AO 149	W1WE 111
K2BSM 182	W6JKJ 148	VE3AHV/SU 111
W2JVZ 182	OK3EA 148	W1YU 110
W9GHK 180	EA4GA 144	W3CJP 110
VE2AYY 180	W1MLG 142	W60YW 110
JA2DN 177	K5ESW 142	W8NAN 110
K9ENB 175		

Radiotelephone

W3ECR 251	W8LAV 162	K0ANF 140
DL3LL 238	W4TDW 161	W3ZNV 133
W5PQA 236	W2TVR 157	IT1TAL 131
PY4PT 225	PZ1AX 157	W1ICV 130
ZS5JM 215	W2TZS 155	F 9 2CE 130
W8NGO 205	W6HYG 153	F 2 JAZ 124
W1MMV 197	E43CI 152	W5 2TY 123
W0QGI 187	W6WV 150	W 8ICQ 120
PA6FX 174	VE3BHR 150	W1YCZ 120
W5RHV 172	SM3AZI 150	W9LXW 120
W5HEX 170	W1DBM 140	VE2WY 120
G3JNX 163		K6BX 110

U. S. — Canada Area and Continental Leaders

KH6CD 261	VOIDX 235	VE6NX 256
K1TFI 231	VE2WV 276	VE7ZI 285
W9ELA 230	VE3DF 230	VE8AA 295
VE1PQ 252	VE4XO 200	4X4DK 289
	VE5JV 200	

Radiotelephone

W2BXA 274	VE1PQ 151	VE4RP 172
W5BGP 260	VOIDX 123	VE5RU 178
KH6OR 254	VE2WW 220	VE8TF 170
KT7AFR 190	VE3QA 241	VE7ZI 267
W0A1W 270		GZ1L 266

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 WIAW will be made Jan. 20 at 2130 Eastern Standard Time (0230 GMT, Jan. 21). Identical texts will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,075, 28,080, 50,900 and 145,800 kc. The next qualifying run from W6OWP will only be transmitted Jan. 5 at 2100 PST (0500 GMT, Jan. 6) on 3590 and 7129 kc.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code-practice transmissions are made from WIAW each evening at 2130 PST (0230 GMT). Approximately 10 minutes' practice is given at each speed. Reference to tests used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text sometimes is reversed. To improve your list, hook up your own key and audio oscillator and attempt to send in step with WIAW.

Date Subject of Practice Text from November QST
 Jan. 3: *It Seems to Us*, p. 9
 Jan. 9: *The Gamma-Matched Ground Plane*, p. 15
 Jan. 12: *A V.H.F. . . . Crystal Exciter*, p. 27
 Jan. 17: *A Better Way to Install Fittings . . .*, p. 29
 Jan. 23: *50- and 144-Mc. Reception at Low Cost*, p. 39
 Jan. 26: *Planning Ahead*, p. 56
 Jan. 30: *The Amateur and the Army*, p. 58

A.R.R.L. ACTIVITIES CALENDAR

Jan. 5: CP Qualifying Run — W6OWP
 Jan. 7-8: V.H.F. Sweepstakes
 Jan. 14-15: CD Party (c.w.)
 Jan. 20: CP Qualifying Run — WIAW
 Jan. 21-22: CD Party (phone)
 Jan. 28-Feb. 12: Novice Roundup
 Feb. 1: CP Qualifying Run — W6OWP
 Feb. 3-5: DX Competition (phone)
 Feb. 11: CP Qualifying Run — WIAW
 Feb. 15: Frequency Measuring Test
 Feb. 17-19: DX Competition (c.w.)
 Mar. 2: CP Qualifying Run — W6OWP
 Mar. 3-5: DX Competition (phone)
 Mar. 17-19: DX Competition (c.w.)
 Mar. 20: CP Qualifying Run — WIAW
 June 10-11: V.H.F. QSO Party
 June 24-25: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

Jan. 14-15: WAE DX Contest (c.w.), DARC (page 85, this issue).
 Jan. 14-15: New Mexico QSO Party, Sandia Base Radio Club (page 136, this issue).
 Jan. 21-22: Seventh Annual VEI Contest (c.w.), New Brunswick Amateur Radio Assn. (page 146, this issue).
 Jan. 28-29: Massachusetts QSO Party, Merrimack Valley Amateur Radio Club (page 161, last month).
 Jan. 28-29: Kansas Centennial QSO Party (page 118, this issue).
 Jan. 28-29: Seventh Annual VEI Contest (phone).
 Feb. 10-12: QCWA QSO Party, Quarter Century Wireless Assn. (page 72, this issue).

SUPPLEMENT TO NET DIRECTORY

The following listing will supplement and correct the listing on page 88-89, November QST. Please inform us promptly of any errors or omissions so that they can be included in the March QST installment. This brings the record up to date as far as Nov. 18, 1960. Registrations received after that date will appear in the March QST list.

Only nets which registered between Sept. 22 and Nov. 18 are included in this list, except for corrections and previous omissions. Net registrations that do not show a public service purpose are not included. Net registrations that do not give the five required items of information (see p. 90, Sept. 1960 QST) have also been omitted.

Insofar as possible, nets are registered *exactly* as received, except that certain common abbreviations in net names are used to conserve space. Under column headed "Days," the following abbreviations are used: Sn, Sunday; M, Monday; T, Tuesday; W, Wednesday; Th, Thursday; F, Friday; S, Saturday; Dy, Daily, including Sunday; 1/M, first Monday of month (& similar); 1/3M, first and third Mondays of month (& similar).

All net times are given in *Greenwich Mean Time* (GMT). If it is necessary to convert this to local time, refer to conversion chart, p. 81, August QST. Don't forget that in converting to local time the *days* of net operation will be the days *previous* to those shown if converting takes you through 0000.

Important note: QST net listings are for information only. Listing in QST or the annual cross-indexed Net Directory does not signify necessarily that nets listed have any official status, does not entitle them to prior or exclusive right to the frequency or frequencies on which registered, and is in no sense a form of copyright.

Name of Net	Freq.	GMT	Days
Adams County AREC Net	3865	1800	Alt/Sn
Addison County Emerg. Service Net (Vt.) (ACES)	145,800	1800	Dy
Akron C. D. (Ohio) Net	50,700	2400	M
Ala Emerg. Net "I" (AEND) ¹	3885	1830	Sn
Ala. Emerg. Net P (AENP) ^{1,2}	3955	2400	Dy
		1400	Sn
Ala. Emerg. Net "R" (AENR) ¹	50,550	0115	W-F
Ala. Emerg. Net "T" (AENT) ^{1,2}	3905	2230	Dy
		1430	S
American Legion Amateur Radio Net, (nc)	3975	0300	Dy
	146,570	0330	Dy
Anniston Emerg. Net Y (AENY)	3830	0230	T
A.R.C.-Red Cross Disaster Services Net	50,700	0130	Th
Arrowhead Civil Defense Net (ACDN)	29,600	0330	W-F
Atlanta 10 Meter Phone Net	29,600	0300	M
Baltimore County Emerg. Net (BCEN)	29,250	0130	3/T
Bedford CD & AREC Net (Mass.)	29,120	0100	T
Belleville C.D. Net (N. J.)	146,250	1430	Sn
Berks County C.D. Radio Net (Pa.)	145,400	0100	T
Berrien County Emerg. Net (BCEN) (Mich.)	29,610	1930	Last/Sn
Blackstone Valley Radio Net	29,000	2400	M
	50,675	0030	Th
Boone County RACES Net (Ind.)	52,525	1730	Sn
	147,300		
Boston Red Cross Net (BRCN)	29,650	0100	T
Brazoria Amateur Radio Club Net (Texas)	3930	0100	F
Breakfast Club Net	3873	1000	Dy
British Columbia Emerg. Net (BCEN) ²	3650	0300	Dy
		0600	Dy
Broward Emerg. Net (BEN) (Fla.)	29,610	0200	T
	50,445	0130	T
Brown County Emerg. Net (BCEN) (Wis.)	3950	1930	Sn
Buckeye (Ohio CW) Net (BN) (Ohio) ²	3580	2400	Dy
Burlington County RACES Net (N. J.)	29,580	0030	Th
	51,000		
	146,320		
Buzzards Bay, Cape Cod & Islands Emerg. Net (Mass.)	145,620	2400	M
Calif. Intra-state Traffic Net (C.I.T.N.)	145,080	1900	M-F
California Net (CN)	3555	0200	Dy
	7125	2000	M-F
Calumet Area Emerg. Net (CAEN) ²	1805	2400	Dy

Cambria County Civil Defense Net (Pa.)	29,370	0100	W	Eastern Canada Net (ECN) ²	3540	0045	T-S
Capital Area Radio Emerg. Net (CARE) (N. Y.)	145,350	2000	Sn	Eastern Mass. Net (EMN) ²	3960	2300	M-F
Carbon County Emerg. Net (Pa.)	3840	1400	S	Eastern Mass. 2 Meter Net (EM2M) ²	145,500	0100	T-S
Carroll County Net (Md.)	29,300	0200	T	Eastern Penna. Net (EPA) ²	3610	2330	Dy
Catalpa Amateur Radio Society Net (CARS)	3970	1430	Sn	Eastern States Net (ESN)	7080	2230	Dy
Cedar Valley 6 Meter Civil Defense Net (Iowa)	50,400	0200	Th	Eglin AFB/Fort Walton 10 meter Emerg. Net (HAIR) (Fla.)	29,564	0100	T
Central Fla. Operational Area C. D. Net (CFOA)	145,200	2400	M-Th	Eglin AFB/Fort Walton 2 meter Emerg. Net (Fla.)	145,200	0100	T
Central Gulf Coast SSB Net	3925	2330	Dy	Eighth Regional Net (8RN) ²	3530	0045	Dy
Central Illinois Net (CIN)	1815	1430	Sn	Evergreen Emergency Net (Wash.)	51,000	0330	W
Central Kans. Phone Net	3930	1330	S	FARM Net (Friendly Amateur Radio Messagers)	3935	0200	T-S
Central New England Net (CNEN)	3842	1145	M-S	Fla. Emerg. Phone Net (FEPN)	3910	2330	T
Central Texas Emerg. Net (Centexen)	3870	1400	Sn	Fla. Mid-Day Traffic Net (FMTN) ²	7230	1700	M-S
Centre County Six Meter RACES Network (Pa.)	50,380	0200	Sn	Florida Net (CW) ²	3650	2330	Dy
Champlain Valley VHF AREC Net	146,820	2300	T	Fla. Phone Traffic Net (FPTN) ²	3945	1200	M-S
Charlotte CD Net (N. C.)	38	5	1830	Foreign Legion Net	3910	0700	T
Chattanooga Amateur Radio Emerg. Net (CARE)	50,400	0130	M	Fourth Regional Net (4RN) ²	3547	0030	Dy
Chemung County AREC Net (CCAREC) (N. Y.)	3605	0200	M	Fox River Valley 6 meter Emer. Net (Wis.)	50,160	0300	T
Chicago Area RACES Net	145,200	0200	F	Franklin County AREC Net (Ohio)	50,820	0030	Th
The Chicago Civil Defense Corp 6 Meter Net	50,540	0300	F	Fulton County Amateur Net (Ill.)	3810	1930	Sn
Chittenden County Emerg. Net (AREC) (CCEN) (Vt.)	145,800	1700	Sn	Fulton County (Ohio) Net	1821	0100	Th
Clark County, Ohio Civil Defense Net	3860	1800	1/3Sn	Genesee County Emerg. Net (Mich.)	29,480	0100	Th
Clermont County Emerg. Net (CCEN) (Ohio)	29,600	0100	M	Georgia Cracker Mobile Net	3995	1830	Sn
Clinton County RACES Net (N. Y.)	146,820	2300	T	Georgia State Net (GSN) ²	3595	2400	Dy
Colonia Amateur Net (N. Y.)	3742	2000	Dy	Golden Empire Amateur Radio Society (Civil Emerg. Net (Calif.))	1980	0400	T
Colorado C.W. Net (CCW) ²	3652	0300	T-S	Grand Cayon State Phone Net	7210	1500	Sn
Columbia Basin Net (C.B.N.) ¹	3960	0330	Dy	Granite State Phone Net (GSPN) ²	3842	2400	Sn-F
Comanche County AREC Net (Okla.)	3885	1900	Sn	Grave Yard Network (GYN)	3885	0900	Dy
Communications Club of New Rochelle Net (N. Y.)	145,380	2330	T	Greater Atlanta Six Meter Net (GAN)	50,169	0130	S
Confederate Signal Two Meter Net (CSC2M)	145,350	0100	T	Green Mt. Net (GMN) (Vt.) ²	3855	2330	M-S
Conn. Nutmeg Net (CN) ²	3640	2345	Dy	Grey-Bruce Net (GBN) ^{1,2}	3645	2330	M-S
Conn. 6 Meter Phone Net (C6MPN)	50,580	0045	TF	Hambutcher Net	7280	1805	M-F
Conn. Training Net (CTN) ²	3640	1400	Sn	Hamilton County AREC Net (Ind.)	50,400	0100	F
Conn. VHF Trf & Emg. Net	145,980	0130	T/ThS	Hamilton County Emerg. Net (Iowa)	1815	0930	Dy
Cook County Races Net (Ill.)	50,680	0130	T	Hampton Roads Emerg. Net (Va.)	29,000	0100	T
Coosa Valley Emerg. Net (CVEN) (Ga.)	3950	1830	Sn		145,800		
Copper State Net (CSN) ²	3880	0230	T-S	Hancock Co. AREC Net (Ind.)	50,550	0300	S
CQ Radio Club Net (Conn.)	146,700	2400	T	Hardin County Emerg. Net (HCN) (Ohio)	3810	1460	Sn
Cumberland County Emerg. Communications Network (CCECN) (Me.)	3960	1730	Sn	Hawkeye Phone Net (Iowa)	50,250	2400	M
Cumberland Valley Amateur Radio Club Net (Pa.)	29,400	0300	M	Heap Big Net (HRN)	3930	1400	Sn
Cuyahoga County Zone Ten RACES (Ohio) Net	29,600	0130	T	Hi-Plains Emerg. & Traffic Net	3720	2300	M/WFS
Cuyahoga Falls Radio Net (Ohio)	53,520	2345	M	Hudson Traffic Net (HTN)	1815	0030	Th
Dade Emerg. Net (DEN)	50,250	0030	T	Huntington (WVA) Weather Net (HWN)	1400	1400	Sn
Dade Emerg. Net (Miami, Fla.)	29,500	0100	T/Ex3	Illinois CW Net (ILN) ²	7060	2145	Dy
Danvers Emerg. Net (DEN) (Mass.)	29,455	2345	M	Ill. Weather Net, Inc. ¹	50,550	1900E	2400
Defiance Co. Emerg. Net (DCE)	7120	2330	WF	Ind. State CW Net (ILN) ²	3515	0100	T-Sn
Delaware Co. AREC Net (Pa.)	29,050	0230	M	Ind. State Training Net (QIN)	3873	1335	Sn
Delaware Emerg. Net	3905	2330	S	Inter County Net (Miami, Fla.)	0200	0200	W
Delaware 6 Meter Net (DSN)	50,400	0200	W	Inter Mountain Amateur Radio Net (IMARN)	38,900	0300	Th
Dixie Early Birds Net (DEB)	7235	1230	Dy	Intermountain Weather Net	3970	1400	M-S
Doghouse Net (DHN)	3860	2300	M	Iowa 160 Meter Emerg. Net	1815	0100	Dy
Dover Delaware Six Meter Net	50,300	0100	F	Iowa Tall Corn Net (TLCN) ²	3560	0030	T-Sn
Du Page County Emerg. Net (DECN) (Ill.)	50,280	0330	S	Jackalope Net	7255	1915	M-F
Dutchess County AREC 10 Meter Net (N. Y.)	29,480	0200	F	Jasper County AREC Net (Iowa)	1810	0130	T
Dutchess County A.R.E.C. 2 Meter Net (N. Y.)	145,800	0200	S	Kanawha County Six Meter Emer. Net (KCEAN) (W. Va.)	50,250	1400	W
Early Bird Transcontinental Net (EBTN)	3845	1000	Dy	Kansas Phone Net (KPN) ²	3920	1400	Sn
East Central Ind. 6 Meter Net (EC16M)	50,400	0200	T-Sn	Kans. Section CW Net (QKS) ^{1,2}	3610	0030	Dy
East Coast Teletype Net (ECTN)	3620	2400	W	Keep Minn. Green Net (Fome) (KMG) ²	3835	0930	Dy
East Tenn. Net	3980	1100	M-F	Keenehooshee Emerg. and Traffic Net (Ga.)	29,460	0230	M
Eastern Area Net (EAN) ²	3670	0130	Dy	Kentucky Novice Net (KNN)	3720	2300	M-F
Eastern Area Slow Net (EASN)	3748	2300	Dy	Kentucky Phone Net (KPN) ^{1,2}	3960	0130	T-Sn
Eastern Arctic Coast Guard Net (EACGN)	14,280	1100	M-F	Killeen-Bell County Emerg. Net (KREN) (Texas)	3985	1400	Sn
	21,410	2200	M-F	Kings County AREC CD Net (N. Y.)	29,640	0200	T
				Kings County AREC & CD Net (N. Y.)	145,200	0130	T
				KW 6 Meter Emerg. Net (KWN)	50,550	0300	T

Lancaster Emerg. Net (LEN) (Pa.)	146,800	0300	T	NYC-LI CW Net ²	3630	0030	T-S
Lawrence Co. Emerg. Net	3860	0030	1/W	N. Y. C.-L. I. Phone Net (NYCLIPN) ²	3908	0015	SnM
	50,100			N. Y. C.-L. I. VHF Tfe Net	145,800	0100	WThF
Linn County Emerg. Net (LCEN) (Iowa)	3915	1900	Sn	N. Y. State C.D. Command Net (CW) (YCD)	3510.5	1400	Sn
Long Beach C.D. 10 Meter Net (Calif.)	29,560	0415	T	N. Y. State C.D. Command Net (YCD)	3993	1400	Sn
Long Beach C.D. High Two Meter Net (Calif.)	147,300	0130	T	N. Y. State Phone Traffic & Emerg. Net (NYSPTEN)	3925	2300	Dy
Long Beach C.D. Low Two Meter Net (Calif.)	145,460	0345	T	N. Y./Vt. RTTY Net (NY/VT RTTY)	147,150	2300	M-F
Lorain County 160 Net (Ohio)	1805	1800	Sn	Newfoundland Net (Phone)	3785	2130	Dy
Louisiana CW Traffic Net (LAN) ²	3615	0100	T-S	Newport County Emerg. Net (R. I.)	29,530	1500	Sn
La Delta 75 Meter Net	3905	1330	Sn	Newton, Mass. Civil Defense Net	53,745	0200	M
Louisville Area Radio Emerg. Net (LAREN)	29,500	0130	T	Nite Owl Net (Ill.)	29,640	0400	F
	53,600			Nite Owl Set (Ohio)	50,700	0130	S
	147,300			No Name Phone Net	7250	1300	Dy
Madison County Emerg. Net (MCEN) (Ind.)	50,400	0200	M	N. C. RACES Net	3880	2400	MTh
Madison County (Ill.) Weather Observation Nets	29,640	0300	1/3F	N. C. Single Sideband Net (NSCBN)	3895	0030	T-S
Madison Mobile Net (MMN) (Wis.)	50,540	0460	1/3F	No. Central Phone Net (NCPN)	3915	1245	M-S
Maine Slow-speed Net	29,620	0100	W	N. C. CW Net (NCN)	3547	2330	Dy
Malden Emerg. Net (Mass.)	3726	2230	TThSSa		3610	0300	Dy
Manitoba Phone Net	29,540	0030	T	N. C. 6 Meter Net	50,285	1330	Sn
Maritime AREC Net (MAREC)	3760	6100	Dy	N. Dak. 75 Meter Phone Net	3845	2400	M-S
Maritime Phone Net (MPN)	3790	2215	Sn	North Eastern States Traffic Net (NEST)	3915	2200	Dy
Maryland Delaware & Dist. of Columbia Net ²	3750	2300	Dy	N. Texas CW Traffic Net (NTX) ²	3770	0100	T-Sn
	3650	0015	T-Sn		0400		
Mason Red Cross Disaster Net (Mich.)	3920	0200	T	N. Texas Emerg. Net (NTEEN)	3930	1330	Sn
Mass. Phone Net (MPN) ²	3870	2300	M-S	Northeast Area Harnyard Net	3960	1300	M-S
McDonough City 6 Meter Emerg. Net (MON) (Ill.)	50,350	0200	W	Northern Calif. Net (NCON) ²	3635	0300	T-Sn
				Northern Va. Emerg. Net (NVEN)	29,200	1730	Sn
Md Six Meter Emerg. Net	50,250	0200	Th	Northwest Slow Speed Net (NSN)	3700	6500	T-Sn
MDD AREC Net	3521	0100	W	Nutley Amateur Radio Net (N. J.)	29,400	1830	Sn
	3900			Oak Ridge Emerg. Net (OREN) (Penn.)	50,700	2400	M-F
	7042			Ohio Emerg. CW Net (OREN) ²	3580	0100	Sn
	50,700			Ohio Emergency Net (OEN)	3860	2300	Th
	145,660			Ohio Emergency Net (OPN) ²	3860	0100	F
Medford C.D. Net (Mass.)	29,520	2400	M	The Ohio Phone Net (OPN) ²	3860	2200	M-F
Medina County 160 Net (Ohio)	1820	1800	Sn	Ohio Slow Net (OSN) ²	3580	2230	M-F
Memphis 6 Meter Emerg. Net	50,500	0200	TS	Okla. Night Owl Net	50,250	0230	W-M
Memphis Ten Meter Mobile Emerg. Net	29,627	0100	TS	Okla. Slow-Speed Net (SSZ) ²	3682.5	0330	T-Sn
Memphis Two Meter FM Net	145,500	0130	T	Oklahoma Traffic Net (OLZ) ²	3682.5	0160	T-Sn
Miami Valley Emerg. Net (Ohio)	1820	1400	Sn	Ontario Fone Net (OFN) ²	3770	2400	M-S
Miami Valley VHF Net (Dayton, Ohio)	50,540	0200	Sn	Ontario Quebec Net ²	3555	2400	M-S
	146,520			Orange County 6M Emerg. Net (Texas)	50,080	0100	Dy
Mich. Emerg. (Sun) Buzzards Roost (Week) Net (BR/MEN)	3930	2230	M-F	Oregon A.R.E.C. Net	3875	0300	T-S
		2400	M-F	Oregon State Net (OSN) ²	3585	0230	T-S
		1400	Sn	Ottawa County Races Net (Mich.)	50,418	2400	M
Michigan Thumb Net (MTN)	3850	1300	Sn	Pacific Area Net (PAN) ²	3875	0130	Dy
Middletown Intercom Net	146,250	0200	T	Pembina County AREC-RACES Net (N. Dak.)	1990	0300	Th
Mike Farad Emerg. and Traffic Net (MFN)	7238	1700	M-F	Pennsylvania Civil Defense (CW) Net (PaCD)	3503.5	1400	Sn
	3610	0500	Dy	Penna. Central Area Net (Civil Defense)	3997	1300	Sn
Minn. Junior Net (MJN) ²	3595	0100	Dy	Penna. Eastern Area Net (Civil Defense)	3997	1400	Sn
Minn. Section Net (CW) (MSN) ²	3595	0030	Dy	Penna. Phone Net (PPN) ²	3850	2300	M-F
Minn. Single Side Band Net (MSSB)	3805	1730	M-F	Penna. State Net (Civil Defense)	3997	1240	Sn
Minn. State Phone Net (MPN) ²	3820	1805	Dy	Penna. Western Area Net (Civil Defense)	3997	1330	Sn
Minn. State Phone Net (EVE) (MSPN) ²	3820	2400	M-S	Phila. Electric Co. Employees Assoc. Amateur Radio Club Net	29,450	0200	T
Missouri Emergency Net (MEN) ²	3885	2400	MWF	Pictured Rocks Net (PRN) (Mich.)	28,800	0130	Th
Mo. Slow Speed Net (Mo.)	3715	2230	M-F	Pierce County Races Forum Net (Wash.)	29,510	0100	M
Montana Phone Net	3910	0100	TWS		50,600		
Monterey Bay Radio Emerg. Net (Calif.)	147,160	0400	T		145,650		
Montgomery County AREC, Ill. Net (MCD2)	145,500	0130	W	Pine Tree Net (Me.) ²	3596	2400	Dy
	147,300			PLAN (Piedmont Local Area Net) (S. C.)	50,200	0030	T-S
Montgomery Co. Operational Net	29,520	1200	Th	Post Road Emerg. Net (Mass.)	29,490	2400	M
Morning Ky. Phone Net (MKPN) ^{1,2}	3960	1330	Dy	Pothole Net, Ottawa Valley Mobile Radio Club	3760	1500	SSn
Muskegon County Civil Defense and Red Cross Amateur Radio Communication Network (Mich.)	145,216	0200	Th	Poweshiek County Emerg. Corp. Net	3775	1500	Sn
Muskegon County Civil Defense 6 Meter Net (Mich.)	50,418	0200	Tf		3835		
Muskingum (County) Emerg. Net (Ohio)	29,616	0300	S	Prince Georges County AREC Net (PGAREC)	145,660	0200	W
Muskege County Net (MCN) (Okla.)	3742	0130	F	Prince Georges County Civil Defense Net (PGCD)	145,620	0100	F
Naples Amateur Net (NAN) (Fla.)	51,000	2230	Dy	Pub. Int. Con. or Nec. Net (Minn.)	3840	2200	Alt/
Nassau County 10 Meter Net (N. Y.)	28,720	0100	T	Queen City Emerg. Net (QCEN)	29,600	0100	T
Nebr. Slow Speed Net (NSS)	3750	2300	M-F		50,700	0100	Th
NETEN (North East Texas Emerg. Net N. H. CW Traffic Net (NHN) ^{1,2}	3970	1400	Sn	Queens County, N. Y. AREC Net	29,500	0130	T
N. J. Civil Defense Net (CW) (CDNJ)	3685	2330	M-F	Quincy Emerg. Net (Mass.)	146,800	1500	Sn
N. J. Civil Defense Net (Phone) (NJ-2)	3505.5	1515	Sn		0015	T	
N. J. Emerg. Phone & Traffic Net (NJPN) ²	3993	1430	Sn		1400	Sn	
	3900	2300	M-S		1400	Sn	
	3570	0200	TThS		3838	1400	M-S
N. M. Brass Pounders Net (NMBP)	3838	1400	M-S		3838	1430	Sn
N. M. Breakfast Club Net (NMBC)	3838	1430	Sn		0100	WF	
N. M. Emerg. Phone Net (NMEPN)		0100	WF				
				Randolph C-D-Net (Mass.)	145,700	0200	T
				Red Rocks Amateur Radio Club Net (N. M.)	7250	0115	Th

Regional Net Five (RN5) ²	3645	0145	Dy	Tenn. Phone Net ²	3980	1245	M-S
Rhode Island Net CW (RIN) ²	3540	2400	M-F	Tenn. Slow Speed Net (TNSN)	7075	0230	W-F
R. I. State Phone Net (RISPN) ²	50,600	2330	Dy	Third Region Net (3RN) ²	3590	0045	Dy
River Forecast Net (RFN)	3656	1400	Sn	Totem Emerg. Net (Wash.)	29,000	0100	W
Roane County Emerg. Net (Tenn.)	50,300	2330	M-F	Traffic Hounds' Morning Watch (MW)	7080	1200	M-S
Rock Island County RACES Net (Ill.)	50,580	0230	W	Trans Continental Relay Net			
Rockford Emerg. Net (REN) (Ill.)	28,700	0300	T	(TCRN1)	7042	0615	Dy
Rome CD Net (N. Y.)	50,600	0200	T	(TCRN2)	7042	0215	Dy
RTNET (Southern Calif. R'PTY Net)	147,850	0100	W	(TCRN3)	7042	1600	Dy
RTTY and Telegraphy Net (RATS)	3620	0200	W	(TCRN4)	3521	2200	Dy
San Bernardino AREC Net (Calif.)	29,200	0300	T	Treasure State Net	7230	1900	M-F
San Diego AREC for 75 Meters Net (Calif.)	3825	1700	Sn	Tri-County Net (Calif.)	3820	2000	M-F
San Diego CD Metropolitan Net (Calif.)	50,510	0300	T	The Tri-State Traffic and Emerg. Net (TTEN) ¹	29,100	0100	TWS
San Diego CD 75M Monitoring Net (Calif.)	3991	0300	T	Tropical Phone Traffic Net (Fla.) ²	3945	2230	Dy
San Diego 10M Metropolitan Net (1 OMAREC) (Calif.)	29,500	0300	W	Trumbull County Emerg. Net (Ohio)	29,604	2345	T
San Diego Two Meter Net (Cal.)	145,500	0300	W	Tucson Emerg. Net (A.R.E.C.)	3880	0200	Th
Santa Clara County Emerg. Net (Calif.)	50,500	0300	T	(TENAREC) (Ariz.)			
Sask. A.R.R.I., Phone Net	3780	0130	Dy	Tulare County Net (TCN) (Calif.)	3895	1800	Sn
Satellite Data Link Net (SDL)	3820	2300	TTh	Tularosa Basin Two Meter E.P. Net (N.M.)	146,802	0100	T
Schenectady Emerg. Communications Net (SEC)	3950	1900	Sn	Turlock ARC Alternate Tuesday Nite Net (Calif.)	145,350	0100	Alt/W
Schenectady Emergency Communications Six Meter Net (SEC-6)	50,640	1900	Sn	**"Tuxedo" Net (PMN-1) (Ill.)	147,500	0100	F
Scioto County Emerg. Net (S.C.E.N.) (Ohio)	3845	1600	Sn	2-4-6 Net (Calif.)	145,080	0245	Dy
Sea Gull Net (Me.) ²	3940	2200	Dy	Union County N. J. Amateur Radio Emerg. Corps Net			
Sector 2D Stoughton, Mass. Net	29,490	0030	T	United Trunk Lines (Central) (UTL)	3590	0330	Dy
Seneca Radi Club — 2 Meter Net (Ohio)	147,325			United Trunk Lines (East-West 7 Mc.)	7093	0300	Dy
Sector 2-D M.C.D.A. Net (Mass.)	145,440	0130	F	Upper Level Hillbilly Net (N. C.)	29,560	1400	Sn
7290 Traffic Net	7290	1500	M-F	Upper Peninsula of Mich. Emerg. Net (UPEN)	3920	1400	Sn
Seventh Region Net (RN7) ²	3565	0345	Dy	Vanderburgh County AREC & RACES Net (Ind.) ²	29,600	0130	TF
Seymour Amateur Radio Club Net (Ine.)	3750	0100	1/Mn	Vermont Emerg. Phone Net (VEPN)	3855	2230	Sn
Shore Emerg. Net (N. J.) ^{1,2}	147,300	2100	1/Sn	Virginia Net (VN) ²	3680	2400	Dy
Short Skip Radio Club Net (SSRC)	21,111	0103	W	Walpole Emergency Net (Mass.)	145,275	2400	M
6 Meter Cross-Band Traffic Net	28,800	0510	Sn	Waltham CD Net (Mass.)	146,790	0030	T
The Six Meter Net of the Apple Pie Hillers (N. J.)	50,850	0030	M-F	WARTS (Washington Amateur Radio Traffic System) Net	3970	0200	T-Sn
Sixth Regional Net (RN6) ²	50,250	1430	Sn	Washington County AREC Net	50,550	0400	W
Skokie Six Meter Indians Net (SSMI)	50,298	0300	T	Washington County Emerg. Net (Ohio)	3825	1700	Sn
Socal 6 Net (Metro Div.)	50,400	0300	T-S	West Fla. Phone Net (WFPN)	3836	1200	Dy
(Valley Div.)	51,000			West Gulf Emerg. Net (Texas)	3995	1400	Sn
Sooner Noonnet	7235	1820	M-S	West Nebr. Emerg. Net (WNEN)	50,400	1500	Sn
Sooner Traffic Net (STN)	3850	2400	M-S	West Park Radiops Emerg. Net (Ohio)	3850	0115	Dy
South Bay C.D. Net (Calif.)	146,960	0300	T	West Phila. Radio Assn. Net	29,360	1600	Sn
S. C. Emerg. Phone Net (SCEN) ²	3930	0030	T-S	West Virginia CW Net (WVN) ²	3570	2400	M-S
		1330	Sn	West Virginia Phone Net ²	3890	2300	M-F
		2030	Sn	Western Mass. Novice Net (WMNN)	3744	2330	MWF
South Carolina Net (SCN) ²	3795	2400	Dy	Western Mass Slow Speed Traffic Net (WMSN) ²	3560	2330	TTh
South County Amateur Radio Society CD Net (SCARS) (Calif.)	50,710	0330	T	Western Nebraska Net ²	3950	1400	M-S
South West Va. Civil Defense Net	3835	1300	Sn	Western Penna. Traffic Net (ORS) ²	3585	2400	M-F
Southern Alameda County Emerg. Net (SACEN) (Calif.)	3985	0500	M	Westmoreland Co. C.D. Net (Pa.)	29,500	0200	W
Southern Calif. Net (SCN) ²	50,250	0400	F	Whiteside County Civilian Defense Net (WCCD) (Ill.)	50,520	0100	W
Southern Michigan Net	3600	0300	Dy	Whittier Emerg. Net (Calif.)	3885	0415	T
Southwest Mich. Two Meter Net	50,700	0100	TTh	Wichita Radio Emerg. Net (WREN) (Kans.)	29,600	2400	Sn
St. Clair County Emerg. Net (SCEN) (Mich.)	145,260	0100	T	Winchester CD RACES Net (Mass.)	147,100	0045	Th
Southern Peninsula Emerg. Communications Service Net (Calif.)	29,610	0100	T	Winston-Salem 2-Meter Civil Defense Net (N. C.)	146,700	0100	WF
Spokane Radio Amateurs AREC Net, Inc. (Wash.)	29,500			Winthrop Emerg. Radio Net (Mass.)	146,500	2330	M
St. Louis and St. Louis County 50.55 R.A.C.E.S. Net	146,000	0345	T	Wis. Intrastate Net (WIN) ²	3535	0115	Dy
St. Louis and St. Louis County 29.640 R.A.C.E.S. Net	29,600	0300	W	Wisconsin Races Net	3505.5	1500	Sn
Steuben County AREC Net (Ind.) ¹	52,525	2315	Th		3993	1400	Sn
Steuben County CD Net (N. Y.)	50,580	1430	Sn	Wis. Slow Speed Net (WSSN) ²	3535	0020	T-S
		0200	F	Wolverine Net (Mich.)	3930	2400	Dy
Tennessee CW Net (TN) ²	3635	0100	T-Sn	Wood-Ridge, N. J. Civil Defense Net	145,680	0100	Th
				Wyoming County, N. Y. C-D and Emergency Net (N. Y.)	28,610	0100	W
				Wyo. Pony Express Net	3920	1530	Sn
				York Emergency Net	145,620	0300	T
				YO Net ²	3610	0130	TThS

¹ Correction from previous listing; ² ARRL National Traffic System.

• 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, DUI, PAM; IYS, RM; AXA. The new EC for Philadelphia County is DJW, 6904 City Ave. K3JLW is a new OPS and K3LPK is a new ORS. K3GAY was added to the list of OESS. BNR spent two weeks vacation from W6-Land back here with his OAL, who is AMC, who in turn has now left for the hills of Nevada until the holidays. K3BHU has taken his place as NCS for Wed. on the PFN. K3MVO is spending a few days in the Cleveland Area. W42AXR, from New Jersey, will locate in Yardley, Pa. K3DCB has set up portable with 10 watts at the Carson Long Institute. New officers of the Delaware Lehigh ARC are: SAP, pres.; NNT, vice-pres.; K3DVF, treas.; K3MAZ, secy. The York Road RCs officers are ZYO, pres.; EOS, vice-pres.; SOB, treas.; AIX, secy. K3CAH still is finding it difficult to freeload some apple pies. KALD had his rig down for repairs for three weeks and it felt like three years. When it rains it pours for our RM AXA. His Ford stopped "fording" the store's cash register gave up the ghost, his XYL's washing machine stopped gyrating, his typewriter went west, then for the clincher his rig blew up and is now QRP. PAM IYS has been appointed net manager of the Pennsylvania Post Office Net (PPON). K3BFA is using d.s.b. on 2 meters and is looking for 220-Mc. activity in the area. After receiving regular monthly reports from IEZ for more than a year we are surprised to find out that he was SCM in Iowa back in the 30s. New Gear Dept: To YLI, a bird-cage beam, which he says is a monster; to AEQ a kw. final awaiting a low-pass filter; to VR a 40-meter beam, a 50-lb. monster; to K3EOS a new skywire raised by BUR; to EML a new paint job for the shack. His XYL thought it so nice she decided that he should do the whole house. We regret to record the passing of EU's mother. For 16 months ADE has just placed a big 73 in his activity portion of his monthly Form 1 card. May we add to it by wishing each and every one in the section a Very Joyous Holiday Season and a Most Happy and Prosperous New Year. Traffic: (Oct.), W3IVS 774, VR 628, EML 418, ENK 319, K3BHU 101, W3AXA 78, AEQ 64, UJU 60, K3HEX 57, W3NNL 55, KMD 52, K3CAH 50, JLUW 39, CRU 31, W3ZRQ 31, K3HTZ 28, MVO 23, W3BUR 21, K3JNX 20, W3TT1 19, K3ALD 12, W3NVO 18, RFF 17, NQB 16, K3DCB 14, W3ADE 12, AMC 10, K3ANU 10, W3OY 6, K3AKN 4, W3DUI 4, BNR 3, EU 2, ELI 1.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Thomas B. Hedges, W3BKE—SEC: CVE, MDD Traffic Net meets on 3550 kc. Mon-Sat, at 0015Z; the MEPN (phone) on 3820 kc. Mon., Wed. and Fri. at 2300Z and Sat. and Sun. at 1800Z; the MDD AREC Nets every Wed. at 0100Z on 3521 and 7042 kc.; also 6 and 2 meters. New appointments: CQS and JSL as ORSS. K3BRS and YOZ as OESS; K3JJQ and K3NKK as OPSS. K3BRS and HC as OOS. K3JDN is the new EC for Sussex Co., Del. Sixteen MDD section operators participated in the Sept. 16 FMT. TN made the BPL. CVE is bringing this section back on the AREC map and is doing a bang-up job! There still are a few EC vacancies to be filled. K3ADS just completed his new 120-watt, 6-meter rig and reports it works fine. AHQ maintains his usual high level of OO activity. AYD won the VP9 Contest and is planning his trip to Bermuda. The new dipole at K3ANA has one leg in Md. and one leg in D.C. BUD reports St. Mary's Co. AREC scored 96 points in the SET for the greatest ever. K3BYD says his new beam is getting out fine. CDG has a new Hornet Tri-band. GDQ is helping with the Washington Radio Club code class. K3CRF attended the Del. Emergency Net

Picnic. The Free State ARC exhibited its mobile emergency van at the Fort Meade Fire Prevention Jamboree. K3DCP is doing a fine job with the *Baltimore ARC Bulletin*. K3EJF reports 2-meter activity. EOY conducted a c.d. drill by watching fire boxes for the local police during Halloween. K3ATA has moved to a new QTH. EQK has the new 450-watt rig working fine. 4EXM/3 works on phone. FYS is temporarily at UCLA doing research. K3GBV is active in the PG AREC Net. K3GKF is starting another 10-week lecture series on atomic energy. K3GZK would like to stir up more interest in the Md. Slow Net. HCE has a 6-meter yagi on a 78-ft. tower. K3HDW wonders why more 2-meter locals can't copy c.w. HKS expects to step up activity this winter. K3KPZ got his 20-w.p.m. stunner and reports a new club at Towson High School. K3ICZ reports plenty of DX. The Washington RC had a working model satellite transmitter at its Oct. 7 meeting. K3JZM reports a 2-meter opening on the night of Oct. 20. K3JIQ is building a new keyer for contest work. K3JYD reports in with his traffic total. K3JYZ has a new transistorized r.f.-powered monitor. JZY operated from a fire tower during the V.H.F. Contest. KDY is building a high-power rig. KHA reports great interest at Johns Hopkins ARC. K3KHN says Calvert Hall College soon will have a station on. K3LFD is a new reporter and likes traffic work. KN3LLR is trying a new antenna. MCG has a new beam on a 70-ft. tower. K3MDL got his General Class ticket. The PVRC had 68A1 as a speaker Oct. 10. K3MLY blew three 6146s, so is modifying the rig. MSR is now EC for Howard County. KN3NFJ is now an RCC member. OSF check in. K3PIV/3 is doing a good job as NCS for MDD. RNY is raising a new 45-ft. tower on the shack. TMZ is preparing for the contest season. TN keeps up his traffic activity. UE reports attendance and interest is keeping a good pace in 3RN. K3WBJ sends in another good traffic score from Walter Reed Hospital. WG reports. YTV is now in Easton and providing a good Eastern Shore outlet for traffic. ZAQ has a Tri-bander at his new QTH. ZNW is doing a fine job on the MDD and AREC nets. Traffic: (Oct.), W3UE 257, K3PIV/3 204, W3TN 191, K3JIQ 115, W3MCG 111, BKE 102, K3WBJ 99, KPZ 67, W3AHQ 46, ZNW 46, WG 40, BUD 33, EOY 19, K3JYZ 18, W3CDG 12, K3JYD 8, MDL 8, EJJ 7, DCP 6, GZK 5, W3EQK 4, K3HDW 4, IVO 1, KN3NFJ 1, W3YTW 1. (Sept.), K3GZK 1.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: W2YRW. RMs: W2BZJ, W2HDW and W2Z1. New appointees are WA2IBG and K2MOV; both members of the Levittown (N. J.) Radio Club and very active in Burlington County AREC Nets. Recommendation for their appointment as OBS was made by K2ECY, Burlington Co. EC. W2EZM, Maple Shade, attended the Hudson Division Convention. W2SXV, Hightstown, reports on activities during the recent 125th Anniversary Parade of Hightstown Engine Co. #1. Over 200 messages were handled. Those taking part were K2DOV, K2DPS, K2JPO, WA2LHS, WV2KHY, KN9YZO, W2ZI, K2SNK, K2CDH, WA2AAI, K2MHD, W2LZZ, K2BBT, K2VCT, W3WVDV, W2HX and W2CQF. Very favorable public reaction was received. K2IHW, Trenton, reports increasing activity in Mercer County RACES drills. W2BLV, SJRA's *Harmonics* news and fibel writer, keeps the members up to date on tropo and aurora conditions. W2ZX, also SJRA, supplies the DX news. WA21VJ, Levittown, has returned from Greenland. Notice the big increase in K2RXB's traffic total; also that of K2DEI, who made BPL again. N. J. Emerg. and Tfc. Net totals for Oct.: 31 sessions, QNI 639, traffic 206, W2Z1 net manager, sports a new receiver. K2SNK has been QRL with antennas getting ready for winter DX. We regret the passing of WA2HEA as the result of an auto accident. WA2ARJ, Millville, OBS, supplied the above information, also that the Bridgeton Area Radio Klub assisted in the Halloween Patrol. W2RXL, NJN manager, keeps the net members well informed with his monthly bulletin. All clubs and AREC groups are urged to send me reports of their activities. A list of newly-elected officers also is desired. Traffic: (Oct.), K2DEI 224, W2RG 181, K2RXB 142, W2ZI 64, W2BZJ 63, K2SNK 17, K2JJC 15, W2SXV 11, WA2ARJ 5. (Sept.), W2SXV 44.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2LXE. RMs: W2WUF and W2ZRC. PAM: W2PVI. NYS C.W. meets on 3615 kc. at 1900. ESS on 3590 kc. at 1800, NYSPTEN on 3925 kc. at 1800, NYS C.D. on 3510.5 and 3993 kc. at 0900 Sun.. TCPN

2nd call area on 3970 kc. at 1900, IPN on 3980 kc. at 1600. W2E2B and W2C1G again cop BPL honors. W2KVN has been appointed OES. Happy New Year everyone. I hope the New Year brings each of you success and happiness. So far, the comments for a new section name revolve around either "Empire Section" or "New York State Section". What do you think? W2E7Y writes with thoughtful reflection regarding increased emphasis on more inter-club activity for greater strength, organized amateur contribution to charitable organizations, not monetary, but in the form of service and from the hobby angle with reference to technical skills. A good example of this is "The SEARC Library for Blind," for which W2IRU is the radio digest editor. He reads articles from QST and ARRL Bulletins plus other items on magnetic tape for distribution to sightless hams. W2E7Y would be glad to hear from others interested in similar activities. It would be nice if we could get some type of section organization coordinating activities of this nature, both in the interest of efficiency and public relations. The Syracuse V.H.F. spon-sored V.H.F. Roundup was the best yet, with over 600 in attendance. The Kenmore HIS RC elected K2MITV, pres.; W2RQS, vice-pres.; K2IYR, rec. secy.; W2ABQB, corr. secy.; and W2GJV, treas. The club plans to build a club transmitter to a kw, and acquire a Viking Valiant. The North Chautauqua ARC elected K2TKD, pres.; W2CDX, vice-pres.; and W2SB, secy. W2RUF has a 758-1 receiver. I would like to take time this month to compliment the efforts of the editors of the many club bulletins received here. *The RARA Rag*, edited by W2YPK, Rochester ARA, *The TARA PARA*, edited by K2ZWG, Tioga ARA; *QRM*, edited by W2YIY, Corning ARA; *Ham Bulletin*, monthly newsletter of the Champlain Valley ARC, edited by W2AGCH; *The Squaw Island Smoke Signal*, edited by W2UTH/FRL, SIARC, Canandigua; *W2ODT*, Adirondack RC, Glens Falls. These are monthly efforts and there are others such as *QLF*, edited by W2QCI of Lockport and *The Old Timer's Bulletin*, edited by W2ICE; also *The Backwave*, by Auburn ARA. Traffic: (Oct.), W2E2B 635, W2C1G 600, W2RUF 307, W2OE 233, K2SSX 216, K2IYP 138, W2FEB 126, K2QDT 96, K2RTQ 75, K2OFV 59, W2ZCRH 58, K2TDG 57, K2IMK 49, K2GQU 44, W2IYB 39, K2IMK 38, W2BFI 35, W2AHEC 31, K2BBJ 30, K2AOQ 25, W2QOQ 22, W2PGA 17, W2UZJ 17, K2TXB 15, K2DG 12, W2TPV 11, K2EE 7, W2PVI 7, K2RYH 7, W2BLO 7, W2EMW 2. (Sept.) K2JBX 25.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC: OMA. RMs: KUN, GEG and NUG. The WPA Traffic Net meets Mon. through Fri. at 1900 EST on 3585 kc. It is with deep regret we record the deaths of ROA, of Altoona, and K3K1TZ, of Meridian, Pa. New appointments: K3AKR and SYY as OES. AOH as ORS. K3EDK is home from the hospital with both legs in a cast. MPB is interested in starting a slow-speed traffic net on 80 meters around 1800 EST. Anyone interested, contact Bill Hann at Brockway, Pa. LSS is getting ready on 2 meters. Congratulations to K3DKD on making DXCC. Joe is one of or the first K3 to make it. Up Erie way: KNQ received the Radio Operator of the Year Award; the RAE conducts code and theory classes at the YMCA on Thurs.; MBC is radio officer of CAP. The Coke Center RC reports: TTY and K3HTR have modified their Hy-Gain beams; RUK and BTR are using Hornet beams. New officers of the ATA of WPA are UGV, pres.; NUG, vice-pres.; ZJZ, secy.; UL, treas.; KQF, LTH and EOU directors. The Etna RC reports via *Oscillator*: New officers are OVM, pres.; TOC, vice-pres.; K3KLP, treas.; DMK, secy. K3ERO is attending the U. of Cincinnati. The Nittany ARC reports via *QST de K3HKK*. POP came through with the top W3 score (7th place in the U.S.A.) in last year's R5GB 21/28-Mc. telephony contest; JTS is holder of an A-1 certificate; the Centre County Six-Meter Net participated in the S.E.T. The Washington County ARC reports: A new Tech. licensee is K3KYQ; BWU handled emergency traffic during Hurricane Donna; the club visited radio station WESA in November. The Greater Pittsburgh V.H.F. Society reports: K3GEG is attending Penn State College; the POOS (Pettycoat Operators Of Six) elected the following new officers: AZZ, pres.; FTV, net mgr., EDO, secy.; COP, treas.; K4QOJ/3 is now living in Library; the GPVHF Society is doing a nice job cleaning up the birdies on 6 meters. K3BWI received his Extra Class ticket, OEZ still is in the local hospital. K3GZE is a new General around Butler. New appointee: MRI as OBS. BWU was guest speaker at the November ATA meeting. K3AKR and SYY organized the Centre County Six-Meter RACES Net. Traffic: (Oct.), W3WRE 185, MPB 96, K3HWL 95, GHH 79, W3KUN 76, LSS 36, UHN 24, K3COT 6, W3KNQ 6. (Sept.), K3HWL 16.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, 9GME. SEC: PSP. RM:

USR. PAM: RYU, EC of Cook County; HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. The Central Division Convention Committee is hard at work preparing for one of the finest meetings of this division which will be held Aug. 26 and 27 at Springfield, Ill. Make your vacation plans and visit Springfield during these days. MCE, UYP and PRN are DXing with new TA-33 beams. K9KHZ is now on 2 meters and looking for many new contacts. K9YRI, who recently suffered a coronary, is now in Dwight Veterans Hospital. K9AUB is running his new home-brew 600-watt rig on 40-meter c.w. Litchfield has formed a new amateur radio club for that area. KN9ACC is a new Novice call heard. TZN, REC, QGL, ZIV, K9OCU, K9KIM, K9CIL, K9BHD, HPG and K9JDR participated in the recent Frequency Measuring Test. The North Central Phone Net handled 128 messages during October and the ILN's traffic count was 150 messages for the same period. A belated September report for the ILN includes a traffic report of 210 messages. K9IDW is Acting EC of McDonough County following the resignation of K9BIV. SKR has joined the ranks of QSL manufacturers. Lansing, e.d. has gone to 2 meters and soon will have mobiles on the same frequency. The Sangamon County e.d. furnished 6-meter communications for the Vice-President's Parade held in Springfield commemorating the 100th year of Lincoln's inauguration to the presidency. GDI has 242 contacts confirmed on his DXCC. This column extends sympathy to JJJ and his family on the death of his mother. PNY's new beam is a Hy-Gain. A new call in Glenview is K9WGM, ex-K0UYO, ex-K5G00. K9CIL's new antenna is a Thunderbird mounted on a 120-ft. tower and he claims he hears signals that he has never heard before. QGL has a new Heath HD-19. JEC is now on 432 Mc. with a 4X150A final. K9LXX is using a Hy-Gain five-element yagi on 2 meters. The 6-Meter Club of Chicago held an area exhibition of amateur radio techniques demonstrating a filtered TV set and an unfiltered set, which was opened to the public at Evergreen Shopping Plaza. The Joliet Amateur Radio Society cooperated with the local police with mobiles in patrolling for Halloween. K9MFK is s.s.b. with a 20A and kw. linear. K9TKT has finished his home-brew 250-watt a.m. rig and is bringing in the DX. BPL and ADV were elected president and secy.-treas. of the Fulton County Amateur Radio Club. From all reports received, the October SET was very successful and all those who participated reported FB signals. The Kishwaukee Radio Club is starting a Novice Class and Pres. K9SLM invites prospective members to get information from K9SLM or come to meetings, the 2nd Mon. evening of each month at DeKalb High School. Traffic: (Oct.), W9IDA 960, K9BTE 563, W9DO 416, K9UGY 267, W9USR 222, UQT 149, K9AUB 116, UOV 102, W9JXV 82, K9LXG 39, RAS 38, GSR 32, QAE 20, UJT 20, W9PRN 19, K9BIV 14, W9DUA 14, MAK 13, SKR 6, VAR 6, K9KEJ 4, LLA 4, W9KQL 3, K9OCU 3, W9WPC 2, K9ISP 1, RHU 1. (Sept.), W9USR 192, FAW 48, K9GDQ 47, CIL 28, OXW 8.

INDIANA—SCM, Clifford M. Singer, W9SWD—Asst. SCM: Arthur G. Evans, 9TQC. SEC: SNQ. PAMs: K9AOM, BKJ, RVM and UKX. RMs: DGA, TT and VAY. Net -skeys: IFN 0900 daily and 1830 M-F on 3910 kc.; ISN (s.s.b.) 1930 daily on 3920 kc.; QIN (training) 1800 M-F on 3745 kc.; CAEN (160 meters) daily at 1900 on 1850 kc.; QIN 1900 daily and RFN 0700 Sun. on 3656 kc. New appointments: K9GEL as EC for Hamilton County, K9VEC as EC for Fulton County and UPI as EC for Randolph County. K9IDV and K9PFQ are OPSs. K9OES is OES. Thirty-three clubs were represented by delegates at the Indiana Radio Club Council meeting held at Purdue University Oct. 2. Five new clubs were accepted for membership in the council: Calumet ARC of East Chicago, South Bend ARC, Michigan City ARC, Indiana Memorial Union AAC of Bloomington and Hancock ARC of Greenfield. The RCA Radio Club of Indianapolis offered to host the Council's Annual Summer Hamfest. Date and location is to be announced. Newly-elected officers of the IRCC are TQC, KT, RTH and LYU. Directors are: IHO, K9IND, DKR and MHP. The invitation of the Bloomington ARC and the Indiana Memorial Union ARC was accepted for the spring meeting, which will be held at Indiana University Apr. 9. K9VQK has been snagging a lion's share of DX on 15 meters. K9RMQ has a new Ranger. The Home-brew RC of Brownsburg held its annual weiner roast on Oct. 16 with 50 amateurs registering. VAY will manage the QIN Training Net as well as continue as RM for the regular c.w. section net. QIN, ZYK continues to do an FB job as manager of the 9RN and reports that Indiana is represented 100 per cent every month. New AREC nets are the Hancock County, which meets each Fri. on 50.55 Mc. at 2200, and the Tippecanoe County, which meets Tue. at 1930 on 50.40 Mc. The Madison County AREC Net meets on 50.40 Mc. each Sun. evening. *Amateur radio exists as a hobby because of the service it renders.* October net re-
(Continued next page)

ports: IPN 435, ISN 180, QIN 364, QIN (training) 28, RPN 104, CAEN not reported. Those making BPL: ZYK, TT, GJS and DGA. Traffic: (Oct.) W9ZYK 503, TT 359, GJS 290, VAY 228, DGA 149, MM 124, SNQ 123, K9RMIQ 115, W9RVM 103, RTH 102, FJR 97, K9CBB 82, W6SWD 78, K9UBK 75, AOM 59, LXD 56, W9BVR 53, K9TCG 53, W9QYQ 50, SVL 50, FWH 48, JMU 45, K9GMH 35, LLK 29, W9BKJ 28, DOK 28, YB 28, CC 27, VNV 26, K9TUM 24, W9OAJ 22, DZC 21, K9HFG 19, VEP/9 18, W9YXX 18, EDJ 17, B1Q 14, HDG 13, K9KRN 13, K9N9ET 10, K9HMC 9, W9OCG 8, BDP 7, NZZ 5, K9BSU 4, MAN 4, WSV 4, W9AQW 3, K9BPD 3, SSI 3, K9N9VC 3, K9UAN 2, WST 1. (Sept.) K9BSU 44, W9QOC 32, K9RMQ 28, W9OCC 7, K9LZJ 6.

WISCONSIN—SCM, George Woida, W9KQB—SEC: YQH, PAMs: NGT and NRP, RMS: VHP and VIK. WIN certificates were issued to ONI and K9EQQ. Three clubs elected new officers. The Mancorin's officers are K9EOS, pres.; GXD, vice-pres.; and DVC, secy.-treas. The La Crosse Club elected K9KPE, pres.; K9CUT, vice-pres.; GGY, secy.; K9KIG, treas. The Central Wisconsin Club at Wisconsin Rapids elected K9UTQ, pres.; VCM, vice-pres.; KN9YY, secy.; and K9RIV, treas. ZB is collecting stamps via new-round friends contacted in foreign countries. HDZ, K9S LCL, SCG, TGP and UZR covered 250 miles in 4 hours in aiding the Fond du Lac police patrol on Halloween. K9S LIM, UML and KN9VBZ operated from the police station. SAA now is a participating member of the Wisconsin Post Office Net on 3860 and 3920 kc. GDW and K9HDL organized the Chippewa Valley Mobile Club, which took part in the SET and received congratulations from the Red Cross and the Sheriff's Dept. for success in the undertaking. ABO, ex-OZXT, is back in Wisconsin after 22 years in North Dakota and is active from Washburn. RTP is handling the c.w. organizing in the traffic committee of the U. of Wis. Club. EC K9KJT, of Milwaukee, reports full 48-hour operation by the Milwaukee Emergency Corps during the SET. VSY is active on 15- and 20-meter s.s.b. with a kw. RKP, GFL, K9GDF and K9HMJ took part in the FMT with good accuracy. A 9-page bulletin named *Sparks* is being issued the 34 members of the Sun Prairie Club. K9LWV is editing the Waupaca Club bulletin. Instructions by K9MIE and K9RIV produced six new Novices and one General at Junction City. The Oshkosh Club reports successful SET operations. Traffic: (Oct.) W9DYG 764, CXY 356, K9B 118, SAA 93, VHP 47, K9DTK 37, W9CBE 29, K9GSG 26, W4VYRD/9 25, W9OTL 19, MWQ 18, K9GDF 16, W9KKA 15, YF 14, VIK 13, K9LWV 12, EQQ 11, JQA 11, W9ZB 10, K9HLD 9, W9LFK 8, ONI 8, CCO 7, WJH 7. (Sept.) W9SIZ 7.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, W0HVA—SEC: K0KBW, PAM: K0KJR, RM: KIZ. Your SCM has a new job, working for WWL at Tony's 2-Way Communications and a new address, 1416 6th Ave., Williston. HVA has just put his rig on the air at his new address. K0GRM has his 1st-class radiotelephone license. K0IVQ has been checking into the Tenth Regional Net. K0OSV and OSW have a new Valiant. OSV is attending college. A new ham in Fargo is KN0EAN. The 75-Meter Phone Net reports for Sept. 23 sessions, total check-ins 500, maximum check-ins 28, minimum 10; 58 pieces of formal traffic, 46 informal, and 6 relays; for Oct. 21 sessions, total check-ins 394, maximum check-ins 29, minimum 6; 78 pieces of formal traffic, 41 informal and 10 relays. K0QWY and IVQ took the General Class exams in St. Paul last summer and passed them. Traffic: (Oct.) K0ITP 101, TTY 37, KJR 30, IVQ 23, GRM 19, MPH 18, WOYCL 11, K0WIN 10, TVI 8, W0DNJ 7, K0PVH 7, RLF 7, W0QR 4, IHM 3, IAN 2, K0KBV 2, W0OMA 2, K0AJW 1, W0BHF 1, K0RRZ 1. (Sept.) K0GRM 24, IVQ 7, GGI 3.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN, SEC: SCT. Director Compton visited the Black Hills ARC and the Signal Hills ARC in October. Those attending Huron College are K0S TKN, TKO, QFS, QZW and KN0DDZ. TKN worked all continents on 10-meter c.w. in a week. K0S SZJ and TGX qualified as Class 1 OOs in the recent FMT. K0S YUZ, TFP and TVJ are attending Southern State Teachers College. Units from Meade, Frapp, Brown, Brookings, McPherson and Lawrence Counties participated in the SET. WEN passed the General Class exam in St. Paul. OCL, of Kansas City, is working in Sioux Falls. GDS is operating RTTY. ALU got his beam up on the second attempt. Traffic: W0ZWL 371, SCT 353, DVB 217, K0HESW 52, W0CFZ 32, K0WJP 24, W0QC 24, W0QVY 17, SZJ 14, DUR 10, VIZ 10, IANZ 8, DHA 5, SEZ 3, W0YVF 3, K0PDW 2, W0RWX 2, K0ACG 1.

MINNESOTA—SCM, Mrs. Lydia S. Johnson, W0KJZ—Asst. SCM, Rollin O. Hall, Q1ST, SEC: TUS, Asst. SEC: K0EWC, RMS: K0EJZ and RIQ, Asst. RM: PET, PAMs: OPX and K0EPT. QIN gave a talk on 2-meter operation at the Mankato Club. BBY is active on RTTY. K0EWC has a new position as engineer and announcer for KTOE. OGP put up a Horner Tri-bander. K0ZVW and his XYL had a baby girl recently. K0OTH built an antenna tuner. OES NYAI reports no activity on 6 meters. RM K0IZD is off his job because of heavy school studies, so Asst. RM W0PET is in charge of M.N. K0LJV, in Outing, worked KLG, m Dassel, with 14 watts phone. K0EJC has an Apache on the air. K0LBC is employed at KWAD, Wadena. As an announcer, EC K0GKI was visited by Asst. Dir. KLG. K0SNG has a Viking II. K0SBB reports that the Rochester Police Dept. asked the radio club to furnish mobiles to assist in patrolling the streets on Halloween. Six mobiles participated successfully. New officers of the Winona Amateur Radio Club are UWG, pres.; QXK, vice-pres.; K0DHL, secy.-treas. The Winona State College Radio Club's officers are K0KLN, pres.; K0DHH, vice-pres.; K0LWF, secy.-treas. Asst. RO for Olmsted Co. is K0SBB. KN0WNI participated in the FMT successfully. K0GIW renewed his EC appointment. K0MIV renewed his OPS. TUS and K0ORK made BPL. Dir. BC, NYI, KMJ and your SCM spoke at the St. Cloud Radio Club. All radio clubs are requested to contact your Director, your SEC and your SCM if you wish to have some speak at your club. We are urged to appear at as many clubs as possible. Novices interested in traffic-training, send your call, QTH, name and crystal frequency to your SCM. You will be placed on roll-call and called by the NCS on AMN at 0110 GMT on 3595 kc. Traffic: (Oct.) W0TUS 692, K0ORK 658, W0ISJ 144, K0OBI 113, W0NYG 104, K0SNC 101, W0KJZ 100, K0UKU 95, W0PET 88, TWG 80, VPO 76, K0SBB 73, W0HEN 72, RIQ 71, K0GIW 70, W0KLG 58, PBY 54, K0PAIL 50, W0UMX 38, OPX 36, K0SNG 32, EPT 27, W0WMA 22, K0IYI 20, MGT 20, W0NYM 18, K0IWK 15, W0RQJ 14, K0EJC 13, W0ALW 11, FGP 10, OJH 10, K0IKU 9, W0MXC 8, K0OBB 8, W0YHR 8, K0NAKM 7, W0BIO 6, DYC 6, K0RYK 6, W0LST 6, K0RHN 6, W0VX 6, W0V 5, MAH 4, VPJ 4, VPP, K0NOCIB 2, W0WVT 2. (Sept.) W0UYR 6. (Aug.) W0ISJ 91.

DELTA DIVISION

ARKANSAS—SCM, Ulmon M. Goings, W5ZZY—SEC: K5CFR, PAM: DYL, RM: K5TYW. At this writing the voting for the new SCM is being carried on and the retiring SCM will continue his duties until the new one is named. 9PHR, who has been away in school, has returned to his duties with MARS at Blytheville AFB. K5ABE recently purchased a BC-669. The Bressink brothers, K5RPH and K5SGE, have purchased a DX-100 and have put up a 30-ft. tower with a three-element beam atop. By coincidence, the brothers bought the rig from a father and son, K5TXO and TWZ. K5TST has a new three-element beam, a 50-ft. tower, 400-watt linear and a new D-104 mike. K5TCJ has built a new 6-meter rig. The Arkansas Emergency Phone Net meets Mon. through Sat. at 0600 on 3885 kc. The OZK C.W. Net meets Mon. through Fri. at 1900 on 3790 kc. Every amateur is urged to see that his town or community has representation on these section traffic nets. Let us try to get the Arkansas traffic delivered via amateur radio as near its destination as possible.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—The Greater New Orleans Amateur Radio Club now holds elections in a brewery. New officers are K5BIB, pres.; Q0K, vice-pres.; QPS, treas.; K5PME, corr. secy.; UOC, rec. secy.; MIX, EC. K5TUS has been appointed OPS. He is on the air with Collins s.s.b. equipment. K5PGV has been appointed ORS. He has been acting net control for LAN. Congrats to K5OZV on his General Class ticket. A new Novice at Carville is KN5FOV. OES UQR sent in a nice report on v.h.f. activities which was forwarded to the v.h.f. editor. K5SBF-LKC have moved to Bunkie. They have started a new ham scrapbook so all visitors will have to submit to being photographed for the new project. K5KDO recently received a bundle of QRM at his shack; his wife presented him with twin boys. K5MAF is waiting for his new Viking 500 to arrive. K5HYL is active on LAN. RN5 and LARC. K5USO has just about recovered from the New Orleans Hamfest. Our SEC, MIX, has been making some trips meeting with clubs over the State. Contact him and make a check to have him address your club. CEZ is back home pending brass. K5ARH is writing a ham club started at McNeese State College. The club has a DX-100 and an NC-125. DJL, ORS in Shreve-

(Continued on page 108)

PUTTING SATELLITES TO WORK IN AMATEUR RADIO

PART I: NOISE AS A SYSTEM DESIGN LIMITATION

THE recent successful Moon Bounce and Echo satellite communication tests have enhanced the interest of hams in communications via satellites. Accordingly, some of the considerations which arise in "putting satellites to work in amateur radio" will be discussed.

COMMUNICATION satellites may be classified as either "active" or "passive" depending upon whether they contain an active repeater with its associated power supplies, antennas and control systems. Communication via passive satellites utilizes the ability of satellites to reflect or scatter radio waves which fall on their surface; hence, passive satellites should have large physical dimensions but can be very light in weight. Even though great effort is being made to promote the launching of an active satellite for amateur use, the following remarks are directed toward the utilization of passive satellites such as Echo.

THE basic limiting factor in the design of a satellite communication system is the noise appearing at the output of the receiver. This noise originates partly in the receiver and partly outside the receiver. The external noise is picked up by the antenna; hence it is frequently referred to as antenna noise.

ANTENNAL noise at UHF and microwave frequencies is largely due to thermal radiation from surrounding objects; however, some antenna noise originates in cosmic sources, and from the random absorption of the signal by oxygen and water vapor in the earth's atmosphere. Receiver noise is usually considerably greater than antenna noise for most microwave receivers; but the development of low-noise preamplifiers of the maser and parametric types has enhanced the relative importance of antenna noise. By utilizing highly directive horn or parabolic antennas whose radiation pattern sidelobes are at a very low level, antenna noise originating in thermal radiation from ground objects can be reduced to such a low level that cosmic and absorption noise becomes dominant. Cosmic noise per unit bandwidth decreases as the operating frequency is increased. Absorption noise increases very rapidly at frequencies greater than 10,000 Mc. Absorption noise also decreases as the angle between the antenna and the horizon is increased. For minimum antenna noise, it follows that the operating frequency should be chosen at the highest feasible value in the 500- to 10,000-Mc range.

THE amount of noise appearing at the output of a receiver is proportional to the width of the receiver's pass-band; the receiver-bandwidth requirement is determined by the type of modulation being utilized and on the frequency stability of the system. If the frequency changes very slowly with time so that receiver retuning is feasible, a receiver bandwidth of at least 2,000 cycles per second is required for single-sideband modulation, 4,000 cycles for amplitude modulation, while 100 cycles per second or less is needed for CW.

THE required level of received power P_R should be greater than the combined receiver and antenna noise power by a factor of 100 or more; in mathematical form, $P_R = 100 \times 1.4 \times 10^{-23} T_E B$, where T_E is the effective noise temperature and B is the bandwidth. Assuming a T_E of 500° Kelvin as a measure of antenna plus receiver noise, the required level of received power must be of the order of 1.4×10^{-15} watts for SSB, 2.8×10^{-15} watts for AM, but a level of approximately $.7 \times 10^{-16}$ watts would suffice for CW signals.

IN a later issue of *QST*, other system considerations will be discussed.

— DR. ROBERT E. BEAM, W9BGZ

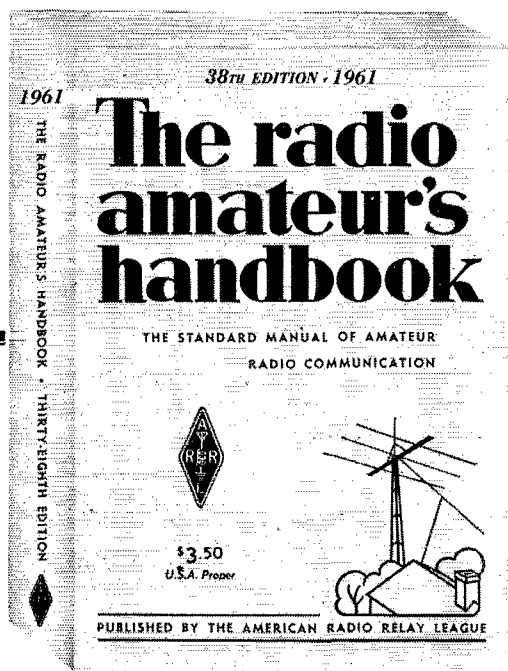
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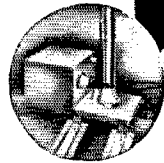
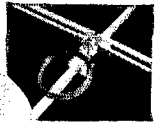
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137-102



250-43

"6N2" VFO—Replaces 8 to 9 mc. crystals in frequency multiplying 6 and 2 meter transmitters. Output range: 7.995 to 9.010 mc. With tubes and power cable.

Cat. No. 240-133-1..Kit..... Amateur Net \$34.95
Cat. No. 240-133-2..Wired and tested..... Amateur Net \$54.95

"6N2" CONVERTER—Instant front panel switching from normal receiver operation to 6 or 2 meters. Available in following ranges: 26 to 30 mcs., 28 to 30 mcs., 14 to 18 mcs., or 30.5 to 24.5 mcs. With tubes.

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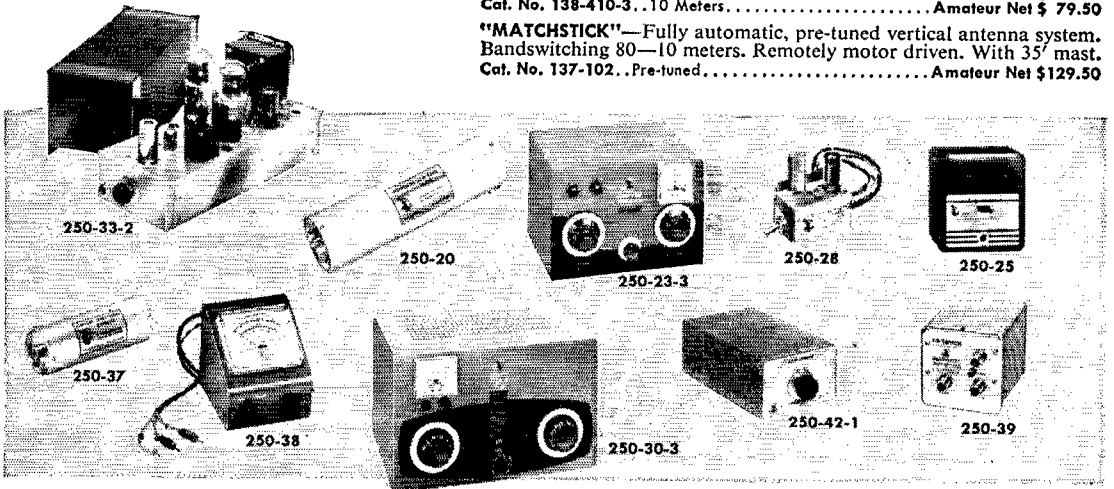
PRE-TUNED BEAMS—Rugged, semi-wide spaced with balun matching sections. 3 elements, boom and balun.

Cat. No. 138-420-3..20 Meters..... Amateur Net \$139.50

Cat. No. 138-415-3..15 Meters..... Amateur Net \$110.00

Cat. No. 138-410-3..10 Meters..... Amateur Net \$ 79.50

"MATCHSTICK"—Fully automatic, pre-tuned vertical antenna system. Bandswitching 80—10 meters. Remotely motor driven. With 35' mast.
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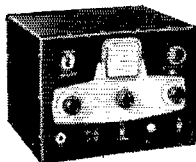


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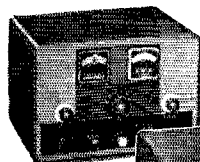
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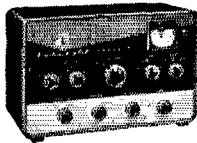
"ADVENTURER"



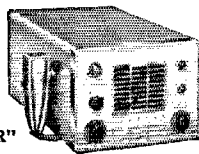
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"NAVIGATOR"



"6N2"



10-METER
"MESSENGER"

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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.

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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.

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"6N2" TRANSMITTER

Rated 150 watts CW and 100 watts phone—offers instant bandswitching coverage of both 6 and 2 meters. Fully TVI suppressed—may be used with the Viking I, II, "Ranger", "Valiant" or similar power supply/modulator combinations. Operates by crystal control or external VFO with 8-9 mc. output. With tubes, less crystals.

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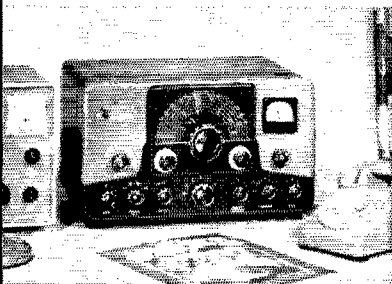
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Complete 10-tube (including rectifier) crystal-controlled transceiver. 10 watts input—pre-tuned for 29.4 to 29.7 mcs—covers any 5 frequencies within a 300 kc segment of 10-meter band. Excellent receiver sensitivity and selectivity. ANL, AVC, and positive-acting Squelch. With tubes, push-to-talk microphone, and crystals for national calling and emergency frequency (29,640 kc).

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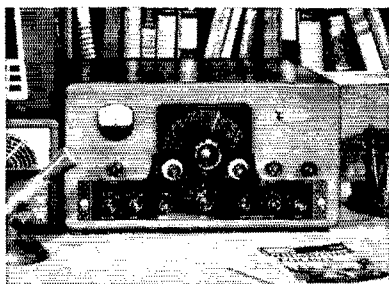
"RANGER" TRANSMITTER/EXCITER

This popular 75 watt CW or 65 watt phone transmitter will also serve as an RF/audio exciter for high power equipment. Completely self-contained—instant bandswitching 160 through 10 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. Amateur Net

240-161-1 . . . Kit \$229.50

240-161-2 . . . Wired and tested . . . \$329.50



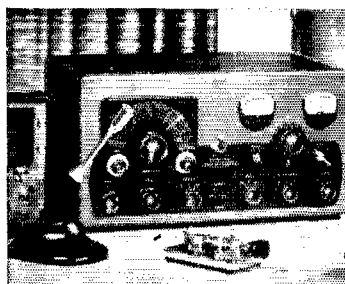
"VALIANT" TRANSMITTER

275 watts input CW and SSB (P.E.P. with auxiliary SSB exciter) 200 watts phone. Instant bandswitching 160 through 10 meters—built-in VFO or crystal control. Pi-network output matches antenna loads from 50 to 600 ohms. TVI suppressed—timed sequence keying—built-in low pass audio filter—self-contained power supplies. With tubes, less crystals.

Cat. No. Amateur Net

240-104-1 . . . Kit \$349.50

240-104-2 . . . Wired and tested . . . \$439.50



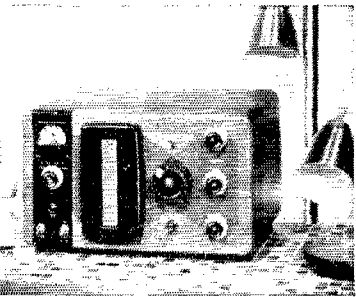
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Full 600 watts CW—500 watts phone and SSB. (P.E.P. with auxiliary SSB exciter.) Compact RF unit designed for desk-top operation. All exciter stages ganged to VFO tuning—may also be operated by crystal control. Instant bandswitching 80 through 10 meters—TVI suppressed—high gain push-to-talk audio system. Wide range pi-network output. With tubes, less crystals.

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240-500-1 . . . Kit \$749.50

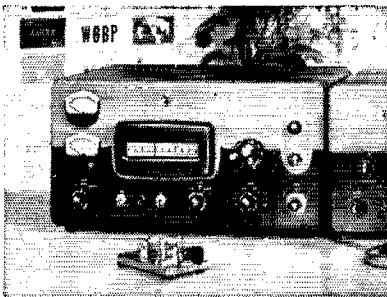
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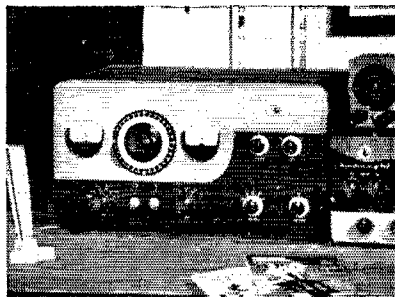
Cat. No. **Amateur Net**
240-352-2..Wired and tested...\$289.50



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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.

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240-353-1..Kit.....\$524.50
240-353-2..Wired and tested...\$589.50



"6N2 THUNDERBOLT" AMPLIFIER

1200 watts (twice average DC) input SSB and DSB, Class AB₂; 1000 watts CW, Class C; and 700 watts input AM linear. Continuous band-switched coverage on 6 and 2 meters. TVI suppressed. Drive requirements; approx. 5 watts Class AB₂ linear, 6 watts Class C CW. With tubes and built-in power supply.

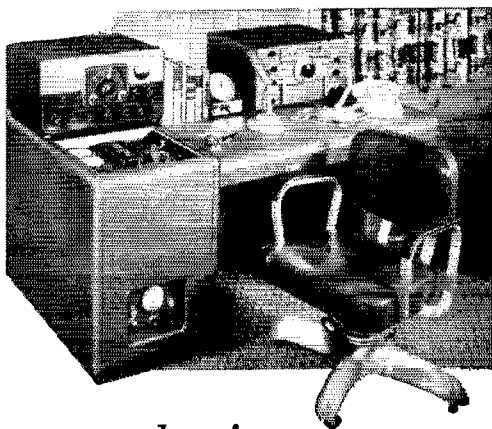
Cat. No. **Amateur Net**
240-362-1..Kit.....\$524.50
240-362-2..Wired and tested...\$589.50

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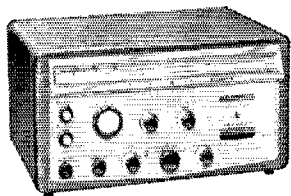
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The only transmitter that provides maximum legal power in all modes—SSB, CW, and plate modulated AM. Two 4-400A tubes in Class AB₂ easily deliver 2000 watts P.E.P. (twice average DC) in SSB mode—1000 watts input AM with two push-pull 810 tubes in Class B modulator service—1000 watts input Class C CW. High efficiency pi-network output circuit. Excitation requirements: 30 watts RF and 10 watts audio for AM; 10 watts peak for SSB. Pedestal contains complete unit. With tubes.

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The transmitter you've been waiting for—with more exclusive features than any other Transmitter/Exciter on the market today! Instant band-switching 80 through 10 meters—no extra crystals to buy—no retuning necessary. Rated 200 watts CW and SSB input; 90 watts input on AM. Unwanted sideband and carrier suppression is 60 db or better! Wide range pi-network output circuit. Fully TVI suppressed. Self-contained heavy-duty power supply. Wired and tested with tubes and crystals.

Cat. No. **Amateur Net**
240-302-2.....\$619.50

INVADER-2000

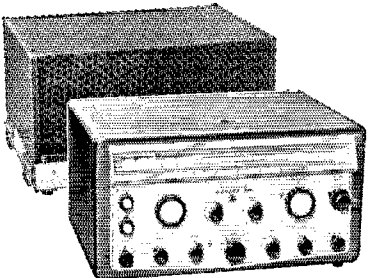
Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated a solid 2000 watts P.E.P. (twice average DC) input on SSB; 1000 watts CW; and 800 watts input AM! Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. Wired and tested with power supply, tubes and crystals.

Cat. No. **Amateur Net**
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Station Activities

(Continued from page 102)

port, can hardly keep up with the Official Bulletins ARRL is sending him. 4LDM/5 reports that traffic is picking up. NUH, net control for the Dixie Early Bird Net on 7235 kc., reports 31 sessions for the month of October, with 651 checking in and 241 pieces of traffic. If you handle traffic on phone or c.w., you should be an ORS or an OPS. Ask the SCM for information. Traffic: W5CEZ 373, MXQ 82, W4LDM/5 64, W5NUH 54, K5UYL 47, USO 32.

MISSISSIPPI—SCM, Floyd C. Teetson, W5MUG—A meeting to organize RACES in Mississippi was held in Jackson recently. There were 46 amateurs present. Three nets were formed. These are the Northern, Central and Southern Regional Nets. They meet on 3880, 3885 and 3890 kc. at 3 p.m. Sun. Anyone interested may call in and join up. Delta Division Director 4RRV was a recent visitor to Jackson. Various fellows from the section met with us in the club rooms of the JARC. We discussed our needs for such appointments as OO, OPS, ORS, OES. Should any of you want one of these appointments, please contact me. The Magnolia Net had 618 check-ins for the month and handled 57 pieces of traffic. NCSs were K5s PPI, IHQ, VAK, VVM, QXH, ZSU, SQS and W5NRU.

TENNESSEE—SCM, R. W. Ingraham, W4UIO—SEC: K4EJN. RM: FX. PAMs: UOT and PAH. K4KTC is converting an ARC-4 for 2 meters and reports that JVM, TDZ, K4s VYP and IXN showed their mobiles on Chattanooga TV. WBK announces that Alt. ECs for Memphis are K4s CPM and ENA. JVM reports that 6 meters really has taken hold in Chattanooga with 15 mobiles and more under way and 6-meter CARE Net QNI at 32. We welcome old-timer ZYF back to the C.W. Net and the reporting list. TDZ is using a 75A-4 now. Thanks for reports: SET—JVM and K4OUK; net—PAH and UOT; OBS—WBK, TDZ and K4AKP; OC—TDZ, K4s RIN and K4TC; OES—TDZ and K4KYL. New appointments: K4YOF as OO, K4TOS as OBS. Renewals: K4OUK as ORS. Thanks to those in Kingsport who helped during the plant disaster. Traffic: (Oct.). K4AKP 1322, W4PL 901, OCG 581, ODR 445, FX 157, ZYF 95, K4AMC 77, W4JVM 74, PGP 58, K4OUK 44, BWS 42, FNR 37, W4VJ 31, UIO 27, HPN 13, K4VOP 8, W4TDZ 6, TYV 4, UVL 4, VNU 3, SGI 2, VTS 2. (Sept.). W4SZI 4.

GREAT LAKES DIVISION

KENTUCKY—SCM, Robert A. Thomason, W4SUD—Asst. SCM: W. C. Alcock, 4CDA. SEC: BAZ. RM: K4CSH. PAM: SZB. V.H.F. PAM: K4LOA. The traffic and QNIs on our section nets are picking up with the cool weather; however, not quite as fast as we would like. The Kentucky Novice Net is now operating (3720 kc., 4700 CST. Mon.-Fri.) under the able direction of K4PXW. This has always been an excellent training and recruiting net for KYN. KYN net certificates went to K4MPR and W8IF. MKPN certificates to KJP, SYE, TRO, VNJ, K4UMN, PEQ, CSH, MIQ, SFD, OLT, RTA and VDO. CDA reports a successful Scout Camporee using emergency equipment. Good reports on the SET were received from Louisville and Owensboro. The Owensboro Amateur Radio Club is working with city commissioners in planning a big expansion of c.d. communications. K4ZQR is sending code practice on 6 meters. The Louisville v.h.f. group is meeting regularly with good attendance. JCN soon will be back on our section nets. K4PGH is shooting for HPL during the holidays. KN4SXC and Dad KN4SWZ moved into Kentucky from Tennessee. K4LOA reports the Kentucky and MARS Six Meter Nets going well. OES reports were received from ADH and GSH; OO reports from W4SZL, K4ZQR and K4ZRA. Traffic: (Oct.). K4PGH 394, KWQ 143, W4SUD 143, BAZ 136, K4VDO 44, W4SZB 33, K4LOA 27, W4CDA 25, ADH 24, K4LHQ 22, W4YYI 19, HNPV 16, K4OZI 14, W4TUV 13, KJP 10, K4OLT 9, W4WVU 8, K4HSB 7, W4SZL 5, K4MZW 4, W4VJV 4, K4ZQR 3, ZRA 1.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: YAN. RMs: SCW, OCC, QOO and FWQ. PAMs: AQA, K8CKD, K8JUG and ATB. V.H.F. PAMs: NOH and PT. EC appointments went to K8CTS, PQO and QFQ; ORS to MGQ, NOH and RAE; OPS to HPR; OBS to FNJ. New officers of the Genesee Co. RC are K8JXR, pres.; IPK, RUV and K8JZV, vice-pres.; JAC, secy.; K8KMQ, treas.; Holland Area RC's new officers are

QOL, pres.; LAI, vice-pres.; K8EMV, secy., K8PVS, treas.; K8QWS, act. dir.; DYT, editor. Kazoo ARC's officers are EMD, pres.; K8DBY, vice-pres.; K8DVL, secy./editor; K8JBQ; act. editor. Nice bulletins were received from Flint, Holland, Kazoo, Saginaw and Detroit. OES reports were received from K8BGZ, FZ, EMD, NOH, K8PBA, PYQ, K8HNQ and PT. The QCWA Net, on 3900 kc., is going well each Sun. at 0800. FZ has an LW-51 for 50 Mc. Bay City will have the Michigan ARRL Convention next Mar. 25 at the Wenona Hotel. CTY and LNE have a new Drake 2A receiver. RTN takes organ lessons! Met K8NHC at the Cleveland Convention. QMU got a nice notice in the Lausling paper for helping to save a Brazil ham's life. K8PBA is doing very well on 144 Mc. PT and PYQ hold a sked 3 times a week on 220 Mc. and want skeds with Lansing, Grand Rapids and Jackson on 220 Mc. NOH built a 3-transistor crystal converter for the car for 50 and 144 Mc. K8KMQ made the BPL on originations and deliveries. JTQ moved to Jackson. K8GJD made WAC. K8GWZ rebuilt the 813 rig. FDO is back from Oklahoma. A new QMNER is K8MEG. OQN has a new SX-101. QIX has a new 350-watt 813 final. K8CKD has a new jr operator. AHV and UGO visited the Michigan Historical Museum and suggest that more Michigan hams do the same. QMI also is a new QMNER. QBA finished the GG 813s, 500 watts. ALG has a new 60-ft. EZ Way tower. K8NEC got Swedish WAV. K8EFY says that 13 NCSs from the BR Net met. K8KCO is in a new QTH—no more antenna lead cutting—he hopes. THZ goes s.s.h. IBB finished a new v.i.o. like that in Oct. QST. MGQ has a Viking II on 1820 kc. Form 1 cards not here by the 5th in a month late, as "Late Reports." Traffic: (Oct.). W8FWQ 217, RTN 165, JRX 149, OCC 141, K8KMQ 135, W8ELW 95, YAN 93, K8EXE 74, W8FX 71, JTQ 60, K8LZF 53, DJQ 44, W8EU 38, K8GJD 33, NEY 30, W8NOH 27, K8GWZ 26, W8FDO 23, K8MEG 18, W8HKT 17, OQN 17, CQU 16, SCW 15, QIX 14, UFS 14, ILP 13, K8JED 12, W8AUD 11, K8EVI 11, NAW 11, W8ZHB 10, K8CKD 8, W8AHV 6, K8LPV 6, W8QBA 6, TBP 6, EGI 5, ALG 4, K8HLR 4, NHC 2, W8WVL 2, EMD 1. (Sept.) W8ILP 42, TBP 38, UFS 24, IBB 6.

OHIO—SCM, Wilson E. Werkel, W8AL—Asst. SCM: J. C. Erickson, 8DAE. SEC: HNP. RMs: DAE and VTP. PAM: HZJ. Findlay RC's *The W8PT News* named DP, a ham for nearly 49 years, as its Ham of the Month. QKO was discharged from the Air Force. HUX's OM, BHO, has joined Silent Keys. K8s BHC and EJX moved to Bloomville and KN8WIP, the XYL of JWM, is a new Novice. BXB joined Silent Keys. The Cuyahoga Falls RC's officers are K8EGY pres.; NNS, vice-pres.; K8COT, secy.; CLO, treas.; K8CTP, radio officer. The club meets the 1st and 3rd Wed. of the month. The Canton ARC's *Feedline* states that GBJ has a new HQ-170; K8QOA has a new KWM2; DCW has a new TA-33; OYV worked 9USKU for a new country; K8KTM has a new TA-33 Jr.; K8USK and KN8WLU (the XYL of VYU) are new hams in Canton. Springfield ARC's Q-5 tells us the club's new officers are EHW, pres.; K8LQG, vice-pres.; KJP, secy.; WAU, treas.; and ENS, DCJ, VZE and KJT on committees. IVE writes that the Greater Cincinnati ARA's new officers are PKD, pres.; QBJ, 1st vice-pres.; K8HKP, 2nd vice-pres.; K8IMC, corr. secy.; LPC, rec. secy.; and NCV, treas. The club celebrated United Nations Week by operating a station in Shillito's store window with three operators showing the public how we work other stations in this country and around the world using K8UN as the call. The club's code and theory classes have 73 enrolled. The Seneca RC showed a sound film, "Treasure For Your Table," about glass-making. K8RNH has his General Class license. The Lancaster and Fairfield County ARC operated its club station at the civil defense exhibit in the fairgrounds. Columbus ARA's *Carscope* informs us that IFV spoke on amateur RTTY and K8QAD has 63 Ohio counties confirmed. Toledo's *Ham Shack Gossip* named K8HVN as its "Ham of the Month" and tells us that KN8s VYV, WDL and WEH are new hams, and the Toledo RC held its annual family night. The Geneva ARA conducts code and theory classes. DVA is attending Gammon College. The Great Lakes ARRL Division Convention held recently in Cleveland attracted about 2500 people, 1200 registered with about 250 attending the banquet, 125 took the General Class license examination and 75 took the Novice and Technician Class examinations. AZU won a KWM-2, 3NMP a CDR Ham-M rotator, K8USF a mobile 6-meter transmitter, CWV a transistor power supply, OOP and K8BKF each a Na-

(Continued on page 114)

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**HERE'S A NEW HEATHKIT GROUNDED GRID KW LINEAR AT A
RECORD-SMASHING LOW PRICE . . . JUST \$229⁹⁵**

The new Heathkit "Warrior" is a completely self-contained, desk-top kilowatt linear, loaded with special features, at half the cost of comparable units! Compare feature for feature, quality component for quality component, you'll find no shortcuts . . . only the finest watt-per-dollar value in a linear amplifier on the amateur market today!

Maximum power input: SSB—1000 watts P.E.P., CW—1000 watts, AM—400 watts (500 watts using carrier controlled modulation), RIT—650 watts. **Driving power required:** 50 to 75 watts—depending on frequency. **Output circuit:** Variable pi-network (50 to 75 ohms). **Input circuit:** Broad banded—requires no tuning. **Input impedance:** Approx. 70 ohms. **Band coverage:** 80, 40, 20, 15, 10 meters. **Panel metering:** Switch-selected, grid current, plate current, high voltage and relative power output for ease of loading. **Tube complement:** 4-811A, 2-866A. **Size:** 19 $\frac{1}{2}$ " W x 11 $\frac{3}{4}$ " H x 16" D.



This inside view shows the neat circuit layout and husky components that emphasize quality. Note the internal shielding of plate circuit for maximum protection against TVI.

CHECK THESE FEATURES . . .

Completely self-contained . . . HV, Fil. and Bias supplies built in. *Versatile . . .* May be driven by any 50 to 125 watt transmitter or exciter—no matching or swamping network required.

Efficient . . . Stable grounded grid circuitry allows most driving power to appear in output for up to 70% efficiency.

Oil-filled capacitor . . . And 5-50 henry swinging-choke provide the excellent dynamic regulation required for high peak power output with low distortion.

Inexpensive tubes . . . 4 paralleled 811A's and 2-866A's, forced-air cooled by silent built-in fan.

Design . . . Special low-capacity filament transformer—requires less driving power—eliminates broad band filament RF choke.

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Model DX-60 **\$82⁹⁵**

- Built-in low pass filter
- Neutralized 6146 final amplifier
- Grid block keying
- Handsome low profile styling

more features, better performance in this new Heathkit transmitter

PHONE AND CW TRANSMITTER KIT (DX-60)

Smart modern styling . . . clean, rugged construction . . . and conservatively rated components all add up to ease of assembly, trouble-free operation and fine performance in the new DX-60 Transmitter. Offering far more than any other unit in its price and power class the DX-60 features a built-in *low pass filter* for harmonic suppression, *neutralized final* for high stability, *grid block keying* for excellent keying characteristics and easy access to crystal sockets on the rear chassis apron. A front panel switch selects any of four crystal positions or external VFO. Modulator and power supply are *built in*. *Single knob bandswitching* for 80 through 10 meters and the *pi-network output* provide complete operating convenience. A tune-operate switch provides protection during tuneup and a *separate drive control* allows adjustment of drive level without detuning driver. *Panel meter* shows final grid or plate current. A fine kit for the beginner as well as general class amateur, the DX-60 may be run at reduced power for novice operation. Operates CW or AM phone with crystal or VFO control. Power input is *90 watts peak*, carrier controlled phone or CW. Construction of the DX-60 is a breeze, with its clean circuit layout, precut and cabled *wiring harness* and the complete, informative instructions furnished. The handsomely-styled finished unit measures only 13³/₄" W x 11¹/₂" D x 6¹/₂" H. 29 lbs.

Model DX-60 . . . \$8.30 dn., \$8 mo. **\$82.95**

you get twice as much for your budget



Model HW-20 **\$199⁹⁵**

- Tracked VFO & Exciter Stages for single knob tuning
- 10-watt RF output to antenna—6360 final
- Built-in low pass filter
- Built-in 3-way power supply for 117 VAC, 6 VDC, 12 VDC
- Push-to-talk ceramic element microphone

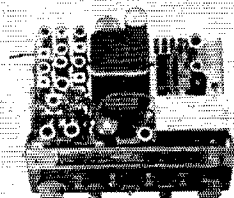
new transceivers for 6 & 2 meter nomads

VHF TRANSCIVER KITS (HW-10 & HW-20)

"Mobile" or "Fixed", the new "Shawnee" 6-meter or "Pawnee" 2-meter transceivers bring you unprecedented performance, for each is a complete AM & CW Transmitter/Receiver combination with features unmatched at this price . . . just connect an antenna and you are in business! Transmitters feature a *built-in VFO* with all frequency determining components mounted on a "heat sink" plate for temperature stability and *four* switch-selected crystal positions for novice, CAP, MARS or net operation. VFO and all exciter stages are tracked for convenient *single knob tuning* over any 500 kc band segment (greater excursions require simple re-peaking of final). A VFO "spotting" switch is provided to "zero in" signals with transmitter off-the-air. The 6360 dual-tetrode final RF amplifier provides 10 watts of power *output* to the antenna and a built-in *low pass filter* is incorporated to suppress harmonics and other spurious radiation. The *dual-purpose modulator* provides a full 10 watts of audio for high level plate modulation of the final RF amplifier or 15 watts of audio for paging or public address use, selectable with push-pull switch. Superheterodyne receivers feature double conversion with first oscillator crystal-controlled. All oscillators are voltage regulated for stability. A large slide-rule dial and vernier tuning provide more than ample bandspread for both receiver and VFO. RF gain, BFO, ANL, Squeelch, AVC on/off and transmitter controls are front panel mounted. *Tuning meter* is automatically switched to read signal strength or relative power output. Units come complete with built-in speaker, heavy duty AC & DC power cables, primary fused relay, adjustable mounting bracket and push-to-talk ceramic element microphone with coil cord & mounting clip. 6" H x 12" W x 10" D. 34 lbs. each.

Model HW-20 (2 meters) . . . \$20 dn., \$17 mo. . . . **\$199.95**
 Expected Shipping Date Feb. 25.

Model HW-10 (6 meters) Coming Soon.



Model
HW-29A
\$44.95



Attn. HW-29 owners: Convert your "Sixer" to the new improved "A" model with this easy-to-install conversion kit. Allows use of 8 mc crystal for maximum stability.

Model HWM-29-1 1 lb. **\$4.95**

lowest cost transceivers on the air

- Operate from low-frequency crystals for greater stability
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2, 6 & 10 METER TRANSCEIVER KITS (HW-30, 29A, 19)

These three outstanding transceiver models bring you top performance at the lowest prices offered in complete amateur facilities. Each model has a crystal controlled transmitter and tunable, superregenerative receiver with RF preamplifier. Receivers pull in signals as low as 1 uv and the 5 watt transmitters are ideal for emergency work or "local" net operation. Features include push-to-talk transmit/receive switch, metering jack, ceramic element microphone, and two power cables. Less crystal. 10 lbs. each.

Model HW-19 (10 meter)...\$4 dn., \$5 mo.....**\$39.95**

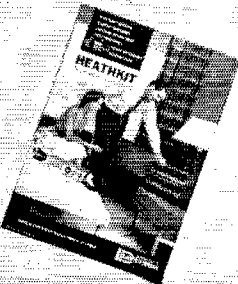
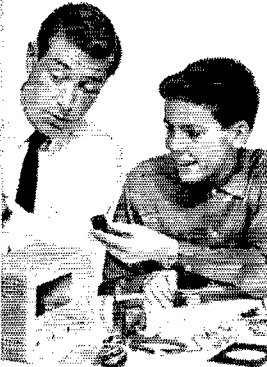
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TWO BANDER BEAMS

A full half-wave element is used on each band. No coils, traps, baluns, or stubs are used. No calculations or machining required. Everything comes ready for easy assembly and use. *Proven Gotham Value!*

6-10 TWO BANDER.....	<input type="checkbox"/>	\$29.95
10-15 TWO BANDER.....	<input type="checkbox"/>	34.95
10-20 TWO BANDER.....	<input type="checkbox"/>	36.95
15-20 TWO BANDER.....	<input type="checkbox"/>	38.95

TRIBANDER

Do not confuse these full-size Tribander beams with so-called midgets. The Tribander has individually fed (52 or 72 ohm coax) elements and is broad banded. It does not have baluns, coils, traps, or other devices intended to take the place of aluminum tubing. The way to work multi-band and get gain is to use a Gotham Tribander Beam.

<input type="checkbox"/> 6-10-15	\$39.95	<input type="checkbox"/> 10-15-20	\$49.95
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2 METER BEAMS

Gotham makes only two different two meter beams, a six-element job and a twelve-element job. They are both Yagi beams, with all the elements in line on a twelve foot boom.

<input type="checkbox"/> Deluxe 6-Element	9.95	<input type="checkbox"/> 12-El	16.95
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6 METER BEAMS

New records are being made every day with Gotham six-meter beams. Give your rig a chance to show what it can do, with a Gotham six-meter beam.

<input type="checkbox"/> Std. 3-El Gamma match	12.95	<input type="checkbox"/> T match	14.95
<input type="checkbox"/> Deluxe 3-El Gamma match	21.95	<input type="checkbox"/> T match	24.95
<input type="checkbox"/> Std. 4-El Gamma match	16.95	<input type="checkbox"/> T match	19.95
<input type="checkbox"/> Deluxe 4-El Gamma match	25.95	<input type="checkbox"/> T match	28.95

10 METER BEAMS

Ten meter addicts claim that ten meters can't be beaten for all-around performance. Plenty of DX and skip contacts when the band is open, and 30-50 miles consistent ground wave when the band is shut down. Thousands of Gotham ten meter beams have been perking for years, working wonders for their owners, and attesting to the superior design and value of a Gotham beam.

<input type="checkbox"/> Std. 2-El Gamma match	11.95	<input type="checkbox"/> T match	14.95
<input type="checkbox"/> Deluxe 2-El Gamma match	18.95	<input type="checkbox"/> T match	21.95
<input type="checkbox"/> Std. 3-El Gamma match	16.95	<input type="checkbox"/> T match	18.95
<input type="checkbox"/> Deluxe 3-El Gamma match	22.95	<input type="checkbox"/> T match	25.95
<input type="checkbox"/> Std. 4-El Gamma match	21.95	<input type="checkbox"/> T match	24.95
<input type="checkbox"/> Deluxe 4-El Gamma match	27.95	<input type="checkbox"/> T match	30.95

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New! Ruggedized 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

- Beam #R6 (6 Meters, 4-El) . . . \$38.95
- Beam #R10 (10 Meters, 4-El) . . 40.95
- Beam #R15 (15 Meters, 3-El) . . 49.95



15 METER BEAMS

Fifteen meters is the "sleeper" band. Don't be surprised if you put out a quick, quiet CQ and get a contact half-way around the world. Working the world with low power is a common occurrence on fifteen meters when you have a Gotham beam.

- | | | | |
|--|-------|----------------------------------|-------|
| <input type="checkbox"/> Std. 2-El Gamma match | 19.95 | <input type="checkbox"/> T match | 22.95 |
| <input type="checkbox"/> Deluxe 2-El Gamma match | 29.95 | <input type="checkbox"/> T match | 32.95 |
| <input type="checkbox"/> Std. 3-El Gamma match | 26.95 | <input type="checkbox"/> T match | 29.95 |
| <input type="checkbox"/> Deluxe 3-El Gamma match | 36.95 | <input type="checkbox"/> T match | 39.95 |

20 METER BEAMS

A beam is a necessity on twenty meters, to battle the QRM and to give your signal the added punch it needs to over-ride the high power boys. Hundreds and hundreds of twenty meter beams, working year after year, prove that there is no better value than a Gotham twenty meter beam.

- | | | | |
|--|-------|----------------------------------|-------|
| <input type="checkbox"/> Std. 2-El Gamma match | 21.95 | <input type="checkbox"/> T match | 24.95 |
| <input type="checkbox"/> Deluxe 2-El Gamma match | 31.95 | <input type="checkbox"/> T match | 34.95 |
| <input type="checkbox"/> Std. 3-El Gamma match | 34.95 | <input type="checkbox"/> T match | 37.95 |
| <input type="checkbox"/> Deluxe 3-El Gamma match | 46.95 | <input type="checkbox"/> T match | 49.95 |

(Note: Gamma-match beams use 52 or 72 ohm coax, T-match beams use 300 ohm line.)

IS K6INI THE WORLD'S CHAMPION DX OPERATOR?

Judge for yourself! Read his letter and count the DX he has worked— with only 65 watts and a \$16.95 Gotham V-80 Vertical Antenna.

2405 Bowditch, Berkeley 4, California
 January 31, 1959

GOTHAM
 1805 Purdy Avenue
 Miami Beach 39, Florida

Gentlemen:

I just thought I would drop you a line and let you know how pleased I am with your V-80 vertical antenna. I have been using it for almost two years now, and am positively amazed at its performance with my QRP 65 watts input! Let me show you what I mean:

I have worked over 100 countries and have received very fine reports from many DX stations, including 599 reports from every continent except Europe (589)! I have also worked enough stations for my WAC, WAS, WAJAD and ADXC awards, and I am in the process of working for several other awards. And all this with your GOTHAM V-80 vertical antenna!

Frankly, I fail to see how anyone could ask for better performance with such low power, limited space and a limited budget. In my opinion, the V-80 beats them all in its class.

I am enclosing a list of DX countries I have worked to give you an idea of what I have been talking about.

Wishing you the best for 1959, I am

Sincerely yours,
 Thomas G. Gabbert, K6INI (Ex-T12TG)

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ON THE GOTHAM

V-80 VERTICAL ANTENNA

- If K6INI can do it, so can you.
- Absolutely no guying needed.
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- 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.
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- Withstands 75 mph wind-storms.
- Non-corrosive aluminum used exclusively.
- Omnidirectional radiation.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
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- 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. **ONLY \$16.95.**

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tional VFO Model 62, NZD an NC-60 receiver, GSX a Turner Model 250 mike and LKD a 4-400 tube. We had the distinct honor and pleasure of having IBDI (from ARRL Headquarters), UPB (our Great Lakes Division Director) and FX (the SCM of Michigan) with us. New appointees are K8AAG as OBS, HZJ and LQB as ECs. IBX received his KZ5-25 award. K8VLU is a new General in Canton, GBJ has a new HQ-170. K8GZT is in the Navy, K8FWH received his General Class license. DAE and UPH made the BPL in October, ZYU has his Ranger working again and is in BN. The Clermont County AREC Net meets every Sun. on 29.6 and 50.7 Mc. AMJ joined Silent Keys. QCU has a new HQ-180. K8MPY received his WAC-Phone certificate. AL received his Chix on Six certificate and a book, *The Wayside Pulpit*, written by EEQ. Mt. Vernon appointed K8AKK as city c.d. director and K8LFA as Radio Officer. CPU, FEM, OUZ, K8s AKK, LFA, OBE, OUZ and TGA helped local police on Halloween using 2-meter mobiles. Traffic: (Oct.) W8DAE 694, UPH 561, BZX 223, ZYU 132, CXM 115, K8ONQ 82, QHH 56, OEX 22, MFY 24, EPG 17, W8OXN 17, QCU 12, YGR 12, AL 10, WYS 7, K8MYG 5, W8BLS 4, K8HEJ 4, TRW 4, KSN 3, QOJ 3, DDG 2, W8IBX 2. (Sept.) K8QHH 43, MTI 22, W8CTZ 19, K8MPY 15, IKK 13, W8AEB 4, K8BLS 4, HEJ 3, MKW 2, LTA 1. (Aug.) K8MPY 54, RMW 12, KHH 9, W8PBX 8, K8LTA 6, JSQ 2, NXN 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC; W2KGC. RM; W2PHX. PAMS: W2LJG and W2NOC. Section nets: NYS on 3615 kc. at 1900; NYSPTEN on 3925 kc. at 1800; IPN on 3980 kc. at 1600; ENY (emerg.) on 29.490 Mc. (Thurs.) and 145.35 Mc. (Fri.) at 2100; MHT (Novice) on 3716 kc. Sat. at 1300. Endorsements: W2HO, W2ZTZ and K2GCH as ECs. Nice to hear that WA2AKK is attending Stevens Tech. A new Telrex Spiralray 2-meter beam rotates over the shack of K2DEM. The new Hornet TB-500 beam increases the DX at WA2EKE. K2BGU reports good tests from his new 220-Mc. rig. The IBM Radio Club is conducting theory classes one night a week. Also on 220 Mc is K2CXP. Two new E.N.Y. stations on the NYS are W2THE and WA2KUS, Sam Harris, W1FZJ, was speaker at the Schenectady Club. SEC W2KGC reported receipt of 23 messages during the SET. K2IOM was auctioneer at the Yonkers Club auction. Among the prize winners at the HARC (Hudson Division Convention) were K2BFU, K2CON and K2MBU. K2BIY has a new 75A-1 to match his 32V-3. The RPI Club, W2SZ, is handling traffic for the students on a nightly basis. K2DLM was speaker at its Oct. 19 meeting. The "Whopping Fog Hollow" v.h.f. group meets twice monthly in Albany, sparked by W2BKH. A new General Class licensee is W2JKI. Expanded nets on 80-meter c.w. as well as 40- and 6-meter phone are planned by the New York State Red Cross Mutual Aid Net (first Sun. of month on 3875 kc. at 1200), according to the net bulletin. Contact W2KCR for complete details on their operation. Traffic: (Oct.) W2EFU 265, W2PHX 143, K2MBU 100, K2OZT 91, K2RKY 78, W2THE 32, K2SJV 28, K2HNV 19, K2CKG 15, WA2EKE 1. (Sept.) K2MBU 137, K2BGU 8.

NEW YORK CITY AND LONG ISLAND—SCM, Harry J. Dannels, W2TUK—SEC; W2ADO. RM; W2GXC. PAM: W2UGF. V.H.F. PAM: W2EW. Section nets: NLI, 3630 kc. nightly at 1930 EST (regular session) and 1815 EST (early session) and Sat. and Sun. at 1915 EST; NYC-LIPN, 3908 kc. Mon. through Sat. from 1730 to 1830 EST; NYC-LI AREC, 3908 kc. Sun. at 1730 EST; V.H.F. Traffic Net, 145.8 Mc., Tue, Wed, and Thurs. at 2000 EST. BPL cards were earned by K2UAT, K2RBW, K2UBG, W2EW and K2UFT, the latter three on originations plus deliveries. W2EW thus earns his seventh BPL exclusively on the V.H.F. Traffic Net. K2UFT has now earned the BPL medallion for his fine traffic work. A pair of 81As is helping Dick with his long-haul work with TCC. W2GKZ added a Heath Chippewa KW final to his all-Heath layout. In answer to several requests here are the Emergency Coordinators for each of our county areas: Bronx—W2DUP, Kings—K2OVN, Manhattan—K2JVB, Nassau—W2FL, Queens—W2LKG, Richmond—W2VKF and Suffolk—W2KNA. Please contact the above AREC leaders for information relative to AREC/RACES activity in your area. W2PF visited KP4-Land, K2QBW, attending M.I.T., spoke to the Walkham ARA on "Satellite Scatter." K2OKX has been appointed Asst. EC for the Kings 2-Meter AREC. K2QGT is active on 20-meter s.s.b. and 6 and 2 meters. WA2AED sends regards from college at Fort Wayne, Ind., where he operates W9BHR on 20-meter s.s.b. K2UYG installed a new three-element wide-spaced 20-meter beam. Bill is attending Villanova and operates W3YP. New officers of the Mohawk RC are K2IUT,

(Continued on page 116)

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Max. power input..... 150 watts
Omnidirectional gain..... 5.8 db
Internal feedline..... RG-8A/U
Frequency range..... 450-470 mc

Nominal input impedance 50 ohms
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Max. power input..... 75 watts
Omnidirectional gain..... 4.2 db
Feedline 10' of RG-58/U
Frequency range..... 450-470 mc

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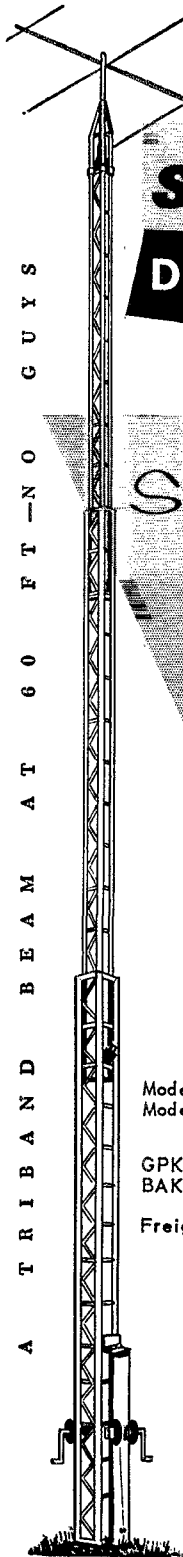
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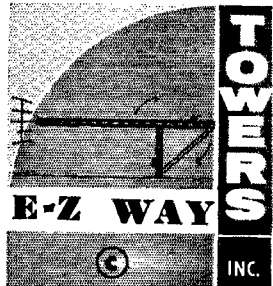
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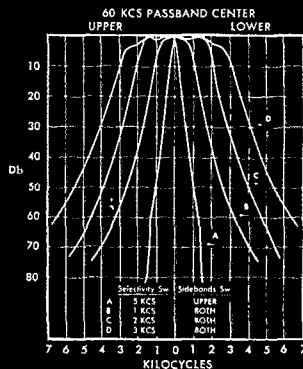
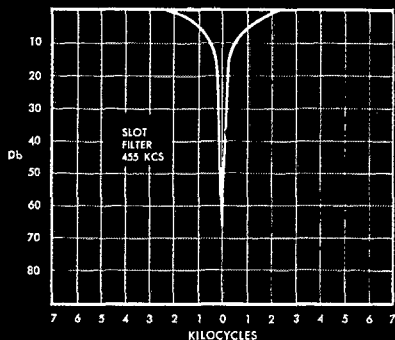
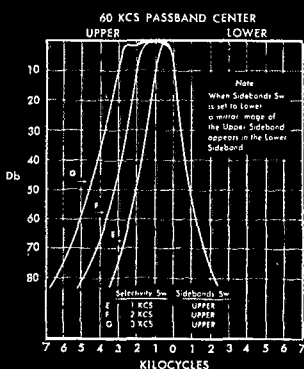
pres.; K2TAQ, vice-pres.; W2III, secy.; and W2MGV, treas. An urgent radio call for a special blood type for K2SBH, the XYL of K2GCA, brought about response from the following amateurs who assisted on and off the air: W2PRH, W2VYE, K2JFL, WA2AFX and WV2NPU. To those and others who aided go the heartfelt thanks of K2GCA and K2SBH. It is with deep regret that I report the membership of K2KQG in Silent Keys. WA2GAF is on the air with a Viking I, an HQ-120-X and a vertical antenna. WA2IKN is now using a DX-100. WA2AIX has left the section for a new assignment with the Navy in Brunswick, Maine. Our loss is Maine's gain. Good luck, Norm! Incidentally, Norm snagged state No. 50 just a few weeks before pulling the big switch. WA2LKY, WA2AVY, K2KCK, WA2EEP and WA2BWM wish the very best to WA2AFX at his new QTH in Maine. Vol. 1, No. 1, of the *Mid-Island Sixer*, the net paper for the Mid-Island Six-Meter Net, published by WA2EQK, is a fine job. Officers of the net are WA2EQK, net control; K2KOA, alternate NCS; WA2HCP, alternate NCS; K2YMV, secy.-treas.; and WA2DLS, act. mgr. Here we are at the beginning of another new year. Did you make any new or renewed resolutions? If not, how about considering PICON? Ragchewing and chasing DX are fun, but has your station participated in any public service event? Happy New Year to all and hope to see you in '61. Traffic: (Oct.), K2UAT 666, K2RBW 563, K2UBG 480, W2EW 286, K2UFT 276, WA2GPT 179, WA2FBC 159, WA2CZG 147, K2THY 141, W2GXC 89, W2GKZ 58, W2OKU 53, K2CMJ 42, WV2KWZ 39, K2DNY 28, K2RHG 14, W2JBQ 13, W2LKG 12, K2YQK 12, W2AEE 9, W2UAL 8, W2PF 6, W2GP 4, W2MDM 3, WA2IKN 2, K2QBW 2, K2ADL 1, K2MEM 1. (Sept.), W2LKG 12, K2SJP 4.

NORTHERN NEW JERSEY—SCM, J. Sparks Remezyk, K2MFF—SEC: WA2APY, RM: K2VNL. PAM: K2SLG. V.H.F. PAM: K2KVR. Section nets: NJN daily at 0000 GMT on 3695 kc., NJFN daily at 2300 GMT on 3900 kc., N.J. 6 & 2 Thurs. and Sun. at 0400 GMT on 51.15 Mc. and Wed. at 0100 GMT on 147.75 Mc. NJN reports 31 sessions, attendance 666 and 419 messages handled. NJFN report 31 sessions, attendance 639 and 206 messages handled. N.J. 6 & 2 reports 18 sessions, attendance 173 and 5 messages handled. New appointments: K2JRJ as OBS, WA2CCF as EC and WA2IGQ as EC. WA2ASM snagged both WAS and WAC. The new officers of the Freehold Regional HSRC are: K2KOD, pres.; W2GLX, vice-pres.; WA2IDM, treas.; WA2EJZ, secy. WA2AXR has moved to Yardley, Pa. K2UKQ received the AHC and CHC awards. The State Line Radio Club's new officers are K2IEF, pres.; K2BPG, secy.; WA2DMY, act. mgr. WA2GQI was the top N.J. operator in the N.J. QSO Party with 12,402 points. WA2CCF, WA2COO and W2DMJ earned BPL cards for October traffic. WA2MNK, WA2JUC and WA2JNJ are new Generals in our section. W2CVW won the code-copying contest at the HARC Division Convention at 55 w.p.m. Compared to his barefoot v.f.o., WA2DKH is running high power with a new DX-40. WA2IDM's tongue is hanging out. He has 99 countries to date. The Maritain Bay Radio Assn. got its new season off to a flying start with a lecture by W2AZL on v.h.f. techniques. W2VPO is the new MARS director for N.J. WA2GQZ is teaching coie and theory at the Garden State ARA classes. K2VNL was elected manager of NJN for 1961 at the annual meeting Nov. 5. K2YLH has been married only two months and has almost convinced his wife to become a ham. WA2INB worked a VE2 on 2 meters during the auroral disturbance Oct. 6. Attention, readers! If you want news of your activities in QST, I must have the information in my hands by the seventh of the month. Let me hear from you. Traffic: (Oct.), WA2COO 531, WA2APY 251, WA2GOZ 245, K2UCY 238, W2DMJ 220, K2VNL 216, WA2JHQ 207, W2QNL 183, K2ETS 168, W2OPB 150, W2RXL 122, WA2CCF 117, WA2EJZ 110, WA2GQI 96, WA2MNK 75, WA2EDG 69, K2MFF 50, W2REH 45, K2CBG 42, K2PVH 38, K2MFX 37, W2EBG 34, K2SLG 25, K2RWO 24, K2EQP 23, WA2AKM 22, WA2CNV 20, WA2DBF 17, K2JTU 17, K2AGJ 16, WA2EBR 16, W2DRV 14, W2CVW 13, W2ZVW 12, W2ANG 11, WA2PT 9, W2AZZ 9, W2NIY 3, K2PTI 2, WA2KKH 1. (Sept.), K2PVH 102, K2ETS 48, W2ZVW 38, K2EQP 33, K2AGJ 32, WA2EBR 22, K2JTU 5, K2UKQ 4, K2RHN 1. (Aug.), WA2EBR 165.

MIDWEST DIVISION

IOWA—SCM, Russell B. Marquis, WØBDR—Asst. SCM: Walter G. Porter, ØUJC, SEC: KØEXN. PAM: MFX. RM: PZO. NWX set a new record in the ARRL DX Contest operating as VPIJH. He made 4037 QSOs in 86 hours. Bob showed colored slides of his trip at the Central Iowa Club and the Story County Club meetings. New officers of the SUI Radio Club are JNJ, pres.;

(Continued on page 118)



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KOUJJ, vice-pres.; RAP secy.-treas. IO, the club station, is active on 75 through 6 meters. HNA received an EC appointment. TGQ renewed his EC appointment and BAJ renewed his ORS. The TLCN reports QNS 246, QTC 496, 26 sessions. The 160-Meter Net reports QNS 410, QTC 22. New officers of the O'Brien County Amateur Radio Assn. (OCARA) are KOREF, pres.; OIW, vice-pres.; KOVDY, secy.-treas. KOBSZ has moved to Marshalltown. Sorry to lose you as the 75-meter phone net manager, Ed, KOMFX, of Nevada, was elected by the board of directors to be the new net manager. The Sioux City Amateur Radio Assn. received a certificate of incorporation from the State of Iowa. KNØEHF, of near Rock Valley, is a radio operator in the U.S. Navy on board the guided missile cruiser, USS Topeka. KOCBC is visiting the Southland and IHC also is on vacation. Traffic: (Oct.), WØBDR 1590, LGG 1563, SCA 1297, LCX 1060, PZO 356, DUA 278, KØKTP 242, WØNTB 68, KØHBD 58, WØLJW 47, KØPOI 38, EXN 29, RTL 26, WØVVP 25, BTX 19, GQ 18, YOZ 17, YDV 16, QVA 15, KØYLN 15, WØBLH 13, JPJ 12, KØMPX 12, GXP 11, GOT 10, WØREM 10, KØBRE 9, WØPTL 9, KØVSV 8, LDN 7, WØEEG 5, KØSEW 5, WVK 4, KAQ 2, LUZ 2, RTF 2, VDY 2, KBX 1, WØTBR 1. (Sept.), KØTGT 3, WØNWX 2.

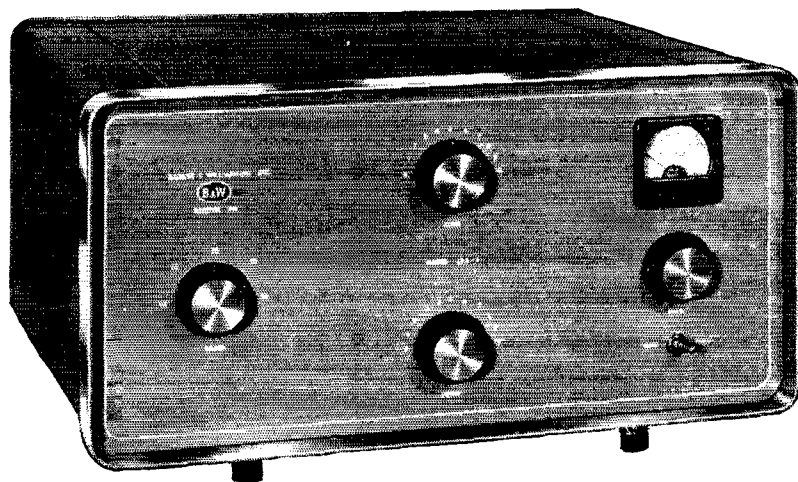
KANSAS—SCM, Raymond E. Baker, WØFNS—SEC: VZM, Asst. SEC: LOW, RM: QGG, PAM: ONF, V.H.F. PAM: HAJ. Section nets: KPN, 3920 kc. Mon. through Fri. at 0645, Sun. at 0800, mgr. ONF, NCSs KØQKS, KØEFL, KØJZM and AMJ. QKS, 3610 kc. daily at 1830, mgr. QGG, NCSs SAF, TOL, FNS and KØBXF. HBN, 7280 kc. Mon. through Fri. at 1200, mgr. KØHGI. The following six Kansas stations qualified for Class I OO in the September Frequency Measuring Test: KØRKR, KØJWS, ECF, LEW, DEL and BYV. The Kansas Centennial QSL cards are now available for postage charge. These cards were designed by MXG, of Topeka, in cooperation with the Federation of Kansas Amateur Radio Clubs. The Kansas Nebraska Radio Club elected the following officers: KØUNE, pres.; KØLMU, vice-pres.; JEO, treas.; WXY, secy. The SET proved its worth in Kansas this year with a great percentage of amateurs active in all zones. Traffic: (Oct.), KØEHI 203, WØSAF 203, FNS 173, ABJ 84, QGG 84, VZM 87, ORB 58, TOL 56, IFR 26, AMJ 25, KØTNV 21, WØBYV 17, KØQKS 14, UAX 11, SMQ 7, WØWIZ 6, KØEFL 5, WØWFD 4, KØWUD 3, QOB 2. (Sept.), WØQGG 61, KØBXF 56, WØBII 12.

KANSAS CENTENNIAL QSO PARTY

January 28 and 29

The Kansas Federation of Amateur Radio Clubs invites world-wide participation in the Kansas Centennial QSO Party starting at 1400 GMT Saturday, January 28 and ending 2359 GMT Sunday, January 29. Kansas stations will work other Kansas, W/K and DX stations. Non-Kansas entries will combine c.w. and phone contacts to make one entry. There will be separate c.w. and phone contests for Kansas stations. The exchange will consist of signal report and ARRL section or DX country. Kansas stations will send their county. The same station may be worked on more than one band. Kansas-to-Kansas QSOs will not exchange counties but send "Kansas." Each contact will count one point. Final score will be the number of QSOs multiplied by the number of different location-multipliers (sections or counties). A county, sections, or country will count only once as a multiplier. Suggested frequencies are 3550, 3900, 7050, 14,050, 14,250, 21,050, 21,350, 28,050, 29,000, 52,000, and 144,500 kc. Certificates will be awarded to the winner of each section and country. Certificates will be awarded to the top 25 Kansas c.w. and top 25 phone entries. Send logs to: Kansas Centennial QSO Party Committee, 414 Avenue "C", Wichita, Kansas. Logs must reach the Committee by March 15, 1961.

MISSOURI—SCM, C. O. Gosch, WØBUL—SEC: KØLTP, RMs: OUD and KØONK, PAMs: BVL and OVV. Net reports: (Oct.) MEN (3885 kc. 1800 CST M-W-F) 11 sessions; QNI 338, QTC 257, NCSs KØONK 6, OVV, OHC 2, BUL 1; MON (3580 kc. 1900 CST M-S) 26 sessions; QNI 156, QTC 124; NCSs: OUD 9, KIK 7, KØONK 5, LGZ 2, OJC, PFF, EEE 1, SMN (3850 kc. Sun 1600 CST) 4 sessions; QNI 14; QTC 5; NCS: OUD, MSN (7115 kc. 1630 CST M-F) 19 sessions; QNI 118; QTC 67, NCSs KØONK 12, BXF 2, VAY 1, (Continued on page 120)



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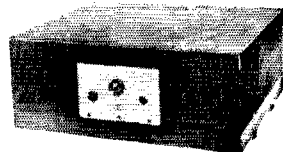
(See Nov. QST, page 115 and Nov. CQ, page 21, for outstanding features)

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BHM 4. KOMMR reports his county was active in the SET; he also reports KQZWR, TGG and NZI as new members of the AREC; MMR lost her 7-3.8-Mc. doublet in a wind storm. GCL is QRL building a K4EEU sidebander. WAP now is keeping a sked with JUR on 2 meters. ERE has a new Drake 2A receiver. KQJPI reports activity on 14.2-Mc. sideband. KQJPL reports HC8, ODD3, HE2 and UM8 as DX contacts, but is having trouble getting that elusive No. 100 country. KOMOD reports from Florida that he is now W4RXS and is attending the U. of Fla. (club station 4DFU). LQC has returned to his teaching duties at SWMSC after a full year of graduate study at the U. of Mo. KQIQH spent a recent leave from the U.S. Navy at home. RVA reports activity on 50-Mc. A-1 emission. Both OVV and KQDOK report losses suffered to mobile equipment because of theft while their cars were parked and unattended. The MON Key, edited by KQLGZ, had its initial publication recently. Items of special interest to c.w. traffic handlers in the State, included a roster of MON Net members. KOONK has a new tri-band beam, those assisting in the installation were MKJ, KQUPH and KQVIQ. Traffic: KQONK 1355, LITJ 345, WQANT 149, KIK 118, KOMMR 94, WQMKJ 80, QUD 68, BYL 64, CTV 51, RTW 46, KQVAY 35, WQBUL 33, GBJ 28, KQLGZ 26, VPH 26, ICB 25, WNZ 16, PCK 10, WQWAP 10, KQRPB 9, WQVFP 4, KQOJC 2, VXU 2, MAU 1.

NEBRASKA—SCM, Charles E. McNeel. WQEXP—SEC: KQTSU. The Nebraska Section C.W. Net, NYU as NC, had 28 sessions, 186 QNI, 99 QTC. The Nebraska Emergency Phone Net, ZOU as NC, had QNI 433, QTC 27 and for September reported QNI 402, QTC 16. The new net manager for this net is EGQ. The Western Nebraska Emergency Net, KORRL as NC, reports 31 sessions, QNI 507, QTC 240, KQTHU and PZH, 100 per cent check-in. The Nebraska Morning Phone Net, KQDGW as NC, reports QNI 715, QTC 147. The Western Nebraska Net, NIK as NC, reports QNI 515, QTC 401, KQTHU 100 per cent check-in. The Sand Hills Radio Club of Chadron and the Alliance Radio Club used mobile rigs to patrol on Halloween night. KQUKN is operating a portable from Creighton University in Omaha. The Blue Valley Radio Club is conducting a series of code and theory classes at Seward. Traffic: (Oct.), KQTHU 437, WQGGP 360, KORRL 219, IJW 139, WQZJF 110, NIK 80, KQKQF 79, DGW 70, DFO 53, DWV 47, WQZPH 44, KQKJP 42, CVN 35, WQDDT 35, KORQE 35, UKN 31, SCM 30, WQRDN 29, OKO 27, KQMVZ 25, WQOFP 24, KQKZT 22, VIA 22, WQBOQ 21, VZJ 19, KOMSS 18, KNQVRQ 13, KQKDW 15, UWK 15, WQEGQ 13, LIJ 13, KQWFG 13, WEP 3, WQVEA 7, KQWKS 7, PTH 6, VAZ 6, PTH 5, SBP 5, ELU 4, WQWKP 4, HTA 3, KQSLB 3, WQYFR 3, HOP 2, KQKLB 2, WQRWX 2.

NEW ENGLAND DIVISION

CONNECTICUT—Acting SCM, Henry R. Sprague, WICHR—SEC: EOR. RM: KYQ. H.F. PAM: YBH. V.H.F. PAM: FHP. Traffic nets: CPN, Mon.-Sat. 1800, Sun. 1000 on 3880 kc.; CN, daily 1845 and 2200 on 3640 kc.; CVN, Mon., Wed. and Fri. 2030 on 145.98 Mc.; CTN, Sun. 0900 on 3640. Vic's transfer to Arabia is our loss but I'm sure you will join me in wishing him and his family the best of luck. Until you elect a new SCM, I'll do my best to fill his shoes. My thanks to those of you sending me your best wishes. KILAH and AW made BPL on originations plus deliveries. KYQ reports early CN handled 481 messages averaging 15.5 per session. Attendance averaged 7.8. Three late sessions handled 16 messages. High QNI were KILAH, OBR, AW, KIGGG and VB. QPD, RAN, VW, OJR, LIG, IRX and KINQJ participated in the Sept. Frequency Measuring Test. APA is back with a half kw. and hopes to be on s.s.b. soon. K5OEA/1 finally is settled in Groton and expects to be an active traffic-handler. His XYL, K5SPD/1, operates s.s.b. on the low end of 40 meters mostly. KIIVR finds school homework is cutting into his radio activities. While FHP was vacationing in the South he visited ex-K1BML, now W4SHD, and ex-K1BMM, now W4SHE (SHE is a lie!) in Coral Gables. He also reports that CVN held 12 sessions and handled 16 messages. New stations were K1KJR, KN1PUG, KN1PIG, K1MINX, K1NML and K1OEQ. YBH says CPN held 31 sessions, handled 260 messages or 8 per session average with daily attendance averaging 27. High QNI were YBH 31, DAV 28, PFP 28, IHG 23, LWV 27, K1BSB 26, VQH 25. The Manchester Radio Club's Basic Electronic Course got off to a flying start with 47 in attendance. EOR is one of the instructors. FOM is immersed in u.h.f. construction. ZPV is searching for maximum wallow from the smallest size 432-Mc. antenna possible and is building a 2-meter s.s.b.-c.w. rig to boot. Appointments renewed: CUH as ORS. New appointments: KIHTV and K1KSH as OOS; WCG as

(Continued on page 122)

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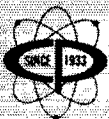
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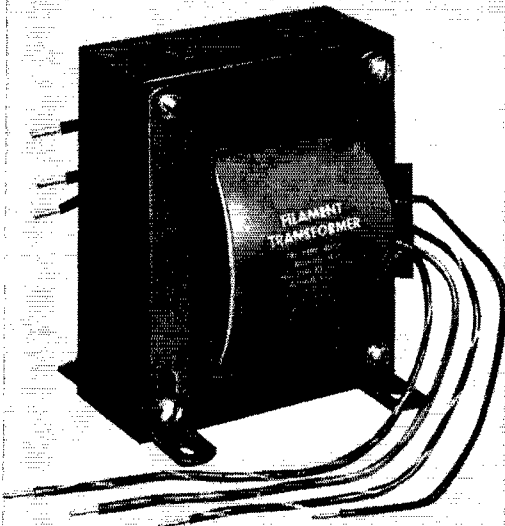
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F-29U	12/11/10CT	11	3000	9.00
F-45X	24CT	1	1500	3.39

ORS. Reports received: OO from EQV, VW, K1LFI, K1GUD, K1HTV, K1KSH, K1IVR and K1EFI; OES from FVV, FOM and ZPV. Traffic: W1AW 491, OBR 386, EKJ 279, WCG 197, KYQ 193, EFW 188, YBE 155, K1GGG 151, LAH 143, W1BDI 114, K8SPD 110, OEA 1105, W1FHP 66, ULZ 62, K1CBV 39, AQE 34, W1QV 30, FTF 29, RFJ 26, K1MBA 19, W1VIV 16, K1HWF 11, DGK 10, LQO 10, W1CHR 9, CUE 7, HJJ 7, JZA 7, APA 6, K1BSS 5, CTT 4, BNB 3, ZPV 3.

MAINE—SCM, Jeffrey I. Weinstein, W1JMN—Well, here it is 1961, and a brand-new year of hamming unfolds in the Pine Tree State. The State of Maine concluded the year 1960 as one of the best organized and most active sections in ARRL. My sincere thanks to all my appointees, AHM, BDQ, BXI, CXX, DUG, DYG, EFR, FNI, FV, GKJ, GRG, GVO, IAA, INL, ISO, JDA, KAK, KFR, KFY, KSG, LHE, MBM, MJN, OTQ, SWX and TKE, and to all the other radio amateurs in our section who rendered their support and worked so diligently for the furtherance of our goals of becoming better operators and maintaining close productive relations with the public and its governmental agencies. We're encountering 1961 with the prestige and respect for the State of Maine at the highest level it has been in amateur radio history! Let's build on our status by participating *actively* in the State of Maine Amateur Radio Emergency Corps, the Sea Gull Net, the Pine Tree Net, the Maine Slo-Speed Net, and in all ARRL contests, functions, and organizational efforts, whether they are sponsored by this office or conducted by ARRL Headquarters. If everyone shares in this effort, we'll have very little difficulty in placing at the top for 1961. Best of luck for the ensuing year! Traffic: (Oct.), K1MPM 82, KSG 73, W1GRG 40, FV 16, K1MZB 14, W1EPN 13, JMN 12, K1MBM 9, BLC 8, LMJ 8, OAZ 6, DYG 2, W1SWX 2, KN1OJH 1.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, jr., W1ALP—SEC: AOG. Many cities and towns in this section do not have an Emergency Coordinator. The requirements are that one must hold a General Class license, be a member of ARRL and have an interest in doing this kind of work. It has been our policy where possible to make the Radio Officer also the EC. If interested in this appointment, write to AOG or ALP. GOU is a new OO. K1MVN is a new OES. Novices and Technicians can hold only the OES appointment and Generals must have three years minimum experience to hold OO appointment. K1COV is a Silent Key. Heard on 75 meters: K1DOJ, IMU, KLO and JNM. K1HYF, Milton, General Class, has a Ranger on the air. TUP has gone to St. Pete, Fla., to work. K8RUA/1, Quincy, is on 10 meters. WK has an SX-101A, GLW is in CAP along with the Braintree Club, and K1NPL is in CAP. Heard on 2 meters: GQP, K1PKX, CLL, KN1s OSN and OMS. K1KUY has a new mobile rig and is putting up a new beam. ZPU has a 55-ft. tower. The following took part in the Sept. FMT: BGW, PLJ, BB, K1GUU, K1DSA, KYC, K1LJK, AYG, K1BBU, YHY and K1JIU. NKA has a whip for 6 meters and beams going up higher. CB is a Silent Key. SS has beams up for several bands. The Framingham Club and the QRA held auctions. ZWJ showed slides on his West Coast trip to the Framingham Club. QPO gave a talk to the QRA. The Barnstable Radio Club elected NPR, pres.; YAN, vice-pres.; K1BEY, secy.-treas.; BCN, K1GAZ, FZH, K1BIF and K1BID, advisory board. The club meets in the Fire House in Barnstable Village. EGZ got married. K1LEK and his XYL have a new harmonic. On 6 meters: BLM, YBY, KN1GFN, K1RIG and BIF. A code and theory class is being held with K1GRP and FZH doing the instructing. K1JZZ has a Halo on 6 meters. FVD moved to Phoenix, Ariz. K1LUT has a Ranger. A nice copy of *Ham News* was received from the Yankee Radio Club. VVI is the editor. PTR is ex-4PTR in Wellesley. IHC is at Ft. Gordon, Ga. K1GSK is on 2 and 6 meters and has a Valiant and tri-band beam. K1ARL has an Apache and a four-element beam. TRC has an Apache. KSB is on 10 and 6 meters. K1DIW has a Globe Scout 680A and an S40-A on all bands. K1MVN is on 2 meters with an eleven-element beam and will be on 220 Mc. BB is busy getting ready for the 160-meter tests. K1GVR/1 is in Roxbury. OFK, our Somerville EC, says drills are held on Sun. night. EEE and DDF spoke on how to win the SS Contest at the El Ray Club. K1AII is building a tape deck to record signals. YYZ, NVV, K1KKQ and DSW are going on a DX-pedition to camp in Palermo, Me. K1JIU, JAW, MHM, BYL, BUF W1s FJJ and MX are active in the 40-meter traffic nets. WA2EBR visited K1JAW. Our Eastern Mass. 2-Meter Net now operates Mon. through Fri. It had 25 sessions, with 363 stations and a traffic total of 201. KSZ has a 6N2. K1KAL has a Ranger and an NC-183D. K1NGI has Tech. Class license. K1IUS is on 75 meters. The T-9 Radio Club met at KON's. LQQ is busy on a new QTH in Newburyport. WFO is Alt.

(Continued on page 124)

Gonset does it again!

Communicator IV for 220 mcs!



Now... another important "first" .. this time the first complete commercially-produced "package" operating on the amateur 220 megacycle band!

Here is no micro-power peanut whistle! An input power of 20 watts—substantial for VHF—capable of a man-sized signal. "Big ears" also—real ability to copy the weak ones—a sensitive, triple conversion receiver with a very good noise figure. This is 2-way equipment of the highest quality built for effective communications on an amateur band with great potential ... "one-and-a-quarter-meters" ... 220-225 megacycles.

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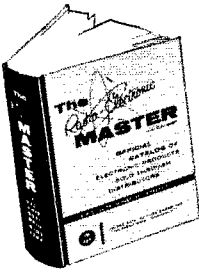
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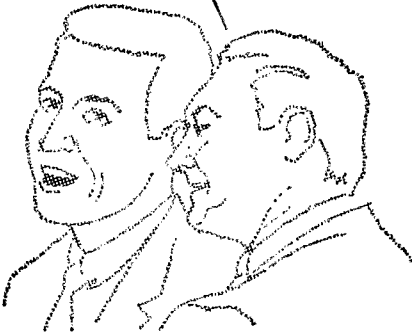
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RO and Asst. EC to ACB in Quincy, FQA had his 200th DXCC confirmed. Our Eastern Mass. C.W. Net on 3660 kc. is looking for more members. KIBUF has a "Tener." KIMEM is on 160 meters and is building an electronic key. KILCQ says the Mass. V.H.F. Club conducted a patrol in Holbrook on Halloween. The Neighborhood Net meets on 3825 kc. each Sun. at 1400 GMT. KILUJ is founder. AUQ is working in Andover now. Appointments endorsed: KIGYM Winchester, YYZ Randolph, VYS Weston, DDF Watertown, BR Winthrop, SS Lincoln, TRC Maynard as ECs; ZSS, SS and KIGYM as OPSs; KJAW, KIBUF and SS as ORSs; RB and SAD as OOs; NKA as OES; KIBUF as OBS; SAD as RM for 20-meter c.w. JOS has a Viking II and an NC-183D on all bands. KNIPOW is on 2 meters. Traffic: (Oct.). KIGNR 369, WIEMG 290, KILLX 200, WIEAE 127, PEX 126, ZSS 94, HGN 86, OFK 79, KIMHM 70, BUF 63, MEM 60, WIFJJ 54, KJAW 53, WISIV 28, KIDTJ 24, WILHX 16, KIGTX 13, WIVYS 13, KICMS 12, WIRQL 11, KIDIO 10, LCQ 10, WILJK 3, AIUQ 2, BB 2. (Sept.). W1YHY 26.

MASSACHUSETTS QSO PARTY

January 28 and 29

The Merrimack Valley Amateur Radio Club reminds all amateurs of the Massachusetts QSO Party, January 28 and 29. The contest starts at 6 P.M. EST Saturday and ends 11:59 P.M. Sunday. "CQ MASS" will get you started. Logs must be postmarked no later than February 18. See page 164 of last month's QST for full details.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, WIBVR—SEC: BYH, RM; KIJV, RAM; DNS. WMN meets on 3560 kc. at 7 P.M. Mon. through Sat. MPN meets on 3870 kc. at 6 P.M. daily. WMNN meets on or near 3744 kc. at 6:30 P.M. Mon., Wed. and Fri. The new Slow Net (WMSN) meets on 3560 kc. Tue. and Thurs. at 6:30 P.M. RM KIJV sent out 125 bulletins to West. Mass. Novices in the interests of the WMNN. That sure should get some results! The new First Region phone sessions are going very well under the direction of DXS, with all New England sections represented with the exception of Eastern Massachusetts. New officers of the Springfield Tech. High Radio Club are KIGCV, pres.; KIISQ, vice-pres.; KILWS, secy.; KIMKF, treas. The club call is GCR. ZPB reports that the Mt. Hermon School Club has 8 boys taking c.w. and theory for their Novice tickets and 4 for General. KIAPR/WIBYH is having more than his share of rig trouble at his new QTH. KIMGK is at Worcester Junior College instead of at W.P.I., as previously reported here. KIIQZ has been checking into the new WMSN and says that it's too bad some of the phone boys don't check into a net like this to at least get some practice on their c.w.! RM KIJV has completed the list of WMN NCSs and 1RN representatives for the season. BVR's antenna at his new QTH is doing OK. RFI, BGV, and STR are playing chess via ham radio on 6 and 2 meters. AZW and WF attended the N.E. DX Assn. dinner and meeting at Albany. KIJGZ has a new DX-40 and an HQ-100. GRZ has retired after more than 40 years at Simonds Saw and Steel Company. Traffic: WIYK 148, DXS 136, KIJV 107, LBB 106, WIBVR 98, ZPB 37, OSK 16, KIAPR 12, GCV 9, WIDVW 8, KIIQZ 2.

NEW HAMPSHIRE—SCM, Ellis F. Miller, W1IQ—SEC: KIIQK, RM; KICIF, PAM; KVG, GSPN meets Mon. through Fri. at 1900 and Sun. at 0930 on 3842 kc. NHN (c.w.) meets Mon. through Sat. at 1830 on 3685 kc. CNEM meets Mon. through Sat. at 0645 on 3842 kc. New appointments: KVG as PAM, KICIF as RM, RMH as OBS and OO, YHI and IIQ both thank all for their support in the recent SCM election. Thanks to Bob Wright for a splendid job as SCM. Hope I can do as well. The Manchester Radio Club is offering code and theory classes to those interested. Its members plan a 22nd anniversary celebration in February. We need ECs for Grafton, Belknap, Coos, Strafford and Cheshire Counties. How about it, gang? Let's get behind the AREC. KVG made DXCC. KIGAA has returned from Korea and is now stationed at Pense AFB. Welcome home, Ben. The Manchester Emergency Net meets Fri. at 2400 GMT on 29,000 kc., 50.4 Mc. and 145.27 Mc. Traffic: (Oct.). KIIK 199, CTF 105, WICUF 94, KIITS 81, WITA 56, ZUR 54, ZUS 42, KIJDN 28, W1IQ 25, KIIEE 12, W1AJ 8, KIGGH 8, IEH 7, W1YHI 4. (Sept.). KICIF 30, W1AJ 6.

(Continued on page 126)

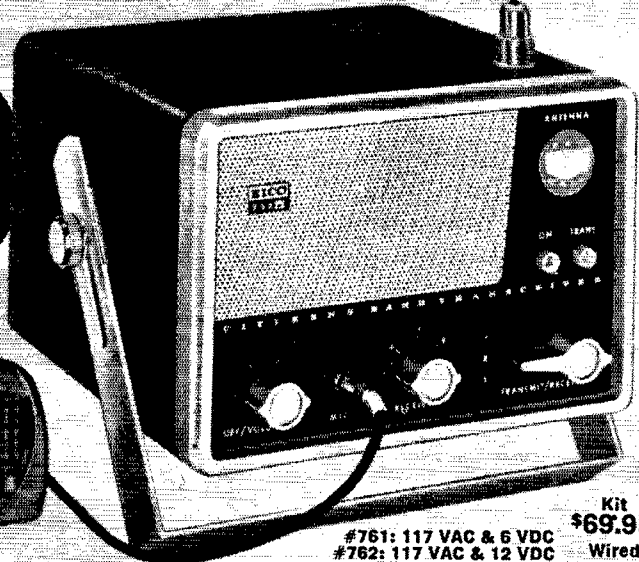
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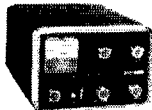
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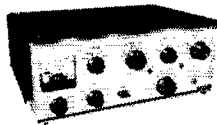
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FT-243 holders	MC-7 holders	DC-34 holders	FT-171 holders
Pin spacing 1/2"	Pin spacing 3/4"	Pin spacing 3/4"	Pin spacing 3/4"
Pin diameter .093	Pin diameter .125	Pin diameter .156	Banana pins

MADE TO ORDER CRYSTALS • Specify holder wanted

1001 KC to 2600 KC:	
.01% Tolerance.....	\$2.00 ea.
.005% Tolerance.....	\$2.75 ea.
2601 KC to 9000 KC:	
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Amateur, Novice, Technician Band Crystals

.01% Tolerance... **\$1.50 ea.**—80 meters (3701-3749 KC), 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC

FT-241 lattice Crystals in all frequencies from 370 KC to 540 KC (all except 455 KC and 500 KC)..... **.50¢ ea.**

Pin spacing 1/2" Pin diameter .093
Matched pairs = 15 cycles **\$2.50** per pair
200 KC Crystals, **\$2.00 ea.**; 455 KC Crystals, **\$1.50 ea.**; 500 KC Crystals, **\$1.50 ea.**; 100 KC Frequency Standard Crystals in HC6/U holders **\$4.50 ea.**; Socket for FT-243 crystal **15¢ ea.**; Dual socket for FT-243 crystals, **15¢ ea.**; Sockets for MC-7 and FT-171 crystals **25¢ ea.**; Ceramic socket for HC6/U crystals **20¢ ea.**

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TERMS: All items subject to prior sale and change of price without notice. All crystal orders must be accompanied by check cash or M.O. with PAYMENT IN FULL. NO COD'S. Q-11

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: PAZ, RM: SMU, PAM: TXL. Appointments: KILSA, KIPNI, KIKAZ, KIDZX as OESs. Endorsements: K1BKK as ORS. The R. I. State Phone Net held a meeting at the home of the PAM and elected KIDZX net manager. Those attending were K1GRC, GRA, PNI, EBX, AAV, WIBQH, TXL, SMU and JHF. RISPNI reports 31 sessions, 56 traffic and 206 QNI. RIN reports 21 sessions, 73 traffic and 67 QNI. The WIAQ Club of East Providence reports activities of members as follows: JZI has completed a home-built quad for 10 meters. K1CZD now has his SB-10 operating. BDN is in the process of plate modulating his DX-35. K1N1PEL and KNINSY are studying hard for their Tech. Class license. K1HMN and OYK comprise a father-and-son team on 6 meters. Present officers of the Roger Williams V.H.F. Society are MDT, pres.; K1ALI, vice-pres.; KEM, secy-treas.; KBD and ICI, board members. Pawtucket Tolman H.S. has formed a radio club with 28 members and TL as trustee. The R.I. Mobilers were called on to provide communication during a fire at the State Prison. K1PNI, ex-K8LZP, has just completed a quad for 6 meters. Traffic: (Oct.) W1SMU 786, TXL 214, K1GRC 49, BKK 45, DZX 39, W1WFF/1 32, JFF 18, K1PNI 10, AAV 9, W1WED 7. (Aug.) K1BBK 12.

VERMONT—SCM, Mrs. Harriet Proctor, W1EIB—SEC: K1DQB, PAM: HRG, RM: KRV. Vermont frequency: C.w. 3520, phone 3855, RTTY 3620 kc. Nets: C.W., Mon.-Sat. at 1830; GAN, Mon.-Sat. at 1730; VPNI, Sun. at 0900; VEPPN, Sun. at 1730. Congratulations to K1BSN on his new XYL. His new QTH is Essex Junction, and he has a new job at G.E. Ray Minor, ex-WISJCJ of Williston, has taken the exam to get back on the air. Our best wishes go to new operators KN1PPK in Essex Junction and KN1PPP in So. Burlington. K1PZL, ex-K2UYI, has come to Essex Jct. K1HDB will be attending electronics school in Washington, D. C., until February. The BARC and CVARC both put out club news letters. They sure can develop interest. We need more news items from the southern end of the State, and we need more traffic originated in Vermont. How about it? Traffic: (Oct.) W1HRG 39, EIB 28, KJG 13, K1OXD 1. (Sept.) VE2AZI/W1 1714, K1DQB 17.

NORTHWESTERN DIVISION

IDAHO—SCM, Mrs. Helen M. Maillet, W7GGV—FARM Net check-ins and traffic picked up considerably during October. Reports on activities during the SET came from ECs VQC, Moscow, and GCO, Pocatello. The District 4 80-Meter Morning C.D. Net terminated in favor of 6-meter operations. K7ATT is the new prexy of the Ricks College Club. Southeast Idaho Club's new officers are ISY, prexy; KN7LCW, veep; and K7DUX, ser. W7QIS/6 visited the Pocatello Club and gave a talk on 2-meter mobile installation. He also directed the club project of vertical and dipole antenna installations on K7JJK's ranch home. Lois showed appreciation by serving a steak dinner. A new Novice in Pocatello is KN7NQI. Those dropping the "N" from their calls are K7LKD, Ririe, and K7JWZ, Idaho Falls. KN7MBL is now active on 80 meters. LQU, working for WAS on 20 meters, copped a couple of choice DX stations, EL4A and OH1TN. K7HDW has a new son. FARM Net traffic: 40. Traffic: W7GGV 47, VQC 19, K7BWW 17, W7DWE 6, EMT 6.

MONTANA—SCM, Ray Woods, W7SFK—SEC: BOZ, PAM: YHS, RM: K7AEZ. The MPN meets Mon.-Wed.-Fri. at 1800 on 3910 kc. TSN meets Mon. through Fri. at 1200 on 7230 kc. MSN meets Tue.-Thurs.-Sat. at 1830 on 3530 kc. HJM and ZJZ are at Hingham with a hotel in operation. Glad to hear that UWY recovered from a successful operation and is back on the air. UPR is on a vacation in California. K7EGA passed his exam. Some new calls in Montana are K7JAZ and K7NSL. We hear that GDE is leaving Montana. IDK is starting Novice classes in Havre. YZQ will be doing the same thing at Billings. Lots of hunting yarus are on the air in Montana as the amateurs wind up the hunting season. New calls in Billings are K7NPV, K7EZI and K7NPJ. TDW is back on s.s.b. again. The stamp "net" can be heard some mornings in this area. The Helena Radio Club reports big things for this winter. New appointments are COH as EC, K7CTI as OBS, W7TDD as OPS, K7BKH made BPL again. Traffic: K7DCI 389, BKH 276, DCH 68, BYC 21, W7IDK 18, TGM 5, YQZ 4, K7CTI 3.

OREGON—SCM, Hubert R. McNally, W7JDX—K7EPA is busy building an ultramodulator these days. LT is going for DX again after all these years! A nice SET report was received from GWC. K7EPO has joined the "4eft wingests," whatever that is. K7JWY is busy inventing things which will make someone's hair

(Continued on page 128)

An unsolicited letter that speaks for itself -

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TELEPHONE
FRANKLIN 3-7245

December 1, 1960

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450 Mc gain antennas.

I have tried many types of antennas for 450 Mc and have
come to the inescapable conclusion that this is the finest
450 Mc vehicular antenna of them all. My tests have been
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Not only do your antennas perform far better than anything
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one customer who gave up his radio because he was moving to
another area, wanted to keep his antenna because it looked so
good on his car.

As a result of the great advantage over the roof-top whips,
I have now discontinued using roof-top antennas altogether
on new subscriber installations and am going to your Cat.
No. 181-509 gain antennas. As the old installations are
traded in, or show a need for better coverage, they also will
be replaced with your new antennas.

In short "you-all" make a mighty good antenna!

Very truly yours,

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Alan H. Rosenson
Owner and Chief Engineer

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Communication Antenna Systems for American Business

Communication Products Company, Inc.

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**needs no ground
plane radials—**

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Emergency nets and citizens band wherever omnidirectional coverage is desired.

Campers and apartment residents or wherever space is a problem.

A second antenna for low angle radiation.

The New C-4 features . . .

- Full electrical half waves on all bands . . . eliminating the need for awkward ground plane radials.
- Easy, inexpensive mounting with regular TV hardware such as simple chimney mount as shown.
- Compactness . . . only 12" over-all height.
- End-loaded to provide maximum radiator current for maximum radiation.
- Quick installation . . . about ½ hour.
- Power rating . . . 300 watts AM.
- Feed line . . . RG58AU or equivalent.
- SWR . . . less than 1.5 to 1 at resonance.

Model C-4 **amateur net** **\$34.95**

Two other 6-10-15-20 meter antennas:

Model B-24 Four Band Beam
Element length 11' — boom length 5'
Turning radius 7'
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Mobile • 5'-3" high
Fits all standard mounts
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The above antennas are also available for 6-10 or citizens band operation.

Write for literature and the name of your nearest Mini-Products distributor. Patents pending

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stand on end, like a memory machine which will store up log-book information. DIC is having trouble getting things mailed. K7CLL still is busy studying law in Salem. A nice card was received from Betty, CPV. DEAI is trying to show up the SCM with all of his fishing tales. It looks like Chas had quite a trip on the Rogue River. Also ZB went deer hunting with the same luck such as JDX has fishing. A new applicant for OPS appointment is K7KKB. AJN is looking for boot-leg calls and having success. Fine RACES work was reported at c.d. headquarters during an open house there. GLZ, GWB, GWT, JDX, HIO, NGW, K7BCX and K7DVK took part. There was bad news for RACES with the death of K7DIN in a hunting accident. K7EZF is busy on 6 meters. A nice letter was received from Beth, NJS, our PAM, with plans for the future. K7JSJ is experimenting with 5600-Mc. gear. GUH continues listening for harmonics, etc. A fine AREC report was sent by UQL. We understand Red expects to be very busy in 1961 in other lines so we may have to secure a new SEC soon. Traffic: (Oct.), K7AXF 280, W7BDU 199, ZB 86, K7CBA 53, CPV 27, W7DEM 23, MTW 19, AJN 15, K7CLL 13, W7DIC 10, K7EPO 10, W7GWC 8, LT 7, D'TT 5, JDX 4, K7EZF 3, EPA 2, (Sept.), W7ZB 467.

WASHINGTON—SCM, Robert B. Thurston, W7PGY —SEC: HMQ, RM; AIB, PAMs: LFA and PGY. Washington nets: CBN, 3960 kc. 2100 PST Mon. through Sat. ESN, 3920 kc. 1800 PST Mon., Wed. and Fri. NSN, 3700 kc. 2100 PST Mon. through Fri. WARTS, 3970 kc. 1830 PST Mon. through Sat. WSN, 3535 kc. 1900 PST Mon. through Fri. New officers of the Spokane Amateur Radio Club are K7BEO, pres.; K7EUA, vice-pres.; UOJ, treas.; K7AGL, secy.; HCJ, ZNN, OPR, EQU and K7AFE, trustees. The new EC for the Spokane Area is WIL. The Richland Area AREC received newspaper coverage through the Red Cross during the SET just completed. K7BBO renewed his OES appointment. OMO was issued a Section Net certificate for WSN. ACA and K7IEY are very active in the WSN and K7IEY made the BPL UOJ is NCS for the Spokane Area AREC Net on 146.16 Mc. each Tue. K7GZB has a new nine-element 2-meter beam. NUN was the NCS on the Totem Emergency Net (Seattle) during the SET. The net now has 66 members. K7CWO moved to a new QTH in Bellevue and works for Boeing. HCJ and EQU are new OO appointees in the Spokane Area. AMC soon will have a portable ham station and will travel. K7GYA is active on 10 meters. BTB says conditions were very bad for skeds to KL7-Land. AIB returned from a Reno and Lake Tahoe vacation. K7CHH makes DXCC. New EC appointees are UJA for Asotin County and EG for Kittitas County. A total of 129 SET pieces of traffic was received by HMQ, the SEC. MCU was a visitor at the VARC meeting. HMQ helped kick off Lewis County AREC activities. ISC is doing a fine job as EC. The Boeing gang (BEARS) has applied for a station license. CGA attended the Air Force MARS meeting in W6-Land. Frank is State Coordinator. VI received his 2nd-class phone license. Traffic: W7BA 1014, DZX 974, K7IEY 500, W7APS 95, KZ 94, K7HIL 86, W7AMC 54, ACA 39, BSW 34, YFO 29, EHH 24, LFA 24, GYF 23, JEY 20, K7AJT 19, W7AIB 15, K7ASY 12, DDQ 11, BTB 10, K7CHH 6, W7OMO 6.

PACIFIC DIVISION

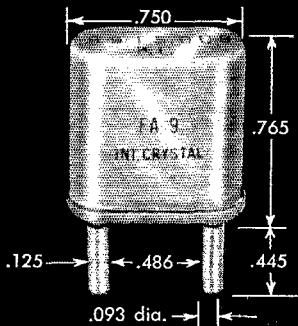
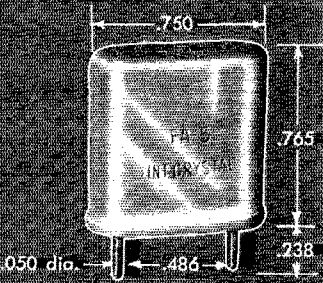
NEVADA—SCM, Charles A. Rhines, W7VIU—K6FDB will be active again soon. BFM now is at Carson City with the Department of Education. JHB is a new ham at Sparks. AGZ operated mobile while on a hunting trip. CNG spent some time in the hospital but is OK again. JDI is in Korea awaiting his discharge. ZT has a 10-kw. emergency power supply and remote control from his concrete fall-out shelter. UPS is back in Elko. VR is on fixed and mobile with a KWM-2. VIU received his WAC-YL, WAC-Phone and WAP certificates. He has his new shack finished and since ham radio doesn't keep him busy enough he is the new local chairman for his union. Boulder City had a successful SET with JU, BVA, PWE, HJ, BJY, SNP, TKV, YRY, CXQ, TGK, YCT and HQS participating. WA6AML/7 is a new ham in Reno. NARA supplied communications for the Admission Day Parade in Carson City. Traffic: W7VIU 2.

SANTA CLARA VALLEY—SCM, W. Conley Smith, K6DYX—Your SCM will welcome notice of results of club elections for his records and for publicity. K6BBD, EC for Santa Clara County, also is the new trustee of W6UW, SCARA Red Cross station. The MARS Club in Santa Clara held a 2-meter transmitter hunt Nov. 5. This group, including W6ASEH, W6VCI, K6ZVC, K6-MOB, K6PAV and K6BAM, again provided communications for the Santa Clara Columbus Day Parade.

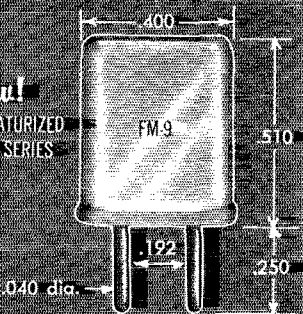
(Continued on page 130)

Amateur Crystals

**1000 KC to
137 MC - .01%
TOLERANCE**



New!
MINIATURIZED
FM-9 SERIES



Wire mounted, plated crystals for use by amateurs and experimenters where tolerances of .01% are permissible and wide-range temperatures are not encountered.

Just any crystal in any oscillator will NOT combine to produce spot frequencies. These crystals are designed to operate into a 32 mmf load on their fundamental between 1000 kc and 15000 kc. Overtone crystals operate at anti-resonance on 3rd mode and series resonance on 5th and 7th mode crystals.

- **HOLDERS:** Metal, hermetically sealed. FA-5 and FA-9 are HC/6U pin type while the FM-9 is an HC/18U pin type.
- **FREQUENCIES** (Specify crystal type and frequency when ordering.)

	FA-5 and FA-9	Price	FM-9	Price
Fundamental	1000 - 1499 kc	\$ 5.75	Not available	
	1500 - 1799 kc	\$ 4.95	Not available	
	1800 - 1999 kc	\$ 4.40	Not available	
	2000 - 9999 kc	\$ 3.30	8000 - 9999.999 kc	\$ 5.00
	10000 - 14999 kc	\$ 4.40	10000 - 15000 kc	\$ 5.50
	15000 - 20000 kc	\$ 5.50	15001 - 19999.999 kc	\$ 6.50
Overtone (3rd)	10 - 14.99 mc	\$ 4.40	Not available	
	15 - 29.99 mc	\$ 3.30	20 - 39.99 mc	\$ 5.00
	30 - 59.99 mc	\$ 4.40	40 - 59.99 mc	\$ 5.50
Overtone (5th)	60 - 75.99 mc	\$ 4.95	60 - 89.99 mc	\$ 6.50
	76 - 99.99 mc	\$ 7.15	90 - 100 mc	\$ 8.50
	Not available		101 - 110 mc	\$10.00
Overtone (7th)	100 - 137 mc	\$ 9.35	Not available	

Overtone crystals are calibrated on their overtone frequency. They are valuable for receiver-converter applications and are **NORMALLY NOT UTILIZED IN TRANSMITTERS** since only a small amount of power is available under stable operating conditions.

- **CALIBRATION TOLERANCE:** $\pm .01\%$ of nominal at 30° C.
- **TEMPERATURE RANGE:** -40° to +70° C. $\pm .01\%$ of frequency at 30° C.
- **DRIVE LEVEL:** Recommended, maximum 3 milliwatts for overtones; up to 80 milliwatts for fundamentals, depending on frequency.

ONE DAY PROCESSING . . .

Orders for less than five crystals will be processed and shipped in one day. Orders received on Monday through Thursdays will be shipped on the day following. Orders received on Friday will be shipped the following Monday.

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WHY THE Shakespeare WONDEROD CITIZENS BAND WHIP IS...

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ONLY
96"
LONG:
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The WONDEROD whip is, of course, fiberglass (all Shakespeare antennas are). And, because the fiberglass sheath (a rod formed by exclusive Shakespeare process so that it won't take a set) is loaded dielectrically, the best impedance match is made with a shorter rod. Thus, you get full quarter wave efficiency from your 96" WONDEROD—with a full 6" more clearance than standard 102" metal whips.

Fiberglass gives WONDERODS other advantages: insulation to reduce operating hazards under live wires . . . high impact and flexural strength . . . a surface that won't rust, even in salt spray, etc. . . . a light weight that cuts road noises, and reduces sway.

Still wonder whether you're getting it all in 96"? Just try it!

COLUMBIA PRODUCTS CO.

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Columbia, South Carolina

W6WCT gave a fine talk on video tape-recording before the Palo Alto ARA. K6DYX won the 2-meter hunt held by the Fort Ord MARS club. The Monterey Band Jammers enjoyed a pizza party Nov. 6. Lick-Wilmerding High School RC, K6JS, is on the air with a kw. donated by W6CHE. Bill Orr's and Paul Wolf's problems involving antenna towers and city ordinances are the subject of sympathetic interest and concern by all fellow amateurs. The latest winds from the North bear the ominous news that San Mateo is drafting an ordinance requiring a fifty-dollar permit on all radio broadcasting facilities! W6JUV and W6KUW, an uncle-nephew team, are active with an Apache. W6MING and W6ZXS study technical writing at San Mateo College night school. K6FL has a new Thunderbird on 55-ft. tower. W6YBV now runs 200 watts to a 4-125A. W6RSY is rearranging the shack. W6RFF is going high power. K6ZCR is "expecting"—a new transmitter! Traffic: (Oct.). W6RSY 1078. K6ZCR 352. K6DYX 303. WA6OAO 176. W6YBV 145. W6AIT 105. WA6HZM 103. W6DEF 99. W6FON 74. W6HC 60. K6GZ 32. W6YHM 24. W6OH 23. K6YKG 21. W6RFF 13. W6ASH 11. K6EQE 11. WA6HRS 2. (Sept.). W6ASH 12.

EAST BAY—SCM, B. W. Southwell, W6QJW—SEC: K6DQM, ECs: K6JNV, K6YXK, K6BSZ, K6TYX, K6VXM, W6EFL, and W6LDV (acting). W6JOH was active in the SS. K6DQM and WA6HKD are regular check-ins on NCN and WA6HKD is liaison to RN6. WA6GCS has Gonet Mobile twins. K6OKK has departed the section for San Diego. W6PIR is installing Gonet twins. WA6HSQ got her General Class ticket. Congrats. The East Bay Radio Club now meets at John Hinkle Park Clubhouse. The ARAC held a picnic in Oakland Hills Oct. 16. K6JHV bought K6CUH's rig and is on 75-meter phone. WA6IVG is a new General Class licensee in Richmond. FB. K6BAJ is attending U.C. K6TGA and WA6AFF got 2nd-class radiotelephone commercial tickets. Thirty-two hams turned out for the State C.D. Drill on Oct. 1. W6MIE and W6CNW are new General Class licensees in the Walnut Creek Area. K6LVE is working on his antenna. The CCRC met at the San Francisco Chapter of the Red Cross for its October meeting. WA6QAK is the call of the Castro Valley High School Radio Club. K6DQM and his XYL, WA6HYO, visited the HARC. W6LTYG has a new DX-35. W6NYK is on 75-meter phone with a DX-100. K6BD is the call of the Hayward High School Radio Club. WA6IMC is a new Technician Class licensee. WA6CSK has a new 10-meter transceiver. WA6GUM is back from Salt Lake City. Traffic: (Oct.). W6NBX 285. K6GK 40. W6OT 17. K6OSO 8. (Sept.). W6OT 19.

SAN FRANCISCO—SCM, Leonard R. Gerdald, K6ANP —The Northern California Net (NCN) meets on 3635 kc. at 1900 Mon. through Sat. All c.w. operators in the section are welcome to check in. New officers of the San Francisco Radio Club are K6MUZ, pres.; W6UDL, vice-pres.; K6IPM, secy.; and W6HVN, treas. Guest speaker at the November meeting was Mr. N. Landry, engineer in charge of the FCC. During the October meeting, the Bandsponsors voted to disband and join the ranks of the San Francisco Radio Club. The treasury was donated to the American Cancer Society. W6MXJ is the proud owner of a new 100V. W6QMO is putting out a very fine signal with her 30K. W6GQY is back on the traffic nets after his usual summer layoff. W6BIP and W6GQA were active in the October CD Party. In the September Frequency Measuring Test, W6GQA made a tremendous score of 1.7 parts per million. Nice going, Al. K6LWC was winner of the 6-meter hidden transmitter hunt in November. Reports from clubs and individual amateurs in the section are cordially invited. Send your news to your SCM. It will be a pleasure to serve you. Traffic: W6QMO 434. W6GQY 203. W6BIP 84. W6GGC 58.

SACRAMENTO VALLEY—SCM, Jon J. O'Brien, W6GDO—Asst. SCM: William van de Kamp, W6CKV. The RAMS, ever on the run, visited the historic town of Virginia City, Nev., on Oct. 2, Golden Gate Park and Planetarium on Oct. 9 and Feather River Canyon on Oct. 23. On Oct. 30 several local hams went to the races, they provided emergency communications for the Golden State One Hundred Mile Auto Race at the State Fair Grounds. Those who participated were W6s BND, GDO, HQF, MLN, K6s GDS, HHD, OCY, UVK, WA6s GNB and JTO. The GEARS had good weather and delicious steaks for their annual Steak Bake Oct. 1. Twenty-eight people attended. The North Hills Radio Club showed a film at its Oct. meeting, one of the many available to affiliated clubs for this purpose from ARRL. W6AF completed his big trip through the north and southwestern states. He covered 7600 miles, hunting and fishing, and says he can now settle down to work for a while.

(Continued on page 132)

FOR THE PROFESSIONAL AMATEUR



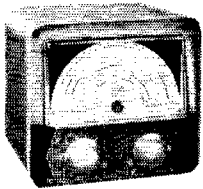
Globe Scout Deluxe



Globe Scout Deluxe, Model SD-75A, is a modern new handswitching 6-80M transmitter for 90w CW, 75w phone input power with relay controlled circuitry. Final amplifier works straight through on all bands, panel control for antenna loading on all bands, high level plate modulation, pi-net output on 10-80M — tuned link on 6M, matching into low impedance beams, built-in power supply for 115 VAC. Extensive TVI precautions including separate shielding of final amplifier and meter. Convenient rotary switches. Functional design. 15½x6¼x1¼".

Wired \$159.95

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Globe VFO 755A

The Globe VFO 755A comes complete with well-filtered power supply with voltage regulation. Output: 40 and 160M. Vernier Drive. 18:1 tuning ratio. Approx. 50 MF volts output. Temperature compensated for utmost stability for DSB, AM & CW.

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Globe's FCL-1 Speech Booster

Globe's FCL-1 Speech Booster is a peak limiting audio pre-amplifier, increases modulation intensity for most penetrating audio, with harmonic suppression. Adapts to most transmitters.



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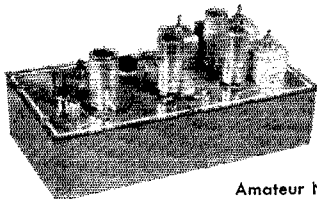
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USE WITH
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Amateur Net **\$44.95**

MODEL

CC-50 50-54 mc - 6 meters	CC-144 144-148 mc - 2 meters
CC-108 108 mc - Satel- lite Frequencies	CC-148 Aircraft and In- dustrial Frequencies
CC-120 For Aircraft Frequencies	CC-220 220-225 mc - 1 1/4 meters

Specify I.F. Frequency

CRYSTAL-CONTROLLED CONVERTERS FOR 10 AND 15 METERS

Model C-3-21 15 meters
Model C-3-26 10 meters

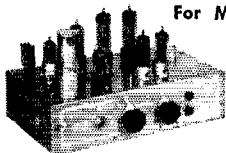
Choose IF output between
2 and 6 mc. to suit your
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For Mobile And Fixed Stations



Complete with
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SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—On Oct. 22, the Tulare County Amateur Radio Club held a dinner honoring W6GCS on his 80th birthday with 23 persons attending. K6VWV and W6ZKH are conducting code classes for Novices and Technicians. W7LUJ was a recent visitor in Fresno on his way to Formosa, where he will operate from VB1US. K6OLN is working on an ARC-5 rig. K6OZL and K6ROU made DXCC. W6HYR is recuperating from a recent operation. W6HYG still is working DX. W6FXV is working over a BC-453 for s.s.b. operation. W6NJF was a recent visitor to Fresno. The Annual Marfest was held in Fresno on Oct. 22, with 116 in attendance. W6NKZ won a Halo 6-meter antenna in a contest. The Fresno Radio Club traded in an SX-100 for a 75A-2 for use in the emergency trailer. The trailer can operate on all bands with B&W and Conset equipment. K6GTI still is working on a transistor power supply for his mobile rig. K6-AHQ has an all-band transistor receiver. K6CBQ is heard on 75-meter mobile. W6BAN got a new pick-up and is accumulating parts for his mobile. K6OGX won a 5" scope at the Fresno Radio Club fund-raising affair. W6NKZ is working a tuned Cavity for the 2-meter repeater of the Fresno Radio Club. I would like to wish all of you a very Prosperous and a Happy New Year. Traffic: K6ROU 147, K6OZL 26, K6OLN 7, W6ARE 3, W6FXV 2.

ROANOKE DIVISION

NORTH CAROLINA—SCM, B. Riley Fowler, W4RRH—PAM: DRC, V.H.F. PAM: AGY, RM; PNM, KN4-WLX reports on a Novice net that meets Mon., Wed., Fri. and Sat. at 2300 GMT on 3720 kc. Paul reports a membership of 12, and urges other Novice operators to join the net. The net is known as the "Heap Big Net." Seems to me this is a mighty good place for Novice operators to begin their training in net operation. RNH reports that the Belmont amateurs have reorganized for the coming year. Tom is secretary and OOG is president. I suggest that all clubs write Ed Handy, of ARRL, and secure the list of training aids and booklets helpful in club programming. Many reports arrive here too late to get in the current month's activity. You must know by now that material sent in any month will appear two months later in QST. Please keep this in mind when writing. For example, a club putting on a hamfest should let me know two or more months in advance of the date you plan your meeting. 3JWN/4 and 4LEV qualified for BPL in September, but their reports arrived too late for listing with the September activity. I believe that 3JWN/4 has qualified for a BPL medallion. Try to get all traffic reports to me before the fourth of the month to be included in the section activity.

SOUTH CAROLINA—SCM, Dr. J. O. Dunlap, W4GQV—FFH and VIW both did exceptionally well in the September Frequency Measuring Test, and have been appointed OO. New in Orangeburg is AYG, formerly OXO of Texas. The Low Country ARC's booth at the Charleston Fair attracted much favorable comment. In September the S.S.B. Net had 429 stations check in with 45 formal and 68 informal messages. The Phone Net had 774 stations check in with 40 formal and 103 informal traffic. The Rock Hill ARC is receiving much favorable comment on the two net suppers and the hamfest sponsored by the club. A combined affair of all the nets, to be called "The S.C. Section Meeting," is planned for next year. At the SCN supper meeting a great variety of subjects were discussed by AKC, vice-director, and GQV, SCM. SEC K4PJE complimented the net on its recent hurricane activities. ILE discussed phone net activity. All invited the group to join and support RACES. FFH, manager of the S.S.B. Net, stressed the importance of coordination of all modes of operation. CE gave a descriptive picture of activities in the early days. MWH, Roanoke Division Director, conducted a question and answer period of ARRL policies and actions. The October issue of *SCN News* is most excellent. Traffic: (Oct.) W4KNI 115, K4AVU 114, W4NKC 81, K4ZHV 79, HDX 65, W4FFH 44, VIW 32, K4HJK 31, W4CHD 22, PED 21, K4KIT 14.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—PAM: BGP, RMs: K4QER, K4KNP and QDY. VSN-1830 to 1900 EST and VN at 1900 and 2200 EST on 3680 kc. VFN meets at 1900 EST on 3835 kc. October was a busy month what with the SET and other activities. DVT, one of our ORSs, has moved to Philadelphia. Pa. OOL reports that the SVARC had 9 mobiles and 2 fixed stations working with the police on Halloween. CHK was first place winner of the Va. QSO Party, with CXQ second and JUJ third. JSJ/4, a new outlet in Hampton, is doing a nice job. RHA also is coming to life again.

(Continued on page 134)

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Our PAM, who also is OO, OBS and OPS, is sporting an ART-13 these days and says it's working fine. The TMRC furnished communications for the Elizabeth City Boat Races on Oct. 1-2. Reports are that the October CD Party was fast and furious. K4AL reports that there was too much QRM in the Party and he scored only 11. Hi. There is some agitation for more s.s.b. on VFN. K4FMJ is getting his feet wet in DX. IA is back from the Pacific and glad to be home. Welcome. Ev! K4LPR is making contacts on 160-meter phone. 5RKR/4 has a kw. ready for all-band s.s.b. K9CVJ/4 also has gone s.s.b. JJJ's new wall paper is DVQ and LARK. He also picked up two more countries and now has a DX count of 161. CVO still is on the road a lot. Former SCM KK now is pushing a "store-boughten" transmitter, which is the first "bought" job in 36 years on the air! K4IKF reports a new radio club in Roanoke called the Roanoke Valley Amateur Radio Club and says that he is going more s.s.b. Traffic: (Oct.). K4-MXF 297, W4QDY 262, K4LRL 226, F8S 155, W4DVT 114, OOL 77, SLLJ 77, K4SGQ 75, W4CHB 70, JSJ/4 61, RHA 59, BCP 49, K4AL 47, W4LK 39, K4QLX 36, K9CVJ/4 29, K4FMJ 27, W4IA 27, K4MEO 24, W4BZE 12, AD 8, OWY 7, K4CHA 6, W4CVO 6, JJJ 6, K4LPR 6, W4KX 5. (Sept.). K9CVJ/4 37, K4IKF 2. (Aug.). W4CXQ 45.

WEST VIRGINIA—SCM. Donald B. Morris, W8JM

It is with deep regret that I report the passing of NCS of Richwood. New officers of the Clarksburg ARC are K8MAU, pres.; ESQ, vice-pres.; K8ARA, sec.-treas.; K8LGI, act. mgr. DYA is a new OBS with 100V and 4-1000-A. New officers of Mountain State Transmitter ARC at Elkins are K8CHW, pres.; K8TPF, vice-pres.; Nicholas Loudin, secy.-treas.; GIU, act. mgr., who is also trustee for club station K8VNO. Congrats to WUB for a fine phone net bulletin. New officers of the Greenbrier ARC at Rainelle are K8ELJ, pres.; K8OML, vice-pres.; K8OLY, secy.; K8N8VD, treas. K8UCD is a new YL operator at Martinsburg. UHK alerted the Barbour-Taylor County EC Net when a plane crashed near his home. New officers of the MARA ARC at Fairmont are DPT, pres.; ELX, vice-pres.; JM, secy.-treas.; LXG, act. mgr. K8KZF now is attending W.V.U. and reports that more than 20 amateurs attended the first meeting of the new radio club at W.V.U. K8JSX is active in OBS and AREC work. K8PCF is building for 420 Mc. Traffic: (Oct.). K8HID 114, W8PBO 105, K8KFK 97, QXS 53, W8ELX 47, K8CNB 43, W8NYH 41, K8JLF 27, W8CCR 13, JM 12, SNP 11, WUB 11, K8-QYG 4, W8ESH 3, K8JSX 2.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM. Carl J. Smith, W0BWJ—Asst. SCM: Howard Eldridge, K0DCW. SEC: NIT. RMs: WME and MYB. PAMs: CXW and LJR. OBS: K0DCC. New appointments during October: IUF as OBS, FEO as OPS, K0OVQ as Class I OO and K0UQM as EC of Rio Blanca and Moffet Counties. New editors of CTNN are K0s YLA and YKV. News from the club bulletins: *RF Carrier*. Western Slope Radio Club officers are RJD, pres.; IQV, vice-pres.; and RTO, secy. FKY is home from the hospital and feeling much better. *Splatter Chatter*. YAE has returned to C.S.U. as head of the EE Dept. HRS and JTZ have new 2-meter beams. *The Roundtable*: WRO has been awarded DXCC. HOO is president and WJF secretary of the new Roaring Fork Amateur Radio Club in Carbondale. Net news: YFL is now NCS of CEPN with CXW and NIT as alternates. KN0ZNV is NCS of the Nervous Novice Net that meets at 2030 the 2nd and last Sun. of each month on 3720 kc. Novices and old-timers are all welcome to report. V.h.f. news: Aurora conditions provided IUF with Arkansas for his 6th state and MOX with Iowa. Missouri and Kentucky for a total of 17 on 2 meters. Definition: Experience is something that enables you to recognize a mistake when you make it again! FEO made BPL Traffic: (Oct.). K0EDK 429, EDH 363, W2D 324, W0FEO 234, K0DCW 160, QGO 143, W0MYB 82, ENA 61, AC 33, K0EVG 29, CBI 12. (Sept.). W0FEO 219.

UTAH—SCM. Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson. 70CX. SEC: K7BLR. The Ogden ARC really is pushing the AREC along with its civil defense program and it shouldn't be long before we have an active AREC unit there. OCX, QWH and K7BDX received BRAT Awards for work on BUN. MWR has been on 20-meter c.w. lately. K7BHE, HVF and VTI, operating 10-meter mobile assisted by K7KIE and K7KDF, helped assemble and pace the Steel Day Parade held in American Fork on Labor Day. K7EAY and MAC have SCR-522 rigs on 2 meters. 2-meter activity really is picking up in Utah. Most of the fellows in Salt Lake are vertically polarized. QWH has been ap-

(Continued on page 136)

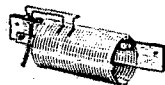
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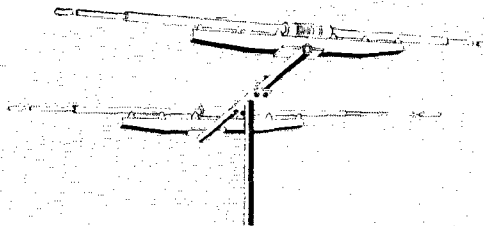
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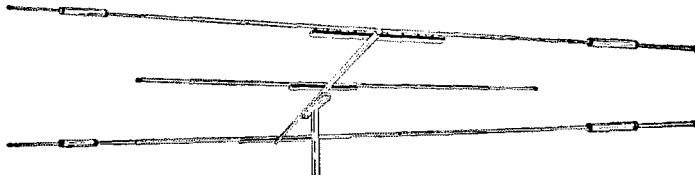
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pointed director of communications for Salt Lake City Civil Defense, Traffic; (Oct.), W70CX 153, W9FVD/7 64, W7QWH 20. (Sept.), W7MWR 12, K7BHE 9.

NEW MEXICO—SCM, Newell F. Greene, K5IQL—Asst. SCM; Carl W. Franz, 5ZHN, PAM; ZU, 10-meter PAM; LQM, V.H.F. PAM; FPB, RM; ZHN, The Breakfast Club meets Mon. through Sat. at 0700 MST on 3838 kc, NMBP meets Mon., Wed. and Fri. at 1900 on 3750 kc, TWN meets daily at 2000 on the same frequency, NMBPN meets Sun. at 0730 and Tue. and Thurs. at 1800 on 3838 kc. Amateur radio took an active part in the search for two missing university students. Following that event, a "Search and Rescue Council," comprised of all groups who can take part in such emergencies, held an organizational meeting. The AREC was well represented. The Red Rocks ARC, of Gallup, again is active, says K5RXN, 1WKJ/5 at White Sands has about finished his "Perseids Powerhouse" and will be looking for skeds, Traffic; (Oct.), W5ZHN 753, UBW 7L, K5DAB 26, W5VC 24, K5KBJ 23, GOJ 11, DAA 2. (Sept.), W5ZHN 553.

2ND NEW MEXICO QSO PARTY

January 14-15, 1961

The Sandia Base Radio Club of Albuquerque announces its 2nd New Mexico QSO Party and invites all amateurs to participate. New Mexico hams are urged to work as many out of state stations as possible, so that those interested can earn credit towards WAS and the Sandia Base Fellowship Award.

Rules (1) Time: 36 hour period from 0800 MST Saturday Jan. 14 to 2000 MST Sunday Jan. 15. (2) No time limit or power restrictions; all bands can be used. (3) Scoring: New Mexico stations count 1 point per contact and multiply total by the number of states, U. S. Possessions, Canadian Provinces, and countries worked. Non-New Mexico stations count 3 points for each New Mexico station worked; multiply total by number of counties in New Mexico worked. (4) Stations can be worked once *per band*. (5) A certificate will be awarded to the highest scoring station in each state, and to the highest scoring station in each country, Canadian Province, and U. S. Possession; plus a certificate to the highest scoring non-New Mexico station in the U.S.A. A certificate will be awarded to the 1st, 2nd, 3rd, and 4th highest scoring station in New Mexico. Special certificate for multi-operator groups. (6) A Sandia Base Fellowship Award is given to any station who contacts 25 different stations in Albuquerque. Party logs showing required data will be accepted in lieu of QSL's. (7) General call: "CQ NM," New Mexico c.w. stations should identify by signing "DE NM (call) K." Phone stations say: "New Mexico calling." Frequencies to watch 3600, 3835, 7050, 7250, 14,050, 14,250, 21,050, 21,300, 28,100, 28,600, 29,000, 29,600, and 50,280 kc. (8) Exchanges: New Mexico stations send QSO number, RS or RST, and county. Non-New Mexico stations send QSO number, RS or RST, and state, possession, province or county. (9) Logs must be sent post-marked no later than Feb. 15, 1961 to: Sandia Base Radio Club, c/o John C. Kanode, K5UYF, 408½ Cornell Drive S.E., Albuquerque, New Mexico.

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WYOMING—SCM, Lial D. Branson, W7AMU—SEC: CQL. The Pony Express Net meets Sun. at 0830 MST on 3920 kc. The Wyoming Jackalope Net meets Mon. through Fri. at 1200 MST on 7255 kc. for traffic. The YO Net is a c.w. net on Mon., Wed. and Fri. at 1830 MST on 3610 kc. The Casper Radio Club is planning to move the club house and install a full basement for the use of the communication equipment with auxiliary power plant. The main floor will be used for meetings and social events. We have a get-together every morning between 6 and 7 A.M. with from two to eight hams answering in on 3920 kc. LKQ has a new building to move into with his two-way radio business. BXS has a new HT-37 Hallcrafters transmitter and a Drake 1A receiver. LKQ has a new 111 Hallcrafters receiver. CQL has an 813 final. We had a well-attended civil defense meeting with the State Radio Officer, RACES nets will be activated in the near future. Traffic: W7BHH 65, HH 39, LKQ 25, CQL 18, K7KLE 14, W7YWW 14, K7IAY 11, W7AMU 6, AEC 2, BK1 2, UFB 2.

(Continued on page 138)

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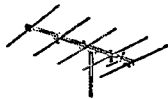
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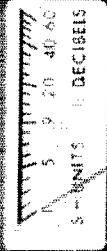
LAMPKIN LABORATORIES, INC.
 BRADENTON, FLORIDA

SOUTHEASTERN DIVISION

ALABAMA—SCM. William D. Dotherow, K4AOZ—SEC: JDA, RM: RLG, PAMs: PHH, BTO and JJK. New appointments: K4CFD as ORS, K4LNA as OO Class 1, K4FJZ as OBS, K4ZXX as OBS. Welcome to AENB: SEZ Madison, K4GRA Northport, EAW Atlanta, Ga. K4CFD and USM on CP-35 hold daily sleds on 3375 kc. at 1815 CST at 40 to 50 w.p.m. using electronic keyers. We welcome K4ZXX back to AENB after an absence of several months. MI is having good results with a Thunderbird Tri-Bander on 10, 15 and 20 meters. K4PIIH urges all CD appointees to participate in the quarterly CD Parties. K4ZNI has a new all-band mobile. K4KHC now has 6 watts s.s.b. chalking up the states. K4RIL moved to a new QTH in Sheffield. Congrats to K4ZXX, the new manager of ABNT teenage net. K4GXS works Tuscaloosa, Holt and Northport on 3955 kc. K4AUP, WHW, EFF and PKA report successful SET drills during Oct. K4AUP reports that K4WIF and K4TZJ have dropped the "N" from their calls. CWO is racking up DX on 10- and 15-meter phone. Congrats to ZSH and his XYL on a daughter born Oct. 27. Congrats to YER, new liaison captain for AENP. WHW urges all Mobile County hams to join AENG on 29,500 Sun. at 1930 CST. PKA reports Decatur ARC members IQQ, NME and K4JSL provided liaison communications to Huntsville for the Huntsville Sports Car Rally. PKA has appointed BFM, HVK, K4UEC and K4JSL as Asst. ECs. *Six-Meter News*: MI is getting good reports on a new eight-element beam. K4AJF worked Illinois, Minnesota and South Dakota Oct. 19 during a 2-hour opening. EFF reports 73 per cent of the AENX members checked in during October, also AENX was on emergency standby Oct. 8 because of tornado warnings. JJX reports: OYK is on 6-meter d.s.b. using a modified Globe Sideband driving a homebrew kw. linear. ZRZ now is on 6 meters after sidebanding on the lower bands. It is with regret that we announce the resignation of K4OCV as V.H.F. RM. K4AOZ is on 6 meters with 7 watts and a dipole antenna. RACES: DFE, Jefferson County RACES chief, reports the 6-meter Network "E" on 50.7 Mc. is operating very successfully with approximately 20 checking in each Wed. at 8 p.m. Also participation is increasing on Network "C" 145.350-Mc. i.m. at 7 p.m. each Wed. Jefferson County has received 2-meter equipment to be installed at Warrior, Ala., c.d. control headquarters. DFE also reports large attendance at the c.d. "Key to Survival" briefing sessions held in October. Traffic: (Oct.). W4RLG 212, PVG 51, K4JDA 49, PHH 49, W4KIX 48, K4ZXX 39, AOZ 36, W4OKQ 36, K4BTO 23, W4MI 29, K4CFD 23, GXS 19, RCA 17, W4CIU 15, K4KHC 12, TDJ 9, W4WHW 9, K4ZNI 7, RIL 6, W4RTQ 6, YRO 5, K4HJM 4, RSB 4, W4DGH 3, K4HFX 3, W4ZSH 3, K4AAU 2, W4CWO 2, K4OIJ 2, FJZ 1, JSP 1. (Sept.). K4ZBX 4.

EASTERN FLORIDA—SCM. John F. Porter, W4KQJ—SEC: IYT, RM: K4SJH, PAMs: SDR and K4LCP. V.H.F. PAM: RMU. We regret to report the passing of NW, who died of a heart attack Oct. 31. Harold will be missed by his many friends in amateur radio. The Florida DX Club (all DXCC) now has about 25 members. They are making application for League affiliation. The Hillsborough County RACES now has communications on 2-meter i.m. on 147.25 Mc. On Sept. 4 a message originated at Jacksonville reached 2ESX one hour and 6 minutes later via 144-Mc. relay. LMT has a new 6N2. SVB swapped his NC-125 for a new SX-101A. K4RNS received a Conch certificate. K4IWT, ARCAOS, participated in the SET as NCS for Florida Red Cross and ARRL traffic. CKB handled a distress message for a rare drug for PY6JD. K4UOU handled 1076 messages in 120 hours of operation during and after Hurricane Donna. MLE did an excellent job of keeping the press informed of the progress of "Donna." K4USK will instruct the Novice code class for the St. Pete ARC this year. If you know of anyone interested in the area, have them contact the club at P.O. Box 4026, St. Petersburg, Fla. The DEN (Dade County) is now operating its 6-meter net from the 18th floor of the Court House. FJE did a fine job for the "Day in Spain" Fiesta at St. Augustine. Those helping out were UHC, ETE, PEG, AGK, LQJ, K4QBP, BWO and KN4WIG. Don't forget the Tropical Hamboree in Miami Jan. 14 and 15. There will be technical talks, a MAKS meeting, a banquet and plenty of eyeball QSOs. Write P.O. Box 104, Miami 1, Fla., for more details. This hamfest again is sponsored by the Dade Radio Club, Inc. Traffic: (Oct.). K4SJH 675, W4SDR 255, K4LCD 226, LCF 218, K4DN 200, W4YLT 158, K4ILB 132, W4TRS 132, K4BY 100, W4AKB 72, CJJ 70, K4IWT 70, DBT 68, W4BKC 59, LDF 49, K4BLM 38, RNS 46, W4WVM 45, NGR 39, K4WQ 38, W4CNY 35, K4MTP 32, PMA 30, NQG 27, W4SGY 26, LSA 25, K4BOO 24, W4LMT 24, SMK 18, DPD 16, K4VNA 15, OSQ 13, DAD 11, W4DQS 8, LUV 6, SVB 6, NVV 3.

(Continued on page 140)



PRESELECTOR



29.1	29.2	29.3	29.4	29.5	29.6	29.7
28.5	28.6	28.7	28.8	28.9	29.0	29.1
28.0	28.1	28.2	28.3	28.4	28.5	28.6
3.5	3.6	3.7	3.8	3.9	4.0	4.1

7.5	7.4	7.3	7.2	7.1	7.0	6.9
14.5	14.4	14.3	14.2	14.1	14.0	13.9
21.5	21.4	21.3	21.2	21.1	21.0	20.9
500	400	300	200	100	0	-100

FREQUENCY

POWER OFF

NL OFF

STBY RCY

CAL OFF

S. AVC

F. AVC

2.4KC

4.8KC

PROD

DIODE

BFO OFF

BAND

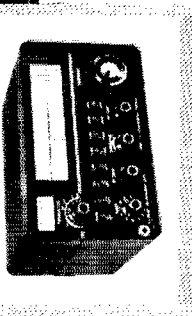
RF GAIN

SIDE BAND

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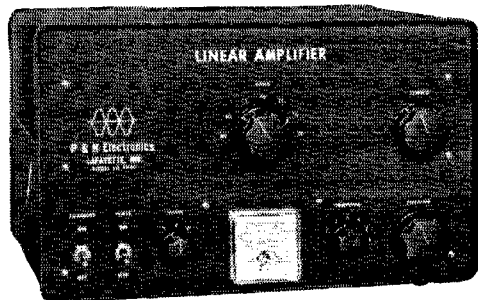
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140

K4TDN 4, DSH 3. (Sept.), K4UUO 1076, W4NDJ 357, K4EHY 244, W4RUO 86, GOG 25, LVV 24, CKB 20, RMU 1.

WESTERN FLORIDA—SCM. Frank M. Butler, Jr., W4RKH—SEC: HKK, PAM; K4RZF, RM; K4UBR. Tallahassee: MLE is a new EC, with K4VLE as assistant. They have done an FB job organizing hams in that area to meet any emergency. A revised RACES Plan has been submitted, and a directory of hams in the area has been published. Steinhatchee: UZB, local EC, held his SET Oct. 15 with 8 AREC members taking part. Perry: KQP has 37 members in his high school radio club. Marianna: Hams are setting up a radio net to link the Florida School for Boys here with 6 other similar schools throughout the State. Quincy: K4QDN has joined the W. Fla. Phone Net, running 40 watts. Defuniak: HQN had 294 QSOs in 82 sections during the recent CD Party. Bill's antenna farm includes five "V" beams, each with 700-ft. legs! Separate kw. rigs are used for each band. Panama City: 29.560 Mc. is becoming more active, with 15 stations checking into the PCARC Net. K4AHV and K4FQQ are mobile on 10 meters. K4BOE/BOI have a new tri-band beam. K4CXG is back on with an ARC-5; an 813 rig is brewing. Gulf Breeze: K4ZMV is increasing OBS schedules and hunting DX on 20 and 15 meters. Pensacola: K4HYL scored high in the Sept. FMT. New V.H.F. Club officers are LGC, pres.; K4QZP, vice-pres.; RWY, secy.; and K4FTL, treas. The V.H.F. Ham of the Year Award was won by EQR. Much traffic was handled at the fair radio booth set up by the PARC and the V.H.F. Club. 1HGL keeps the NAS Club station hot, handling traffic. Traffic: (Oct.), K4SWQ 218, W4HQN 36, K4VND 25, DAD/4 11, ZMV 6.

GEORGIA—SCM. William F. Kennedy, W4CFJ—SEC: PMJ, PAMS; LXE and ACH, RM; DDY. GCEN meets on 3995 kc. at 1830 EST on Tue. and Thurs. 0800 EST on Sun. GSN meets Mon. through Sun. on 3595 kc. at 1900 EST. with DDY as NC. The 75-Meter Mobile Net meets each Sun. on 3995 kc. at 1330 EST with K4YID as NC. The GPYL Net meets each Thurs. on 7260 kc. at 0900 EST with K4ZZS as NC. The Atl. Ten-Meter Phone Net meets Sun. on 29.6 Mc. at 2200 EST with W4BGE as net mgr. The Ga. S.S.B. Net meets each Mon. through Fri. on 3970 kc. at 2000 EST with K4RHB as net mgr. A group of amateurs met at Macon, Ga., on the week end of Oct. 22-23 and formed an association called the "Georgia Single Sideband Association." Also at this meeting the constitution and by-laws were adopted. Their board of directors is K4RHB, pres., K4RZL, vice-pres.; K4SUD, secy.-treas. K4AUM and W4PMJ are members-at-large. The president is the net mgr. The net is primarily a training net, but traffic will be passed on the net. Sure sorry to lose K4LVE and EDT to Ocala, Fla. Their address is now 3152 Corinth Rd., Ocala, Fla. Gladys sure puts out a fine signal on 40 meters from there. FWH transmits Official Bulletins regularly on 144 Mc. LING has just finished writing a chapter on "The R.F. Link" for a new textbook on "Aerospace Telemetry." MA, in Temple, sure has been doing a lot of listing lately. Traffic: W4EAW 144, K4OGG 58, BVD 40, LVE 23, PHA 11, PPK 9, TEA 6, BAI 1, QPL 1.

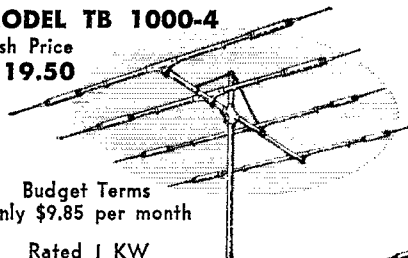
WEST INDIES—SCM. William Werner, KP4DJ—SEC: AAA. KD is back on from his new QTH with a beam and a Heath Sixer and collected 12 new KP4s for a WPR-500 sticker and 18 KP4s towards the WPR-25 50-Mc. Award. KD received the Certificate Hunters Club certificate. KD and AAA had trap troubles in the Tri-bander beams. KD worked son K4PUJ for the 600th time. Ex-AM is a Silent Key. API writes from Cornell that he expects to work fixed and mobile on 50 Mc. while here for the Christmas holidays. Notus de Mayaguez: EJ 6 de Oct. KV4CI/mm vistó a la Abuela. WT. le hizo una "interview" tomándole una grabación al mismo tiempo, para la Voz de America. Al fin Mayaguez salió en 6 metros y comunicó con la Isla, este es Jose Luis Hernandez, hermano de KE. WT skeds the Antilles Emergency Weather Net at 7 a.m. and 5 p.m. on 7245 kc. daily and Antilles MARS at 6 p.m. on 7 Mc. AWH, at Aibonito, ordered a Heath Sixer for fixed and mobile use with a Saturn halo in VW, and put up inverted "Vs" for 80 and 40 meters for the Sweepstakes. AMH is out of hospital from where he worked the 6-meter gang using a Heath Sixer and is at home in Vega Baja using an HQ-110, a TBS-50 and a four-element beam 40 feet high. NJ writes from Japan that he climbed to the top of Mt. Fuji. AIS's younger brother is now WP4XO on 15 meters. AAB says his Letting 6 and 2 transmitter works beautifully. His sister, AEU, is on 6 meters with a Heath Sixer and halo antenna from Rio Piedras. W8CW is vacationing in KP4-Land. ALY went mobile on 6 meters using a Heath Sixer and a Saturn halo and almost immediately contacted sta-

(Continued on page 142)

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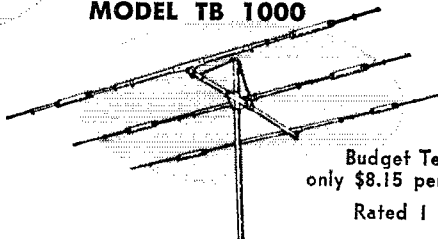
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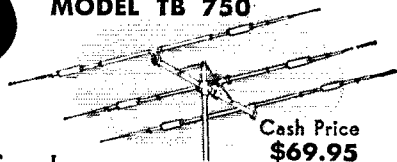
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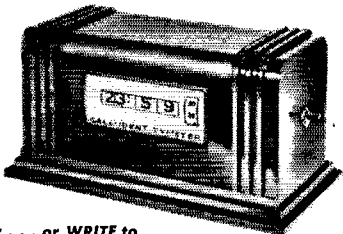
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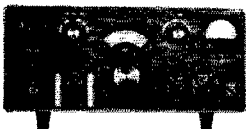


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Terry W9DIA

tions in Texas and Mexico on a band-opening late one afternoon. AVB/m with the same type of equipment broke in and also worked the Mexican station. ALY/m is on 50.196 Mc. KD is on 50.2 Mc. MO and ABD worked 50-Mc. mobile from Barranquitas high in the mountains. Six-meter band openings to Argentina were frequent recently. LUBEX has been contacted by every KP4 on 6 meters. CK is now on 6-meter mobile with a Heath Sixer and a halo antenna. A new station on 50 Mc. is AXC at Caparra Heights using a Gonset G50 and an eight-element Hy-Gain beam. AAN uses an Elmec for local 6-meter contacts and a Thunderbolt amplifier for DX. SV doubled the power-output of the Heath Sixer by changing from 8A8 to 8AW8A and adding a small r.f. choke and resistor. ALY is modifying his Heath Sixer to use 8-Mc. crystals. AVB built a 40-ft. tower. AWL is on 50 Mc. with a Scout Deluxe and a three-element beam from Caguas. HH has ordered a 32-S1 and a 75-S1. DJ added an RME phasing type slideband selector to the HRO. Traffic: KP4AOD 87, WT 75.

CANAL ZONE—SCM, Thomas B. DeMeis, KZ5TD—The KZ5 mobile members of the AREC assisted in the collection of pledges for the United Fund Telethon held Oct. 28. On the Pacific side, KZ5VR acted as dispatcher. Mobile units were operated by RV, EP, BW, KJ and RU. Atlantic Side participants were AD, CD, BK, AR, GM, MM, RA and OB with mobiles AD, MM, RA and OB. The two areas were not tied in by radio and acted as separate nets. VR6AC, from Pitcairn Island, delivered an interesting talk and slide show to the CZARA at its monthly club meeting. Floyd and his XYZ are on their way back to Pitcairn Island after a Stateside visit. Floyd will be back on the air with an HT-37, an SX-111 and a TA-33. OB/OA put up a new three-band Gamma-matched quad. VF now has a 20A and a 4-250A final. CD now has a DSB-100 and a Gonset linear. GC and CR will be moving over to the Atlantic side from their present location. TD and BK made tests preparatory to setting up a new 40-meter net for phone. LC is back from his vacation with a new kw. rig. KR assisted TD in putting up a 20-meter ground plane for the Sweepstakes Contest. HC8GI is working KR and TD regularly Mon. nights on 21.220 kc. and a new quad is to be set up on the Islands shortly. SE is using a "v" beam. Traffic: KZ5KQ 66, JW 51, TD 46, CD 27, OA 27, AD 23, SB 18, OB 6, KR 3.

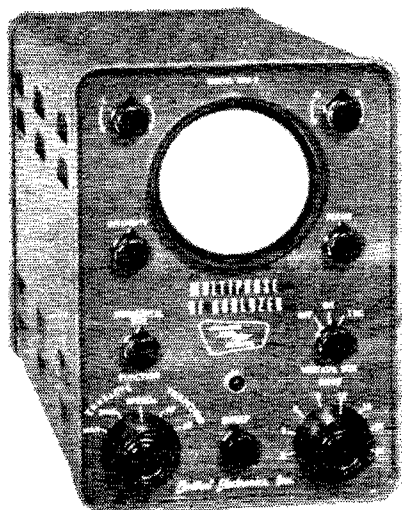
SOUTHWESTERN DIVISION

LOS ANGELES—SCM, Albert F. Hill, jr., W6JQB—SEC: W6LIP. RMs: W6BHG and K6HLR. PAMs: W6BUB and W6ORS. The following stations earned BPL for the month of October: W6WPF, K6MCA, K6CLS/6, W6GYH, K6EPT and K6WAH. Congrats, fellows! New officers of the Ramona Radio Club are K6KUB, pres.; K6VNX, vice-pres.; Marilyn Meyers, secy.; W6OIV, treas. WA6DJB reports the 6-meter link to San Francisco is holding up fine. K6GTG is putting up stacked twenty-element spiral beams on 2 meters! K6CLS/6 put up a new tri-band beam. W6BUB enjoyed his visit at Headquarters. K6CDW reports more stations on during the Phone CD Party. W6FB has the big a.m. rig about ready to go. K6KUU cleared up bad noise interference. K6OQD has the new 2-meter RTTY rig on the air. W6CK did a wonderful job with CAP on a search mission. WA6HUO reports 10 meters is opening up very well. New officers of the Southeast Amateur Radio Club are WA6CGV, pres.; WA6FCY, vice-pres.; WV6NPZ, secy.; Neal Miller, treas. W6GAA has been mobiling around California. The So. Calif. DX Club reports DX still is pretty good in spite of poor conditions. New officers of the Tri-County Amateur Radio Assn. are W6OP, pres.; K6QWO, vice-pres.; WA6LXY, secy.; K6OSY, treas. It looks like W6BES was top man in the recent CD Party. WA6DWP is now asst. manager of the California Net. WA6BFC rebuilt the mobile gear. K6TVC has a new "ZL Special" beam on 6 meters. Support your section nets: On c.w., the Southern California Net meeting at 0300 GMT on 3600 kc.; on phone, the SoCal 6 Net meeting at 0300 GMT on 50.4 Mc. Traffic: W6WPF 2384, K6MCA 1431, K6CLS/6 727, W6GYH 667, K6EPT 517, K6LVR 403, K6WAH 306, WA6DJB 250, K6OZJ 214, W6BIG 133, W6USY 70, WA6DWP 66, WA6CKR 44, K6SHZ 28, WV6KZZ 25, W6CK 21, W6VOZ 19, K6SIX 18, WA6FED 16, WA6HUO 5, W6BUB 3, W6HRM 2, K6CDW 1. (Sept.). WA6GKK 222, K6PZM 91, K6JSD 69.

ARIZONA—SCM, Kenneth P. Cole, W7QZH—PAM: OIF. The Copper State Net meets at 1930 MST Mon. through Fri.; the Grand Canyon Net Wed. at 0800 on 7210 kc.; the Catalina Emergency Net Wed. at 2000 on 29.627 and 145.8 Mc.; the Tucson AREC Net Wed. at 1900 on 3880 kc. 6MILZ, Southwestern Division ARRL

(Continued on page 144)

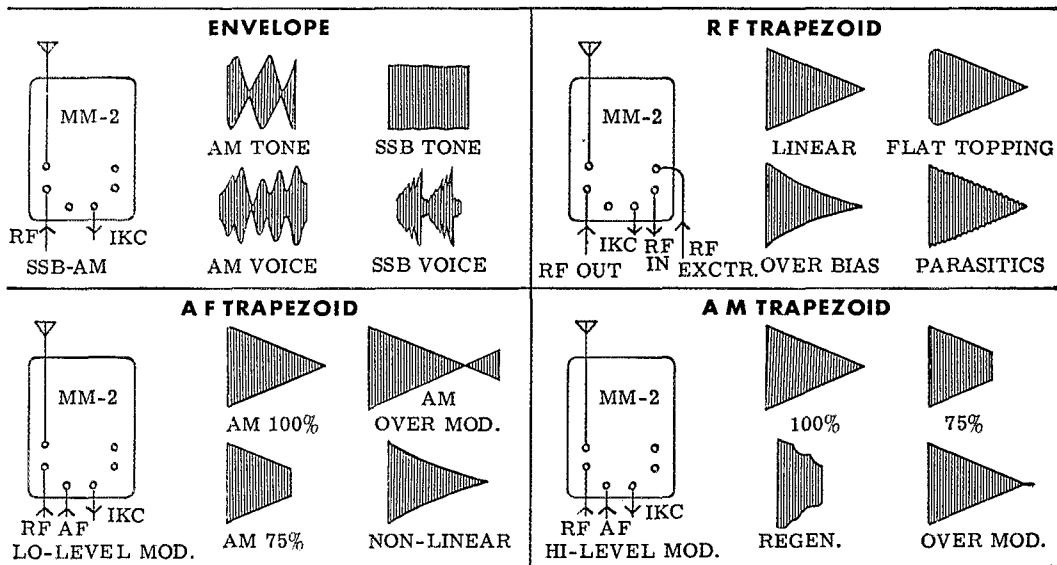
THE MULTIPHASE MODEL MM-2 RF ANALYZER



MM-2 Kit ... (less IF adaptor). \$119. 50
 Wired ... (less IF adaptor). \$149. 50
 Plug-in IF adaptors (wired only)
 RM-50 (50 KC), RM-80 (60-80 KC),
 RM-455 (450-500 KC)... ea. ... \$12.50

- Monitors the RECEIVED and TRANSMITTED signals. Shows flat-topping, overmodulation, parasitics, keyed wave shape etc. Silent electronic switching keyed by transmitted RF.
- No tuning required. Broadband response flat 1 MC to 55 MC at power levels of 5 watts to 5 KW.
- New variable sweep control for transmit and receive.
- RF attenuator controls height of pattern. Calibrated in 3 DB steps.
- Function selector for ENVELOPE, TRAPEZOID and BOW-TIE patterns on transmit. For SSB, DSB, AM and CW.
- Built-in 1 KC audio oscillator, less than 0.5% distortion. With 3" scope, is ideal for complete alignment of SSB exciters.
- For use in series with 52-72 ohm coax lines. A short pickup antenna may be used with other systems.
- Plug-in adaptors available to match 50 KC, 60 KC, 80 KC or 455 KC receiver IF systems. Only one simple connection to receiver.

THERE IS NO SUBSTITUTE FOR A SCOPE IF YOU WANT THE CLEANEST, MOST PERFECTLY MODULATED SIGNAL YOUR TRANSMITTER CAN PROVIDE. THE MM-2 IS BY FAR THE MOST DEPENDABLE and EASIEST TO USE, SINCE IT WAS DESIGNED STRICTLY FOR THIS PURPOSE.



OTHER FINE C.E. PRODUCTS

Model 600L ... Broad-Band Linear Amplifier	\$495. 00
* Model 20A ... Bandswitching SSB Exciter	\$299. 50
* Model 10B ... Multiband SSB Exciter	\$193. 50
* Model GC-1 ... Gated-Compression Amplifier	\$ 66. 50
* Model B ... Sideband Slicer with Q Multiplier	\$104. 50

* Also available in kit form
 AND MANY OTHERS ... WRITE FOR LITERATURE

**THE
SSB
PIONEER**



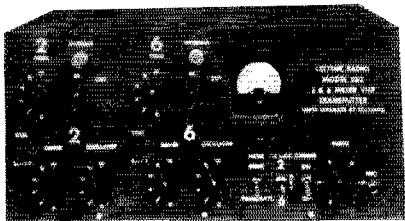
Central Electronics, Inc.

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A subsidiary of Zenith Radio Corp.

**2 AND 6 METERS ON ONE CHASSIS
WITH SEPARATE RF SECTIONS
LETTINE MODEL 262**



**Powerful 45 to 50 Watt VHF Transmitter
With Mobile Connections and A. C. Supply**

The 262 contains the identical RF sections of the 2 meter 242 and the 6 meter 242 transmitters on one chassis, with a single 242 audio and power supply section. The only switching necessary to change bands is in the filament circuit. The separate RF sections make RF switching unnecessary, providing the same high efficiency of single band transmitters. Each RF section has its own tubes and circuits, comprising 4-5763's as oscillators and drivers, 2-6146's as final amplifiers, 12AT7 crystal mike amplifier, 6V6 audio driver, 2-6V6's class B 100% push-pull plate modulator, 5U4G rectifier. Two separate antenna outputs are provided with coaxial connectors on the front of the transmitter. These are connected to swinging links, controllable from the front panel, matching antennas from 52 to 300 ohms. The 262 uses standard 8 mc. crystals and will operate with the Lettine VFO. A socket is provided at the rear for relay connections. Cabinet 8 x 17 x 8 inches. Weight 32 lbs. Will operate mobile from a 12P-103 dynamotor. Completely wired and ready to operate.

Price with eleven tubes and two crystals—\$137.50.
Send Full Amount or \$25 With Order—Balance C.O.D.

LETTINE RADIO MFG. CO.

62 BERKELEY STREET VALLEY STREAM, L. I., N. Y.

**G4ZU INCREASING
"G4ZU PAT." POWER?**

**Do It Efficiently — The G4ZU Way
No TRAPS No COILS
No INTERLACED ELEMENTS**

With G4ZU Beams you have the "Big Signal" no matter what input you choose.

20-40 Meter Birdcages—Single 52 ohm feed gives you DX Ammunition with a 14 pound beam just barely larger than a 10-meter beam. (Now available without mast)..... **\$87.25**

25' zoom-up mast designed for the Birdcage..... **\$7.25**

10-15 and 20 Meter Minibeam—Single feed, 52 ohms. Famous over six years. This 16 pound beam with 13' 6" radius—the best of them all..... **\$89.50**

Rohn Towers—Sturdy—Strong—Made for Amateurs. #6, Single Beams; #25, Stacked; #45, "Christmas Tree Arrays".

	30 ft.	40 ft.	50 ft.
#6	\$ 48.05	\$ 63.70	\$ 79.35
#25	64.15	82.40	100.65
#45	108.35	142.55	176.75

All Specifications Available

G4ZU DOES IT AGAIN!

ALL DRIVEN "METEOR" COMING SOON



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House of Antennas manned 100% by amateurs. Go where they understand your problem.

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Director, spoke at a joint meeting of the Salt River Amateur Radio Club, the Scottsdale Amateur Radio Club, the Motorola Amateur Radio Club and the Arizona Amateur Radio Club. The meeting, held at the Salt River Project Administration Building, was well attended. In addition to a discussion of what ARRL was doing for the amateurs, Ray gave an excellent talk on his experiences as radio operator with the submarine *Nautilus 1*, the first submarine to make exploration under the Arctic ice floe. The Verde Valley Radio Club, sponsored by K7GWX, reports that school field trips will be facilitated by inter-vehicular communication on 10 meters. The school is to be congratulated on its "first high school radio convoy." May 26, 1961, is the definite date for the Southwestern Division ARRL Convention to be held in Phoenix, Arizona. *Facts not fiction!* K7MEZ, mobile, in his Volkswagon, was traveling a highway about 50 miles north of Phoenix. He was in QSO with 9SU1, DeKalb, Ill. A truck careened across the highway. K7MEZ's car was struck. A call for help was made to 9SU1 who immediately called for any Arizona station. ZMH, Tucson, answered the call, was given the facts and called the Highway Patrol. A patrolman, patrolling the highway, was immediately dispatched to the scene. He arrived minutes after the accident occurred. Moral: Keep your mobile transmitter warmed up. It may come in handy. Where is the *Catalina News Bulletin*?

SAN DIEGO—SCM, Don Stansifer, W6LRU—New officers of the San Diego Council of Amateur Radio Organizations for 1961 are K6BPL, chairman; K6EDA, vice-chairman; K6SSX, secy.; and K6HQJ, treas. WA6DJS is now active from El Cajon High School with a DX-100, W6HU and K6EF (ex-6LA) are planning an old-timers dinner in Orange County. W6IAB is now net manager for the MCAN-7 net, and has a new operator from KH6BGS. K6RCK, OES in Santa Ana, has a new VHF-152 and a Gonset G-50. New officers of the Fullerton Club are W6ECV, pres.; K6TGB, vice-pres.; K6LMX, secy.; and K6ATK, treas. New officers of the Newport Club are K6RCK, pres.; K6GPG, vice-pres.; W6OYS, secy.; and WA6KPF, treas. VR6AC showed his colored slides of Pitcairn Island at a special meeting of the San Diego DX Club, held at the home of W6BKZ in late October. Over thirty members and wives attended. Your SCM, W6LRU, spoke to the Newport Club on "Mobile Manners" and ARRL appointments in late October. I'm happy to report that RF again is being published by the Orange County Amateur Radio Club, Inc., with WA6KRW as editor. If you live in Orange County and want to know what is going on, read RF. Traffic: W6IAB 2345, W6YDK 1905, K6BPI 1896, W6EOT 527, K6LKD 221, WA6ATB 154, WA6CDD 95, WA6DJS 33, W6ELQ 8, K6RCK 6, W6HU 2.

SANTA BARBARA—SCM, Robert A. Henke, K6CVR—The Poinsettia RC Fishy Hamfest was a big success with 59 hams and 143 XYLs and harmonics attending. K6RVP did his escape act and a little bit of singing and guitaring. K6EGC moved to a better reception area after 30 years in a hotel room. The RADIO RC has transmitter hunts apart from the club program. WA6BZ, from Guadalupe, dropped in for a visit at RADIO RC. WA6IU is mobile on 75 meters with a DX-35 transmitter. A new call in Paso Robles is WV6OJN. The Tri-County Net is trying out two frequencies, 3810 kc. for s.s.b. and 3820 kc. for a.m. The net meets daily at 12 noon. K6LFQ is looking for a 10-lb. all-hand four-element beam. Congrats to W6VNXL on getting his Novice Class license. Stay in there, OM, and get that Gen. Class ticket. Traffic: W6JPP 16, W6YCF 9, W6FYW 5, W6ENR 3.

WEST GULF DIVISION

OKLAHOMA—SCM, Adrian V. Rea, W5DRZ—K5KTW is the new SEC for Oklahoma. All EC reports should go to him. MGZ is owner of a new HQ-180. He also conducts a Novice class at Southwestern State College. K5FLC is a new General Class licensee at Holdenville. K5LUS and KN5AWC are new amateurs at Pawhuska. K5MBK is back in the State and stationed at Ft. Sill. EHC is running a regular sked to ZL-Land. K5VQW has a Drake 2-A receiver. K5TMY says his BC-460D is really the thing for 20 meters. K5DLJ has a home-brew mobile, making four mobiles in Ottawa County. K5CAY is building a new shack. GIQ is the new EC for Payne County. State AREC has many new emergency units mounted on trailers; typical is that of K5SWL, who says he is ready to go. ADC is determined to get a 2-meter signal across the state and now has a new more-powerful 2-meter rig. Oklahoma gave a good account of itself in the SET; a record number of AREC groups participated. A tip of the hat to UXQ for the long hours he put in. We hate to

(Continued on page 146)

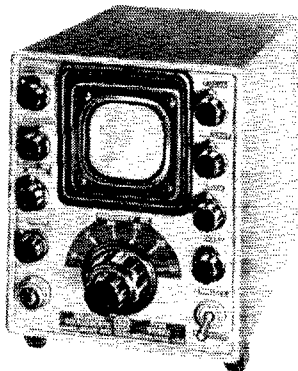
Let HARRISON help you keep your NEW YEAR'S RESOLUTIONS!

✓ 1. To put out a cleaner signal!

Use the new Millen 90932 Cathode Ray Transmitter Monitor to watch the output of your rig, and see the distinctive pattern displays that tell you exactly what is causing any trouble or distortion of your signal, or when you have perfect modulation (AM or SSB).

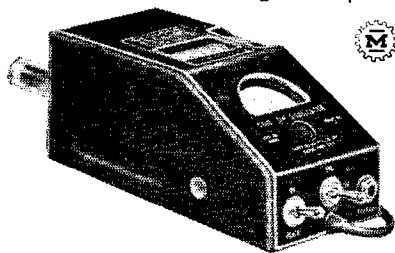
Read all about this essential accessory for good operating, on pages 18 thru 22 of December QST. Designed specifically for Ham use, it should be in every shack!

Millen 90932 Transmitter Monitor. \$87.00
2BPI Cathode Ray Tube. \$19.05



✓ 2. To put out a signal with more sock!

To ride thru QRM, and to give more solid pleasure to your QSO's, these Millen commercial quality test and measuring instruments will enable you to get more power out of your transmitter into the air!



GRID DIP METER

The most useful and versatile tool, and Millen's is one of the best. Direct frequency reading 1.7 to 300 Mc for measurement and adjustment of every tuned circuit of receiver, transmitter, and antenna system, of inductance and capacitance, indication of Q, signal generator, etc.

Works on 115 volt AC, or batteries.

Model 90651 — \$61.50

4 Coils to extend range down to 220 Kc — \$6.72 each coil.

TONE MODULATOR

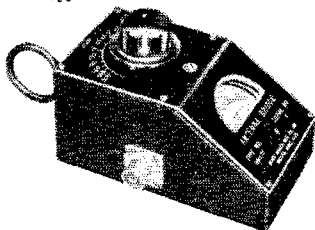
Plug this compact transistorized unit into the phone jack of the Grid Dip Meter and it modulates the RF output at around 800 cycles. In mike jack of transmitter,

it provides tone modulated CW. For code practice, connect a key and headphone to it. Only 4"x1.5"/16"x1.5"/16", it contains a mercury battery for long life.

Model 90751 — \$15.00



ANTENNA BRIDGE



A sensitive bridge for accurately measuring impedances of 5 to 500 ohms at frequencies up to 200 Mc. The easiest way to adjust every part of your radiation system to match impedances — and matched impedances give the strongest signals! Readily driven by the 90651 Grid Dipper, or reduced power transmitter.

Model 90672 — \$45.00

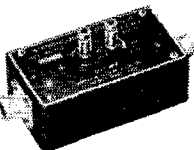
Baluns, for direct reading of balanced 20 to 2000 ohm impedance loads. Plug into Antenna Bridge.

Per Ham band, each — \$7.50

SWR BRIDGE

An easy and inexpensive way of measuring the Standing Wave Ratio on antennas using coaxial cable feed. Insert in the coax line, and connect any 0-1 DCMA meter to its terminals. Complete instructions provided.

Millen 90671 — \$16.80



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Both he and we will thank you!

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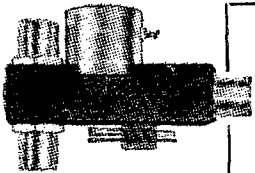
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USED IN
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SERIES**

COAXIAL RELAYS

For quieter operation and resistance against moisture, all coils are encapsulated in an epoxy resin. Add to this: low VSWR — less than 1.15 to 1 at 500 mc. — low losses — high contact pressures — patented receiver protecting connector (optional) — biturated DPT external contacts (optional) — and many other mechanical and electrical features, all of which are found in the NEW Dow DK60 series. **\$10.90 to \$14.20.**

OTHER FINE DOW-KEY PRODUCTS:

DK60-T2—Transfer two or more antennas — 1 KW capacity — price (with standard U.H.F. connectors) **\$10.90 to \$12.65.**

T-R switches — 3 models — self powered and non self-powered. Also available for special COMMERCIAL frequencies up to 250 mc. Engineering inquiries solicited, regular models **\$12.50 and \$27.75.**

We invite inquiries for coaxial relays using types 'N' 'C' 'HN' 'RNC' and 'UHF' connectors.

Catalog sheets available from any of our 700 dealers and distributors in U.S. and Canada or from the main office.

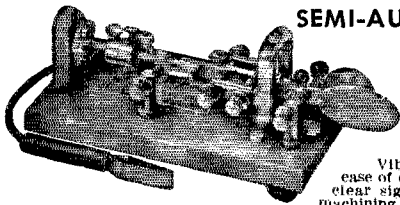
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EVERY HAM NEEDS THIS FAMOUS

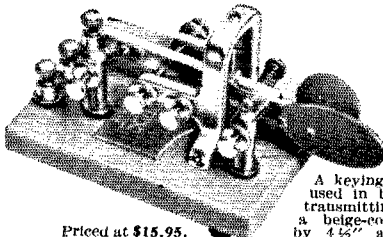
VIBROPLEX

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The Original Vibroplex features ease of operation, sharp

clear signals, precision machining and is acclaimed by thousands of the finest operators. Adjustable to any speed and will not tire the arm or upset the nerves. Good for 30 or more years even under rough usage. Comes in five models, standard or deluxe and is priced at only **\$15.95 to \$29.95.**



VIBRO-KEYER

A keying mechanism to be used in building electronic transmitting units. Features a beige-colored base, $3\frac{1}{4}''$ by $4\frac{1}{2}''$ and weighing $3\frac{1}{2}$ lbs. A thing of beauty with the same large sized contacts, main frame and super-finished parts as the DeLuxe Vibroplex. Red finger and thumb pieces and trunion lever. Adjustable to suit your speed. Order today at your dealer's or direct.

Priced at **\$15.95.**

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lose him as SEC. K5CAI is ready for the storm season with a new kilowatt rig. Traffic: K5IBZ 294, W5OOF 193, UYQ 165, DRZ 107, K5JGZ 93, CAY 52, DUJ 48, AUX 47, ELG 46, DLP 39, W5JXM 36, K5OOV 35, JOA 29, MYF/5 25, W5WAF 25, MFX 23, K5LZF 22, W5KY 21, CCK 17, K5ZEP 14, CRA 13, BNQ 12, OJD 12, W5PNG 12, VLW 12, K5LYM 10, EZM 5, W5WAX 5, EHC 2, K5HQE 2.

SOUTHERN TEXAS—SCM, Roy K. Eggleston, W5QEM—SEC: QKF, PAM: ZPD, RM: K5BSZ, K5JEH has a new Hornet Tribander and rotator. New officers of the San Antonio Amateur Radio Club are HFE, pres.; IWE, vice-pres.; K5VCR, secy.; K5TYI, treas.; and K5SJB, sgt. at arms. DRO and LLS visited the Corpus Christi Amateur Radio Club. ETA, QKF and QEM visited the San Antonio Amateur Radio Club and with the Convention Committee at Kerrville. The SET was well worked in the Southern Texas section. I understand that the Chamber of Commerce is going to pay the expenses of the Corpus Christi Amateur Radio Club, and have the members go somewhere else to hold theirs in 1961. In 1959 the problem was a simulated tornado that struck in Corpus Christi, and in less than 24 hours there was a real one. This year the problem was supposed to start at 1355. At 1200 we received a call from the Red Cross because of high water, flooding and a tornado. It had rained from 7 to 16 inches in about 18 hours and some residences on the south side of the city had to be evacuated. One tornado struck in a sub-division that was being built and another one at Sinton, only 30 miles away. The Chamber of Commerce thinks it would be cheaper to send SET participants out of town, probably to New Braunfels. K5MXO is the new net manager of the 7200 Traffic Net. The net had 38 sessions with 1187 stations and handled 400 messages. Traffic: (Oct.) K5WIC 304, MVI 301, K4BSS/5 266, K5MXO 72, W5ZPD 53, K5JFP 16, MWC 1. (Sept.) K5ABV 327, BSZ 310.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. D. Solomon, VE1QC, and H. C. Hillyard, VO1CZ. SEC: BL. New appointments include PK, EC for Sydney. G6CJ was a recent visitor to the homes of DB, EK, OM and PQ. QV has erected a tower for his new quad. PV is doing post-graduate work in geology at the University of St. Louis. 3AMQ, formerly of Goose Bay and Ottawa, has been transferred to Shearwater. 2UY (ex-1MS) now resides in Montreal. Congratulations to PQ, top man for VE1s in both the phone and c.w. sections of the 1960 ARRL DX Contest. FQ recently attended the c.d. college at Arrprior, Ont.

SEVENTH ANNUAL VE1 CONTEST

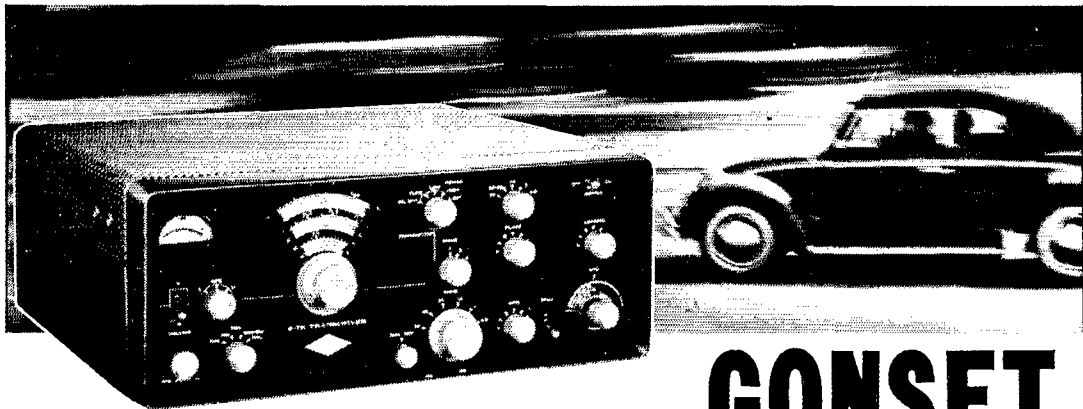
Jan. 21-22 and 28-29, 1961

All VE1 amateurs are invited to participate in a contest sponsored by the New Brunswick Amateur Radio Association. The contest this year will be divided into two sections, phone and c.w. The highest scoring contestant in each section will be awarded an engraved cup, the NBARA Trophy.

RULES: 1) The c.w. contest will begin at 2000 AST Saturday, Jan. 21 and end at 2000 AST Sunday, Jan. 22. 2) The phone contest will begin at 2000 AST Saturday, Jan. 28 and end at 2000 AST Sunday, Jan. 29. 3) Any and all amateur bands may be used but only c.w. to c.w., or phone to phone contacts will count. Any contestant may participate and be eligible for awards in both sections. 4) The same station may be counted but once for credit (in each section) regardless of band used. Mobile, portable, and home stations covered by the same station license constitute the same station. 5) The general call is "CQ VE1." 6) Exchange signal reports, county, province, and operator's name. Local QTH is not required. 7) Logs should show band, type emission, signal reports, county, province, time, and date. 8) Score one point for information sent. Multiply total points by the number of individual counties worked in the three provinces to determine final score. 9) Decisions of the contest committee will be final. Logs must be post-marked not later than Feb. 8 and should be in committee hands not later than Feb. 15. Forward all entries to: Contest Committee, P. O. Box 366, St. Stephen, N.B.

(Continued on page 148)

IN STOCK AT HARVEY



Sparkling new... smooth-working combo... a powerful 100 watt AM transmitter, sensitive dual-conversion receiver... two-way operation on 80-40-20-15-10 and 6 meters. This handsome, designer-styled package is just slightly over one foot long, less than six inches high, mounts handily under the dash of your car—blends in too, belongs. Transistorized DC supply is separate, mounts in any small convenient space.

GONSET G-76 6-band 100 watt AM transceiver

You can take this G-76 out of your car, use it—with matching AC power supply and speaker assembly—for excellent 6 band fixed station operation. Here's opportunity to add new enjoyment—and DX—with operation on another lively amateur band, 6 meters. G-76 is a full-blown, star performer on 6 as well as the other five widely used 10, 15, 20, 40 and 80 meter bands.

While G-76 is properly called a **transceiver** because of some common audio circuitry, transmitter and receiver are separately tunable. Receiver can be set to out-of-band DX, transmitter VFO anywhere within the band. Transmitter VFO is intended to be spotted on receiver dial. Frequency control may be either by VFO or quartz crystal. (Except on 6 meters which is crystal controlled only.) Transmitter and receiver oscillators are both compensated so that drift with temperature is negligible. Oscillator circuit has very low drift even with exceptionally wide excursions in both plate and filament supply voltages.

HIGHLIGHTS: Transmitter power input 100 watts AM, 120 watts CW • pi network output for 52 ohms • Dual conversion receiver • BFO for CW/SSB reception • Automatic noise limiter • Sensitivity: approx. 1 microvolt at 50 ohms for 6 db S+N/N ratio • Selectivity: 3 to 3.5 kc bandwidth at 6 db down, 14 kcs or less at 60 db down.

G-76 less power supply and speaker, #3338.....	376.25
G-76 transistorized 12V DC power supply (neg. ground), #3350.....	145.00
G-76 power supply for 117V AC w/speaker, #3349.....	145.00

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OUR 34TH YEAR

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Background in these areas will be developed through a training program in our Electro-Physics Laboratories, located in Bladensburg, Maryland. Engineers selected will become part of a team extending experiments of the Research and Development Department to the field, in both Domestic and Overseas assignments, and will have ample opportunity to develop technically.

They will possess a combination of the following requirements:

- ✓ BSEE, or equivalent consisting of combined civilian or military technical school plus work experience.
- ✓ Presently employed as a Field Engineer or Project Engineer.
- ✓ A good command of some of the following:

- RADAR, preferably High-Power
- HF Long-Distance Communications Systems
- Tropospheric or Ionospheric Scatter Systems
- Meteor-Burst Communications Systems
- Propagation Prediction—computation of propagation for long-distance communications
- Ionospheric Sounder Operations
- RDF Systems
- Doppler RADAR Systems
- Amateur Radio Enthusiast

- ✓ FCC License, 1st or 2nd Class.

They must be willing to accept assignments for periods up to one year. Differential paid for overseas assignments.

Applications Are Also Being Accepted For
**SENIOR SCIENTISTS
ENGINEERS (All Levels)
ELECTRONIC TECHNICIANS**

for permanent assignment at our Electro-Physics Laboratories in Bladensburg, Md.

Please Send Resume To:
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RIVERDALE, MARYLAND

2PY, formerly operating VEØNA, is now signing /VE1 from the Halifax Area. SCJ, ARRL Canadian Division Director, is planning a visit to the Maritime section early in 1961. Details of his proposed visit will be announced as soon as plans have been completed. Revision of the list of appointment holders in the section is now under way. Should you wish your present appointment renewed or wish a new one, we would appreciate hearing from you. Best wishes and top operating in 1961. Traffic: (Oct.). VE1BL 53, OM 18, ADH 12.

ONTARIO—SCM. Richard W. Roberts, VE3NG—SEC: KM. PAMs: CFR, TX and AMT. October was a good month for the Ontario hams. Good weather was evident throughout the Province as the reports from the mobiles piled up. The Boy Scouts were on the prowl once again. Their Jamboree was a huge success, according to reports. To the amateurs, a very big thanks from their Leaders. The S.S.B. Association held its Annual Dinner in Toronto and a registration of 73 was recorded. DTO is in VE6-Land. Your SCM and SEC met with the PAMs in London. Your Canadian Director met with the gang from North Bay and Sudbury in N. Bay. A new net is being formed on 75-meter phone. This net will carry on where the Muskeg Net left off. The net manager will be AKL, of Coppercliff. The net will meet on 3755 kc. Mon. to Fri. at 1900 and will cover Northern Ontario from west to east and liaison with the Ontario Phone Net. The Niagara Penn. RC is issuing an award for ten member contacts. The secretary has details available. All being well Toronto will be home to an Ontario ARRL Convention in 1961. TX is back on. EAW does FB work for the S.S.B. Assn. DUU had a heart attack but is better now. What has happened to the A-1 Operator award? Those who have this award, are letting it die! DZ is on 40 meters. BTL has a 46-ft. tower. The Quinte ARC's present officers are CBE, pres.; DGC, vice-pres.; BND, secy.; and BOB, treas. COB is home from the hospital. DMT won a prize for his FB mobile at the Montreal Convention. The Algoma ARC has elections coming up. Traffic: (Oct.). VE3CWA 242, NG 102, DPO 99, KM 83, LK 66, AIL 44, CFR 43, EAQ 41, BZB 40, DTO 35, BUR 27, DWN 23, NO 15, AMT 14, EAM 14, EHL 12. (Sept.). VE3AIL 43.

QUEBEC—SCM. C. W. Skarstedt, VE2DR—This month we salute the Montreal Amateur Mobile Club, rapidly becoming a well-known organization. Purpose of the club: "To develop a group of efficient amateurs who, in the event of local or national contingency, could be available to the appropriate authorities to expedite emergency communications." Exercises are held to familiarize members with emergency work. Weekly meetings are held on 3755 and 23,240 at 1100 Sun., phone or c.w. to allow out-of-town mobiles to report traffic for local delivery. During the recent Scout Jamboree members took an active part and placed vehicles at convenient locations allowing Scouts to get on the air and get a feeling of hamming. Elsewhere, home stations cooperated during the Jamboree. PD kept open house, both radio- and refreshment-wise. BB also did his part. VY sports a new car and a brand-new Gonset G-76. ER reports that Shawinigan hams are very enthusiastic on 2 meters. ED uses a DX-40 but is dreaming of a Valiant. WT, OQN mgr. (3535 kc. at 1900) reports 25 sessions, 134 stations reporting, 60 messages handled. QES ABF was active, especially during Aurora openings. Through the courtesy of KZDEI we learn that new nets operating are handling traffic from the N.W.T. and Yukon areas. A sked is set up for 14,280 kc. at 1130 GMT. Any assistance will be appreciated. We regret the passing of AT, formerly of Grand Mere. BGP is a newcomer at Yamachiche. W7QM/V/VE8 has a new Telrex beam. EG had a nice visit from W1BCR, of "Deep Freeze" fame. Happy hunting in 1961 to all of you. Traffic: W7QM/V/VE8 212, VE2BG 45, WT 45, DR 43, EC 34, TA 4.

BRITISH COLUMBIA—SCM. Peter M. McIntyre, VE7JT—The Scout Jamboree was ably coordinated by XI with many stations throughout the VE7 district taking part and making it a success. FY is now the call of the RCARA, in memory of the late Shirley Craig. Three new operators in the RCARA are ABG, BEZ and BES. ST, ex-881, now is in New Westminster. ADF and ADR have a new QTH. VX has moved to Pentiction. Sorry to hear that 6YE joined Silent Keys. George was a consistent check-in to the VE7 AREC Net. Get your thinking caps on to determine who you want as SCM for the next term. I believe one person should not hold the post too long and as yours truly does not have the time, for business reasons, to give the job the time that it deserves the position has suffered. You have a lot of active, well-qualified amateurs who are capable of handling the job if

(Continued on page 150)

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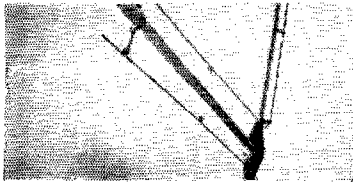
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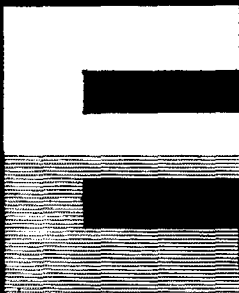


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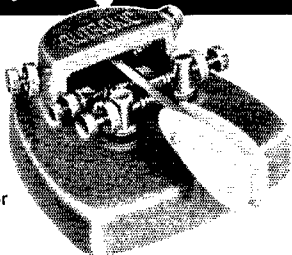
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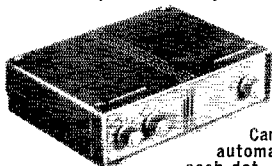
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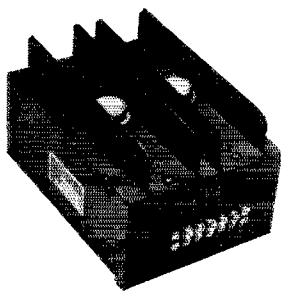
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they will take it. I have enjoyed the association during the past 8 years and want to thank all those who have helped in many ways. I will always be interested in the activity and will do anything I can to help and further the cause of amateur radio. Traffic: VE7AAF 65, JQ 28, AOT 25, ALZ 17, BDC 13.

MANITOBA—SCM, M. S. Watson, VE4JY—The highlight of the ARLM October meeting was a demonstration by KF of 6-meter equipment at which a group of Boy Scouts were interested spectators. TX gave an account of his 6-meter contacts with the Ice Island expedition reporting nine two-way QSOs during the season. KF has organized a 6-meter group for winter activities and reported 20 active in the Winnipeg Area and a number in Brandon. IF, former SCM, is putting in an FB signal from his holiday retreat at Lee River. OX reports good DX having 107 countries on his log, including Mongolia. Ex-VE3EIL, formerly located at Toronto, now is VE4TV at Brandon. Crystal City now has an amateur, VE4TV, RR, of The Pas, and FF and NW, of Flin Flon, are three of the consistent northern net regulars. The "5s" are well represented on the MAN Net by YR, GO, DS and LD. Traffic: VE4JY 17, PE 15, PW 5, QD 4, RR 4, AY 3, AN 2.

SASKATCHEWAN—SCM, Harold R. Horn, VE5HR—Sorry there was no report last month as your SCM was on holidays. QC is doing a fine job as president of the Sask. Amateur Radio League. There still are four district managers needed, information can be obtained from QC or HQ. BY, IL, JK, LM, RE and BO are district managers for Districts 1, 4, 5, 7, 8 and 10. Our best wishes to JK and his bride. HJ is joining the staff of Inspectors Office, Department of Transport, at Saskatoon. DD visited in W6-Land. NQ has the new c.w. net started. New members are welcome and check in on 3685 kc. Mon., Wed., Fri. and Sat. at 7 p.m. MST. IR has been transferred and will be signing VE3. Moose Jaw has picked 3745 kc. as its local mobile frequency. This is a good step and a mobile frequency for all Saskatchewan would be better still. Your ideas on this will be welcomed either by myself or the SARL. Your monthly activities would be appreciated, fellows, for without them this column cannot be written. News is required for the first of each month. May the New Year be a healthy and prosperous one. Traffic: VE5IG 22, CM 16, HQ 9, CR 4, QL 4, NR 2, PD 1.

Correspondence

(Continued from page 87)

we are operating on frequencies not assigned to amateur service. I guess the manufacturers would receive that information before we hams on the band. There are quite a few clean-cut, and friendly hams on 160 meters that would certainly appreciate hearing from any manufacturer that would tell us why they don't include 160 in their new equipment, but include "channel 2" instead. — Joseph M. Abad, K8ONP, Detroit, Michigan.

N.B.F.M. — NO FUSS, NO MUSSI

☐ In re Cal Hadlock's letter about n.b.f.m. (QST, October): I have been using n.b.f.m. since 1956, both fixed and mobile, on 75 and 40 mostly. Based on a modicum of science, a little bit of common sense, and a whole lot of experience, I would like to throw in a few comments.

Of the several thousand stations I worked very few recognized I was on n.b.f.m. My modulator cost me \$3. I have a discriminator to tie on to my SX-88 which cost about \$5. (6BN6 circuit): I can run 30 watts or 500 watts on my V-70D's simply by turning the link. I have worked WAS, Japan, Alaska, Hawaii, New Zealand, Australia, the Canal Zone, Canada and Mexico on 40-meter n.b.f.m. phone, most of the time with good reports. Oh, I have had some troubles, but how much trouble can you have with a 12AX7 and a 1N34?

The real point of all this is that n.b.f.m. is inexpensive, reliable and uncomplicated. There is no trouble figuring legal power limits. QRM and QRN are reduced. TVI, BCI and hi-fi interference problems are reduced. The final is simpler and can operate at high efficiency: no splatter, no fuss, no muss and not much bother. Figure it out on a slip stick if you want to, but I have had a lot of fun, filled a few log books, sent a few QSLs and made a lot of friends — all at hobby prices! — John Shallenberger, K6HDX/O, Littleton, Colorado.

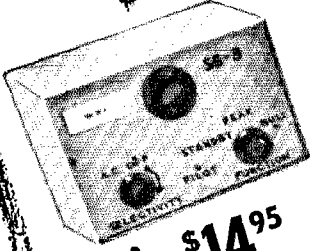
(Continued on page 158)

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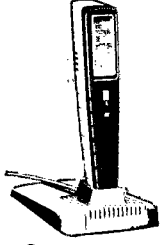
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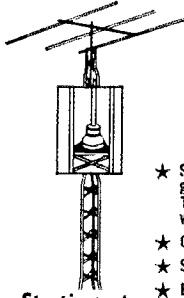
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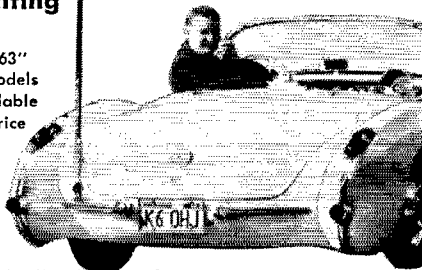
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STRANGE SIGNAL

For the past few months I have been noticing an unusual signal on the 75-meter band during my regular early morning contacts (between 3 A.M. and 6 A.M.).

The signal is an r.f. carrier, usually quite weak, and it has a relatively raw a.c. hum on it. There is no other discernible modulation present. The most unusual feature of this signal is the slow, mechanically precise, scanning of the frequencies. When listening to another station on the band the scanning carrier moves smoothly and slowly into the bandpass of the receiver creating a weak, ever-changing pitched heterodyne. It requires about 15 seconds to pass entirely by and usually passes by every 6 or 7 minutes. It does not seem to create any disturbance with normal communications but I have become very curious as to its origin.

One particular time I noticed it was during a 3-hour period early in the morning of November 5, 1960. It was heard by operators in Indiana, West Virginia, Michigan, and Pennsylvania at that time.

If you at ARRL headquarters or your readers know of the origin of such a signal, I would appreciate hearing from them. — Wayne L. Norton, W9EQL, Ridgeville, Indiana.

Editors Note: Hq. has been in touch with the FCC about this signal but is unable to offer any positive identification. Amateurs hearing this signal should report its signal strength and other characteristics to Hq.

ROTTEN JAMMING

Pursuant to a resolution adopted at a regular meeting of the Rochester Gallon Club, a Committee on Rotten Jamming was appointed to report on the conditions resulting in occasional complaints published regarding the employment of one kilowatt input power by amateur radio operating stations.

The Committee reported (in substance) that the power input was not the probable cause of the jamming. Regarded as more probable causes were:

- (1) the use of high gain antennas (receiving and transmitting),
- (2) propagation conditions,
- (3) the large number of amateurs in the U. S. A.
- (4) aggressive operating practices,
- (5) the human beings' tendency to complain,
- (6) the wider bandwidth resulting from modulation,
- (7) rotten selectivity of modern receivers,
- (8) the additive effect of signals on the same frequency.

The Committee reported (in substance) that the writers of complaints of jamming by U. S. amateurs appeared to be singularly unimaginative in their selection of "high power" as the cause of the trouble, and further that a reduction in the power employed would leave all the other eight (8) factors unaffected.

The real solution to the problem would be to attack all nine factors at once!

The Committee therefore recommended (in substance) that amateurs throughout the world should join in a concerted movement to accomplish this by:

- (1) using only low gain (possibly buried) antennas,
- (2) avoiding years, frequencies, and times when propagation is good,
- (3) petition FCC to revoke as many licenses as possible,
- (4) discourage aggressiveness in amateur radio in the U. S. A.
- (5) encourage human beings to make a better adjustment to their environment,
- (6) discourage the use of modulating systems, including keying,
- (7) encourage the use of better receivers among distant operators,
- (8) invent signals that are not additive.

A minority report was received as well, indicating that a dissenting member of the Committee would agree to only recommendations (5) and (7), as he considered the other recommendations destructive of the purpose of the hobby.

The Committee was thanked for its detailed and searching analysis of the situations contributing to Rotten Jamming, and as the following order of business was the election of Officers, the Chairman called for nominations.

By a singular coincidence, there was a unanimous expression of sentiment in favor of the lone dissenting member

(Continued on page 154)



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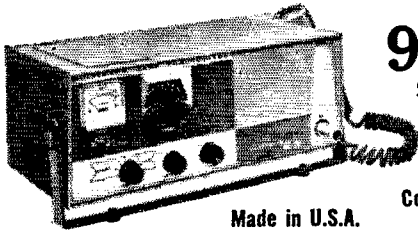
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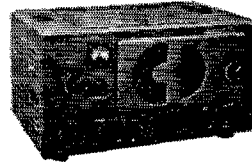
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of the Committee on Rotten Jamming. He was accordingly elected for the forthcoming year, to all offices of the Club. — *Homer Side Case, Sec'y., Rochester (N. Y.) Gallon Club.*

Recent Equipment

(Continued from page 51)

impossible. The Seneca does as good a job of it as most similar rigs. Its v.f.o. is all right for 50-Mc. phone and usable for 50-Mc. c.w.; on 2 meters, the v.f.o.-controlled phone signal sounds pretty fair until you start bearing down with the selectivity or checking it with the h.f.o. on. For 2-meter c.w. you'd better use crystal if you want other c.w. men to think highly of you.

The final stage efficiency of the Seneca shouldn't displease anybody; it's surprisingly good for a two-band v.h.f. rig. On 6 meters, the recommended input is 140 watts; this gives 81 watts output for an efficiency of 58 per cent. Heath says to reduce the input to 110 watts on 2 meters for longer tube life, and this input gave us exactly 50 watts out for an efficiency of 45 per cent. These measurements were made with a Bird Thru-line wattmeter working into a 50-ohm resistive load. — *M. P. S.*

QST

Novice Roundup

(Continued from page 76)

United States will be sent gratis upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be postmarked not later than March 3.

6) *Awards:* A certificate award will be given to the highest-scoring Novice in each ARRL section.

7) *Disqualifications:* Failure to comply with the contest rules or FCC regulations shall constitute grounds for disqualification. ARRL Contest Committee decisions are final.

DX Contest

(Continued from page 79)

(QST) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section or country from which three or more valid multiple-operator entries are received.

b) A suitable certificate will be awarded to the operator making the highest single-operator phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three phone entries by members of the club and that these scores are confirmed by receipt at ARRL of the individual contest logs from such members. The highest single-operator c.w. scorer in each club will be awarded a certificate under the same conditions. Only a bona fide resident member, operating a station in local club territory, may compete for club certificates.

c) ARRL will award a gavel to the affiliated club submitting the greatest aggregate phone and c.w. score by its members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL of the individual contest logs from such members. Only scores of bona fide resident members, operating stations in local club territory, may be included in club totals.

13) *Judges:* All entries will be passed upon by the ARRL Award Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

14) *Disqualifications:* Each participant agrees to observe the contest rules as well as all regulations established for

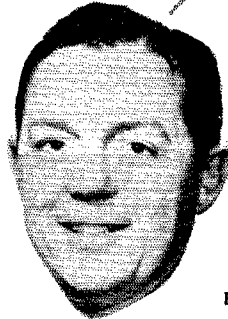
(Continued on page 186)

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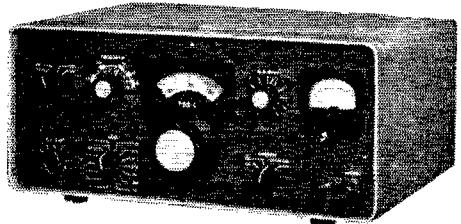
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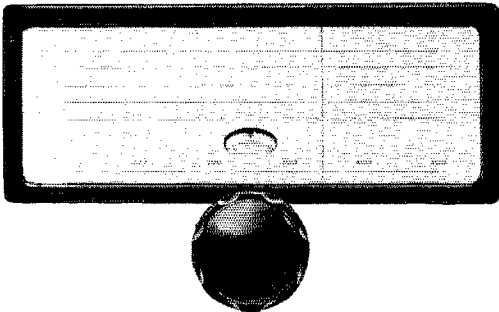
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amateur radio in his country. Violation of any regulation, as confirmed by a single FCC citation or advisory notice or two ARRL accredited Official Observer reports, may constitute grounds for disqualification. Some examples of practices which can result in disqualification: off-frequency (out-of-band) operation, harmonics, spurious emissions, low tone reports in logs, key clicks, splatter, excessive sidebands, W (K) stations working banned countries. **QST**

How's DX?

(Continued from page 86)

mm and shipmates rang up several thousand QSOs as IIC8VB in October and November, then set out for FO8 regions aboard *Yasme III*.

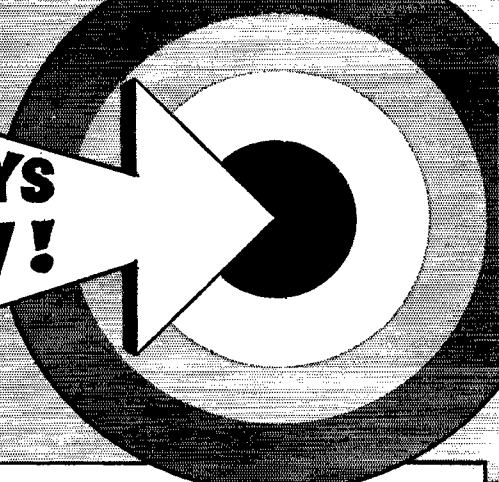
Hereabouts — W8WT scores "DXCC²" No. 35, missing the first all-phone feat by only two c.w. QSLs. Les, active DXwise since 1957, has rolled up 222 countries vocally. . . . Old VE3EIL now is VE4JT, a juicier label, but Tom has to start his DXCC trail anew. . . . Much has been said against (excessive and ill-timed) CQ-DX calls, but K8TKN finds them just the thing to stir up 28-Mc. c.w. when the band is playing "possum. . . . W2WAS is intrigued by the QTH of K17AGX, St. Paul island in the Pribilofs. . . . W6YY becomes member No. 100 in K6BX's Certificate Hunters' Club. K5BNQ is the first YL to qualify at the 50-sheepskin mark. W4HYW becomes No. 1 century man in Finland's similar Award Hunters Club, by the way. . . . W1QLT/1 of XE3QLT/XE5 sets late July as tentative target date for his return to the Alacran reefs with 100 watts. . . . Ws 3HQ 40EF and others thoroughly enjoyed G3WW's Stateside visit late last year. . . . Through W1WPO, W4DHz tells of Norfolk's new Virginia DX Club. "Some plans in the mill to sponsor a few certificates for the paper-chasers. All our members are DXCC and all are 100-per-cent ARRL." . . . This month's "How's" QSL-type ornamentation on the Happy DX New Year motif is credited to earlier "DXCC²" filings by DL1QY, ex-11KN, OK1KTI and W1NLM. . . . W6s FYM and UF of the Eimac Radio Club disclose preliminary plans to operate as W6A/7 in Nevada over April 22nd-24th. The activity is intended to give overseas DXers a decent opportunity to work that rare state for WAS. More detailed info on W6A/7 next month. . . . QSL Manager VE8AT invites, "Any of the gang traveling up the Alean Highway toward K7-land should drop in here for a visit and some coffee. I'm listed in the Whitehorse phone book, or just check in at the RCAF airbase." Smitty interspersed his late-'60 DX activities with some 50-Mc. sport. . . . K2UG spots another father-and-son DX enterprise, that of H82GR and 15-year-old H82AR. . . . K4s AGZ DWU YLU and KN4WQU are readying for a summer Swan Island sally. . . . Semilocal chatter via NCDXC, OVARA and VERNON: K2DGT's experiments would confirm that 7-Mc. Yagis don't begin to perform properly until hoisted to the 80- or 90-foot level. His own 40-meter rotary is 103 feet high. . . . W6s AM BYB and K6CQM lead the NCDXC pack in band-countries with 949, 672 and 591, respectively. . . . W6P1F is said to have joined W8OLJ aboard Project *Hope*. . . . VP9L & Co. rocked the Hoek with a stack of multiband and multimode VP2VII QSOs from the British Virgins in mid-autumn.

Ten Years Ago in "How's DX?" — Famous QST DX fiction of bygone years is nostalgically recalled in your January, 1951, column eye-opener. . . . It's 82 countries on 80 meters for W4BRB, CN8NI, FASBG, HR1AT, TI2PZ and V87KR tease the 3.5-Mc. band. . . . Forty c.w.'s outstanding 1X denizens include FMSAD, LB9AC of Spitzbergen, VP8s AI and AJ. . . . Twenty-cw. cone fans hunt the autographs of Cs 3KS 9AA, E79X, KSAC, LAICQ/ Antarctica, MBAB, P1s IUP 5RE, PKs 4DA, 5AA 6VK 7NL, TA3s FAS GVV, YK1s HV PG YG YM, VS7AQ, VU7AL, XUSSR, Y1BDYN, YJLAB and ZS8MK. Phone ops on 14 Mc.: AR8AB, CS8AA, KJ6AJ, M197HV, OJ13EG, SV5UN, VR5GA and YJ1AA. Ten phone is just the thing for EK1AQ, FL3RT, H21KE, MB3XX, MP1BAB, OQ5s BR DZ, VRIE, ZC6UNJ, ZD4s AH and AX. . . . C.w. 28-Mc. specialists feast on F1D3RG, VQ9AA and W4IKC/KW6. . . . SARL (South Africa) announces an imminent DX contest, and we see that Sicily has adopted the IT1 prefix. . . . Jeeves harasses the Great Suezco with some ticklish r.f. and photos of Jamaica Radio Club VP5s, KR6CA (W2KZZ) and EA0AB rather wrap things up. **QST**

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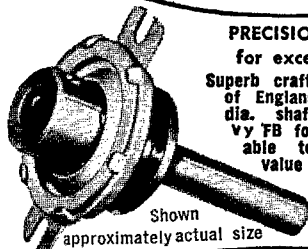
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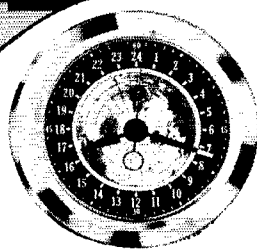
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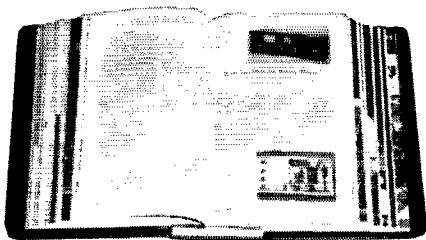
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Happenings of the Month

(Continued from page 64)

**MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 277
November 21, 1960**

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met in West Hartford, Connecticut, at 4:35 P.M., November 21, 1960. Present: President Goodwin L. Dosland, in the Chair; First Vice-President Wayland M. Groves; General Manager A. L. Budlong; Directors John G. Doyle, Milton E. Chaffee, Morton B. Kahn and Raymond E. Meyers; Vice President F. E. Handy; and Treasurer David H. Houghton. Director Gilbert L. Crossley and Assistant General Manager John Hutton were also present.

General Manager Budlong reported on a recent conference between FCC and League personnel concerning the matter of enforcement of amateur regulations. Extended discussion followed, and the Committee gave informal approval to several steps proposed by the General Manager for further League cooperation with the Commission in the tradition of self-policing.

General Manager Budlong reported that the Maritime Mobile Amateur Radio Club had filed a petition with the Commission seeking worldwide maritime mobile privileges on the 14-Mc. amateur band. It was agreed no action by the League was necessary unless and until the Commission might issue a notice of proposed rule making.

The Committee discussed the matter of a proposed "transponder" installation in an earth satellite, operating on amateur frequencies, and indicated the League would be receptive to a proposal to sponsor or coordinate such a project.

On motion of Mr. Chaffee, it was unanimously VOTED to approve the holding of a New England Division Convention in Swampscott, Mass., April 22-23, 1961, and a Central Division Convention in Springfield, Ill., August 26-27, 1961.

On motion of Mr. Kahn, affiliation was unanimously GRANTED to the following societies:

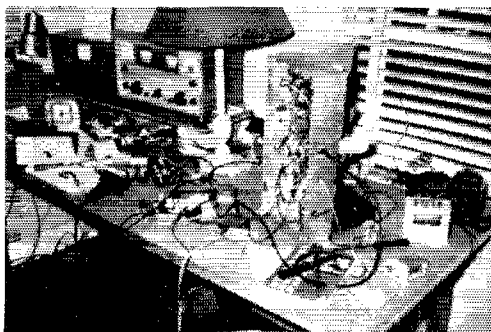
- East Coast V.H.F. Society, Inc. Saddle Brook, N. J.
- Northeast Washington Sevens (N.E.W.7's) Colville, Wash.
- Santa Cruz County Radio Club Santa Cruz, Calif.

Without formal action the Committee discussed various additional matters at some length, with particular attention to preliminary plans for a proposed new Headquarters building and the financing problems attendant thereto.

There being no further business, the Committee adjourned at 7:45 P.M.

A. L. BUDLONG
Secretary

Strays

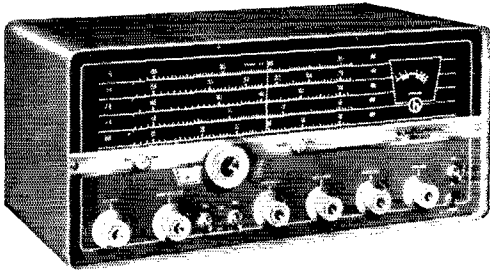


WA2ENV thinks that some of our QST photos of amateur operating positions aren't very true-to-life, seeing as how they are always so neat. Thus, he sends along this picture of his own operating position, showing how it looks most of the time because he is always experimenting on something or other.

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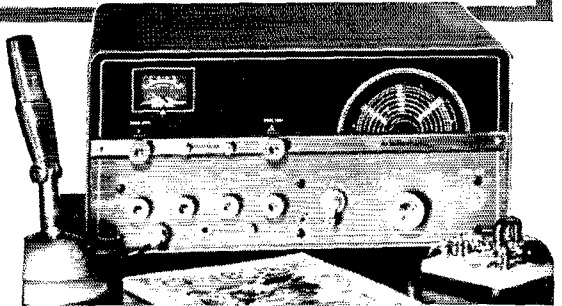


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Technical Correspondence

(Continued from page 61)

this circuit will be found extremely useful." The tunneling effect in junction diodes, as I understand it, is probably very much different; I suppose which effect was responsible for Pickard's oscillation will never now be known.

— John K. Green, W6MMC/7

2523 N. 57th St.
Phoenix, Arizona

Technical Editor, *QST*:

. . . W6MMC points out that the Sylvania diode manual shows a diagram of an audio oscillator using a crystal. While I have not seen the Sylvania manual, I believe it describes an oscillator using the well-known "thermal breakdown" effect. This occurs in the high reverse-bias region of some crystals, and produces a negative-resistance effect, but is not capable of producing high-frequency oscillations because of the long thermal time constant.

Other negative-resistance effects in crystals are known. A welded-contact germanium diode, when used as a mixer in a superheterodyne, exhibits a negative conductance at intermediate frequency. This is described in *Crystal Rectifiers*, Vol. 13, of the Radiation Laboratory Series. It is presumed to be due to the variation of capacitance of the junction caused by the local oscillator. This book was written in 1948; today we have parametric amplifiers using this principle. But Pickard's crystal was not pumped.

We will probably never know just exactly what Dr. Pickard did use, since he died about five years ago. But I do not believe there is anything in either the quotation or diagram that can be used to prove that the crystal was *not* a tunnel diode. . . .

Dr. Pickard patented the crystal detector in its familiar cat's-whisker form in 1906. The original material was silicon. Later on, galena, which is lead sulphide and contains germanium, became popular. Tunnel diodes can be made from both silicon and germanium, plus other materials such as gallium arsenate. I do not believe there is anything in semiconductor theory that excludes the possibility of a point-contact tunnel diode.

So, either by design or serendipity, Dr. Pickard could have discovered the tunnel diode.

Do I believe that the device used in 1920 was a tunnel diode? Well, who knows?

— Harry R. Hyder, K7HQN

Box 412
Sedona, Arizona

Technical Editor, *QST*:

. . . It is clear that too little is known to come to any sensible conclusion . . . (but) I do think it is worth explicitly stating that the oscillating diode was not necessarily a tunnel diode (or acting through the tunneling effect) as well as that which Mr. Hyder wishes—that it was not necessarily *not* a tunnel diode! . . . It would certainly be interesting to see the original laboratory notes, which perhaps are still available, on the oscillating diode.

— John K. Green, W6MMC/7

Strays

I have amateur license plates on my car and when I purchased my city license for 1961, I found that the city was cooperative too. They issued license number 88 to me. At my age I think that number 73 would have been more appropriate!

— W9LYC

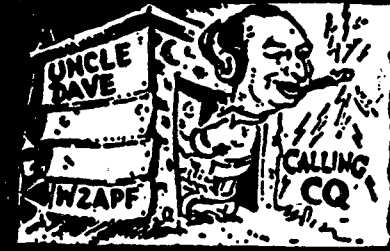
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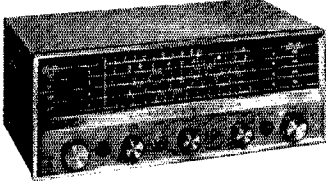
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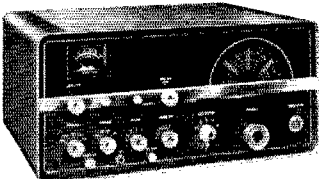


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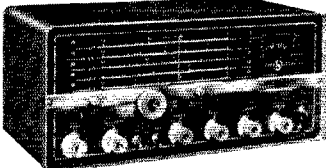
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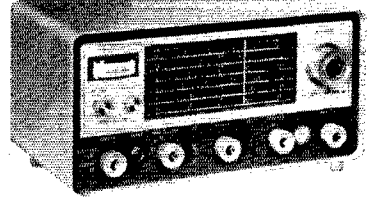
Series II Communicators 2 or 6M.....	150.00
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G43.....	119.50
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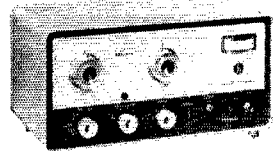
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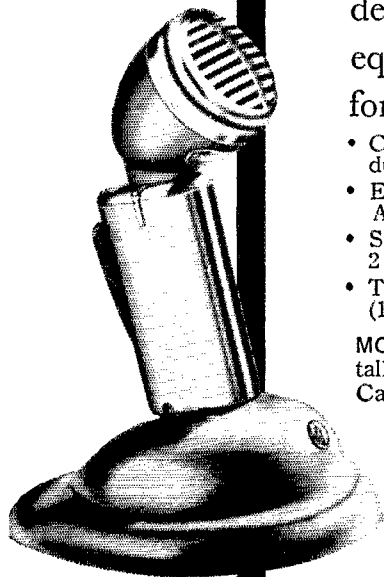
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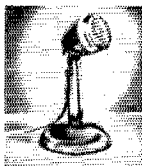
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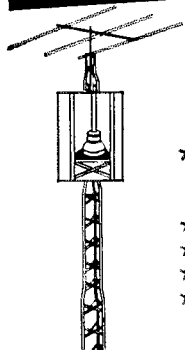


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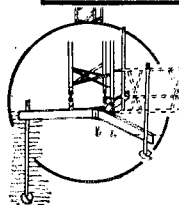
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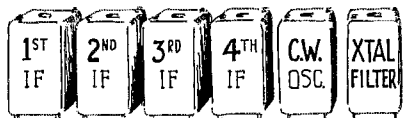
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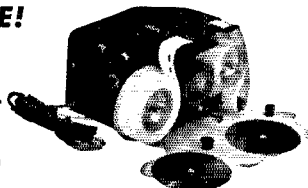
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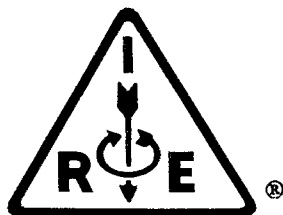


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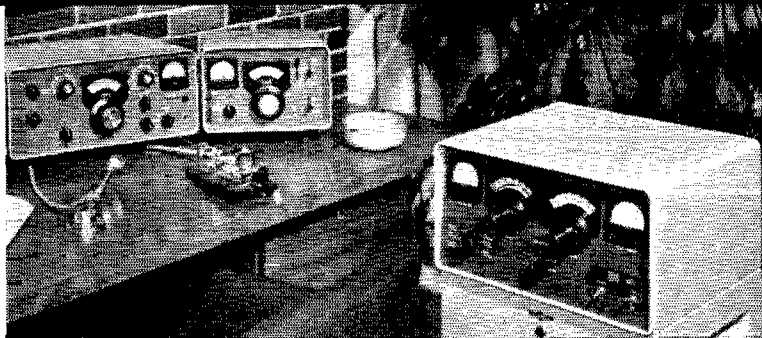
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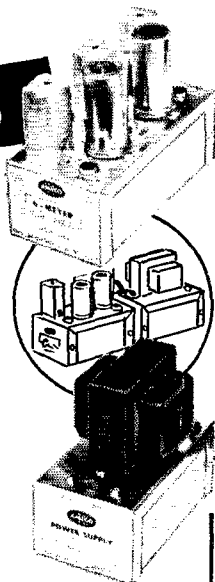
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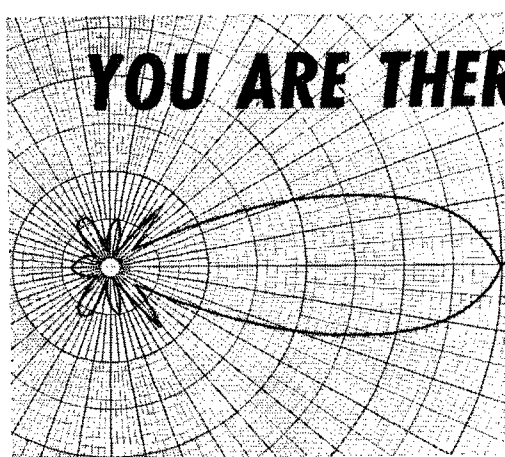
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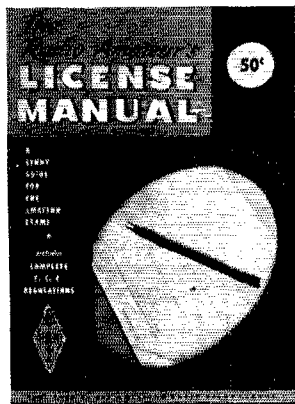
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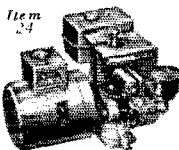
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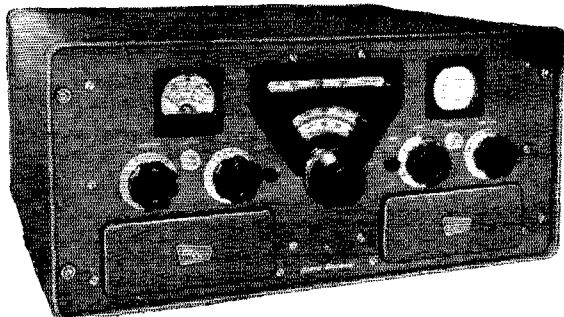
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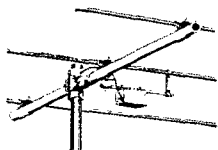


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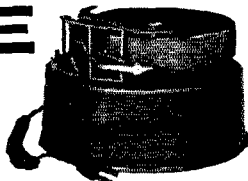


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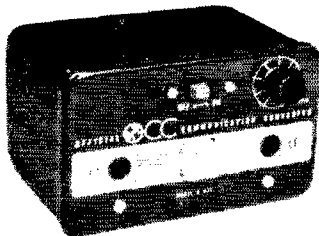
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73,

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ALL ORDERS
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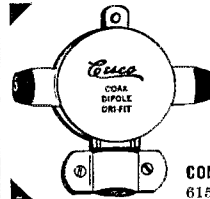
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2-pc. adjustable aluminum mast, bracket, universal bumper hitch. No holes to drill. Co-ax feed line not inc. Net. \$16.95

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(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make any advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

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.

COAXIAL Cable. New surplus RB-54A/U, 58 ohms impedance -30 ft. preaid, \$1.00. Radio magazines, buy, sell, trade. R. Farmer, 3009 No. Columbia, Plainview, Texas.

ALL types of transmitting and receiving tubes wanted. Also aircraft or ground receivers and transmitters. Hamgear or test equipment. For immediate action for cash write or phone Ted Dames, W2KUW, 308 Hickory St., Arlington, N. J.

MOTOROLA used FM communications equipment bought and sold W3BCO, Ralph Hicks, Box 6097, Tulsa, Okla.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 399, Mt. Kisco, N. Y.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmany 8-8262.

HAM TV Equipment bought, sold, traded. Al Denson, WIBYX, Rockville, Conn.

CASH for your gear. We buy, trade or sell. We stock Hammarlund, Hallicrafters, National, Johnson, Gonset, Globe, Hy-Gain, Mosley and many other lines of ham gear. Ask for used equipment list. H. & H Electronic Supply, Inc., 506-510 Kishwaukee St., Rockford, Ill.

"PIG-IN-A-POKE"? Not if you visit Ham Headquarters, USA and see and choose from the hundreds of "Like-New" bargains in the world-famous Harrison Trade-In Center. More for your money, because tremendous turnover makes lower overhead! Terms, trades. Send postcard for mouth-watering photograph and price list Q-6. For the best in all new and used equipment, it pays to come to "Ham Headquarters, USA!" BCNU, 73, Bil Harrison, W2AVA, 225 Greenwich St., New York City, N. Y.

KWMI and a few high plate dissipation tubes wanted. 304T17/TH 4-1000A, 4PR60A, etc. Ted Dames, W2KUW, 64 Grand Place, Arlington, N. J.

CHICAGOLAND Amateurs! Factory authorized service for Hallicrafters, Hammarlund, Globe, Gonset. Service all amateur equipment to factory standards. Heights Electronics, Inc. 1145 Halesite, Chicago Heights, Ill. Tel. SKYline 5-4056.

WANTED: Old time commercially built and unaltered amateur spark transmitting and auditor receiving equipment. Al T. O'Neill, Camp Lakeview, Lake City, Minn.

RECEIVERS: Repaired and aligned by competent engineers using factory standard instruments. Authorized factory service station for Collins, Hallicrafters, Hammarlund, National, Harvey-Wells. Our twenty-fourth year. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

SSBERS! Keep up with SSB news and views! Join the Single Sideband Amateur Radio Association dedicated to furthering good SSB operating; promoting advancement of SSB equipment; and disseminating SSB technical information. Read "The Sidebander", official publication of the SSBARA. Dues \$3.00 yearly. Write for membership application, sample "Sidebander", to SSBARA, 12 Elm St., Lynbrook, N. Y.

WANTED: 6 to 12 304TL tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

ATTENTION Mobileers! Lecce-Neville 6 volt 100 amp. system, \$50; 12 volt 50 amp system \$50; 12 volt 60 amp system, \$60; 12 volt 100 amp system, \$100. Guaranteed no ex-police call units. Herbert A. Zimmermann, Jr. K2PAT, 115 Willow St., Brooklyn 1, N. Y. Tel. DICKens 2-9121 or JACKson 2-2857.

DISTINCTIVE QSLs! Finest, big variety samples 25¢ (re-funded). Callbooks (Winter): American calls, \$5.00; Foreign calls, \$3.00. "Religious" QSL samples 10¢. "Rus" Sakkers. W8DED, Box 218, Holland, Mich.

QSLs. Twenty exclusive designs in 3 colors. Rush \$3 for 100 or \$5 for 200 and get surprise of your life. 48-hour service. Satisfaction guaranteed. Constantine Press, Bladensburg, Md.

QSLs. Quality and economy complete samples dime. QSL Printing, 4319 Wuthering Heights, Houston 45, Texas

QSL-SWLS. Reasonable. Samples 10¢. Glenn Print. Att: M. L. Edmonds, 1103 Pine Heights Ave., Baltimore 29, Md.

QSLs "Brownie." W3CJ1, 3110 Lehigh, Allentown, Penna. Samples, 10¢ with catalogue, 25¢.

C. FRITZ for better QSLs! Samples 10¢. P. O. Box 1684, Scottsdale, Ariz.

QSL-SWLS. Samples 10¢. Malgo Press, 1937 Glensdale Ave., Toledo 14, Ohio.

QSL's New design, lower prices, fast delivery. Catalog 25¢ (coin only), refundable. Dick Crawiord, K6GJM, Box 607, Whittier, Calif.

CREATIVE OSL and SWL Cards. Are you proud of your card? If not let us print your next order. Write for free samples and booklet. Personal attention given to all requests. Bob Wilkins, Jr., KN6ZMT, Creative Printing, P. O. Box 1064-C, Atascadero, Calif.

QSLs. Economy prices, prompt delivery. Send for samples. W7IHZ Press, Box 183, Springfield, Oregon.

QSL-SWLS. Samples free. W4BKT Press, 123 Main, McKenzie, Tenn.

QSLs Samples dime. Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSLs. Taprint, Union, Miss.

SUPERIOR QSLs. samples 10¢, Ham Specialties, Box 3023, Bellaire, Texas.

QSLs. 3-color glossy, 100-\$4.50. Rutgers VariTyping Service, 7 Fairfield Rd., New Brunswick, N. J.

PICTURE OSL. Cards of your shack, home, etc.. Made from your photograph, 1000, \$13.00. Raam's, 4154 Fifth St., Philadelphia 40, Penna.

QSL's-SWL's: That are different, colored, embossed card stock, and "Kromekote." Samples 10¢. Turner, K8AIA Box 953, Hamilton, Ohio.

QSLs-SWLS. reasonable prices. Samples 10¢. Robert Bull, W1BXT, Arlington, Vt.

QSLs. Lapel pins, samples dime. Kephart W2SPV, 4309 Willis, Merchantville, Pa.

QSLs, SWLS, VYL-OMs (sample assortment approximately 95¢) covering designing, planning, printing, arranging, mailing eye-catching, comic, sedate, fantabulous, DX-attracting, prototypical, snazzy, unparagoned cards (Wow!). Rogers, K0AAB, 1200 Marshall Ave., St. Paul 4, Minn.

GLOSSY QSLs. 100, 4 colors, \$3.50. Others less, Samples 10¢. Dick, W8VXK, 7373 No. M-18, Gladwin, Mich.

DELUXE QSLs. Pett, W2HAZ, Box 27, Trenton, N. J. Samples, 10¢.

QSLs. Samples free. Phillips, W7HRG, 1708 Bridge St., The Dalles, Oregon.

QSLs-SWLS. 100 2-color glossy, \$3.00; QSO file cards, \$1.00 per 100. Samples, 10¢. Rusprint, Box 7507, Kansas City 16, Mo.

QSLs-SWLS. Free Samples. Spicer, 4615 Rosedale, Austin 5, Texas.

QSLs. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Samples 10¢. K2VOB Press, 62 Midland Blvd., Maplewood, N. J.

OUTSTANDING (1 1/2" Call) QSLs. One style; 100, \$2.75; sample free. Garievr, 2624 Kroemer, Fort Wayne, Ind.

QSLs: Cartoons, colors, samples 25¢. Chris, W9PPA, 365 Terra Cotta Ave., Crystal Lake, Ill.

DON'T Buy OSLs until you see my free samples. Bolles, 7701 Tisdale, Austin 5, Texas.

ATTRACTIVE QSLs. Pearce, 192 Osborne, Danbury, Conn. QSLs. Samples, dime. Printer, Corwith, Iowa.

QSLs. 100 3-color, \$3.00. Sample sheet, 10¢. RBL Print M.R. 12, Phillipsburg, N. J.

QSLs. 300 for \$3.95. Free samples. W9SKR, "George", RR #1, Box 208-A, Ingleside, Ill.

QSLs. Attractive, colorful. Variety type styles, backgrounds. Samples 10¢. Jack Crandall, K6QAO Press, 3013 Enfield Ave., Encino, Calif.

QSL Cards printed in 2-colors on glossy Kromekote cards. Two designs especially for mobile, \$2.75 for each 100 cards. 5¢ for sample card and brochure. Williams Printing, P.O. Box 2597, Van Nuys, Calif.

EYECATCHING QSLs—quick! Dollar-saving sample. Dime. Rad'Oprint, Ojai, Calif.

QSLs: Samples 25¢ (refundable). W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

FAST Service! Send stamp for QSL samples. K2 Press, Box 372, Mineola, L. I., N. Y.

MAKE Your own photographic QSL cards. Complete kit of materials. Albertson, W4HUD, Box 322, High Point, N. C.

QSLs: \$1.75 per 100 postpaid U.S. only. Glossy, red and green. All orders mailed within 10 days. Free sample. Hobby Print Shop, Umatilla, Fla.

QSLs. Stamp brings samples. Eddie Scott, W3CSX, FairPlay, Md.

RUBBER Stamps for hams, sample impressions. W9UNY, Hamm, 542 North 93, Milwaukee, Wis.

QSLs you'll like. Samples 10¢. Dupli-Press, 1367 Gary St., Merritt Island, Fla.

TRI-COLOR QSLs. \$3.50. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSL. SWLS. Rubber Stamps. samples 5¢. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz.

QUALITY QSLs. Latest designs, samples 10¢. Savory Press, 172 Roosevelt Rd., Weymouth, Mass.

QSL-SWLS 3-colors 100 \$2.00. Samples dime. Bob Garra, Leighton, Penna.

QSLs, reasonable, nice designs, samples dime, W2DJH Press, Warrensburg, N. Y.

QSLs. Large selection styles including photos. Lowest prices. Fast service. Samples dime. Ray, K7HLR, 679 Borah, Twin Falls, Idaho.

3-D QSL cards. Excitingly different! \$3.95 first 100. Samples, 5¢. 3-D QSL, 5 Wood End Rd., Springfield, Mass.

CARDS: QSL-SWPE-Gak, business. Photo, rubber stamps. Labels, stationery, samples dime. Riesland, Del Mar, Calif.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N. C.

COLLINS reconditioned: 51T2, \$495; 51T3, \$675; 75A-4, \$545; HQ-160, \$275; Hickok, #188, \$69.00; HRO-60, \$325; DX-100, \$125; HC-10, \$85; SP-600, \$325; Ranger, \$210; Teletype printers, converters, etc. Alltronics-Howard Co., Box 19, Boston 1, Mass. Tel. Richmond 2-0048.

KWS-1, SC-101 integrated control unit and 75A-4. A complete and superb station in top condition. Package \$2000, W2ADD.

DON'T Fail FCC tests! Check yourself with a time-tested "Sure-check Test". Novice, \$1.50; General, \$1.75; Extra, \$2.00. We pay the postage. Amateur Radio Specialties, 1013 Seventh Ave., Worthington, Minn.

LOWEST Prices: Latest amateur equipment. Factory fresh sealed cartons. Self-addressed stamped envelope for lowest quotation on your needs. HDH Sales Co., 919 High Ridge Rd., Stamford, Conn.

COMPLETE File of QST for sale: 1915-1951. Landa, R2, Clayton, Ga.

TOROIDs: Unused 88 mhy like new. Dollar each. Five, \$4.00. pr. DaPaul, 101 Starview, San Francisco, Calif. After Sept. 1st our address will be at 309 So. Ashton, Millbrae, Calif.

GREAT SURPLUS VALUES! BC-603 Receiver New \$23.00—BC-683 New \$37.00—R-26/ARC 5 Rec 3-6 mc New \$15.00—R-27/ARC 5 Rec 6-9 mc New \$15.00, used exc \$9.95—BC 659 Transceiver with PE-120 \$19.95—T-47/ART-13 Transmitters \$39.00—BC-603 AC Supply \$9.95—Collins Model TS-34/AP \$49.00—Sound-Powered Dynamic Phones Pr. \$4.75—Rec. Microwave R-111/APR-5 \$49.00—Collins Mod. Xformer 100 watt 811-PP to 813 final \$3.95—RA-62-C Power Supply A-C for SCR-522 VHF 110/60 cyc. New \$59.50—Kits only for sale: \$17.00—Ground-plane VHF antennas 40-200 MC. New \$9.95—BC-603 AC Supply \$9.95—T-201 used \$9.50—T-201 RC-5 New \$4.75—RC-458 \$10.00—RC-7 mc New \$10.00—BC-459 7-9.1 mc New \$12.00 HiMu Electronic Sales Company 133 Hamilton Street New Haven 11, Connecticut

S.S.B. Xfmr's. Exact type for "W2EVL Special", and other sideband units, brand new set of 3 for \$3.00. Brand new hermetically-sealed half-ampere bias power xfmr's, 13 lbs., \$4.00. No c.o.d., include postage. S. A. Tucker, W2HLT, 51-10 Little Neck Pkwy, Little Neck 62, L. I. N. Y.

WANTED: Communications equipment, late model, base station and mobiles. Also filters, for 75A3 rcvr, George Tate, W4AIS, RFD #4, Taylors, S. C.

200 Watt amplifier for 720 mc. Exc. cond. \$39.00 including 4x250M tube. W4ALE, Box 602, Cardiff, Calif.

LONG island tube headquarters. We stock more than 1000 types of tubes, surplus and recent production at maximum discounts. Maritime International, 199 Front St., Hempstead, L. I. N. Y. Tel. IV 5-2040.

BEGINNERS: Code memorized in one hour. New method. Used in armed services, Ham radio, Scouting, "Ketchum's Hour Code Course", \$1.00 postpaid. Money back guaranteed. O. H. Ketchum, 10125 Flora Vista, Bellflower, Calif.

SALE: Johnson Valiant, like new, in perf. cond.; \$275. Ben Sherman, 2243 E. 26th, Brooklyn 29, N.Y. KZEXE

FOR SALE: Johnson Matchbox, \$35.00; low-pass filter, \$8.00; standing wave bridge, \$30.00; Morrow CM-1, \$20.00; B&W 5100 and 515B, \$425.00. J. J. Gillen, W3ARI.

WANTED: Typing reperfector, late serial 75A4, new condition, reflecting telescope with drive mount W1VL.

WANTED: Type CME 50063 RME Preselector in gud condx. Write: Mike Delgado, Box 1542, Caracas, Venezuela.

SALE: HT-32, all xtals included. New condition, \$450. C. R. Nissen, W4BWR, RR2, Box 190, Melbourne, Fla.

SELL: SX-100, \$190; Heath DX-20, \$30, Lettine VFO, \$20; Heath SB-10, \$85; Drake Omultiplier, \$7.00; or the whole works for \$310.00. All gear in unaltered A-1 shape in use at present time. Am looking for Heath mobile gear. Don, K2GBN, 174 Ramsey St., Paterson 1, N. J. Tel. MU 4-0690.

FOR Sale: Viking Vallant \$325.00; going mobile. Also D-104 mike and co-ax relay Martin Manes, K2ZGB, 148 West 23rd St., New York 11, N. Y. AL5-1718.

WANTED: Teletype equipment, Tom Howard, WIAFN, 46 Mt. Vernon, Boston 8, Mass.

PLEASE Notice! Hams south of Boston, Massachusetts: Bob Graham now has another exclusive amateur radio store at 1105 North Main St., Randolph, on Rte. 28. 1 mile south of Rte. 128. Telephone: WO 3-5005.

SELL: HRO60T Super DX installation. Standard coils plus broadcast and high sensitivity 10m and 15m coils, NBFM adaptor, xtal calibrator, 6OSC2 comb. spkr, and coil storage rack. New price, \$989. Good as new, \$459. W9ADN, Box 117, Lockport, Ill.

CO-AX 80 ohm TV original packed 300 ft rolls, \$8.00 each prepaid eastern U.S. J. Kelly Johnson, 184 South Ave., New Canaan, Conn.

COLLEGE Bound! For sale: HQ-150, DX-100B, AM-2 S.W.R. Bridge. Low key co-ax relay, excel cond; first check for \$350 takes them. You pay the freight. K2MGU, Paul Bakerman, 216 Cobb Terr., Rochester 20, N.Y.

GLOBE Hi-Bander VHF-62 kit for sale. Make offer. W1EQD, 267 Rockwell St., Winsted, Conn.

COLLINS DC supply 516E-1 (#1342), never used, \$225; 75S-1 (#1088), 32S-1 (#1167) and 312B-4, all three like new, \$1020; AC supply, 516F-2, \$90 and RCA 3" oscilloscope \$25.00. All Collins equipment perfect and with original cartons. Want B&W L1000A, W2SJK, John F. Ashton, 224A Rye Colony, Rye, N.Y. Tel. WOODbine 7-5520.

HQ-140X, \$130. Jim Connor, KODL, 33 Middle Rd., Bedford, Mass.

SX-100 receiver for sale. Perfect condition. \$195.00. N. Brooks, DL4VQ, Quarters 1106A, Ramstein AFB, Ramstein, Germany.

SELL: Receiver National 183D. In gud condx. Xmr: Home brew 90 watts, phone/w/ve 10-20-40-80 meters. Best offer: Gantcher, 1973 81st St., Brooklyn, N. Y. Tel. Terrace 7-1354, K2AAZ.

CANADIANS! Complete ham station sale for \$299; Heath DX-40, Heath VFO, Globe Matchbox, Jr., 300 wv Voltage regulator, Hallcrafters SX-99 and loudspeaker, Heath O-multi, Dow-Key pre-amp and coax ant. change-over relay; 729 Elctro-voice mike, Johnson key, headphones, spare rcvr and xmtr tubes. All in gud condx—used about one year. Will sell or swap for RME DB23 Preselector, Polaroid Speedliner Model 95A camera with carrying case, flash, filters, gud condx. M. D. Kierans, VE1YR, 345 Hennessy St., Bathurst, N.B., Canada.

CANADIANS! For sale, DX-100, unmarked, unmodified and only used a few hours; \$200.00 cash. Beadle (VE4PR), Officers Mess, Ft. Churchill, Manitoba, Canada.

CANADIANS: Collins 75S1 rcvr with noise blanker installed, 32S1 transmitter and 516E2 AC pwr, supply. One year old and 400 new condx. \$100. F.O.B. Winnipeg, Manitoba, Can. Will ship in original packing. Also RME VHF-152A 2-6-10 converter in exc. condx, \$45.00. Call or write VE4AB, W. H. Galpin, 175 Lanark St., Winnipeg 9, Man., Canada.

CANADIANS: Available against ham equipment: wired new Heathkit ten transistors Mohican receiver; 12 volts DC AT-1 Marconi transmitter; ten cubic feet DeLuxe Frigidaire, VE2OU, Box 355, Riviere-du-Loup, Quebec P.C., Canada.

SELL: HQ-170, \$290; Globe 6NZ, \$100; Viking Ranger PTT, \$180; NC300-62 1/4 meter converters, \$340; Gonset III, \$215.00; Heath grid dip meter, \$18.00; D-104 mike, \$17.00. All in mint condx. Prefer a pick-up deal. Peter Miller, WIAMJ, PL 9-2922, Chandler Drive, Prospect, Conn.

I Will accept a certified check for the following items and you pay the shipping costs; KWS-1, all modifications by Collins, \$116.00; Jones SWR bridge and indicator, \$51.00; Astatic 10-11 mike with stand, \$22.20. R. L. Pixler, Rt. 1, Box 354, Avon Park, Fla.

HALLICRAFTERS SX-110 receiver, practically new, in perf. condx. Will be shipped in factory box with manual, R-47 speaker included, \$129.00; Globe Chief 90 in exceptional condition, with manual, factory-wired, \$34.00; 40 watt plate modulator, P.P. 807s, sharp grey paint with technicals, looks professional, \$19.00; International FCV-2 6 meter converter, factory aligned, \$9.00; Vibroplex Champion, used two weeks; shipped in factory box, \$9.00. Collage forces sacrifice of entire station, Ron Schuster, K8KRM, 4346 West 193rd St., Cleveland 26, Ohio.

2-Meter Communicator III, \$220.00; Regency ATC-1, \$50.00. Both in exc. condx, with all plugs, cables, factory cartons, and manuals. Marvin Wallach, K2GFZ, 217-57 Kingsbury Ave., Hollis Hills 64, N. Y. Tel. SP 6-9442.

FOR Sale: Deluxe Rotator, Model 160-003, Ampheno, American Phenolic Corporation; Flexo Action Gear Co., Merkle, Korff, Signal Saurier Direction Indicator and cable, \$65.00. Claude M. Philips, W5KJ, 444 Hammond Ave., San Antonio, Texas.

FOR Sale: GPR raioi with dial tuning dials. Double conversion. In perf. condx. Price: \$255.00. Sorry, pickup deal only. F. Rodio, WAZGKA, 450-51st St., Brooklyn 20, N. Y.

WANTED: Collins 2 and 6 Kc filters for 75A4 receiver. KØAEK, 4390 West 17th Ave., Denver, Colo.

WANTED: Schematic for Springfield TRX-144A Walkie-Talkie. Will pay good price. Wayne A. Smith, 128 Powers Rd., Bedford, Ohio.

WANTED: Cash for surplus tech manuals, one or one hundred. State condition and equipment type. W4FQX, Box 2513, Norfolk, Va.

75A3, spkr, perfect condx, \$375; 10B exc. w/VFO, \$115; KW linear final, bandswitching, \$100, W7BMO, Box Elder, Mont.

FOR Sale: Johnson Viking Pacemaker, \$285.00; Thordason speech amplifier 2A3 output, 10 watts, \$25.00, Henry Clark, 3 Elizabeth Lane, West Paterson, N. J. Tel. LAMBERT 3-0991.

SELL: Collins KWS1/75A4. Latest modifications and instruction books. Try out, pick up only, \$1400 cash. KØDRU, 2690 14th Ave., Marlon, Iowa.

HALLICRAFTERS S-53A rcvr with "S" meter: \$65.00. Will be willing to ship. F.O.B. Jackson Heights, N. Y. R. Glascock, WA2HBE, 3564 80 St., Jackson Heights 72, N. Y. Tel. NE 9-8863.

SELL: Excellent NC-98, Globe Scout 680, Triplett 631, VOM-VTVM. Best offers, All answered. Jerry Sutton, 1205 Gillespie Rd., Chattanooga, Tenn.

SELL: 75A-4 with speaker, Serial #2560, \$505. David Talley, W2PF, 130 Martense St., Brooklyn, N. Y.

SX-28, in A-1 condx, just serviced. Guaranteed. \$90. Also Globe Chief 90-A F.W., \$50.00. Bill Woelner, Jr., KN8VUH, 7198 Kenwood Rd., Cincinnati, Ohio.

COLLINS KWS-1 transmitter 75A4 receiver speaker mike, complete, all in like-new condx, \$3,000 value. For cash sale and pick-up, \$2,000. Commander J. Zammit, U. S. Naval Radio Station (T), Cutler, East Machias, Maine.

ELMAC AF-67 and PS-2V supply, in exc. condx, both for \$150.00; guarantee shipping anywhere. C.O.D. Also Morrow MB-560 and its AC supply, and \$200. Also remains of my station, WIUGH, Dave Mello, 58 Packards Lane, Quincy 69, Mass. Tel. GR 2-4649.

WANTED: 813s, new or used, 0-1 millimeters. Larry Klebox, K9LKA, Belvidere, Ill.

SELL: SX-42, Comanche MR-1 with AK-7, UT-1, DX-100 with AM-2, VX-1, W3FYJ, 501 Cambria St., Punxsutawney, Penna. NEW 4X250B, \$10.00; socket and chimney, \$7.50; 4-65, \$3.50. Mason Booth, K6UWD, 110 Olive, Piedmont, Calif.

SELL, Or Trade for guitar: Eico 90 watt xmt, Heath VFO, BC-312 w/pwr supply ex matching spkr, 14AV vertical w/100 ft. coax, bug, \$180.00, W.A.C., W.A.S.: Jim Lichens, WA6DPR, 1309 Ramona, Salinas, Calif.

COLLINS 3OS-1 amplifier run 44 hours operation. In mint condx on air. Settle estate, \$1225.00, "Frank", WA2FMC, Rt. 111, Smithtown, N. Y. Tel. Andrew 5-6137.

HAVE OLD QSTs. Send your want list. Mrs. Conrad Bardsley, 119 Wythburn Rd., South Portland 7, Maine.

WANT: Viking Navigator: 4-250As; Tri-band KW beam; 600 watt mod. xfmr. Sell: RME DB-23 Pre-selector, \$30; PE-103, \$20.00; Dynakit 60 w. amp. and preamp, \$95; new Shure 55 mike and low impedance xfmr, \$40.00. Fairchild diamond monaral cartridge, \$13.00. Sam Thompson, 2187 N. W. Kearney, Portland, Ore.

TELREX 6-El, 10-meter beam, 36 ft. boom, Model 10M-56-235, in new condx, \$150.00; 4-el, 20 meter beam, 36 ft. boom, tip-over fittings, all aluminum. Cost \$200.00 new; sale price, \$85.00, in perf. condx; Gonset 3220 Tri-band beam 3-el, in exc. condx, \$75.00; Spaulding commercial tower 64 ft., guyed, new, \$125.00; 80 ft. model of same tower, 1 year old, \$165.00, Frank Smith, RFD 3, Paw Paw, Mich.

FOR Sale: Adams linear amp. with spare 4-400A and spare plate xfmr, clean, \$350.00, W2VCZ, 30 Pitcairn Ave., Ho-Ho-Kus, N. J. Tel. GI 4-3535.

HQ-110, \$160, Globe H9Bander, \$85.00, K3EAN.

GOING TO College! DX-100, \$150.00; D-104, \$14.00; Mosley TD33JR, \$60, 50 ft. mast, 15 beam, rotator, \$35.00, K5IUA; Box 1, Ponchatoula, La.

FOR Sale: Two 304T1, one 304TH. In original cartons, unused, guaranteed, \$30 each. Brewer, 2208 11th Ave., Greeley, Colorado.

FOR Sale: Meissner Model EX Signal Shifter VFO, 80 thru 10. Power supply and NBFM, \$30. F.o.b. Marion, Ohio, W8SSL.

FOR Sale: Johnson Navigator, 40 watt exciter-CW xmitter, 160 through 10. Modulator could be added easily. Stable VFO, two crystal positions. Crisp chirpless timed sequence keying. Perfect condition. Wired by electronics instructor, laboratory calibrated. Factory carton, manual, \$140.00 express prepaid in the 48 continental upon receipt of certified check or money order. Prof. Lawrence Roberts, W4RVB, University of Tampa, Tampa, Florida.

FOR Sale: Gonset Communcator, 2-meters, \$135.00; 2 Gonset 2M linears, \$85.00 each, NC-98, \$95, Richard Light, 124 West 79th St., New York City.

HALLICRAFTERS S40B with QF 1, clean, \$50.00, Bill King, 204 Lagoona, Northfield, Ill.

GONSET Twins: G-66B, with 3-way power supply; G-77A, complete with all cables and Shure 505C mike, A-1 condx electrically and physically; \$450.00, Dick Kill, K8GNU, 2103 Karl Rd., Bay City, Mich.

FOR Sale or trade: Factory wired Viking Valiant transmitter with mint condx. Price \$275.00, E. R. Arms, W9PBL, RFD, 1, Harrisburg, Ill.

WANTED: OSTs for personal collection: Jan, 1917, February 1917, May 1917 and September 1917. WCUT, Box 1, West Hartford 7, Conn.

SELL: Heath mobile, Cheyenne, Comanche, power supply, SX-101, Mark III receiver, Heathkit 0-11 oscilloscope. Best offer, W2YCS.

SELL: Heavy duty prop-pitch motor, in exc. condx, \$30.00, 1. Savage, 2 Forest Ave., Old Tappan, N. J.

HAMMARLUND HQ-110-C receiver with clock, like new condx, with manual, in original carton, \$170.00, George Waldheim, W2WVJ, 530 Chestnut St., Kearny, N. J.

WAS, DXCC Aspirants! Send Reply-Paid QSLs! Standard or Personalized, Five usable samples, 25¢, Hart, 467 Park, Birmingham, Michigan.

SELL: Anache, in perfect condition, \$250, K0QJB, 1008 East Sixth, Sioux Falls, So. Dak.

TRADE KWM-1 with noise blander, 12 volt supply, mobile mount, recent factory overhaul, in exc. condx, for Questar, W2HXG, 105 State St., Seneca Falls, N. Y.

SELL: NC-98, \$95; DX-35, \$40; Knight VFO, \$20; or make offer, K8GWK, Trobridge, Union City, Ohio.

NC300, in exc. condx, \$219 with speaker, XCU 300 calibrator, \$10, W5VDC/9, 18 N. Lewis Ave., Waukegan, Illinois.

FOR Sale: 4-1000As, \$20; 4-250As, \$10; 4-125As, \$7.50; 250THs, new, \$7.50; 810s, \$6.00; VT-127As, \$5.00, Peter W. Dahl, K0BIT, 5331 Oaklawn, Minneapolis 24, Minn.

SOUTHERN California: Transmitters and receivers repaired, aligned, bandwidth, frequency, harmonics measured, Used ham gear bought, sold, traded, Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel. Kellog 8-0500.

FOR Sale: Hallcrafters SX-71, Heathkit DX-100, Both in gud condx. Best offer, 1140 South Elm, Webster Groves 19, Mo.

WILL Trade HT33A, in mint condx, for KWM-1 power supply and speaker, in mint condx, W7HTB, 2709 5th Ave. So., Great Falls, Mont.

SELL: SX-101A Mark III, HT-32, \$700. Unaltered. One owner. Located within 50 miles N.Y.C. Bob Herzborg, W2DJ, 241-16 Alameda Ave., Douglaston 62, L. I., N. Y. Phone Bayside 5-5384.

WANTED: Johnson Matchbox 250-23, WA2EKE.

WON a Valiant, Quick sale, DX-100, \$150. Can be seen in operation. Will deliver within 100 miles. All replies answered, Ray Gianchetti, WA2CUB, 560 Barlow Ave., Woodbury, N. J.

GOING TO college: Selling SR-34 AC, \$290; SX-99, \$100; Globe Chief 90A, \$40. All are in excellent condition. WA2CBS, 144-11 Jewel Ave., Flushing 67, L. I., N. Y.

SELL Or trade: Gonset GSB-100, like new, condition, price \$335, K0KKL, Chuck Jovenal, 6923 "B" St., Omaha 6, Nebraska.

SELL: Globe Chief 90A, near new, \$35, K0WGA, Kenneth Johnson, Cooperstown, N. D.

DX Adapter for KWM1 for sale. Unused, new. Best offer takes it. Must be sold, Stephen Dames, 64 Grand Pl., Arlington, N. J.

SELL: SX-28A, in gud condx, with Q Multiplier and spare tubes, \$75; Heath SWR meter, \$8.00, WA2BFP, RD 1, 4 Crooked St., Ballston Lake, N. Y.

TRADE: Two new Scott-Atwater outboard motors 4 & 5 horse-power both with forward neutral, electrical shift for commercially built amateur xmitter and rcvr. Separately or together. Give details in first letter, K5OQQ, Olney, Texas.

FOR Sale: SX-96, in like-new condx, \$149, K2ZRU, 684 South Washngton Ave., New Market, N. J.

WANTED: World War I French L-3 amplifier, Mu-Rad receivers and R.F. transformers for electrical test. Buy, borrow, trade. Also 11V206, UV208 tubes, Grote Reber, Research-Cottrell, Bound Brook, N. J.

SELL Gonset III 12V-6M, in new condx, K2BPX, 709 Graisbury Ave., Haddonfield, N. J.

BARGAIN: Collins 32S-1 transmitter, \$450; 516F2 power supply, \$80. In exc. condition, will ship prepaid express, Frank Layton, W7IQS, 731 W. Dana, Mesa, Ariz.

UNMODIFIED equipment: DX-35 with VF-1, SX-99, Heath AR-3, all compactly contained in wooden cabinet, \$135, K6ULH, 1475 Riviera Dr., Pasadena, Calif.

KWS-1, perfect electrically and mechanically, \$1,025, R. Matthews, 4246 Woodfield Lane, N.E., Cedar Rapids, Iowa.

BUY, Sell or Trade, short-wave ham receivers, transmitters, Trigger, W9IVJ, 7361-1/2 W. North Ave., River Forest, Ill. Chicago, Phone TXuxedo 9-6429, Monday-Friday, 12 N-9 PM; Sat., 9 AM-5 PM.

FOR Sale: Collins 75S1, \$400; Collins 312-B-2, speaker, wattmeter, \$100; AR-22 Rotor, \$15; 2 low-pass filter B.W., \$7.50; 1 Sonar L.P. filter, \$7.50, J. H. Garretson, 1235 E. 40th St., Brooklyn 10, N. Y.

TYPE AC 15M breadsup coil for HRO-50, \$20, W5CPZ, 2917 La Veta N.E., Albuquerque, N. Mex.

SELLING Out: 75A4, \$625; G4ZU beam, unopened, \$70; CE 100V factory guarantee, \$680; 75M Heliwhip, \$7; KWS-1 perfect, \$975; 6V mobile P.S., 425V-375 Ma, \$20; Fisher PR 66 stereo preamp, \$18; Bell 3030 stereo preamp and amp., \$100; Roberts stereo 4-track record and playback with preamps and amps for speakers, \$375; Concertone (American Electronics) Custom 33, scrics 7 1/2 and 15 IPS, stereo recorder, preamp, 10" reels, 4 heads and room for 5th, carrying cases, \$690, W3VDE, 1219 Yardley Rd., Morrisville, Pa.

SWAP 304TLs new for 100TH or 250TH, also BC610-H, new condx, Paul Ralston, 1501 E. 38th St., Indianapolis 5, Ind.

HALLICRAFTERS S-76, fairly good on SSB, \$99, Philip Paul, Box 2447 Area C, Wright Patterson AFB, Ohio.

FOR Sale: New, in original carton, 4CX300A with socket and chimney. Best offer over \$10.00 takes it, WA2AJP, 62 Aster Dr., New Hyde Park, N. Y.

SELL: Pair Electro-Voice 664 Dynamic mikes serial nos. 26575 and 26576, \$65 per pair or \$35.00 each, Heath HW-19 10-meter transceiver with mike and crystal, \$35; Heath AA-1 Audio Analyzer, \$40; Eico HF-30 30-watt high fidelity amplifier, \$35; Homebrew 10-watt high fidelity amplifier, \$15 (see p. 55 Nov. 1953 Radio-Electronics), Weathers KM-1 turntable, \$25; ESL S-1000 phono arm with Fairchild SM-1 stereo cartridge, \$45, Peter Stark, K2QAW, 519 East 86th St., New York City, telephone RE 4-4513.

DX-100, S-38E, Heath Q multiplier, relay and Balun coils. First \$200 takes all, WA2FCU, Robert Shafer, Margaretville, N. Y. Phone 0143 after 7 PM.

SELL: SX-99, A-1 condx. Best offer, Leon Steinberger, W2EVV, 55 Lenox Road, Brooklyn, N. Y. Tel. BU 2-4737.

KWS-1 Transmitter, SSB, AM, CW, excellent condx, leaving for college. Must sell immediately! Complete with 10D microphone, spare 4X250Bs, Best buy in country! \$975.00, F.o.b. Detroit, K8DZQ, 5566 West Outer Drive, Detroit 35, Michigan.

MOBILE: Selling Heathkit MT-1, MP-1, Gonset Super 12. Interested in Collins 32S1. Make offer, K2YOR, Bethpage, N. Y. PErshing 5-8903.

GONSET G-50 6 meter transceiver in excellent condx. Best offer over \$220 takes it, Robert Barnett, K2VDI, RFD #5, Box 195, Kingston, N. Y.

FOR Sale: Complete single sideband station Cosmophone 50 with AC supply, \$500.00, Write W2ZRA, Harry Paskin, 63-04 Forest Ave., Ridgewood 27, N. Y.

CUSTOM Built chassis for your pet project. Free estimates. Mail sketch or print, Browne Elec-Tool Associates, 5501 SW 25th Court, Hollywood, Fla.

ARIZONA Amateurs. Surplus Electronic Parts, Beacon Electronics, 1226 S. 26th St., Phoenix, Ariz. Open evenings only and all day Saturday.

KWM-1 extra crystal, AC, DC, supplies, mobile rack, cables, new Heliwhip, band mobile antenna and mount, \$735. Dr. Gordon, 12 N. 27th, Camden, N. J.

DX-1000, sud condx, modified for SB10, \$160; SB10 A-1 condition, \$90. F. Graenings, W9KHS, Tremont, Ill.

FOR Sale: Rack panel 20A factory built QW, 458 VFO, 160-10 meters, \$190. W5CZZ, Box 43, McGeehe, Ark.

ESTATE of WIGBO, National NC300 with speaker and 100 KC calibrator, \$240. Globe Champion model 300, \$275. Len Luther, W1BGA, Phone PA 5-0675.

KILOWATT Pair 813s, \$500.00 Navy CME-50063 Preslector, new, \$50. Louis Hodges, Arcadia, Missouri.

BEGINNERS: Code memorized in one hour. New Method. Used in Armed Services, Ham Radio, Scouting, "Ketchum's Hour Code Course", \$1.00 postpaid, Money back guaranteed. O. H. Ketchum, 10125 Flora Vista, Bellflower, Calif.

SACRIFICED, selling out, 400 watt phone/c.w. transmitter, Bandswitching, plate modulated, complete, \$165. 100 watt phone/c.w. transmitter, Bandswitching, plate modulated, complete, \$85. 3" lab. oscilloscope, \$20. 30, 144 or 220 Mc. converters, crystal controlled, \$12.00 each, 2 meter portable battery operated transmitter, \$9.00. Will ship any of the above. Let's go! Howard Fruchter, WA2DCM, 589 Barnard Ave., Woodmere, N. Y.

CRYSTALS Airmailed: SSB, MARS, Net; Custom finished FT-243 .01% any kilocycle 3500 to 8600, \$1.49 (10 or more FT-243, 99¢) any quantity Novine 99¢; 1700 to 20,000, \$1.95; 20,000 to 30,000, \$2.25; add 60¢ to prices for HC-6-u hermetically sealed crystal packages; June 1958 QST, SSB Hand book, "SSB Package", 5 mixer FT-243, \$9.95 sets; Nov. 1959 "Phasing Sideband"; May 1960 "IMP"; November 1960 p. 40, six matched filter, Crystals for all projects. If you don't see it, write, Airmailing 9¢ crystal, regular 5¢. Crystals since 1933. C-W Crystals, Box 2065Q, El Monte, Calif.

SELL: Everything from tower to tubes. Moving to apartment. High and low power components: modulation and power transformers, matching meters, rack cabinets, rack panels, new transmitting and receiving tubes, Robinson tower, Variaes, sockets, chassis, oil capacitors, chokes, etc. 6M, KW; NC-300; SP-600, Centimeg 432 Mc. and Filter King 220 Mc converters, Jones VHF-UHF directional coupler and much, much more. Prefer local transaction but will ship. Send stamped envelope for list. Larry Kohlman, WB-C, 330 Beechmont Drive, New Rochelle, N. Y., Phone NE 2-5760.

EICO 720-K for sale, \$75.00; in perfect condx, 1'ke new. Doug Swanson, WA2KJP, 29 Oakwood Tr., Sparta, N. J.

SALE: Johnson T.R. Switch, \$16.00. Transformers, chokes, coils, tubes, meters, condensers, rack, police receiver, much more. Stamp for list. Claude, K4ODC, 213 Linda Lane, Madison, Tennessee.

HT-37 Xmtre-Exciter unit. Used ten months. Exc. condx. \$355.00 cash or check. No trades. A. G. Gibbons, 817 Merrifield St. S.E., Grand Rapids 7, Michigan.

FOR Sale: Mint condition Harvey-Wells F-90 and equivalent 115 volt AP-90 supply, \$100; all band 813 linear or final with power supply, \$80. Excellent self-powered TR switch, \$12.00, good Q multiplier, \$6.00, three months old Hy-Gain Triband 2-el. beam and AR4 rotor, \$75, excellent homebrew SSB-CW receiver, \$35.00. Write for photos, diagrams, Jennings P.O. 7152, Greensboro, N. C.

QST, Radio, CQ 1937 through 1954. Some binders. Stamp for list. Box 1002, Lima, Ohio.

SALE: Valliant W/T \$325.00; Hammarlund HQ-110C clock and speaker, \$180. Myron Caplan, 312 Hedgerow La., Wyncote, Penna.

COLLINS 32S-1, \$510; 75S-1, \$410; 30S-1, \$1175; 312B-4 console, \$150; 316F-2 AC supply, \$90. K2TXR, 83 Burhans Ave., Yonkers 2, N. Y.

DX-40, will ship, \$50. K3JHG, 2789 Highland, Broomall, Penna. EL 6-0822.

SELL SX71 revr, \$115; DX20, \$25.00; Heath VFO, \$17; all in exc. condx, Bill Hewitt, K2VIC, 451 Conger Ave., Collingswood, N. J. Tel. UL 4-0488.

KWM-1 installed in 57 Olds Super 88, full power, air conditioned, A.C. supply. Write for detailed description, W2WK, 548 Brookside Ave., Freeport, N. Y.

WILL Swap for commercial receiver or transmitter—A brand new Bausch & Lomb 500 watt automatic protector (won in raffie) with remote control, case, etc. Stan Cokas, 16 Edgerhill Rd., Swampscott, Mass.

SELL: NC-303 WVV crystal calibrator, spkr, \$340.00; Apache transmitter, \$220; DX Hound beam, \$20. The whole works—\$535.00. Jerry WAZFPN, Tel. GE 4-5431, Brooklyn 30, N. Y. 763 Ocean Pkwy.

SALE: Station—Hammarlund HQ170C, Viking I with VFO, 6N2 with VFO, Tecraft 2M conv. 30 ft. tower, 4-clement 10M beam, \$80, 6M beam, CDR rotor, \$620, John Entwistle, K2ZZT, Medford Lakes, N. J. Tel. OL 4-4643.

COLLINS Complete station: 75S-1 with 500 cycle filter, 312B-3 spkr, \$25; 316F-2 AC supply, Electro-Voice #4 1/2" mike, w/stand; MicroMata, Ohmite dummy antenna, 25 ft. new co-ax, Mospley mobile antenna, instruction books and factory cartons. Everything perfect, \$895, F.o.b. WIRMS, 198 Euclid Ave., Waterbury, Conn.

SELL: BC348N, \$50; BC314G, \$39; BC455, new, \$10; used, \$6.00; Precision E200-C, \$45.00; DB23, \$35; parts for sale. Stamp for list. M. J. Marshall, 455 Washington Ave., Dumont, N. J.

WANT To sell: 32V2 with spare final tube, \$225, in exc. condx. Russell Dye, 1011 Boland, Richmond Heights, Mo.

HT32A, 75A3, quad, \$800. W2MHL.

COLLINS 32S1, 75S1, 516 F2 Serial # above 2000, \$925.00. Ed Rosen, 229 E. 18th St., Brooklyn, N. Y. Tel. BU 7-0970.

WANT National 183D, Will trade Uniontr 2.4' refracting equatorial-mount astronomical telescope, K8BLL, 483 Ridge-way, St. Joseph, Mich.

SALE: 7 ft. 7 in. rack, fully enclosed, black crackle finish 19" panels. Too tall for my ceiling height. Will sell for \$25.00 or trade for rack less than 7 ft. high but taller than 3 ft. W3VDA, P.O. Box 1225, Harrisburg, Penna.

MUST Sell, need cash! Johnson Viking II, VFO, Matchbox, low-pass filter, SWR bridge, Asking \$215.00, W3BUC, 309 Vine St., Perkasie, Penna.

QST, 14 year run, 5 in binders—\$35.00, CQ 12 year run, ditto, \$30.00, crated. Want KWM-1 with AC power, W8GWA.

VF-1 VFO, Heathkit, \$15; K3SLR, Mike McCalley, 305 Worthington Rd., Towson 4, Md.

SX-111, \$200; Temco 250 watt AM xmt, \$110; 85 ft. crank-up and Triband, \$195.00; AF-67, \$120; SX-28 and Q mult; \$80; Heath lab sig. gen., \$35.00; Waterman 2 in. scope, \$15.00; Johnson all-band coil, \$12. K6UYD, 650 West Collette, Santa Rosa, Calif.

FOR Sale: SX10A, \$325; Drake 1A, \$225; both in perfect like-new condx, w/spkr and books. Gonset Super Six converter, \$30.00, in gud condx, freight prepaid in continental USA. Prices lower for local or a pick-up deal. Wanted: 500 cycle filter for 75A4, DX-20, Trades considered, W4SFL, 125 New St., Decatur, Ga. Tel. BUtler 4-2494.

100V for sale: used about 15 hours, \$650.00. Need the cash! MM2 with 50 Kc adp. for Hallcrafters revr, like new, \$100. K9CNG, 839 N. 6th St., Vandalia, Ill.

FOR Sale: 3 home brew transmitters, 200, 400, and 600 watts. Selling due to illness. Any reasonable offer accepted. W. Dixon, 1038 Boston Rd., W2BCY, LU 9-1420.

75A2, Full AVC on SSB, \$275.00; 120 mfd, 3000 volt oil-filled cond., \$35.00; locally, \$5.00 to crate, BC348 converted to AC, \$35.00. All F.o.b. W5BDE, 1411 LaVerne, Shauance, Okla.

SELL: DX-100B with MK-1 kit, built in for SSB and SB-10. Sell one or both. Amos H. Carmical, K4IZU, 521 Fleeda Rd., Memphis, Tenn.

SELL: Guaranteed new condition HT-37, \$400. W4PED, 112 Sheffield St., Belvedere, S. C.

COMPLETE All-band mobile station, Palco 65-A xmttr, Harvey-Wells R9A revr, Heath HP-10 (new), transistor power supply, Dow-Key DK60G (new), E-V 210s carbon mike, Mark Heliwhips (10m, 15m, 20m) and base mount, \$300 complete. Also James C-1470 12vdc/110vac mobile supply, \$30.00; new Hy-Gain TGS-3 Triband beam, \$65.00. All above with manuals. K1GAW, 123 Maple Ave., Windsor, Conn.

WANTED: Xmttr, revr, VFO, bug, xtal cal. Ted Beseparis, Frackville, Penna.

32V3, \$375; SX-101, \$220, beam, \$50.00. Don Gordon, 4724-17th St., San Francisco 17, Calif.

SX-100, in exc. condx, \$180 plus express. Danner, 840 South 29th St., Omaha, Nebr.

FOR Sale: FCV-2 model 144 converter with STPM-1 cabinet, \$18. David Oliver, KN9VUA, Godfrey, Ill.

VIKING II, excellent condition, with VFO, book, new 807S, 6146s inside, \$200. Will ship to point in USA. WA6AJD Carl Olson, 15436 Faymshitt, Gardena, Calif.

SELL: Eldico 1000F, perfect. Two 4CX300As at 2500 volts; built-in scope, quiet power supply and blower; 50 ohm resistive input; no padding required with 32S1 or similar exciter. Have KWS-1 so will part with this table-top beauty reluctantly for \$500. W2KOY, 1740 Front St., East Meadow, L. I., N. Y.

ELMAC AF67, \$90; Gonset Tribander, \$17.50. In gud condx. W6HOJ, 2096 Hamner, Corona, Calif.

HT33A Hallcrafters Kilowatt Linear; new in Oct. of 1959. Clean, excellent, \$955.00. Need the cash. W2PMR, 433 Abington, Bloomfield, New Jersey.

FOR Sale: Collins transmitter KWS1 and receiver 75A4, used very little, like new condx, \$1800. L. Klinzel, Rte #4, Lake View Drive, Pewaukee, Wis.

G5B-100 for sale. In exc. condx, year old; \$400. Conflict of interest forces sale. George Scott, W2LFX, 6 Stuart Drive West, Glen Cove, N. Y. ORiole 6-2088.

SELL: 75A4, Serial 4400, spkr, two filters, \$550; Collins 32V3, \$400; both in excellent condx; shipped prepaid to highest certified check. W3QNQ, Joseph M. Mazzell, 1314 Romine Ave., McKeesport, Penna. Tel. OR 2-0514.

SELL: Hi-Fi gear: ham gear, antennas and accessories, Write for list. K2IKZ.

TRANSMITTER, Etc. W2EWL design for 20 & 75, works fine, \$30.00; some parts for pwr. supply—ARC5 (Q5r) with xtal conv. for 20, \$25.00, converted 5CR522 in beautiful cabinet for 2 meters, \$25.00, 12V DC trans. power supply 600V @ 200M, \$25; Heath amplifier model A9, \$25; Johnson K/W Matchbox, \$75; Hallcrafters SX100, excellent, \$150. Offers on the above considered. F.o.b. Washington, D. C. S. Ades, W3WQN, 1924 Tulip St., N. W. Washington 2, D. C.

COLLINS 32S1, brand new, unopened carton with warranty; \$575. W8WGA.

SELL: NC-300, matching spkr, NC-2 meter converter, \$250.00. All in like-new condx. K2YEQ, 57 Melbury Rd., Babylon, L.I., N.Y.

WANTED: Two 805s, in gud condx. Also desire hams motoring through Asheville, N. C. to enjoy my first-rate motel with use of 400 watt AM/CW SSB rig on 10-15-20-40-75. Old Timer hospitality. Joe, W4OLU, Bennett's Motel, Asheville, N. C.

MID South area, for sale: HR-050 with A.B.C.D coils, NFM adapter, calibrator, and spkr. W4HHK, Box 417, Collierville, Tenn.

INDIANA'S Oldest ham distributor offers the following: 75A2, \$295; 75A4 (spotless) \$550; 312B1, \$12.95; F455J-15, \$35; SX101 1H, \$299; NC98, \$109; HQ-150, \$219; HQ-170, \$295; G66B W/3-way supply, \$119; G77A W/3-way supply, \$219; Hunter Cyclomaster (clean), \$89; Heath DX100, \$169; SB10, \$85; Apache, \$275, many others. Write us on your needs. Radio Distributing Co., South Bend, Ind.

GONSET G-50, excellent condx, \$225. W4OPB, 207 Pollard St., East Point, Ga.

SELL: Apache, \$215; SX-100 with R-46B spkr, \$190; AM-2, \$10; QF-1, \$3; Dow-Key DKC GEE relay with connector, \$8. All equipment is in exc. cond. KIGUX, 143 Sproat, Middleboro, Mass.

SB-10 Heathkit sideband adapter, exc. condx, \$79; Elmac PMR7 revr, \$115; BC779 Supor Pro revr, orig. pwr, supply, book, beautiful, \$115. All F.o.b. Rte. 2, Box 314W, Tallahassee, Fla.

FOR Sale: SX-101A, R-48, \$290; HT-32A, 3 mixer xtals, \$440; 32 ft. KTV w/pc, complete, \$65.00; Hy-Gain RBX-1 rotator, \$135; Telrex Triband TBTE beam, \$70. All equipment 9 mons. old and F.o.b. A. J. Lebel, Maple St., Middleton, Mass.

NOISE Blanker for KWM-2, never used, \$50.00. KOGRP, Estelline, S. D.

KWS-1, first come, first served! \$900 you pick it up. Virgil Shaffer, 3165 Grove Court, Cedar Rapids, Iowa.

FOR Collins in Detroit Area, it's Michigan Ham Headquarters, also a large selection of trade-ins on display. M. N. Duffy Ham & Electronics, 2040 Grand River, Detroit 26, Mich. Tel. WO 3-2270.

WANTED: KWS-1 without power supply. Miller, 603 Bunkers Cove Road, Panama City, Fla.

SELL OST 1936-1959 run, four or more, 25¢ each. W0MCX, Art A. Jablonsky, 1022 N. Rockhill Rd., Rock Hill 19, Mo.

TRANSFORMERS (3) W2EWL Special, \$3.00 PP. Coils L1 thru L7, 3 xfrms, template for "W2EWL Special", \$10.95 PP. Vitale, W2EWL, Denville, N. J.

REGINNER'S Equipment: Instructograph Junior with instruction book and tapes 1,2,3,4,5,6,7 and 13, \$15.50; QF-1 O-multiplier and cabinet AR-3 receiver, factory aligned, both for \$30.00; CT-1 in-circuit capacitor checker, \$6.50. K1JZU, 13 Seagate Road, Darien, Conn.

WANTED: Panoramic adaptor or similar display device for use with 455 Kc I.F. receiver. W8HMU, R. J. Steiger, 1953 Lakeview, Trenton, Michigan. Tel. OR:6-5924.

WILL Trade Collins S Line 3251 (with noise blander): 30S1, 31B4; MM-2 scope. All for late model car plus cash, if necessary. K7EPD, 3850 E. Elm St., Phoenix, Arizona, CR 9-2824.

SELLING 32V2 complete TVT'd, \$300; 75A1 plus speaker, \$325; kilowatt xmtr 250THs, \$250, Mort Bernstein, W2KJT, 38 Dorchester Dr., Manhasset, N. Y.

BARGAINS for "cash": HT-37 Demonstrator, \$319; KWM-2, used, \$769; Collins S-Line, complete, \$895, 100-V, \$595; 30S-1 Linear late ser, no. 101099; HQ-140X, perfect, \$139; Drake 2A revr, \$209. Ed Moory Wholesale Radio, Box 506, DeWitt, Arkansas. Phone: WHitney 6-2820.

WANTED: RAL with pwr, supply. Also double button mike, Sensitive Scintillator also desired. Send details. W6QV, 4532 Paulhan Ave., Los Angeles 41, Calif.

SELL: 15 KW pwr, plant, mounted on two wheel trailer, 220V, 60 cycle, w/ye connected generator, 4 cyl Jen. engine. Complete less battery. Gud cond. \$925. F.o.b. central Ohio points. L. R. Langley, W8DSX, 2713 West Harvard, Santa Ana, Calif.

SELL: SX-100; R-46B speaker; Globe Scout 680, factory wired, push-to-talk; D-104 mike. Best offer. K2CMF, 76 Glenview Rd., South Orange, N. J.

GOING Away to college and must sell Heath DX-100, in excellent physical and operating condx, \$170 or your best offer! Terafit CC-144 2M converter, 14-18 Mc. I.F., \$39.00, K2SYM, George Bucks, 14 Wantaugh Ave., Poughkeepsie, N. Y.

FOR Sale: SX-101A receiver, in like new condx, only 3 months old, \$300, Nathan Freund, 48-53 44th St., Woodside 1, L. I., N. Y. Tel ST 6-4365. Sry for price error in my last adv.

A-1 RECONDITIONED equipment. On approval. Trades. Terms. Hallcrafter \$40B \$69.00, SX-99 \$109.00, SX-100 \$199.00, HT-37 \$359.00, S85, SX-110, SX-111, SX-101A, HT-32, HT-32A, HT-33A; Collins 75A-1, 75A-2, 75A-3, 75A-4, KWM-1, 600L, \$299.00; KWS-1, Central 10A, \$79.00, 20A \$39.00, 600L \$299.00; Elmac PMR6 \$69.00, PMR-7 \$109.00, AF-67 \$109.00; Gonset G66B, G77A, G50, GSB-100, GSB-101; Hammariund HQ-100 \$129.00, HQ-110 \$179.00, HQ-129X, HQ-140X, HQ-140XA, HQ-150, HQ-160, HQ-170, HQ-180; Johnson Adventurer \$39.00, 6N2 \$99.00, Navigator \$99.00, Viking II \$79.00, Ranger \$179.00, Valiant \$279.00; National NC-98 \$99.00, HRC-50F \$199.00, NC-300 \$209.00, HRC-60 \$349.00, NC-183D, NC-303; Heath, Globe, RME other items. List free. Henry Radio, Butler, Mo.

FOR Sale: Viking KW w/desk; \$1100; (Sry, cannot ship KW); Viking audio amplifier, \$60; 75A-3, calibrator, product detector, vernier dial, \$325.00; HT32, \$400. W4ENH, 817-8th Ave. N.E., Hickory, N. C.

FOR Sale Or Trade: HT-33, 440 or will trade HT32A, HT33 and SX101A on KWI and 75A3, H. C. Stamate, Box 76, Leesburg, Ind.

F.O.B. 4218 Herkimer Place, Bronx 70, N. Y. (2) 4 x 250F (new) each \$25.00; 6 ft. relay rack, \$15.00; all components for rack-mounting, KW supply, \$30. All prices firm. WA2EET.

FOR Sale: Collins 75A-4, in excellent condx; 3 Kc filter, \$475. Shipping charges collect. R. Littler, 640 Snowhill, Springfield, Ohio. Tel. FAirfax 2-8722.

SELL: N-183D with spkr, \$225. Cash & carry deal. K2BEJ, 63 St. Johns Ave., Yonkers, N. Y.

FOR Sale: Valiant; \$375; HQ-170, \$325; CDR Ham-M rotor, \$100; Tele-Vue Tower, \$125; Gonset beam, \$95, or complete station including key, cables, \$1,000. W4HOI, P. J. Davis, 3511 Redding Rd., Chattanooga, Tenn.

HT-37, new last July, \$315.00; HR060T complete set coils 50 Kc to 30 Mc. with xtal calibrator and product detector, \$350; Globe H-Bander, \$70; Ameco 6, \$15; Ameco 2, \$20; Rca. pwr. supply \$15; Mosley TA 3, \$65; CDR AR2, \$20; 10 ft. Rohn top section, \$12.50; Telrex 8-el. 2M, \$7.00; 200 t. RG8U, \$12; whole package for \$875. All equipment in like-new condx. George Mowbray, Mt. Kisco 6-8507, WA2EFQ, 14 Washburn Rd., Mt. Kisco, N. Y.

KWM 2 for sale, \$950 w/ A.C. pwr. supply and spkr, late serial number; contact W1ZSZ, ED 5-0502, Weymouth, Mass. or W1EVX, WO 7-8874 at Ellsworth, Me.

SELL: Complete key watt station, Albert Woods, 348 Bryn Mawr Rd., New Hyde Park, N. Y. PI 6-6686.

HAMMARLUND HQ170 revr; 3 el. Triband beam, Howard Davis, 601 N.W. 16th Ave., Miami 35, Fla. Tel. FR 4-0000.

FOR Sale: Babbs 6-meter transmitter/converter with two transmitting and 3 receiving crystals. Used only 15 hours. \$600. Regency ATC1 converter, new, \$60.00. NC57 with Q multiplier, \$60. K8EAE, G-5465 Calkins Rd., Flint 4, Mich.

WANT, Need, must have; ML-203-B wind measuring equipment as used during WW-2. Top priority. Will take complete units or parts. Made by Ione Corp., N. K. Thompson, W1LWV, 99 Water St., Millinocket, Maine.

EICO #720 xmtr, \$75; Eico #730 mod-driver with cover, \$50.00; Heathkit VFO with pwr. supply, \$20; Heathkit Lab. scope, \$65; all in gud condx; everything for \$195. Robert Jehu, K1GLL, 20 Lois St., Danbury, Conn.

BARGAINS In new and used surplus beams, rotators, transmitters, etc. Send self-addressed envelope for complete lists and prices to W1OZ, Golden, 42 Sun Hill Lane, Newton Center, Mass.

SELLING Complete station. No time to operate. HQ-160 receiver and matching speaker; HT-37 transmitter and spare parts; Hy-Gain TH-4 beam; Ham-M rotator; fifty-foot supporting tower; Astatic 10-D mike and stand; Gotham V-80 vertical; Dow Key antenna relay; and about 400 feet of various cables. Receiver used seven months; all others, three months. Will show sales ticket to verify. Perfect condition. \$900 complete, or sell individually. All inquiries answered. Alfred Volkwitz, 414 East 59th St., Kansas City, Mo.

BARGAIN: HT30 and P & H 400, complete 400 watt SSB station. First offer of \$300. Call Adams 2-2544, Westfield, N. J. Pete, W2FDU, 59 Sandra Circle.

SELL: KW mod. PP 810, variable 2500v power supply, screen bias supply, fully metered, enclosed in 6 ft. rack cabinet. Will include parts for 813 final plus many spare parts. \$250. K9HXY, 1139 Jefferson, Shelbyville, Ind.

SELL Or trade, National VFO-62, New in factory-sealed carton. Convention prize. Best offer. K8BKF, 1168 Elbur, Lakewood 7, Ohio.

FOR Sale: 6MT T-craft trans., \$30; Heath balun, \$5, 200 unmarked Ceramicon, mixed values, \$1.00, K2LJJ.

SELL: CR5AC communications receiver with cabinet in exc. condx, used only 2 months, 550 Kc. to 30 Megs, Need money, \$30, Ron Munzert, W2V2LX, 73 Oakdale Ave., New Hartford, N. Y.

FOR Sale: SX-71, like new, in exc. condx, \$140. OSTs Aug. 1941 complete run to June 1948. Make offer, Lee Galc, W7IDT, Pocatello, Idaho.

COMPLETE Mobile rig for sale, AF-67, Gonset 12 converter, mike, 505C Ramer, Mosley 3-band antenna, Collins twin dynamos 440 V at 200 mill, and 250 V at 125 mill, changeover relays, cables, \$225 25 ft. aluminum tower, \$20.00, Seymour Kaftan, 63 E. 52 St., Brooklyn 3, N. Y., Call HY 3-5773.

GONSET 101 for sale, excellent condx. Cash and carry deal only. No shipping. Asking \$350. Larry Frank, WA2IAF, 698 West End Ave., N. Y. C. MO 2-3772.

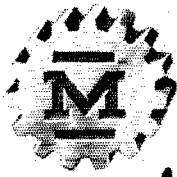
COLLEGE, Will sell Viking II and VFO, FW 2220; SX-101 MK III 3A, \$275, misc., v. gud condx. K0LZU, Box 333, Jesup, Iowa.

TRADE Or sell: FT-102 Federal transmitter 200 watts c.w.; complete mobile rig; Elmac AS4H transmitter, Sonar receiver, power supply and mike; BC614-B speech amplifier; BC modulation decks; 100THs and 304TLs tubes. Interested in SSB equipment, 4 x 5 press camera, power woodworking tools. W5FM, 229 Kenwood Ave., Baton Rouge, La.

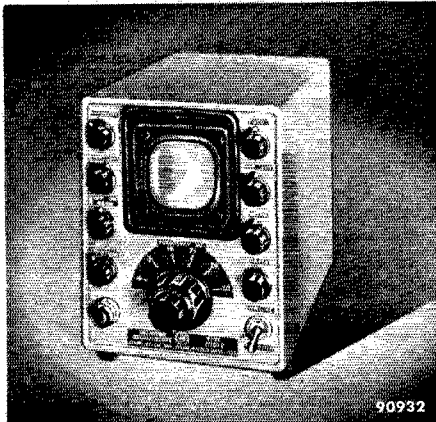
FOR Sale: NC-300 w/s and xtal calibrator, in mint condx, \$335 or best offer. W3YPL, 104 Johns Ave., Gettysburg, Penna.

S38D revr, Morrow 3 band converter, new 30 watt 6V & 110V PA system w/mobile and auditorium spkrs, phone top. Heathkit PC-1 12VDC to 110AC inverter, Minifone pocket recorder and accessories, New 95 ft. Pipestone crankup tower, 2500V and 1 1/2 amp. pwr. supply, Eico 5 scope, Superior AM sig. gen. G-143, V I K-V, Powerstat, 2-30 to 50 Mc. 120 watt line sv. FM xmtrs complete. Want 511 revr, Aircraft ADF revr & indicator & Mark II or Superhomer. W9DSV, Box 87, Webster, Wis.

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STEPHEN HERZOG (left), K5RMA, and George Mayo, K1LYE, check out marine radar equipment at a Raytheon Electronic Services Division service center in Boston, Mass.

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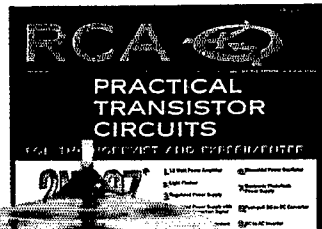
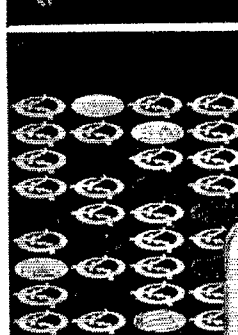
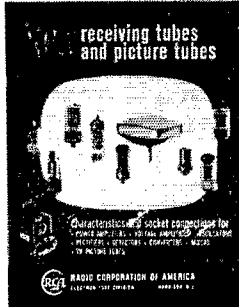
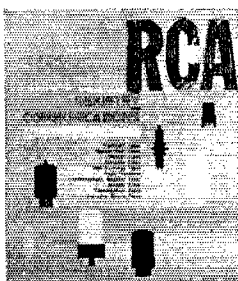
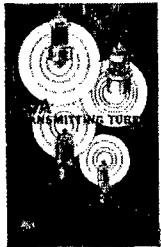
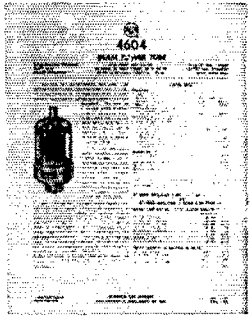
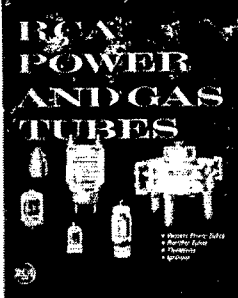
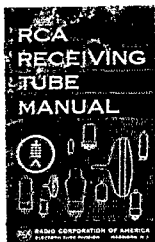


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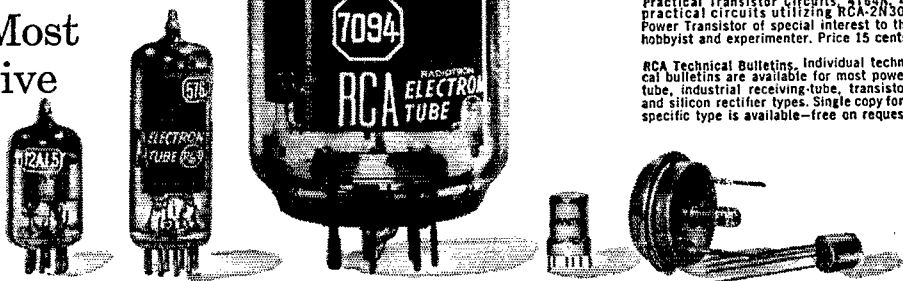
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